

Wind energy development as a potential spatial conflict in rural areas: a case study of the Kraśnik gmina

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Abstract. Given the growing importance of wind energy and the controversies surrounding it, this study aimed to analyse the attitudes of local communities towards potential spatial conflicts related to the location of wind farms in rural areas. A wind farm located in the rural Kraśnik gmina – commune (Poland) was selected as a case study. A research approach combining qualitative and quantitative methods was used, including document- and public-discourse analysis, field research and a questionnaire. The results indicate that, despite general public awareness of the importance of renewable energy, the level of detailed knowledge about its impact remains insufficient. Although no direct spatial conflicts of a legal or aesthetic nature were identified, the study revealed potential land-use conflicts, particularly in the context of residential and agricultural areas, which are a priority for residents and users of the municipality due to their significant impact on their quality of life and agricultural productivity.

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1. Introduction

In the face of a growing climate crisis, coupled with the need for energy security, the energy transition is becoming one of the most important challenges of the modern world. In this process, renewable sources such as wind energy play a fundamental role. Their inexhaustibility, economic viability and lower environmental impact make them an attractive alternative to traditional energy carriers (Tomaszewski & Sekściński, 2020). Poland, too, is dynamically developing this energy sector (WWEA, 2023, 2024). This development is happening through the implementation of national energy policy in line with EU standards (see e.g. Directive EU 2023/2413; *Polityka energetyczna Polski do 2040 r.*) and using its wind potential, including in areas with favourable conditions such as the coastal belt, the central-western part of the country and, partly, uplands (including the Lublin Upland) (Dygulska & Perlańska, 2015; Graczyk, 2021). These conditions translate into the location and number of wind installations in each province and the power they generate (Fig. 1).

The development of renewable energy, especially wind energy, is the subject of intensive research worldwide. The literature on this topic is extensive and addresses a wide range of issues related to the construction and operation of wind farms, from technical (see, e.g., Shikha et al., 2003; Dzik et al., 2005; Joselin Herbert et al., 2014; Szczerbowski & Rakowska, 2016) through economic (see, e.g., Blanco, 2009; Wasiuta, 2014; Babiarczyk, 2017; Milborrow, 2019; Kaczmarczyk et al., 2023) and social, including health (see, e.g., Pawlas et al., 2012; Songsore & Buzzelli, 2014; Badora, 2017; Westerlund, 2020; Graczyk, 2021; Bednarek-Szczepańska, 2023) to location-legal issues (see, e.g., Nadaï & Labussière, 2009; Felber & Stoeglehner, 2014; Sudra & Bida-Wawryniuk, 2018; Niewiadomski, 2022). Comprehensive analyses combining various of the above-mentioned perspectives can also be found in the literature (see, e.g., Surugiu & Paraschivoiu, 2000; Maćkowiak, 2003; Staliński, 2016; Msigwa et al., 2022).

The dynamic development of wind energy entails the need to designate new sites for this type of investment. These locations are the subject of numerous controversies and conflicts, not only in Poland, but

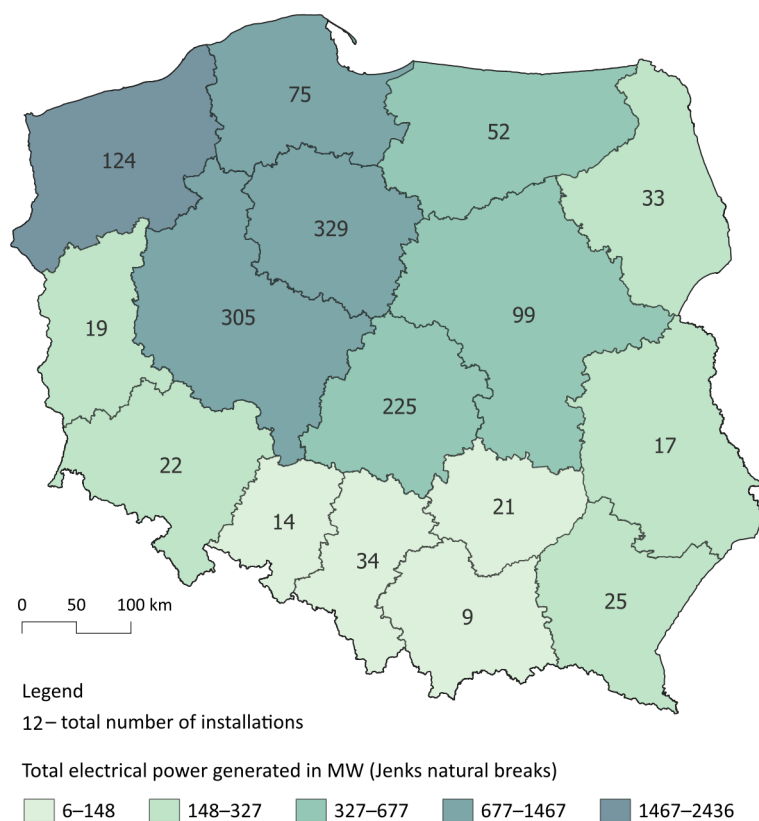


Fig. 1. Number and power of wind installations by voivodeship (as at 31 December 2023)

Source: Own elaboration based on data from the Energy Regulatory Office

also worldwide (Hindmarsh, 2010; Pepermans & Loots, 2013; Bednarek-Szczepańska, 2016; Bednarek-Szczepańska & Dmochowska-Dudek, 2016; Reusswig et al., 2016; Avila-Calero, 2017; Giordano et al., 2018; Graczyk, 2021). This high potential for conflict has made wind energy a frequent topic in research into public media discussions (Hindmarsh, 2014; Songsore & Buzzelli, 2014; Bednarek-Szczepańska, 2016, 2023; Bjärstig et al., 2022), on television (Gearhart et al., 2019) and on social media (Borch et al., 2020).

This topic exhibits a clear but paradoxical disparity between general public support for wind energy but strong resistance from some local communities (Bell et al., 2005; Łucki & Misiak, 2010; Read et al., 2013; Ministry of Climate and Environment, 2020) when introducing this type of investment into new areas. This phenomenon is related to a certain divergence between the global benefits of wind energy and the local costs borne by communities in the vicinity of power plants (Hall et al., 2013). Initially, researchers also interpreted this problem through the prism of the NIMBY (Not-In-My-BackYard) syndrome (Bednarek-Szczepańska, 2016; Bednarek-Szczepańska & Dmochowska-Dudek, 2015, 2016; Reusswig et al., 2016; Wontorczyk, 2016). However, as research has deepened, it has been increasingly emphasised that such an approach is a considerable simplification (Bell et al., 2005; Devine-Wright, 2005; Botetzagias et al., 2015; Petrova, 2016; Rand & Hoen, 2017; Boyle et al., 2019). Nevertheless, regardless of the approach adopted, the risk of spatial conflicts is inherent in this type of development. It therefore becomes crucial to understand the perspective of local communities. This makes it possible, on the one hand, to identify the main sources of conflict and, on the other hand, to effectively implement wind energy projects while minimising the accompanying conflicts. This allows a compromise to be reached between the need for renewable energy development and the interests of all stakeholders involved, with a particular focus on local communities.

Therefore, this article aims to analyse the opinions of local communities in the context of the occurrence of potential spatial conflicts arising from wind energy development in rural areas. This type of research: makes an important contribution to the development of knowledge on the interactions among technology, environment and society; allows for an understanding of the aforementioned divergence; can be used by policymakers, investors and other stakeholders to make more informed and effective decisions and, finally; can be used to develop effective strategies to mitigate conflicts and increase public acceptance of wind energy projects.

2. Study area

This case study focuses on the analysis of potential spatial conflicts related to wind energy development in rural areas. The study is based on the example of the village of Dąbrowa Bór, located in the rural commune of Kraśnik in the Lubelskie Voivodeship. As part of the research, a questionnaire survey was also carried out with the inhabitants of the entire commune of Kraśnik.

The development in question was chosen as a study area for several key reasons. Firstly, it is a relatively new investment, commissioned on 18 September 2024, making it an ideal subject for research into the early effects of this type of project. Although the study was carried out when the development had not yet been commissioned into use, it had nonetheless, visually and spatially, attained its finished form. This means that the relationship between the newly created infrastructure and its surroundings could be captured spatially and socially. Secondly, other forms of renewable energy sources (mainly private investment in solar and photovoltaic installations, and a small hydropower plant in Gościeradów commune) are present in the area in question and throughout Kraśnik County, so the wind farm in Dąbrowa Bór is an interesting example of the introduction of new wind technology to the area. Finally, the investment is located close to residential buildings and the Kraśnik Protected Landscape Area, which may exacerbate potential spatial conflict issues in the area.

The rural commune of Kraśnik is located in the south-western part of the Lubelskie voivodeship, in Kraśnik powiat (district). The seat of the commune is the town of Kraśnik, which does not physically belong to its territory. Physico-geographically, the commune is located on the Urzędowskie Hills, which are part of the Lublin Uplands (Solon et al., 2018). According to statistics from 2023, the commune had 16 *sołectwo* (villages), covered 105 square kilometres, had an average population density of 67 persons per square kilometre and was inhabited by 7,008 people (LDB CSO, 2024). The commune of Kraśnik has a typically agricultural character. Its functional and spatial structure is dominated by agricultural land, occupying just under 61% of the entire commune's area. The commune is also characterised by a relatively high forest cover of almost 31% of the commune's area. The remaining areas occupying just over 7% are built-up areas and transport areas. The rural commune of Kraśnik has significant natural and landscape values, which has resulted in almost two thirds of the commune being covered by some form of nature protection (*Uchwała Nr LIII/359/2023 Rady Gminy Kraśnik*). Due to the high forest cover and the significant proportion of areas

of high nature value, the potential for wind energy development in the commune is limited. Optimal conditions for the location of wind power plants in the Kraśnik commune are found in its northern part, east of the village of Dąbrowa Bór. This is where the area with the highest wind intensity is located (*Projekt założeń do planu zaopatrzenia w ciepło, energię elektryczną i paliwa gazowe gminy Kraśnik na lata 2014–2029*), and it is there that the analysed wind farm investment is located (Fig. 2).

3. Basic information about the investment

At the time of the study, the investment was in the construction phase but was already visually in its final form. As of 18 September 2024, it has been in the operational phase. The Swedish company OX2 was responsible for the construction of the farm, while Equitix was the main investor. The investment, with a total capacity of 24.15 MW, comprises seven wind turbines (each with a capacity of 3.45 MW). The farm, with a total height of 200 m, is expected to produce around 79 GWh of electricity per year, enough to meet the needs of almost 16,000 households (*Lądowa energetyka wiatrowa. Kraśnik 2025*). The wind farm

is located on agricultural land, close to the existing Budzyn GPZ substation, owned by the Lublin branch of PGE. It occupies a relatively small area – ~20 acres have been allocated for the construction of a single wind turbine. The technical infrastructure accompanying the investment is routed along roads, which does not create conflicts with the agricultural use of the adjacent arable land. With the commencement of construction of the entire project, the access road network to the surrounding fields within the entire project has also been improved. The appropriate profile, width and bearing capacity of the roads is expected to increase the accessibility of the fields for agricultural vehicles and improve the course of the agricultural work taking place there (*Więcej niż zielona energia dzięki farmie wiatrowej w Kraśniku, 2024*) (Fig. 3).

4. Research materials and methods

The research objective was realised in several stages. One of the first was to apply the desk research method, consisting of the compilation and analysis of secondary source materials. Data and strategic and planning documents published on the website of the relevant commune office and in its public information bulletin



Fig. 2. Location of the study area

Source: Own elaboration



Fig. 3. Photo documentation of a wind farm in the Kraśnik commune, 2024

Source: Own resources of J. Jarosz

(BIP) were analysed in detail. Particular attention was paid to the commune development strategy, the low-carbon economy plan, the local spatial development plan and the study of conditions and directions for spatial development, which form the basis for energy, development and spatial policy in the commune.

The next phase of the study was based on a field inventory carried out in June 2024. As part of this inventory, a site visit was carried out to gather basic information about the appearance of the wind farm and the development of its immediate surroundings. In addition, photographic documentation of the study area was prepared.

The use of a survey technique was crucial in order to collect primary data. The survey, like the field inventory, was conducted in June 2024. The questionnaire was addressed to the inhabitants of the Kraśnik commune and consisted of 13 questions, nine of which took the form of single-choice questions (including four questions of a metric nature). The remaining four were semi-open-ended multiple-choice questions with the possibility of free comment. The content of the questions covered issues such as public consultation, the level of information the respondents had about the planned construction of the wind farm, their attitude

towards the investment, the wind farm's impact on the landscape, the expected effects of the construction and the wind farm's impact on the environment. In order to cover the widest possible range of respondents and to increase the reliability of the results, two survey research techniques were used. Some questionnaires were completed electronically using the Google Forms platform, which is currently the predominant form of communication. Others were delivered to respondents in person, which in turn allowed the survey to be extended to older people who may have difficulties using the Internet or limited access to it. A total of 85 respondents took part in the survey. Once all responses were collected, they were reviewed, aggregated, interpreted and visualised in Microsoft Excel.

In addition, a detailed analysis of the public discourse on the investment under study was carried out using a variety of online sources. This included comments by Internet users under articles published on the websites of industry portals, local and regional media, and under posts on social networking sites. The extracted content from 2012–2024 was then classified according to their attitude towards the investment, distinguishing between supporting, neutral and opposing comments.

It should be emphasised that the analysis of the content of the surveys conducted among the residents of the Kraśnik commune and comments made by Internet users about the wind farm is an extremely important source of information that allows for a comprehensive assessment of the project, mainly from the perspective of the local community, i.e. the one that may be directly affected by the wind farm.

5. Research results

5.1. Examination of strategic and planning documents

The analysis of strategic and planning documents has shown that the project under study is characterised by vertical and horizontal compatibility. This means that it is in line with the applicable legal regulations at various levels of public administration, from international, through national, to communal. In this context, it should be emphasised that the investment is an implementation of the assumptions contained in the adopted energy policy at both national and international level, and the commune development strategy identified investment in the renewable energy sector as a key factor in local development. The location of the wind farm itself has been precisely defined in the current planning documents of the Kraśnik commune. The study of the conditions and directions of spatial development designated the areas intended for this type of investment, subject to detailed analyses to minimise the natural risks and the negative impact on the acoustic, landscape and natural environment. The document also set out detailed requirements for, among other things, a unified colour scheme, the use of modern technology, distance from residential buildings (min. 500 m) and forests (min. 200 m). It also allowed for the construction and extension of the internal road network to the individual wind farm facilities and the use of the remaining land for agricultural purposes (*Uchwała Nr LII/359/2023 Rady Gminy Kraśnik*). The local spatial development plan detailed the above-mentioned arrangements, specifying, among other things, the maximum power (4.5 MW) and height of a single wind turbine (215 m), the minimum biologically active area (5%) and allowing the location of medium and high voltage electrical stations (*Uchwała Nr XXXVIII/209/2014*).

It should be emphasised that analysing spatial conditions and potential legal conflicts related to the location of wind power plants requires consideration of both local and national regulations in force at a given time. The wind energy development in Poland was

significantly influenced by the Act of 20 May 2016 on investments in wind power plants (Dz.U. 2016 poz. 961), which introduced the so-called 10H rule. According to this rule, the minimum distance of a wind turbine from residential buildings and certain forms of nature conservation should be at least ten times its total height. The 2023 amendment to the Act (Dz.U. 2023 poz. 553) relaxed these requirements, allowing wind turbines to be located at no less than 700 m from residential buildings while maintaining the 10H rule about national parks and introducing a minimum distance of 500 m from nature reserves. Legislative work is currently (as of May 2025) underway on another amendment to further relax the siting requirements – including setting a minimum distance of 500 m from residential buildings, nature reserves and Natura 2000 sites, and 1,500 m from national parks (*Rządowy projekt ustawy o zmianie ustawy o inwestycjach w zakresie elektrowni wiatrowych oraz niektórych innych ustaw*).

In light of the provisions cited above, the investment in question is covered by the transitional regulation contained in Article 13(3) of the 2016 Act. This provision stipulates that building permit proceedings initiated before 16 July 2016 and not completed by that date shall be conducted according to the regulations in force at the time of initiation. As the application was submitted on 23 May 2016, the development was not subject to the 10H minimum distance but was carried out by the provisions of the local development plan. Consequently, the decision of the Kraśnik District Governor to approve the construction project and grant the building permit was issued on the basis of the regulations in force before the entry into force of the 2016 Act, without the application of the subsequent location restrictions. The project also received a decision on environmental conditions, which defined, among other things, the location, conditions of land use and environmental and cultural heritage protection measures. The documentation shows that the project is not located within the boundaries of legally protected areas, including Natura 2000, and will not significantly affect them. It was also concluded that the project does not pose a threat to human or animal health and will not cause degradation of the environment or exceed acceptable noise levels (*Decyzja 619/2019*).

Given the above, it should be concluded that the wind project implementation in the Kraśnik commune was carried out according to the applicable legal order and based on local planning documents. A comprehensive environmental impact assessment preceded it. All this means that no spatial conflict of a legal nature was created, and the project itself was not subject to restrictions under the “Distance Act”, either in its original or amended form.

5.2. Examination of Internet sources

The analysis of online sources carried out revealed diverse opinions on the wind farm. The sources analysed included mainly local material available on the Internet. In particular, the focus was on sources related to building a wind farm in Kraśnik, including posts on online forums, newspaper articles and other forms of social media contributions. To select sources, keywords related to windmills were used, such as the Polish equivalents of “windmills in Kraśnik”, “wind farms”, “wind energy”, “Kraśnik”, etc. A total of over 700 comments were analysed, of which just over 100 were classified as substantive. This means that they contained content relating directly to the issue at hand. They mainly included arguments supporting the commentator's position, concerns and doubts. Only these substantive comments were further analysed in terms of the attitudes of Internet users, classifying them as positive, negative and neutral opinions.

Following the analysis, there was a predominance of negative comments, in which Internet users expressed themselves in a blunt and even vulgar manner, pointing out the poor choice of location due to the low winds, the danger for animals and the problems with the subsequent disposal of elements of the entire installation. There were just under 60 such comments in total, accounting for 52.3% of all comments. It should be noted, however, that in addition to the numerous negative opinions, a number of positive positions were also expressed in relation to the investment in question. These mainly concerned the potential positive effects of the wind farm, concern for sustainable development and the future of the local residents, and assurances that the investment would not be a nuisance. Although they constituted a slightly smaller representation in all analysed comments – 39.4% of all opinions – the voices of supporters of the project were clearly present and worth noting. The last group distinguished – and the least numerous – was that of neutral comments. There were only nine of these, representing 8.3% of the total number of opinions analysed. It can be said that these opinions were relatively objective and saw both advantages and disadvantages of wind farms.

Table 1 shows examples of statements made by Internet users. All quotations have been anonymised and translated into English. Only the punctuation was corrected during the translation.

The analysis leads to the conclusion that the majority of commentators already have an opinion on the project in question and express themselves on the forum, representing their chosen side. This indicates a certain polarisation of positions among Internet users, with a slightly greater predominance of negative

opinions. It should be noted, however, that perhaps not all commentators were local people living in the Kraśnik commune. Among the commentators, there may have been people not directly affected by the investment itself, but who have an opinion on the subject and wanted to share it with other Internet users. Therefore, the results of the analysis should be treated with caution.

5.3. Survey research

In view of the above, it also seems that the opinions collected directly from the inhabitants of the Kraśnik commune are much more important. Already at first glance, the results are somewhat different from those presented above based on comments from Internet users. A total of 85 respondents took part in the survey. Of these, the majority, 65.9%, were women and the remaining 34.1% were men. All respondents resided in the territory of the Kraśnik commune, of which 12.9% were residents of Dąbrowa Bór, a village located near the wind farm under construction. The age structure of the respondents was very diverse. The largest group (43.5%) was between 25 and 45 years old. This was followed by those under 25 years of age (30.6%) and then those between 45 and 65 years of age (16.5%). The smallest percentage of respondents (9.4%) were people over 65 years of age. The educational structure of respondents was dominated by two groups: those with secondary education (45.9%) and those with higher education (43.5%). Far fewer respondents had vocational (9.4%) and primary (1.2%) education.

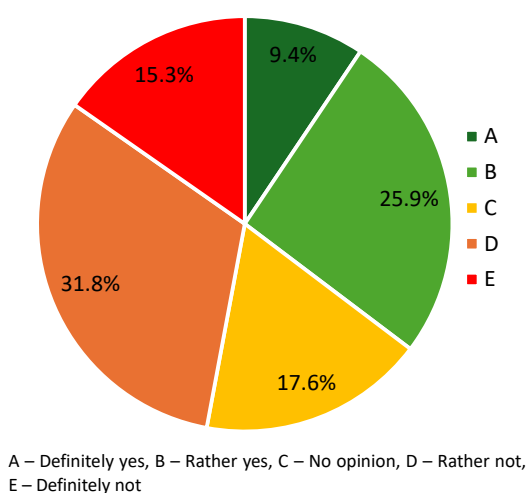
Analysis of the main content of the survey questionnaire showed that almost half of the respondents felt that they had not been adequately informed about the construction and operation of the farm (Fig. 4). The majority had also not heard about the public consultation on the issue and probably for this reason did not participate (Fig. 5).

The next two questions related to respondents' attitudes towards the wind farm before and after its construction. The detailed results of the survey (Table 2) show that the vast majority of respondents, 78.8%, retained their original opinion of the wind farm. This indicates an extremely strong stability of their opinion. For this group, despite the passage of time and the physical establishment of the wind farm, the views expressed towards the investment are deeply rooted and have not been altered even by operating in a new reality. The remaining 21.2% of the total number of respondents have changed their original opinion,

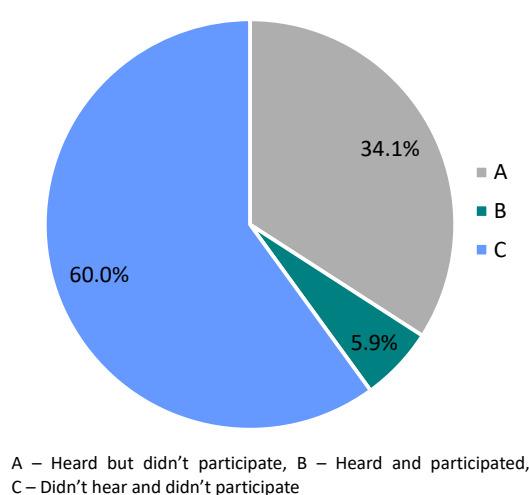
Table 1. Examples of Internet user statements on the wind farm in Kraśnik commune

Examples of negative opinions
'I don't see it turning out well. This investment in such a region is quite a risk.'
'Who needs it? Let them build in their backyard. Animals will be afraid of them, the chickens will stop laying eggs, the range in phones and T.V. antennas will break down. I hope a protest is getting ready, I will be there.'
'Birds are getting fewer and fewer – nature is dying, but who cares? Business is more important.'
'There is no eco in this. Materials difficult to recycle – fiberglass composite, oils, grease, bearings, brakes, and huge amounts of CO ₂ to produce this windmill. PV panels at least compensate for the energy used in their production.'
'This pseudo-green energy is 3x more expensive than conventional energy and 100x more environmentally damaging than a regular coal-fired power station.'
Examples of positive opinions
'Not far away, about 40 km from here, in the Zólkiewka commune, there are 13 windmills, and you have no idea how much profit the commune makes from them – and they are big. Besides, they have an agreement that the street lighting also comes from this source of energy, so don't write nonsense that the profit is only for the corporation ... Also, a power station with chimneys and smoke is a better view? congratulations to those who think so.'
'Still greener than coal. Plus, a Polish company is recycling those sinister shovels.'
'No one doubts that we need energy. Green, ecological energy is our future. We need to think long-term, about the future of our children, grandchildren. I support this investment.'
'For three years, there has been a windmill 850 m from my house. Neither I nor my family feel any inconvenience from it.'
'I am a supporter of producing energy in a human-friendly way. Taking care of the surrounding environment is our duty.'
Example of neutral opinions
'Every power generation technology has advantages and disadvantages.'
'So now we are waiting for climate changes in the region and more frequent droughts? RES [renewable energy sources] are not bad but if I am saying something wrong then please dispel my doubts.'

Source: Own elaboration based on comments posted on the Internet

**Fig. 4.** Distribution of answers to the question: "Do you feel that you adequately informed about the construction and functioning of the wind farm?"

Source: Own elaboration

**Fig. 5.** Distribution of answers to the question: "Did you hear about and participate in the public consultation on the construction of the wind farm?"

Source: Own elaboration

Table 2. Change in attitudes toward the wind farm (in %)

		Opinions after			Opinions before: Totals
		Positive	Neutral	Negative	
Opinions before	Positive	37.6%	2.3%	0.0%	39.9%
	Neutral	<u>14.1%</u>	31.8%	2.4%	48.3%
	Negative	<u>0.0%</u>	<u>2.4%</u>	9.4%	11.8%
Opinions after: Totals		51.7%	36.5%	11.8%	100.0%

Note: Bold indicates the cells showing the share of each opinion category that remained unchanged, underline indicates cells showing the share of each opinion category that shifted to a more positive opinion; italics indicate cells showing the share of each opinion category that shifted to a more negative opinion. Taking the first row as an example, 39.9% of respondents held a positive opinion before; breaking that group down, they comprise those who maintained that opinion (37.6% of respondents) and those who were positive before but neutral afterwards (2.3% of respondents); no respondents changed opinion from positive to negative.

including an increase in acceptance of the investment under consideration among 16.5% of respondents. This, in turn, indicates that direct experience of the existing power plant, including observing, learning and understanding its operation and analysing its potential impacts, may contribute to a change in attitude towards the investment as a whole. Overall, however, it is important to note the overwhelming predominance of positive opinions over negative opinions. This may indicate that respondents accept this type of investment, regardless of the stage of implementation.

The survey questionnaire also asked for an assessment of the aesthetics of the wind farm. The vast majority of respondents (65.9%) assessed the wind farm's impact on landscape aesthetics as positive. This indicates a relatively high acceptance of the visual aspect of this investment. Almost one in five respondents rated the impact of the wind farm on the landscape as neutral. This suggests that, for this group, the aesthetics of the farm are not a factor in their opinion. Despite general acceptance, one in ten respondents expressed a negative attitude towards the impact of wind turbines on the landscape. This group of people is likely to believe that wind farms disfigure the countryside.

The next question was aimed at identifying the areas that respondents believe are most affected by the wind farm. It should be noted that this question was considered in this study as one of the most important tools to identify potential spatial conflicts related to wind energy. It allowed to directly identify the areas that are perceived to be most vulnerable to the negative impacts of a wind farm. By knowing about these areas, it is possible to predict where certain concerns, objections and conflicts may arise among residents affected by the development. It should be noted that respondents were allowed to select up to three responses, with an average of two responses selected. These show that potential spatial conflict may occur

mainly between the wind farm and agricultural and residential areas, i.e. areas which, due to intensive use by the local community, have a significant impact on the quality of life of the residents and on the efficiency of agricultural production (Fig. 6).

The next questions referred to the respondents' perceptions of the potential consequences of the construction and operation of the wind farm. The first focused only on positive aspects, while the second included only negative aspects. As with the previous question, the answers obtained could signal the occurrence of potential spatial conflicts, especially in the case of a clear polarisation of opinions in answers of a dichotomous nature, e.g. "landscape diversity" vs. "landscape disturbance". Respondents were given the opportunity to select up to three answers for each of the questions presented, with the option to supplement these with their own suggestions as well.

Based on the analysis of the data, in terms of positive effects of the construction and operation of a wind farm, the dominance of visual and environmental aspects is noticeable (Fig. 7). Respondents very often point to environmental benefits, such as reduced carbon dioxide emissions and increased environmental awareness. This fact suggests that respondents perceive a link between wind energy and the fight against climate change. In addition to environmental benefits, economic benefits were relatively frequently indicated, mainly related to the possibility of additional income for owners of land on which wind turbines are located and reduced energy costs. It is noteworthy, however, that not all respondents share enthusiasm for the wind farm, as 16.5% of the total respondents did not perceive any positive effects associated with the operation of a wind farm in the commune.

The analysis of the indicated responses in the context of negative effects of the construction and operation of the wind farm in the Kraśnik commune showed that, although a relatively large proportion of people do not

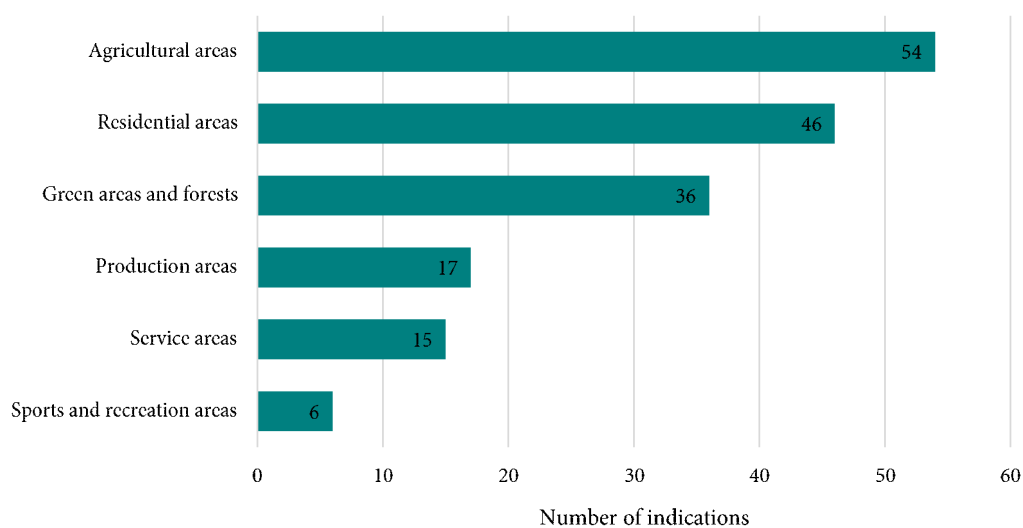


Fig. 6. Respondents' perception of the areas most affected by the wind farm

Source: Own elaboration

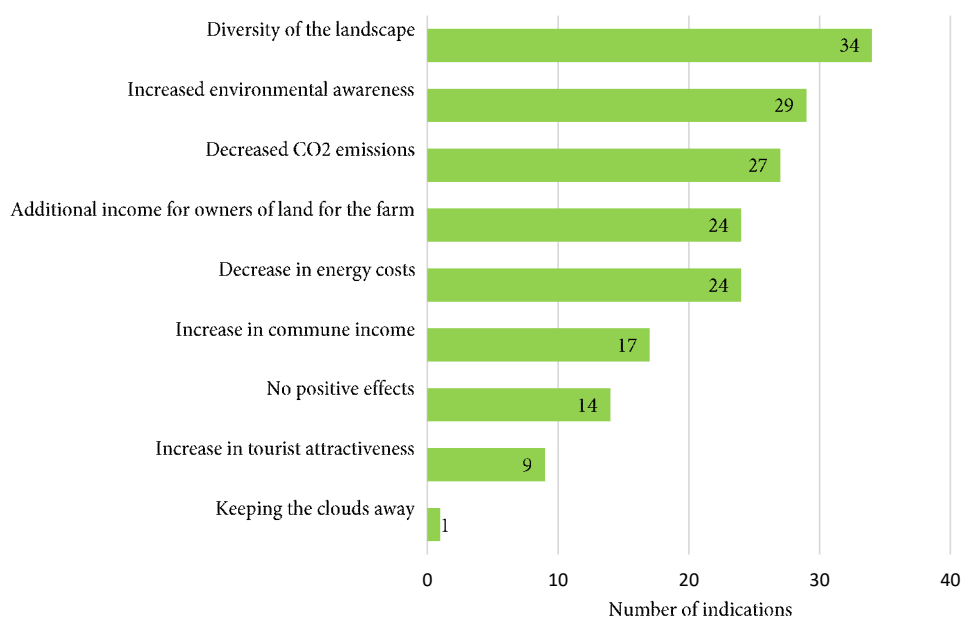


Fig. 7. Positive impacts of wind farm construction and functioning according to respondents

Source: Own elaboration

perceive negative effects of the wind farm, there are some concerns related to this investment (Fig. 8). Most concerns relate to the environmental impact of wind farms. Respondents in this case most often indicated a reduction in agricultural land and a threat to animals. Other important problems signalled by the respondents

were socio-economic aspects directly related to the quality of life of the residents, such as noise or reduction in the value of neighbouring properties. Among the responses, there were also isolated suggestions from respondents, such as problems with hens laying eggs or soil drying out. However, due to the very small

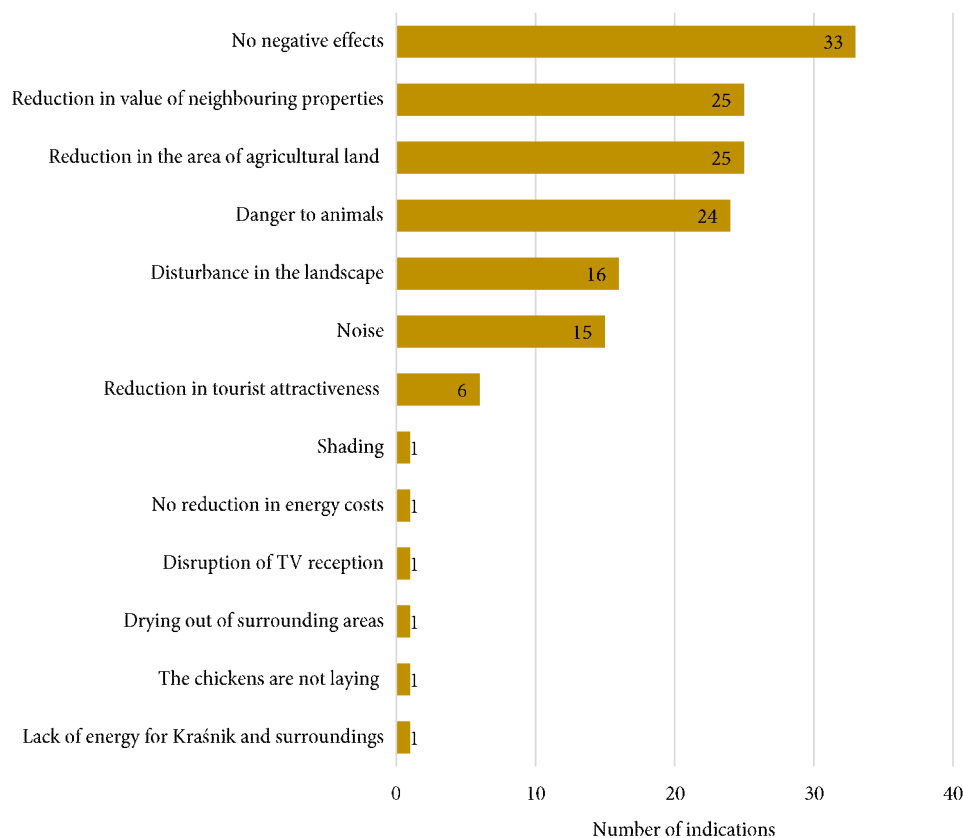


Fig. 8. Negative impacts of wind farm construction and functioning according to respondents

Source: Own elaboration

number of such responses, it can be assumed that the suggestions provided are unconfirmed, and some may even have a somewhat mythical character.

A detailed analysis of the dichotomous responses did not show a clear polarisation of opinions, with the exception of the visual aspect of the wind farms. Despite the presence of negative assessments regarding interference in the landscape, twice as many positive opinions were observed, indicating a general acceptance among respondents of the impact of wind farms on the surrounding landscape. In other areas, such clearly divergent assessments were not observed, but the economic aspect is particularly interesting. There is a relatively high level of agreement on the fact that there will be a reduction in the area of agricultural land, but respondents indicate that these losses can be compensated by additional income from leasing land for wind farms. In addition, an increase in the commune's income from tax revenues is expected (which should improve the quality of life of local communities), but on the other hand, concerns are raised about the potential decline in the value of real estate located in the immediate vicinity of the investment.

Finally, respondents were asked what actions should be taken in the future in relation to the construction and introduction of this type of development on new areas. The proposal to increase public participation in the decision-making process received the most votes (45 responses). The next most frequently mentioned expectations concerned regulating legal issues related to the location and operation of wind farms (31 responses) and increasing the distance between wind farms and residential buildings (29 responses). In addition, respondents also suggested introducing preferential energy tariffs for residents in areas directly adjacent to wind farms (1 response) and increasing the number of wind turbines (1 response).

6. Discussion and conclusions

In view of the growing importance of wind energy and the increasing conflicts surrounding its development, the aim of this article was to analyse the attitudes of local communities towards potential spatial conflicts resulting from the expansion of wind farms in rural

areas. The study presented here fits into the broader context of the social debate on the development of renewable energy sources, with a particular focus on the issue of spatial conflicts related to wind investments.

The analysis shows that wind farms are an important element of the energy transition and actions to combat climate change. This fact is confirmed by the relatively high level of public awareness of the topic in question, as well as a significant acceptance of pro-environmental solutions, which is also reflected in other studies conducted in Poland (Łucki & Misiak, 2010; Badora, 2017; Ministry of Climate and Environment, 2020). Nevertheless, the evaluation of the results indicates that the level of knowledge of the local community regarding both the benefits and potential risks associated with wind energy investments remains insufficient. Respondents clearly highlighted their dissatisfaction with the level of information provided on the planned investment. Consequently, they had to supplement their knowledge by relying on other, often unverified sources of information (*Farmy wiatrowe – badanie poziomu akceptacji społecznej* 2024), such as the press (Bednarek-Szczepańska, 2023) or social media, which, as pointed out by Borch et al. (2020), are powerful communication tools and can lead to the mobilisation of local resistance. This state of affairs may partly explain the predominance of negative opinions appearing on the Internet that were obtained during the research, compared to the opinions of the interviewed inhabitants of the Kraśnik commune. In light of the above, it should be emphasised that the obligation to provide reliable information about the planned investment rests primarily with the local authorities and the investor.

The data obtained also suggest that among the majority of respondents the perception of the wind farm did not change after its construction. Although the direct experience of the investment can influence individual attitudes, it did not have a significant impact on the overall public perception of this type of facility, which is in line with observations made in other cases (e.g., Badora, 2017; Windemer, 2023).

After the analysis of spatial conflicts related to the construction of wind farms, those with a legal background should be excluded, as investments of this type are built in accordance with the current legislation at all levels of public administration. Nor has any conflict on aesthetic grounds been identified. The introduction of wind turbines into rural areas is undoubtedly a significant intrusion into the landscape, which leads to the creation of a new visual dominant (Świdryńska et al., 2024). And although numerous studies indicate a link between the visual impact of turbines and concerns and social tensions (Devine-Wright, 2005; Johansson & Laike, 2007; Ellis et al.,

2009; Wolsink, 2011), the survey conducted in the rural commune of Kraśnik does not confirm this to be a determining factor for residents' opinions. Moreover, respondents assessed wind turbines as an element that enriches rather than disturbs the local landscape. On the other hand, a potential conflict was noted regarding the use of land on which wind farms are built and the land adjacent to them. Sites of this conflict may include the local community, local government bodies and investors. The potential conflict in this case is between the investment areas and the residential and agricultural areas, which are a priority for the residents and users of the commune due to their significant impact on their quality of life and on the efficiency of the agricultural production taking place there.

Finally, it should be added that social acceptance, expressed in the positive opinion and approval of the local community, is one of the key factors determining the success of wind farm investments and minimising the risk of conflict situations. This is also emphasised by Wasiuta (2014) and Stolińska (2014), who claim that the low level of public awareness and resistance of the local community can be a serious obstacle to the implementation of such projects. Therefore, it becomes important, as also emphasised by other researchers (Hindmarsh, 2010; Tomaszewski & Sekściński, 2020), to conduct extensive educational activities, support such initiatives at various spatial levels, provide residents with opportunities to actively participate in the decision-making process regarding the location and operation of wind farms, and build dialogue between investors, local authorities and the community. In addition, local communities expect that a comprehensive approach to the issue of wind power investments should be enriched by developing appropriate compensation mechanisms for communities adjacent to areas where wind farms are located. The aim of the above-mentioned activities should be to raise awareness of the benefits of investments in renewable energy sources and to address the doubts and fears of local residents, since concerns about new technologies or investments very often stem from a lack of knowledge and uncertainty about their potential effects (Owens, 2000; Chapman et al., 2013; Crichton et al., 2014; Graczyk, 2021; Dymek, 2024).

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