

Silesia wind farm II

Non-Technical Summary



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1. Short description of the project

The **Silesia II wind farm** project consists of four separate EIA projects: **Bąków 2B**, **Bąków 2C**, **Bąków 2D**, **Bąków 2E**.

Altiplano Sp. z o.o. plans to install a wind farm consisting of 17 wind turbines (WTGs) (**Bąków 2B**), 13 WTGs (**Bąków 2C**), 3 WTGs (**Bąków 2D**) and 12 WTGs (**Bąków 2E**) in the communes of Grodków, Opolskie Voivodeship. The power plants will be located between the villages of Bąków, Młodoszowice, Jutrznia and Kolnica (**Bąków 2B**), between the villages of Wojstów, Kolnica, Lubcz and Gnojna (**Bąków 2C**), the villages of Grodków, Wojstów and Gnojna (**Bąków 2D**) and the villages of Żarów, Stary Grodków and Nowa Wieś Mała (**Bąków 2E**) in the commune of Grodków, Opolskie Voivodeship. Maximum total height of the power plant: 200 m (comprising maximum tower height – 140 m and maximum rotor radius – 60 m); maximum rotor diameter: 120 m; zone below the rotor – not less than 60 m; maximum sound power of the turbines – limited in accordance with the recommendations of the acoustic analysis attached to the environmental impact report for the project.

2. Legal basis and background

Environmental Impact Assessment (EIA) is governed by a legal framework designed to ensure that environmental considerations

are integrated into project planning and decision-making processes. The primary legislative instrument is *the Act of 3 October 2008 on the Provision of Information on the Environment and Environmental Protection, Public Participation in Environmental Protection and Environmental Impact Assessments*. This act outlines the procedures for conducting EIAs, ensuring public participation, and providing access to environmental information. Additionally, the Regulation of the Council of Ministers of 9 November 2010 *on projects likely to have a major environmental impact* specifies the types of projects requiring an EIA, categorizing them based on their potential environmental impact.

An EIA report was completed for wind farm project under the name *“Bąków 2B wind farm with auxiliary infrastructure in the commune of Grodków, Opolskie Voivodeship”*, planned to be implemented in the area of the villages of Młodoszowice, Bąków and Kolnica in the commune of Grodków, district of Brześć, Opolskie Voivodeship. After the assessment of the environmental impact of the project, Regional Director for Environmental Protection in Opole – decision of 2 March 2012, ref. no. 19 03 12 P (GK.III 7625/40/B/20/10/11/12), agreeing the conditions for the implementation of the project (**Bąków 2B**).

An EIA report was completed for wind farm project under the name *“Bąków 2C wind farm with auxiliary infrastructure in the commune of Grodków, Opolskie Voivodeship”*, planned to be implemented in the area of the villages of Wojstów, Rolnica, Lubcz and Gnojna in the commune of Grodków, the district of Brześć, the Opolskie Voivodeship. After the assessment of the environmental impact of the project, Regional Director for Environmental Protection in Opole – decision of 2 March 2012, ref. no. 32 03 12 P (GK.III 7625/40/C/20/10/11/12), agreeing the conditions for the implementation of the project (**Bąków 2C**).

An EIA report was completed for wind farm project under the name *“Bąków 2D wind farm with auxiliary infrastructure in the commune of Grodków, Opolskie Voivodeship”*, planned to be implemented in the area of the villages of Grodków, Lubcz and Gnojna, in the commune of Grodków, district of Brześć, Opolskie Voivodeship. After the assessment of the environmental impact of the project, Regional Director for Environmental Protection in Opole – decision of 2 March 2012, ref. no. 30 03 12 P (GK.III 7625/40/D/20/10/11/12), agreeing the conditions for the implementation of the project (**Bąków 2D**).

An EIA report was completed for wind farm project under the name *“Bąków 2E wind farm with auxiliary infrastructure in the*

commune of Grodków, Opolskie Voivodeship”, planned to be implemented in the area between the villages of Żarów, Stary Grodków and Nowa Wieś Mała, in the commune of Grodków, Opolskie Voivodeship. After the assessment of the environmental impact of the project, Regional Director for Environmental Protection in Opole – decision of 15 February 2012, ref. no. 19 02 12 P (WOOS.4210.1.2011.IOC.14), agreeing the conditions for the implementation of the project (**Bąków 2E**).

3. Site location and description

The wind farm is planned in the area of the villages of Młodoszowice, Bąków and Kolnica in the commune of Grodków, district of Brześć, Opolskie Voivodeship (**Bąków 2B**), in the area of the villages of Wojstów, Rolnica, Lubcz and Gnojna in the commune of Grodków, the district of Brześć, the Opolskie Voivodeship (**Bąków 2C**), in the area of the villages of Grodków, Lubcz and Gnojna, in the commune of Grodków, district of Brześć, Opolskie Voivodeship (**Bąków 2D**), in the area between the villages of Żarów, Stary Grodków and Nowa Wieś Mała, in the commune of Grodków, Opolskie Voivodeship (**Bąków 2E**).

Internal connection infrastructure in the form of medium voltage (MV) power cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be connected to the external MV/HV “Bąków” substation (Bąków 2C), belonging to the designed wind farm (**Bąków 2C**) (**Bąków 2B**, **2D**, **2E**).

Internal connection infrastructure in the form of 30 kV power cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be connected to the internal substation (**Bąków 2C**).

Internal connection infrastructure, in the form of power 30 kV cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be then connected to an external substation (not being part of the Bąków 2B farm) (**Bąków 2B**) / (not being part of the Bąków 2D farm) (**Bąków 2D**). In the form of power 30 kV cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be then connected to an external substation (not being part of the Bąków 2E farm) (**Bąków 2E**).

4. Description of the planned activity

The total area of land on which the power plants will be set up is approximately 860 ha (**Bąków 2B**), 170 ha (**Bąków 2C**), 45 ha (**Bąków 2D**) and 350 ha (**Bąków 2E**). The average size of the plot of land allocated for a single power plant is only about 0.3 – 0.4 ha.

Type of the project: the planned investment aims to generate electricity from a renewable source that is wind.

The scope of the **Bąków 2B** project will consist of:

- up to 17 wind power plants;
- internal connection infrastructure, in the form of power 30 kV cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be then connected to an external substation (not being part of the Bąków 2B farm)
- access roads to the power plant, manoeuvring, assembly and storage yards,
- construction facilities.

Parameters of the wind power plants:

- maximum total height of the power plant: 200 m,
- maximum height of the tower: 140 m,
- maximum rotor diameter: 120 m,
- maximum sound power of the individual turbines – 106.0 dB(A), except for the EW 11 turbine, whose maximum sound power is 104.0 dB(A) and the EW 13 turbine, whose maximum sound power is 105.0 dB(A).

The power plants will be located in the area of the villages of Młodoszowice, Bąków, Jutrzyzna and Kolnica, in the commune of Grodków, Opolskie Voivodeship, on the following plots of land:

Designation of the power plant	Plot no.	Surveying section
EW 10	17/1	Bąków
EW 11	21/1	Bąków
EW 12	581/2	Młodoszowice
EW 13	716	Młodoszowice
EW 14	17/1	Bąków
EW 15	13/1	Bąków
EW 16	21/1	Bąków
EW 17	581/2	Młodoszowice

EW 18	17/1	Bąków
EW 20	584/2	Młodoszowice
EW 21	581/2	Młodoszowice
EW 23	439	Kolnica
EW 25	431	Kolnica
EW 26	438	Kolnica
EW 27	427	Kolnica
EW 30	427	Kolnica
EW 40	394	Kolnica

The scope of the **Bąków 2C** project will consist of:

- up to 13 wind power plants;
- internal connection infrastructure in the form of 30 kV power cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be connected to the internal substation;
- the MV/HV "Bąków" substation;
- access roads to the power plant, manoeuvring, assembly and storage yards,
- construction facilities.

Parameters of the wind power plants:

- maximum total height of the power plant: 200 m,
- maximum height of the tower: 140 m,
- maximum rotor diameter: 120 m,
- maximum sound power of each turbine: 106 dB(A).

The power plants will be located in the area of the villages of Wojsław, Kolnica, Lubcz and Gnojna, in the commune of Grodków, Opolskie Voivodeship, on the following plots of land:

Designation of the power plant	Plot no.	Surveying section
EW 33	206/2	Kolnica
EW 34	200/1	Kolnica
EW 35	197/1	Kolnica
EW 36	193	Kolnica
EW 37	199/1	Kolnica
EW 38	217/1	Wojsław
EW 44	31	Wojsław
EW 45	232	Wojsław
EW 46	66/1	Wojsław



EW 47	70	Wojstów
EW 51	1	Lubcz
EW 53	40	Lubcz
EW 54	45	Lubcz

The scope of the **Bąków 2D** project will consist of:

- up to 3 wind power plants,
- internal connection infrastructure, in the form of power 30 kV cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be then connected to an external substation (not being part of the Bąków 2D farm),
- access roads to the power plant, manoeuvring, assembly and storage yards,
- construction facilities.

Parameters of the wind power plants:

- maximum total height of the power plant: 200 m,
- maximum height of the tower: 140 m,
- maximum rotor diameter: 120 m,
- maximum sound power of each turbine: 106 dB(A).

The power plants will be located in the area of the villages of Grodków, Lubcz and Gnojna, in the commune of Grodków, Opolskie Voivodeship, on the following plots of land:

Designation of the power plant	Plot no.	Surveying section
EW 56	107/1	Lubcz
EW 59	174/3	Lubcz
EW 63	285/1	Gnojna

The scope of the **Bąków 2E** project will consist of:

- up to 12 wind power plants,
- internal connection infrastructure, in the form of power 30 kV cable lines and telecommunication lines (optical fibres), connecting individual power plants into cable circuits, which will be then connected to an external substation (not being part of the Bąków 2E farm)
- access roads to the power plant, manoeuvring, assembly and storage yards.

Parameters of the wind power plants:

- maximum power of each turbine up to 4 MW,

- maximum total height of the power plant: up to 200 m,
- maximum tower height: up to 140 m,
- maximum rotor radius: up to 60 m,
- maximum sound power of each turbine: 106 dB(A).

The power plants will be located between the villages of Żarów, Stary Grodków and Nowa Wieś Mała, in the commune of Grodków, Opolskie Voivodeship, on the following plots of land:

Designation of the power plant	Plot no.	Surveying section
EW 68	176/12	Nowa Wieś Mała;
EW 69	176/12	Nowa Wieś Mała;
EW 70	77	Żarów
EW 71	176/12	Nowa Wieś Mała;
EW 73	134	Żarów
EW 74	176/12	Nowa Wieś Mała;
EW 75	176/12	Nowa Wieś Mała;
EW 76	94	Żarów
EW 77	176/12	Nowa Wieś Mała;
EW 78	28/1	Żarów
EW 79	34/1	Żarów
EW 80	34/1	Żarów

The tower of each power plant will be a steel or concrete tubular (conical) structure, consisting of several or a dozen segments (depending on the model). The diameter of the base of the tower will be approximately 4 – 6 m, while the diameter of the top will be approximately 3 – 4 m. At the top of each tower there will be a rotating nacelle that positions itself with a rotor depending on the wind direction. The propellers are three blades made of glass fibre reinforced plastic.

The power plants will be founded on footings or piled foundations. In order to ensure that the electrical and technical connections are located above the expected level of any flood water, the foundations may be placed on artificially excavated ground elevations of up to 3 m above sea level.

There are plans to construct medium-voltage underground (cable) power lines connecting individual wind turbines with an external substation (not being part of the farm) and underground telecommunication lines are planned (**Bąków 2B**, **Bąków 2D**, **Bąków 2E**). Underground (cable) medium-voltage power lines connecting individual wind turbines to the internal 30/110 kV

substation and underground telecommunication lines are planned (**Bąków 2C**).

In addition, there are plans to build roads to allow access to the power station through the fields and to reconstruct the existing roads to allow the transport of the finished components from which the power stations will be assembled.

For the duration of construction work, the access roads to the power stations will end with paved assembly yards. Once construction is complete, only small manoeuvring yards will be left at the power plant to be used by power plant maintenance crews.

In the immediate vicinity of the assembly yards, storage yards and construction facilities will be located. They will be temporarily paved. Building materials for the construction of the power plant foundations, structure components and construction machinery and equipment will be stored there. There will be also welfare units, tool containers and portable toilets.

For the Silesia I wind park is planning to build one internal MV/HV “Bąków” substation, which will be belonging to Bąków 2C wind farm.

Wind power plants will convert the kinetic energy of the wind into electrical energy as a result of the production process. The turbine of the wind plant will generate electricity with a voltage of approximately 400 – 700 V, which will be then increased by the power plant transformer. The generated electricity will be transmitted via underground MV cable lines to the internal MV/110kV transformer station (transformer/switching station). Here, the transmitted energy will be transformed to a voltage level of 110 kV and sent via 110 kV power lines to the substation owned by the grid operator.

Wind turbines are closed and unmanned unit, so there is no need to install sanitary facilities or build staff facilities at the farm.

The operation of the power plants will be supervised remotely, via fibre optic cables to be routed from each plant.

5. Summary of the impacts and mitigation measures

5.1 Physical pollution (noise and shading)

Should be done the post-execution analysis of the impact of the project on the state of the acoustic climate in areas legally

protected against noise. The analysis should include the results of environmental noise measurements from the operation of the wind farm, carried out within 6 months of the commissioning of the facility, at three points with coordinates in the state 1992 system, i.e.:

Bakow 2B

x = 323 930, y = 379 590, Bąków section,
x = 323 550, y = 382 180, Młodoszowice section,
x = 322 050, y = 382 171, Kolnica section,

Bakow 2C

x = 321 460, y = 382 932, Kolnica section,
x = 319 290, y = 383 900, Wojsław section,
x = 318 100, y = 383 260, Lubcz section,

Bakow 2D

x = 317 750, y = 383 160, Lubcz section,
x = 318 480, y = 384 220, Wojsław section.

Bakow 2E

x = 311 730, y = 386 130, Old Grodków section,
x = 311 850, y = 386 240, Stary Grodków section,
x = 312 970, y = 386 100, Nowa Wieś Mała section,
x = 311 810, y = 383 720, Nowa Wieś Mała section.

or at points where noise standards are suspected to be exceeded.

In the event that noise standards are exceeded in protected areas by any of the turbines, the turbine must be shut down immediately. The re-activation of the turbine will be possible once the causes of the noise standards being exceeded have been removed and the relevant noise studies have been carried out (Bakow 2B, 2C, 2D).

The analysis in the aforementioned scope should be submitted to the Mayor of Grodków as the competent authority to issue a decision on environmental conditions and to the Regional Director for Environmental Protection in Opole within 9 months from the date of commissioning the facility (Bakow 2B, 2C, 2D, 2E).

The source of negative acoustic impact at the stage of construction works will be the operation of heavy construction equipment (wheel excavators, loaders, bulldozers), in particular during the construction of foundations and site levelling. In addition, sound intensity will increase in the vicinity of the routes of vehicles transporting construction materials. Taking into account the transient nature of the project execution phase and the fact that the construction and assembly works will take place mainly during daytime, it should be considered that this stage will not

cause permanent negative changes in the environment and will not result in exceeding the permissible levels of noise in the environment (Bakow 2B, 2C, 2D, 2E).

There is no significant impact of electromagnetic fields during the construction and installation stages of apparatus, equipment and installations.

During the construction stage, moderate impacts on human health and life are expected (noise, air pollution, risks associated with increased traffic). Elimination of these hazards requires the appropriate organisation of works, marking of work areas, as well as compliance with health and safety rules and road regulations (Bakow 2B, 2C, 2D);

The operation of the wind farm will cause constant emissions of electromagnetic fields and radiation. However, its impact will be negligible and will not exceed the applicable standards.

The operation of the wind farm will result in constant noise

emissions to the environment. Noise generated by the wind turbines will mainly come from the movement of rotor blades (aerodynamic) and, to a lesser extent, from the operation of the generator. The acoustic impact of the project will be long-term and related to the duration of operation of the wind power plant. However, the noise generated by the wind farm will not exceed the applicable standards, provided that the parameters of the power plant specified in the conclusion of this decision, in particular the acceptable sound power of individual turbines, are maintained.

The operation of the wind farm will not have a significant negative impact on living conditions and human health. Painting the tower wings with matt paints will prevent the effect of light reflections that could be troublesome for observers, and the distance kept from buildings will minimise the effect of shadow flicker. The most onerous impact of the wind farm is noise emission, which, however, will not exceed the applicable standards (Bakow 2B, 2C, 2D, 2E).



Mitigation measures

Execution phase of the project: –

Operation phase:

- To produce wind energy use up to seventeen wind turbines with a capacity of up to 4 MW and a sound power level of no more than 106 dB(A) each, with the exception of the EW 11 turbine, which has a maximum sound power level of 104.0 dB(1) and the EW 13 turbine, which has a maximum sound power level of 105.0 dB(A) (Bakow 2B, 2C, 2D, 2E);
- Avoid illumination of the power station with white light and flashing light, with the proviso that this does not apply to lighting resulting from air traffic safety regulations (Bakow 2B, 2C, 2D, 2E);
- Illuminate turbines with low-frequency flashing light (Bakow 2C, 2D, 2E);
- Before the wind farm is put into operation, as-built measurements of the environmental noise level in the nearest protected areas should be carried out under extremely unfavourable conditions, i.e. at the maximum sound power of the individual turbines specified in this decision, which has been declared by the Investor as the limit for the power of the turbines that have the greatest impact on the environmental noise level being exceeded in the nearest protected areas (Bakow 2B, 2C, 2D);
- A report on the periodic technical controls of the individual turbines must be submitted to the Mayor of Grodków each time (Bakow 2B, 2C, 2D);
- Apply the shutdown (rotor stopping) of the EW68, EW69, EW71, EW74, EW75 and EW77 turbines in the period from 1 August to 31 August, from 7:30 OM to 5:30 AM, with no rain and wind speeds below 6 m/s. The periodic shutdowns may be abandoned if the post-execution monitoring recommended in point V.2. indicates low bat activity in the vicinity of the above-mentioned turbines (Bakow 2E).

5.2 Biodiversity

Post-execution analysis regarding the impact of the project on birdlife. The purpose of the post-execution analysis is to determine the impact of the wind farm on birdlife. In the absence of legal norms concerning the manner and scope of this assessment, it is reasonable to perform it in accordance with the methodology

described in the guidelines for the assessment of the impact of wind power plants on birds, applicable at the moment of commissioning the project. Such monitoring should be commenced within the first 12 months of operation, conducted for at least 3 seasons, within the first 5 years from the start-up of the investment and its results along with the analysis should be submitted to the authority issuing the decision on environmental conditions and to the Regional Director for Environmental Protection in Opole by 31 January of each year following the year in which one of the three full cycles of observations was completed.

Post-execution analysis of the impact of the project on chiroptero fauna. The purpose of the post-execution analysis is to determine the impact of the wind farm on chiroptero fauna. In the absence of legal norms concerning the manner and scope of this assessment, it is reasonable to perform it in accordance with the methodology described in the guidelines for the assessment of the impact of wind power plants on bats, applicable at the moment of commissioning the project. The monitoring in this respect should be commenced within the first 12 months of operation, conducted at least for three seasons, within the first five years from the start-up of the investment, with studies being obligatory for the first two years, while the third season of studies may be conducted in the third, fourth or fifth year of the farm's operation. The results of the studies along with their analysis should be submitted to the authority issuing the decision on environmental conditions and the Regional Director for Environmental Protection in Opole by 31 January of each year following the year in which one of the three seasons of observations was completed.

Based on the natural analyses carried out in the report, it has been concluded that the impact of the project on the natural elements of the environment at the construction stage may consist of:

- the direct destruction of vegetation (mainly field crops) in the area where the construction of the power plant, roads, assembly yards and cables is planned (which is also associated with the destruction of breeding, resting or feeding grounds of local animal species);
- animals being disturbed due to increased vehicle traffic, noise and dust,
- the drainage of nearby areas as a result of excavations for the foundations and cable trenches
- the possibility of small animals falling into the foundation pits and cable trenches.

However, the vegetation will be restored after the construction is complete (within a few months), with the exception of the areas directly occupied by the power plants and roads.

Animals will be disturbed only for a short term and they should return to their breeding grounds, resting sites or feeding areas after the construction is complete.

Small animals should be prevented from falling into cable trenches and foundation trenches by immediately backfilling such trenches or covering them with concrete. Construction workers should be required to inspect excavations and, if any animals are identified, to release them with due care. During the construction stage, the project is not expected to have a significant negative impact on the natural elements of the environment, including the integrity, coherence and subject of protection of Natura 2000 areas.

According to the nature studies attached to the environmental impact report, the planned wind farm may cause impacts on some species of birds and bats. However, these impacts will not be significant, provided that the minimising and mitigating measures indicated in the conclusion of this decision are applied (Bakow 2B, 2C, 2D, 2E).

The time limit indicated for the removal of trees and shrubs covers the period when protected species of birds nesting in the trees are not breeding. The following species have been identified as breeding in the area in question during the breeding season: Eurasian tree sparrow, starling, bunting, Eurasian blackcap, buzzard, linnet, red-backed shrike, magpie, crow, chiff-chaff and Eurasian collared dove. The recommendation that an ornithological survey be carried out in the event of nesting on trees and shrubs to be felled in order to avoid damage to the breeding grounds of protected species of the above-mentioned birds.

The time limit for removal of the ground cover indicated the period during which protected bird species nesting on the ground or in herbaceous vegetation do not breed. Lark, yellow wagtail, whinchat, marsh warbler, corn bunting, stonechat, common whitethroat and Montagu's harrier have all been recorded on the site during the breeding season. The recommendation to carry out an ornithological survey in the event of nesting of protected bird species in the area intended for the removal of soil cover is to avoid destruction of the breeding grounds of the protected species of the aforementioned birds.

Migration routes directing the movement of bats towards wind turbines should not be created. Open space acts as a barrier to reduce bat mortality caused by these facilities.

White light illumination may disorient passing birds and direct their movements towards the wind turbines and lead to a concentration of insects in the vicinity of the operating turbines. Significant numbers of insects may in turn attract feeding bats. Avoiding lighting other than that prescribed by air traffic safety regulations is a measure to minimise the mortality of birds, bats and insects, which may include protected species.

The low frequency of light flashes illuminating the turbines reduces the possibility of passing birds getting disoriented. This condition is intended to reduce the risk of birds colliding with the power plant (Bakow 2E).

Mitigation measures

Execution phase of the project:

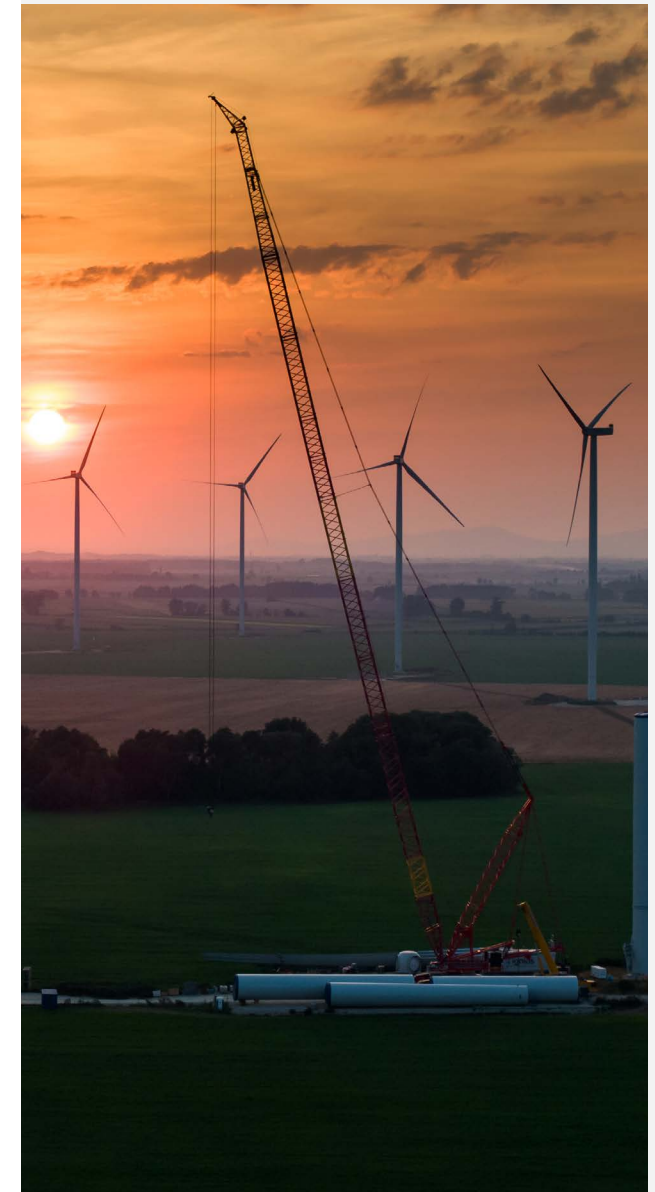
- The felling of trees and shrubs between 1 March and 30 September may only be carried out after an ornithological survey has first established that no protected bird species nest in the trees and shrubs to be removed (Bakow 2B, 2C, 2D, 2E).

Operation phase:

- On the plots of land where wind turbines will be installed, carry out maintenance works (mainly mowing) during the non-breeding season (Bakow 2B);
- If the analysis suggests that the identified mortality of birds has a significant negative impact on local or migrating populations, it is necessary to apply, as a minimising measure, the shutdown of the turbines causing mortality (rotor stopping) during those periods of the year (specified in the post-execution analysis by a range of daily dates) and times of the day (specified by hours) when there is the highest risk of collision with a turbine of the species for which the analysis shows such a risk. Other measures should also be applied to minimise the impact of the wind turbines on birdlife, the necessity of which is suggested by the findings of the analysis;
- If the analysis suggests that the identified mortality of bats has a negative or potentially negative impact on local or migrating populations, it is necessary to apply, as a minimising measure, the shutdown of the turbines (rotor stopping) at wind speeds below 6 m/s during those periods of the year (specified in the post-execution analysis by a range of daily dates) and times of the day (specified by hours) when there is the highest risk of collisions of bats with the wind power plant. Other

measures should also be applied to minimise the impact of the wind turbines on chiroptero fauna, the necessity of which is suggested by the findings of the analysis (Bakow 2B, 2C, 2D, 2E);

- Pre-development monitoring of the chiroptero fauna on the site has shown increased bat activity in the future locations of the following wind turbines: EW68, EW69, EW71, EW74, EW75 and EW77 in August. In view of the above, point II.2.2.9. of this decision imposes an obligation to periodically shut down the above turbines, i.e.: in the period from 1 August to 31 August, from 7.30 PM to 5.30 AM, with no rain and at wind speeds below 6m/sec.
- The use of matt paints will prevent sun reflections blinding passing birds and thus make it easier for them to see and avoid the working turbines, reducing the risk of collisions.
- The recommendation to carry out a post-execution analysis is related to the identified presence in the area of a number of protected bird and bat species, including species particularly vulnerable to collisions with the structural elements of wind turbines and pressure shock, i.e. barotrauma.
- The enclosed report also analyses the cumulative impact on birds and bats of the individual farms. It is demonstrated that there is no significant negative impact on birds and bats, as maintaining the distance between the locations of the individual wind turbines of about 500 m and the existence of several kilometres of free space between the clusters of power plants will allow the existence of free flight corridors for the species possibly appearing in the future which are afraid of the wind turbines;
- The recommendation to shut down the turbines (rotor stopping) is based on the need to minimise the negative impact on birdlife and chiroptero fauna that may be demonstrated during the post-execution analysis. The use of such solutions is recommended by the European Commission in guidelines published in 2010 (European Commission. 2010. Guidance Document: Wind energy developments and Natura 2000), as one of the primary ways to minimise the impact of a wind farm on bats and birds. The wind speed at which the turbine should be shut down periodically has been determined during the studies referred to in the above-mentioned European Commission guidelines. According to these studies, wind speeds of less than 6 m/s lead to more than 80 per cent of bat death events caused by power plants. In addition, in order



to confirm the environmental noise levels in the protected areas obtained on the basis of the calculations performed in the Report, an obligation was imposed to perform a post-execution analysis regarding the impact of the investment on the acoustic climate (Bakow 2E).

5.3 Protected areas and areas of high ecological value

During the construction stage, the project is not expected to have a significant negative impact on the natural elements of the environment, including the integrity, coherence and subject of protection of Natura 2000 areas.

5.4 Soil pollution and erosion

The impact will be mainly due to earthworks to prepare the area for the implementation of the investment.

It is concluded that the construction stage of the wind turbine will not result in significant changes to the soil and water environment. It is assessed that, with the proper storage of construction materials, proper location and securing of the construction facilities, the use of efficient construction equipment and provision of portable toilets, there will be no adverse impact on the soil and water environment. Such situations may only occur in case of emergencies (Bakow 2B, 2C, 2D, 2E);

Soil from and around the assembly yard and the areas of the new access roads and cable trenches will be heaped and the area will be restored to its original state upon the completion of the project. Soil from the cable trenches will be used for backfilling. Soil and soil from the excavated soil for the foundations will be managed partly on site, while the rest will be removed to a place designated by the commune. The method and conditions for the management of the earth masses will be specified in the building permit decision. The proper collection of the generated earth masses (if possible selection), transport, processing and storage will prevent negative impacts on the ground surface and indirectly on other elements of the natural environment (Bakow 2B, 2C, 2D, 2E);

At the operation stage of the wind farm and the transformer/switching station, no negative impacts on the soil, water and air environment are expected. In the area of the transformer station, where oil transformers will be used, there is a possibility of an emergency spill of transformer oil or contamination of soil and surface and groundwater with rainwater contaminated with oil

substances. In order to protect the transformer/switching station site against emergency oil spills, sealed concrete oil pans with a capacity to collect 100% of the oil content of the transformer will be provided under the transformer sites. The station will also be equipped with a rainwater drainage system with a separator of oil derivatives (Bakow 2C).

Mitigation measures

Execution phase of the project:

- In the course of construction works, take all precautions to prevent pollutants (e.g. oil-derived compounds) from penetrating into the soil and water environment. In consequence, the area intended for the construction facilities and the material base must be properly sealed. In addition, in the event of a spill, the works contractor should have suitable sorbents for removing contaminants, especially petroleum-based (e.g. fuels, lubricants) and synthetic (e.g. oils) sorbents;
- Preserve the fertile soil layer removed from the excavation surface and restore it after the construction work is completed;
- The removal of ground cover should, as far as possible, be carried out between 1 September and 14 March;
- The removal of soil cover in the period from 15 March to 31 August can only be carried out after an ornithological survey has first established that no protected bird species nest in the area where soil cover will be removed (Bakow 2B, 2C, 2D, 2E).

Operation phase:

- After the completion of the wind farm operation, the area designed for the individual turbines must be restored to its original state, i.e. the land must be suitable for agricultural use (Bakow 2B, 2C, 2E).

5.5 Air pollution

During the construction works there may be negative impacts affecting the state of atmospheric air and acoustic climate around the investment. During the wind turbine construction works, there will be emissions of pollutants into the air, originating from combustion of fuel (diesel oil) in engines of construction machinery and vehicles delivering materials, secondary dusting due to vehicle traffic in the area of construction works and dusting due to movement of earth masses, cement and construction

aggregates. These impacts will include the works area and a zone approximately 15 – 20 m away from the construction site – away from built-up areas.

At the operation stage of the wind farm, no negative impacts on atmospheric air are expected (Bakow 2B, 2C, 2D, 2E).

5.6 Landscape and visual

The construction stage will have a positive impact on material assets in the commune. Due to the necessity to provide good quality roads for the transportation of the power plant elements, some sections of the public roads will be reconstructed and repaired, which will then be used by residents. These works will be carried out at the investor's expense.

The construction stage of the wind farm will involve a temporary reduction in the aesthetic value of the landscape as a result of the works and the organisation of the works facilities. The construction of the wind farm will result in changes to the cultural landscape through the introduction of its new permanent elements, i.e. the wind turbines.

The operation of the wind farm will have an impact on its landscape. This impact, however, cannot be described as positive, neutral or negative, as this is purely a matter of the observer's subjective assessment (Bakow 2B, 2C, 2D, 2E).

The conditions specified in the conclusion of the decision to minimise the impact on the landscape were established on the basis of the landscape analysis, the content of which shows that the wind turbines can be a clearly dominant element of landscape (Bakow 2E).

Mitigation measures

Execution phase of the project: –

Operation phase:

- Use a uniform colour scheme for all power stations (white or grey, possibly greenish at the base) (Bakow 2B, 2C, 2D);
- Do not place advertising inscriptions on the structures, with the exception of the turbine manufacturer's or investor's logo (Bakow 2B, 2C, 2D, 2E);
- Use matt paints for rotor blade painting;
- Use a colour scheme for all power plants that harmonises with the surroundings (Bakow 2E).

5.7 Hydrology and Hydrogeology

The impact on surface water, groundwater and soil and water environment at the construction stage will be mainly related to the organisation of the construction site and its temporary facilities. Construction facilities will be created locally and will mainly serve as parking areas for machinery, vehicles and staff welfare facilities.

Indirect impacts on groundwater may also occur at the construction stage due to the dewatering of excavations for the wind turbine foundations and cable lines. They may cause a short-term lowering of water levels (drainage effect). It is therefore recommended to plan the investment works in such a way that the foundations, after construction and assembly, are immediately covered with concrete and the cable trenches are backfilled as soon as possible, immediately after the cables have been laid (Bakow 2B, 2C, 2D).

The drainage of groundwater from the wind farm areas, if any, can be counteracted by backfilling the cable trenches as soon as possible after they have been dug, immediately after the cables have been laid in them, while the foundations should be covered with concrete immediately after assembly, which will also prevent the soil from softening (Bakow 2B, 2C, 2D, 2E).

At the operation stage of the wind farm, no negative impacts on the soil, water and air environment are expected.

Mitigation measures

Execution phase of the project: –

Operation phase:

- Ensure the surface discharge of rainwater and snowmelt into the area to which the investor has a legal title (Bakow 2B).

5.8 Waste

It is concluded that the construction stage of the wind turbine will not result in significant changes to the soil and water environment. It is assessed that, with the proper storage of construction materials, proper location and securing of the construction facilities, the use of efficient construction equipment and provision of portable toilets, there will be no adverse impact on the soil and water environment. Such situations may only occur in case of emergencies (Bakow 2B, 2C, 2D).

During the construction of the proposed project (power plant

foundations, installation of the power plant, road, electricity network, etc.), construction waste of group 17, characteristic of construction, installation and finishing works (including soil and earth from contaminated areas), will be generated. Waste generated during the construction will be collected within the construction site, in a designated area, in special containers.

Hazardous waste, if any, will be collected in a separate container suitable for this type of waste. Once the containers are full, the waste will be handed over to companies with the appropriate permits for recovery or treatment. Some of the waste generated during the construction may be handed over by the holder to individuals or organisational units.

During the operation of the wind turbine, waste may be generated from maintenance and repair work carried out on the site. This will be waste from groups 13, 15, 16 and 17. All waste generated during the operation of the wind farm will be collected on an ongoing basis by a maintenance company. This includes hazardous waste. Waste generated during the operation of the wind farm will not be collected or stored at the wind farm site (Bakow 2B, 2C, 2D, 2E).

Mitigation measures

Execution phase of the project:

- The construction site must be equipped with TOI-TOI container sanitary units with watertight collecting tanks. Dispose of domestic sewage at the sewage treatment plant (Bakow 2B, 2C, 2D, 2E).

Operation phase:

- During the execution and operation of the investment, collect waste selectively in a manner preventing the access of unauthorised persons and posing no threat to the environment, health and life of humans, in designated places as described, on a hardened ground, protected against penetration of leachate to the ground, until it is collected by authorised entities (Bakow 2B, 2C, 2D, 2E).

5.9 Fire and extreme events

Neither the execution nor the operation of the investment in question will pose a threat of a serious accident as defined in the Environmental Protection Act.

A major accident is understood as an event, in particular an emission, a fire or an explosion, resulting from an industrial process,

storage or transport, involving one or more hazardous substances, leading to an immediate hazard to human life or health or to the environment, or to a delayed occurrence of such a hazard. **The construction and operation of the wind farms does not involve a major failure hazard.**

Mitigation measures

Execution phase of the project:

- Carry out works using efficient construction equipment, carry out regular technical inspections of the equipment used and supervise its technical efficiency;
- Locate parking spaces for heavy equipment, construction facilities and storage areas for construction materials as far as possible from residential buildings and surface watercourses;
- Switch off machinery and equipment during work breaks; avoid idling of machinery and equipment (Bakow 2B, 2C, 2D, 2E).

Operation phase: –

5.10 Cultural heritage and protected areas

During excavation for the foundations and cable trenches, there is a possibility of encountering archaeological monuments. In this situation, construction work should be suspended and the conservation services should be contacted to agree further action (Bakow 2B, 2C, 2D, 2E).

5.11 Traffic and transport

As a result of the need to provide good quality roads for transporting the power plant components, some sections of public roads will be reconstructed and repaired during the **construction phase** to be subsequently used by local residents. These works will be carried out at the investor's expense.

The **operation** of the project will have a positive impact on material assets. This is because it will cause a significant increase in the commune's income from taxes.

Mitigation measures

Execution phase of the project:

- The construction site must be equipped with TOI-TOI

container sanitary units with watertight collecting tanks.
Dispose of domestic sewage at the sewage treatment plant
(Bakow 2B, 2C, 2D, 2E).

Operation phase:

- Do not place any trees or shrubs around the turbines or along the access roads;
- Prevent tree and shrub succession around the turbines and along the access roads (Bakow 2B, 2C, 2D, 2E).



6. Glossary

EIA	Environmental Impact Assessment.
Local spatial development plan	Legally binding document adopted by a municipal council that dictates land use and development within a specific area.
Natura 2000	A coherent network of special areas of conservation of habitats which is composed of sites hosting the natural habitat types of community interest and habitats of the species of community interest, and which enables the natural habitat types and the species' habitats to be maintained and, where appropriate, restored to a favourable conservation status in their natural range. The Natura 2000 network includes special areas of conservation of birds.
Protected area	A land and/or water area which has clearly defined boundaries, an acknowledged scientific, ecological, cultural and other value and for which a special protection and use regime/procedure has been established by legal acts.
Reserve	A protected area established for the preservation of the natural and/or cultural sites valuable from a scientific or cultural point of view, the territorial complexes and objects/properties of natural and cultural heritage located therein, the landscape, biological diversity, and gene pool. Preservation of the properties located in these areas shall be ensured without terminating economic activities therein.
Restoration site	A protected area intended for the protection, restoration, enhancement and limited use of natural resources, formerly impoverished by human activities.
Sanctuary	A protected area set up in order to preserve and conduct research of the natural or cultural territorial complexes of particular scientific value, ensure the unaffected course of natural processes or maintenance of authenticity of cultural properties, and promote protection of the territorial complexes of natural and cultural heritage. The principal designation of land use shall be established as conservational in these areas, with termination of economic activities therein.
State (national and regional) park	A large, protected area which is complex from the natural, cultural and recreational points of view and is particularly valuable, and whose protection and management is related to the designation of the area's functional and landscape management zones.
WTG	Wind turbine generator.

7. Contacts



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Appendix No. 1

