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REPORT
ON THE IMPACT ON THE ENVIRONMENT

of project named
construction of 7 wind turbines
of the same type with a capacity of 2 to 3 MW, including access roads, manoeuvring areas and electricity infrastructure, on plots nos. 23/2, 76, 77, 85 within the Lubuczewo area and plots nos. 106, 112/3 and 339 within the Września-Kępno area
in the Słupsk commune

Investor: "EWG Słupsk" Sp. z o.o.
Rataja 21
59-220 Legnica

prepared by:

Słupsk, February 2008

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On the basis of:

- the Act of 27 April 2001 on Environmental Protection Law (Journal of Laws No. 62, item 627, as amended),
- the Act of 27 July 2001 on the introduction of the Environmental Protection Law, the Act on Waste and on the Amendment of Certain Acts (Journal of Laws No. 100, item 1085),
- the Act of April 16, 2004 on Nature Conservation (Journal of Laws No. 92, item 880),
- the Act of 27 April 2001 on Waste (Journal of Laws No. 62, item 628),
- Regulation of the Minister of the Environment of September 27, 2001 regarding the waste catalogue (Journal of Laws No. 112, item 1206),
- Regulation of the Minister of the Environment of June 14, 2007 regarding permissible noise levels in the environment (Journal of Laws No. 120, item 826),
- Regulation of the Minister of Environmental Protection, Natural Resources and Forestry of 11 August 1998 on detailed principles of protection against radiation harmful to people and to the environment, acceptable levels of radiation that may occur in the environment, and requirements applicable to radiation control measurements (Journal of Laws No. 107, item 679),

taking into account:

- Provisions of the Mayor of the Słupsk Commune regarding the imposition of the obligation to prepare an environmental impact report, and its scope, for the project entitled "Construction of 7 wind turbines of the same type with a capacity of 2 to 3 MW, including access roads, manoeuvring areas and electricity infrastructure" on plots nos. 23/2, 76, 77, 85 within the Lubuczewo area and plots nos. 106, 112/3 and 339 within the Wrzeście-Kępno area in the Słupsk commune - letter of 9 November 2007, ref. no. OŚ/DŚ - 7625/42/5/07,
- Field inspection and maps and information provided by the investor

a report was prepared on the environmental impact of the project named:

construction of seven wind turbines of the same type with a capacity of 2 to 3 MW, along with access roads, manoeuvring areas and electricity infrastructure, on plots nos. 23/2, 76, 77, 85 within the Lubuczewo area and plots nos. 106, 112/3 and 339 within the Wrzeście-Kępno area in the Słupsk commune.

1. The purpose and scope of the study

The purpose of the study is to analyse the potential impact on the environment of the intended project in the scope determined by the decision of the Mayor of the Słupsk Commune, letter of 9 November 2007, OŚ/DŚ - 7625/42/5/07, on the obligation to prepare an environmental impact report for the project named construction of 7 wind turbines of the same type with a capacity of 2 to 3 MW, including access roads, manoeuvring areas and electricity infrastructure, on plots nos. 23/2, 76, 77, 85 within the Lubuczewo area and plots nos. 106, 112/3 and 339 within the Wrzeście-Kępno area in the Słupsk commune. The report was prepared with detailedness and accuracy appropriate to the possessed data, resulting from the adopted designing premises, as well as the technical parameters of the devices.

2. Description of the planned project

Wind turbines belong to pro-ecological undertakings consisting in the production of energy from renewable sources. In 2006, the share of renewable energy - from water, wind, biomass, thermal water and solar radiation - in the amount of electricity sold to end users in our country amounted to 3.5%. Poland's membership in the European Union obliges us to take steps to increase this share to around 7.5% in 2010 and 12% by 2020. Therefore, renewable energy sources are becoming more and more important. They are also extremely important in the face of increasing air and water pollution, acid rain and global warming. Poland has quite large energy resources from these sources, although the possibilities of their use in various regions of the country are varied. Wind is one of the energy sources, with wind turbines gaining more and more followers. In Europe, especially in the last few years, the most dynamic development of wind energy is noted in Germany and Spain.
Below is a chronological overview of wind turbines that were built in Europe (northern part of the continent):
• 1989 Esbjerg (Denmark) - capacity of 2 MW - single tower with a height of 57 m, blade diameter 60 m, weight of the turbine rotor approx. 67 tons; similarly in Malmö (Sweden) - a single tower with a height of 80 m, with a 3 MW aggregate, blade diameter 78 m,
• 1989 Richborough (England) - capacity of 1 MW - single tower 45 m high, blade diameter 55 m,
• 1991 Vindeby (Denmark) – capacity of 4.9 MW - offshore wind farm consisting of 11 units of 450 kW, located on platforms at a depth of 2 - 5 m,
• 1991 Swarzewo near Puck (Poland) – capacity of approx. 100 kW - single tower with a 21 m diameter impeller, since 1998 additional 2 TACKE TW-600 towers for 600 kW each are operated,
• 1994 Vellinge (Denmark) - capacity of approx. 3.5 MW - wind farm consisting of 34 units of 90 kW and 2 units of 200 kW each,
• 1994 Medemblik (the Netherlands), 4 offshore turbines of 0.5 MW, 2 MW in total,
• 1995 Tuno Knob (Denmark) - 10 offshore turbines 0.5 MW each, 5 MW in total,
• 1995 Rejsby Hede (Denmark) - a farm of 40 wind turbines with a capacity of 600 kW each, a total of 24 MW,
• 1996 Dronten (the Netherlands) - 28 offshore turbines 0.6 MW each, 16.8 MW in total,
• 1997 Clark Wind Farm (Ireland) a farm of 25 turbines 600 kW each, 15 MW in total,
• 1998 Sustrum (Germany) - 32 wind turbines of 1.5 MW, 48 MW in total,
• 1998 BockstigenValar (Sweden) - 5 offshore turbines 0.5 MW each, 2.5 MW in total,
• 1998 Sylthom (Denmark) 35 wind turbines of 750 kW, a total of 26 MW,
• 1998 Mynydd Gorddu (Wales) 12 wind turbines of 500 kW and 7 turbines of 600 kW, 10 MW in total,

Photo 1. One of the first wind farms in Poland, Cisowo I (1999) and II (2002) near Darłowo

• 1999 Cisowo I (near Darłowo, Poland) - 5 wind turbines of 132 kW, total 0.660 MW,
• 2000 Blyth (Great Britain) - 2 offshore turbines 2 MW each, 4 MW in total,
• 2001 Middelgrunden near Copenhagen (Denmark) - 20 offshore turbines 2 MW each and a total capacity of 40 MW (type: BONUS 2.0 MW)
• 2001 Yttre Stengrund (Sweden) - 5 offshore turbines 2 MW each, 10 MW in total,
• 2001 Barzowice (Poland) - 6 wind turbines, about 833 kW each, a total of 5.0 MW,
• 2001 Utgrunden Kalmar (Sweden) - 7 offshore turbines x 1.425 MW, 10 MW in total,
• 2002 Cisowo II (near Darłowo) - 9 wind turbines 2.0 MW each, 18 MW in total.

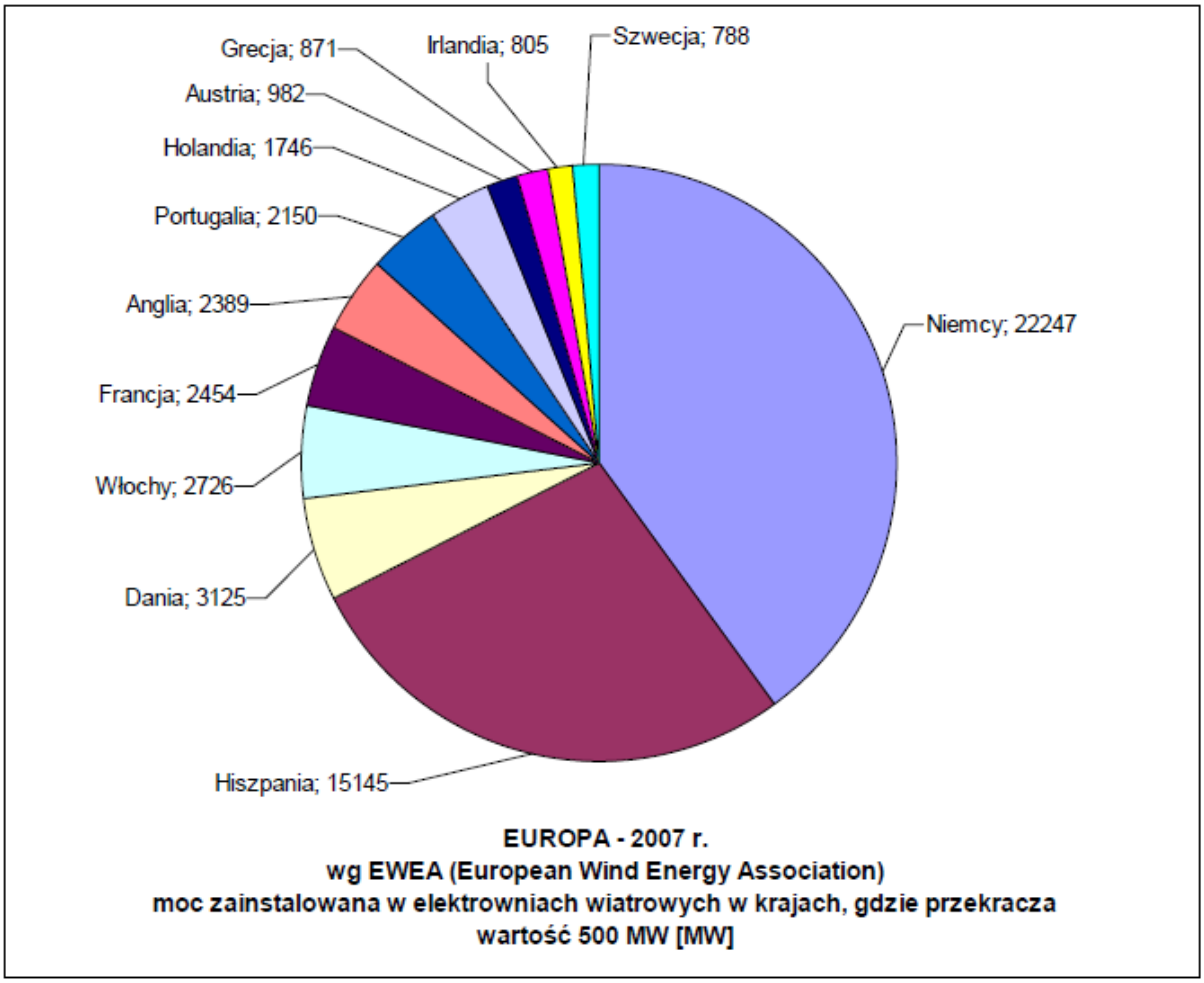
Photo 2. Wind farm in the area of Kołbaskowo, near the Polish-German border

In total, in 2002 Poland's wind capacity was 22 MW. In January 2003, the largest wind farm in the country was opened near Zagórz in the Wolin commune - it consisted of 15 wind turbines with a capacity of 2 MW each, which practically doubled the national potential to a total capacity of approx. 50 MW. In the next stage, after starting the farm in Tymienie near Kołobrzeg opened in June 2006, consisting of 25 VESTAS V80 wind turbines with a capacity of 2.0 MW each, the total national wind capacity reached the level of 150 MW. At the end of 2007, including Kisielice (40 MW), Kamieńsk and Jagniątkowo (30 MW each), this level increased to around 250 MW. The largest wind power producers in Europe after 2007 (over 3,000 MW) are: Germany - 22 247 MW, Spain - 15 145 MW and Denmark - 3 125 MW (Table No. 1)

Table No. 1. Leading countries in Europe in terms of the power output of wind power equipment (over 1000 MW in 2007) as of 1999 - 2007

state	power as of 1999	power as of 2002	power as of 2004	power as of 2005	power as of 2006	power as of 2007
Germany	4 450 MW	8 700 MW	16 630 MW	18 428 MW	20 622 MW	22 247 MW
Spain	1 539 MW	2 500 MW	8 260 MW	10 027 MW	11 615 MW	15 145 MW
Denmark	1 761 MW	2 900 MW	3 117 MW	3 122 MW	3 136 MW	3 125 MW
Italy	-	-	1 120 MW	1 717 MW	2 123 MW	2 726 MW
France	-	-	386 MW	757 MW	1 567 MW	2 454 MW
Great Britain	-	-	888 MW	1 353 MW	1 963 MW	2 389 MW
Portugal		-	522 MW	1 022 MW	1 716 MW	2 150 MW
The Netherlands	-	-	1 078 MW	1 219 MW	1 560 MW	1 746 MW

Fig. 1 Graphic representation of wind capacity in Europe at the end of 2007



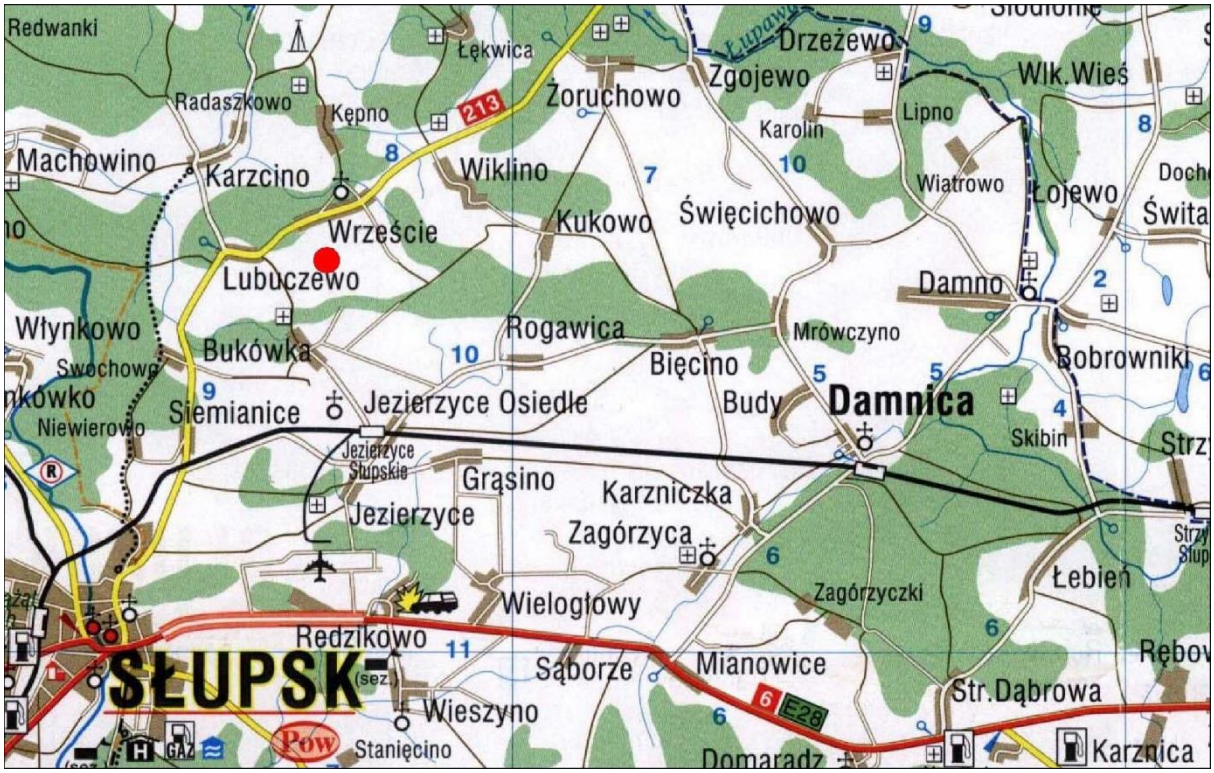
Hiszpania: 15145	Spain: 15145
Dania: 3125	Denmark: 3125
Włochy: 2726	Italy: 2726-
Francja: 2454	France: 2454
Anglia: 2389	England: 2389
Portugalia: 2150	Portugal: 2150-
Holandia: 1746	The Netherlands: 1746-
Austria: 982	Austria: 982
Grecja: 871	Greece: 871
Irlandia: 805	Ireland: 805
Szwecja: 788	Sweden: 788
Niemcy: 22247	Germany: 22247
EUROPA - 2007 r. wg EWEA (European Wind Energy Association) moc zainstalowana w elektrowniach wiatrowych w krajach, gdzie przekracza wartość 500 MW [MW]	**EUROPE - 2007 according to EWEA (European Wind Energy Association) installed capacity in wind turbines in countries where it exceeds 500 MW [MW]**

2.1. Characteristics of the project and conditions of land use in the construction and operation phase

The intention of the investor, i.e. "EWG Słupsk" Sp. z o.o. in Legnica, is to construct 7

NORDEX wind turbines of the same type, in the area of the villages of Lubuczewo and Wrzeście, each with a capacity of 2 - 3 MW, a tower height of 120 m (± 5%) and a rotor diameter of up to 100 m (± 5%). 30 kV MV cable lines will be routed from each turbine to the newly built GPZ 30/110 kV substation, and from there by the 110 kV overhead line to the transformer station GPZ 400/110 kV Słupsk - Wierzbięcino. The construction of power lines and GPZ stations will be a separate project.
The villages Lubuczewo and Wrzeście are located in the Słupsk commune, northeast of Słupsk, about 9 km from the centre, by road no. 213 from Słupsk to Wicko - Puck/Łeba. The area for the planned wind farm is located approx. 2 km south-east of the village of Lubuczewo and approx. 2 km south of the village of Wrzeście.

Fig. 2 Extent of the road map, the red circle indicates the place of the designed set of seven wind turbines in the area of the villages of Lubuczewo and Wrzeście.



The area of the Słupsk commune, in part also covering the planned project, was shaped by a glacier and has a slightly wavy surface. It is located in the Słupia river basin. The ordinates of the area covered by the designed wind farm have values in the range of 65-70 m above sea level. A slight decrease of altitude can be observed from the south towards the north. In a straight line the distance to the sea is about 10 km.
The designed wind farm "Lubuczewo - Wrzeście" will be located on the seven following plots (described in red in Fig. 3), located both within Lubuczewo (4 plots) as well as within Wrzeście (3 plots), on unbilt areas used mainly for agricultural purposes.

Fig. 3 Place for planned wind turbines EW-1 - EW-4 within Lubuczewo and EW-5 - EW-7 within Wrzeście, against the background of a cadastral map (with plot numbers).

Plots earmarked for development are characterized by different surfaces and irregular shapes (Fig. 3). Plots within Lubuczewo, destined for EW-1 - EW-4 wind turbines, have a total area of 45 ha, and those within Wrzeście-Kępno, destined for EW-5 - EW-7 wind turbines, an area of about 11 ha. The set of 7 wind turbines, for which the above-mentioned numbering was adopted in the report, in total will cover the area of approximately 56.3 ha. The areas of individual plots are:
within the Lubuczewo area
- plot no. 23/2 for wind turbines no. 1 and no. 2 - area of 36.62 ha,
- plots no. 76 and 77 for wind turbine no. 3 - area of 6.06 ha,
- plot no. 85 for wind turbine no. 4 - area of 2.46 ha,
within Wrzeście area
- plot no. 106 for wind turbine no. 5 - area of approx. 5.46 ha,
- plot no. 112/2 for wind turbine no. 6 - area of approx. 0.61 ha,
- plot no. 339 for wind turbine no. 7 - area of approx. 5.05 ha.

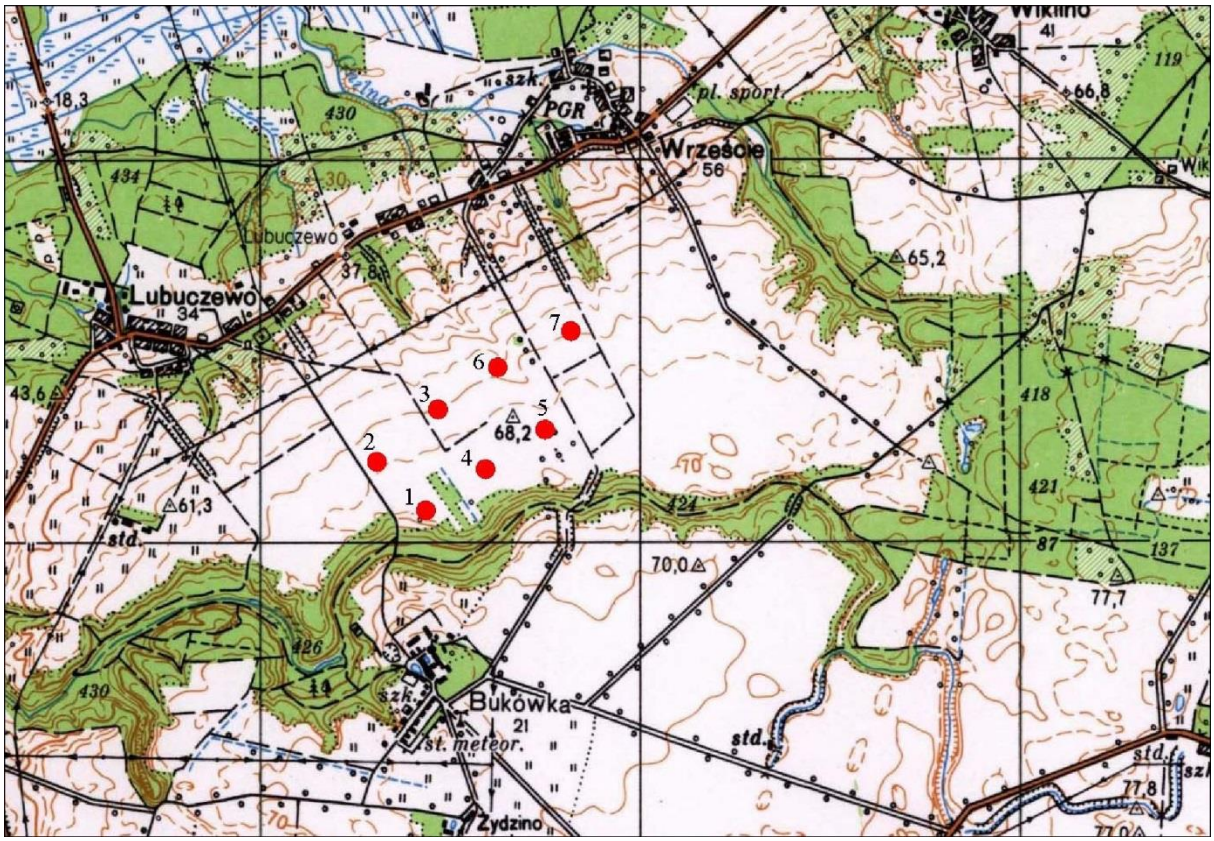
The distances between the outermost wind turbines of the designed wind farm are respectively: in the W-E system approx. 1.2 km, and in the N-S system, approx. 0.7 km, while maintaining a distance of 400 - 500 m between each turbine.
The wind turbines will be mounted on foundations made of reinforced concrete. The foundation of each turbine will occupy a territory measuring 25 m x 25 m and an area of approx. 625 $m^{2.}$ An access road and a manoeuvring area will be indispensable for each turbine by the time the wind farm will have been in operation, thanks to which it will be possible to reach the service team's devices with the equipment needed for renovation or

maintenance. The investor plans to build each of the roads in the immediate vicinity of existing local roads. The required road width is 5 m (min 4.5 m), the angle of the road below 6%. The surface must be paved, with the wind turbine manufacturer recommending the access road to be made of crushed stone (maximum grain size 60 mm, layer thickness 0.4 m) laid on a sand foundation (a layer about 0.3 m thick), separated by a layer of unwoven fabric (silting prevention), optionally for making the top layer it is allowed to use brick or concrete debris instead of gravel (maximum grain size 60 mm, surface area 30 mm, layer thickness 0.5 m) free of impurities such as glass, ceramics, steel or wood . An appropriate road profile is also required, with a 2-3% drop, allowing outflow of rainwater. At the implementation stage of the project, road vehicles will move along the access roads, which - taking into account the dimensions of the individual components supplied - maximum length reaches 52 m, height 5 m, maximum pressure on the vehicle axle about 16 t, maximum single vehicle weight about 165 t , pressure of a track crane about 25 t/$m^{2.}$ It can be estimated that the expanse of each manoeuvring area will be about 630 m^2.
The towers of individual wind turbines will have a height of up to 120 m (± 5%). At the top of each of them will be a nacelle with power generating and control devices. The hub of the wind turbine blades will also be located there. The diameter of the circle made with shovels for the approved type of NORDEX wind turbine has been set to be at the level of 100 m (± 5%). The accompanying installation will include devices matching electrical energy generated in individual generators to the MV receiving line and underground wires supplying energy to the indirect power station GPZ, which will match energy with MV voltage to the HV level (typically 110 kV), from there by the HV overhead line to the area of the village of Wierzbięcino, to the substation 110/400 kV. The total power generated from seven wind turbines (2-3 MW each) will amount to approximately 14 - 21 MW (which corresponds to one block of a typical GPZ station).

Fig. 4 The concept of the location of the GPZ 110/30 kV substation, in the area south of the village of Lubuczewo, for the purposes of discussed "Lubaczewo-Wrzeście" set of 7 wind turbines

Within the area of the farm, the electrical cables along with the fiber-optic line will be lain underground according to the arrangements made during the creation of the building project, the total length of which can be estimated at approx. 3 km.
During the implementation phase, work will be carried out on excavations for power cables, fiber-optic line and foundations. Temporary roads and manoeuvring areas will be constructed for vehicles supplying wind turbine components (tower elements, shovels, nacelles, accessories) and devices for their installation (cranes), as well as for the supply of mechanical equipment (excavators, bulldozers, etc.). Access roads will run from municipal roads to individual plots for the wind turbines.

Fig. 5 Location of seven wind turbines against the background of a topographic map of the Lubuchewo, Bukówka and Wrzeście villages



The location of individual wind turbines is shown on the cadastral map (Fig. 3) and on the topographic map (Fig. 5.)
The area of all the aforementioned plots is approx. 56 ha, while the area directly occupied by the foundations of the turbines will be 0.44 ha (25 m x 25 m x 7), and, as it can be estimated, access roads will occupy approx. 1.5 ha (approx. 3 km x 5 m) and manoeuvring areas 0.4 ha (630 m^2 x 7). The investor predicts that the following quantities of materials will be used for

making access roads and manoeuvring areas: sand (foundation) approx. 6.300 m^3, concrete rubble or rock fractures approx. 12.600 m^3, and for laying foundations for wind turbines within the venture: reinforcing steel approx. 210 Mg, B30 concrete approx. 2.590 m^3, B15 concrete approx. 175 m^3 and a sub-surface of approx. 525 m^3.
During the operation phase of the project, the area around the wind turbine will be used in accordance with the original purpose, i.e. as an agricultural area. The investor does not plan to enclose areas around individual towers of wind turbines.

2.2. The main characteristics of production processes

The technology of generating electricity using wind turbines and putting this energy into the network is based on i.a. the following transformations and phenomena:
- aerodynamic - the transformation of energy carried by wind into rotational motion of the rotor (blades, power plant propellers)
- electromagnetic - conversion of mechanical energy (rotation of the rotor) to electrical energy (power generator),
- electrical - conversion and electrical adaptation (voltage, frequency and phase) to the receiving network (e.g. transformer station GPZ), and energy transmission by the line supplying the network,
- electronic - use of electronic circuits to conduct the work of the team, measurements, control and registration (including remote data transfer).
Depending on the wind turbine type, mechanical transformation is also applied- it is based on adjusting the rotor rotations to the generator rotations (gearing increasing rotation - the so-called gearbox).
The accompanying systems that may also accompany the wind turbine's power generation set are:
- a system that sets the rotor on the wind direction,
- lightning protection system (lightning arrester) requiring grounding,
- generator cooling system (optionally with the use of a coolant),
- gearing cooling system, with gearbox oil (in wind turbines of this type),
- brake (optionally hydraulically assisted, with brake fluid).
The basic structural elements that make up the wind turbine are:
- underground foundation (optionally: piles, slab, slab with piles) with plinth, protruding above the ground, for fixing the tower,
- tower (tubular multi-section, steel or concrete),
- nacelle-head (inside, generator, transducers, control motors, etc.),
- hub with rotor blades.
The wind farm capacities can be divided according to the following ranges:
- from 1.0 to 10 kW includes small installations cooperating with batteries,
- from 100 to 200 kW and from 600 to 3000 kW applies to the most common sources of electricity fed into the power grid, also cooperating with small hydro- or diesel wind farms,
- from 3 to 5 MW - highly technically advanced - large wind farms fed into the grid or as independent energy sources, used most often in places with very favourable wind conditions (e.g. sea farms) and where there is a large local demand for electricity.

The nominal capacity of a particular wind turbine with a specified blade diameter is determined at a certain wind speed, usually 9 - 12 m/s. The turbine is also characterized by the scope of work. The upper and lower wind speed limit at which the turbine works is determined. The lower limit is a speed of approx. 3 - 5 m/s, if exceeded the generator is switched on, and the upper limit of approx. 20 - 25 m/s at which the turbine is immobilized.

Photo 3. The profiles of typical wind turbines with the capacity range of 1.2 - 2.5 MW

Table No. 2. Selected parameters of a wind turbine with similar capacities from the 1.2 MW - 2.5 MW range

Item	wind turbine type	maximum capacity [MW]	power of small generator [kW]	tower height [m]	blade diameter [m]
1	NORDTANK (DK)	1.5	750	50/60/68	64
2	NORDEX N80 (D)	2.5	-	60/80/100	80
3	AUTOFLUG A 1200 (D)	1.2	250	60	61
4	ENERCON E-70 (D)	2.0	-	80/98/112	70
5	TACKE TW 1,5 (D)	1.5	-	67	65
6	VESTAS V80 (DK)	2.0	-	80/100	80

Manufacturers of wind farms provide detailed technical data for each type separately, which was shown in Table 2. Profiles of the wind turbines included in table are shown in Photo 3.
The success of the project depends primarily on wind force at the location of the device (this factor occurs in the third power). The relationship between the size of energy, and i. a. wind speed is as follows:

$$P = 1/2\ C_p\ (\lambda)\ \rho\ A\ V^3$$

where: P - obtained power, C_p - energy conversion factor (different for individual types of devices), ρ - air density, A - surface covered by rotor, V - wind speed

In the technical solutions used so far, wind turbines with the following properties can be distinguished:
- constant rotor speed and one generator nominal power,
- constant rotor speed and switched capacities (with double winding of the generator),
- with smoothly variable rotor speed (within certain speed limits, the energy produced varies infinitely in proportion to the wind force).

Wind turbines usually work in the automation system and are controlled electronically (it is possible to operate them remotely). Such work regime does not require constant operation of the turbine, but only periodic inspections and maintenance.
The investor intends to build seven NORDEX N90 wind turbines, each with a capacity in the range of 2 - 3 MW.

The basic technical parameters of this type of wind turbine, according to the manufacturer's data (NORDEX, "Technical Description", 2006.09.20), are as follows:
- rated power: 2,300 kW, achieved at wind speed of approx. 13 m/s,
- diameter of the rotor arms range: 90 m,
- series of towers with heights: 60/80/100 m,
- principle of the wind turbine operation: mechanical transmission, power generation at variable rotor speed,
- rotor: three-armed with adjustable blade turning, setting on the wind direction in an active way,
- area covered by the reach of the arms: 6 362 m^2,
- material from which the blades are made: epoxy resin,
- total arm length 43.8 m,
- rotor speed range, rotational speed: 9.6 - 16.9 rpm,
- blade turning adjustment: 0.5°/s in the electronic control system,
- working conditions: wind speed 3.0 - 25.0 m/s,
- remote monitoring, Nordex Control 2 system.

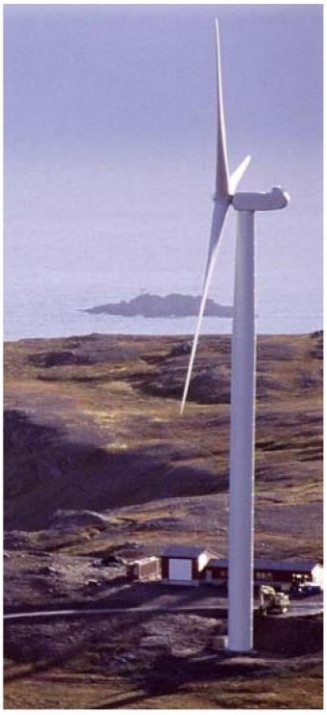


Photo 4. NORDEX Wind Turbine

The principle of generating energy and its transmission

The NORDEX N90 wind turbines belong to the type of turbines generating electricity at variable rotor speeds. Power regulation is realised by changing the angle of the rotor arms. Each of the blades of the turbine propeller is individually screwed in such a way that optimum working conditions are maintained, taking into account the current wind pressure. In the nacelle's rotor axis there is a shaft that carries rotational energy to the gearing, which boost rotation from 9.6-16.9 rpm to the range of 740 - 1 310 rpm.

In the generator, operating on the principle of an asynchronous alternating current generator within the limits of the abovementioned rotation speed range, a three-phase voltage of 660 V and 50 Hz is generated. This energy, through the transformer of the turbine in the form of a free-standing container station with dimensions of 3.1 m x 2.4 m x 2.7 m, increasing the

voltage up to 30 kV and through a network of underground cables, is supplied to the GPZ station, from where, after increasing the voltage to 110 kV, it is fed into the power grid. The guidance system, analysing wind speed and direction data on an ongoing basis, sets the turbine's rotor, by rotating the nacelle, to the direction of the wind and sets the blade turning angle depending on the wind power.
Automatic control (Nordex Control 2) consists in collecting and analysing data from, among others, temperature sensors, energy status of electrical devices, etc. Data on registered parameters are stored in computers placed in individual turbines, to which remote access is possible from virtually anywhere, thanks to the computers being connected to the Internet.
The system is configured in such a way that it enables not only the adjustment of a single wind turbine to work in the electricity network receiving the generated energy, but it also can control the operation of several wind farms. The response to the information received from the network may be, for example, turning off the given turbine. Such situations may occur in the event of a short circuit at the receiving end. The turbine is reconnected to the network in a controlled manner. Other disconnection situations from the wind farm network include atmospheric conditions, such as exceeding the wind speed above the threshold value allowed for a given turbine. Control parameters are programmed in the control system that disconnect the turbine depending on, among others, duration of exceeding the set wind speed limit threshold, with short circuits as well as electric discharges, breaks on transmission lines or other failures.

2.3. Expected types and quantities of pollution resulting from the operation of the planned project

The operation of wind turbines will not be a source of pollutant emissions to the air. Also in the normal operation phase, wind farms will not be a source of pollutant emissions introduced into surface and underground waters and into the ground. Generated waste will include used transmission oils, hydraulic fluids and coolant. Waste will also be worn items such as brake linings, bearings, etc. The operation of the turbine will be accompanied by noise emission, the coverage of which will include the nearest areas adjacent to the wind farm.

3. Description of nature components of the environment covered by the expected environmental impact of the planned project

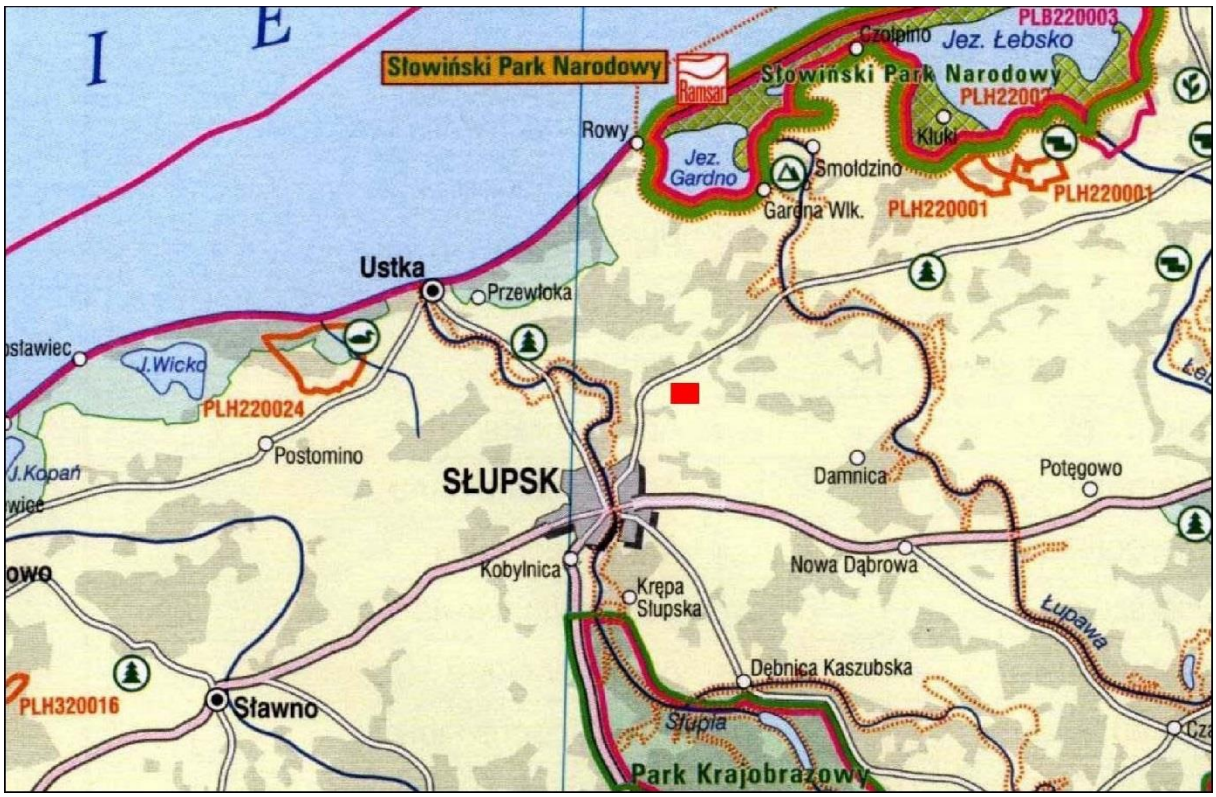
Earth surface, vegetation, natural and landscape values
The Act of 27 July 2001 on the introduction of the Act - Environmental Protection Law, the Act on Waste and the amendment of certain acts introduced the concept of landscape values into the Act on Nature Conservation. This means the ecological, aesthetic and cultural values of the area and related nature components shaped by the forces of nature or as a result of human activity.
The area designated for the planned wind farm is located south of Lubuczewo and Wrzeście and north of the village of Bukówka. The total area of plots on which the wind farm will stand is approx. 56 ha. At the moment the area is used for agricultural purposes. According to the cadastral maps of Lubuczewo and Wrzeście-Kępno, within the boundaries of the project the RIVa and RIVb soil classes (middle class soils) predominate, RIIIb classes (good) are also present, and in some parts RV (weak) and RVI (very weak) classes can be found. It is planned that the area of approx. 2.3 ha will be occupied for direct functions related to the foundation of the wind farm, as well as for access roads and manoeuvring areas, which constitutes approx. 4% of the total area of plots covered by this project. The area in question is free of buildings and used for agriculture (annual crops prevail). There are small shrubs and bushes along the field roads and at the sides.

Photo 5. The place of the planned location of the wind farm - view from the side of the village of Lubuczewo

North-west from the site of the designed wind farms flows the Słupia river, whose water - according to the study of the Provincial Inspectorate for Environmental Protection in Gdańsk in 2005 at the checkpoint in Charnów - showed satisfactory quality (class III quality). High degree of oxygenation of waters, low loading of the general suspension, metals, dissolved inorganic substances as well as biogenic and specific substances (including polycyclic aromatic hydrocarbons) were identified. The quality was determined by the concentrations of organic matter, total nitrogen, selenium, the composition of phytoplankton organisms, periphyton and benthic organisms, and the presence of coliform bacteria, including faecal types. Average annual concentrations reached the following values within the scope of particular indicators: general phosphorus - 0.11 mgP/dm^3, total nitrogen - 1.73 mgN/dm^3, nitrates - 2.82 $mgNO_3/dm^3$ (maximum concentration 6.60 $mgNO_3/dm^3$) and chlorophyll a - 3.4 $\mu g/dm^3$. Near Wrześć flows the right-bank tributary of the Słupia river - the Gnilna river.
The area in the region of the enterprise has no special natural values. Fauna and flora is represented by widely occurring species. The occurrence of species subject to species protection in this area is not documented. The area in question is not covered by any form of protection, such as national park, nature reserve, landscape park, protected landscape area, Nature 2000 area, nature monuments, documentary sites, nature and landscape complexes and plants, animals and fungi species protection.

Nature 2000 Areas
The area with special protection of birds PLB 220002 Dolina Słupi is the area closest to the planned area of the Nature 2000 network. It is located approx. 4 km west from the borders of the project. An extent of the map with areas from the Nature 2000 network is shown in Fig. 6.

Fig. 6 Map of protected areas NATURE 2000 - the area of location of wind farms in the villages of Lubuczewo and Wrzeście region is marked by a red rectangle



According to the standard data form, the area of PLB 220002 Dolina Słupi has an area of 37 033.2 ha. It includes the basin of the middle section of the Słupia River with its tributaries: Bytowa, Jutrzenka and Skotawa. Within its borders there are at least 22 species of birds from Annex I of the Birds Directive and 4 species from the Polish Red Book. During the breeding season it is inhabited by at least 1% of the national population of birds of the species like red kite ore, fawn, osprey, common sandpiper, goldeneye and merganser. There are many birds from the species: white stork, black stork, loner, lerca and red-backed shrike. The threat to the protected area is, among others, water pollution from municipal and agricultural sewage.
Potential special areas of habitat protection placed on the so-called Shadow List, are Łupawa Valley (area 5963.8 ha) and Słupia Valley (area 14839.7 ha) - both marked in Fig. 6. The Słupia Valley lies about 4 km west from the discussed place, while the Łupawa Valley is about 12 km east. Other areas with codes PLH 220023 Pobrzeże Słowińskie and PLB 220003 Ostoja Słowińska, which cover the Słowiński National Park area, and PLB 990002, the Baltic Coastal Waters are located several kilometres north-east and north of the area of the planned investment. The location of the abovementioned areas in relation to the planned project suggests that the impact on these investments can be considered negligible.

Atmospheric air

The air quality in the area of Lubuczewo and Wrzeście has not been studied either by the State Inspectorate for Environmental Protection or the State Sanitary Inspection. Air quality assessment is carried out for zones, i.e. the city and agglomeration areas with a population of over 250.000, and the area of the district not included in the agglomeration. In the Pomeranian voivodeship, the zone is the Słupsk district marked - according to the Nomenclature of Territorial Units for Statistical Purposes - with the code 4.22.28.12. The area in question is within the boundaries of this zone. In terms of health protection, as well as

in terms of plant protection, the zone was classified by the State Environmental Protection Inspection ("Ocena roczna jakości powietrza w województwie pomorskim za rok 2006", Provincial Inspectorate for Environmental Protection in Gdańsk, Gdańsk 2007) as Class A. Class A means that the concentration level does not exceed the limit values and there is no need to take the required action. The classification for health protection includes such indicators as sulfur dioxide SO_2, nitrogen dioxide NO_2, particulate matter PM_{10}, lead Pb, benzene C_6H_6, carbon monoxide CO and ozone O_3, whereas in the field of plant protection sulfur dioxide SO_2, nitrogen oxides NO_X and ozone O_3. Therefore, the air quality in the zone area was recognised as good.

Acoustic climate

Significant - in terms of noise - sources of impact on the environment are road communication routes and they determine the quality of the acoustic climate in this part of the Słupsk commune. The impact range of communication noise depends, among others, on traffic and vehicle speed. The State Environmental Protection Inspection conducts research and assessment of acoustic climate in terms of road traffic noise. SEPI opinion concerns the national road no. 6 from Szczecin to Gdańsk. Noise levels in the environment along this road, according to data for 2004-2005, fluctuated during daytime (6^{00} - 22^{00}) in the range of 61.4 - 61.7 dB, and at night (22^{00} - 6^{00}) 56.9 – 58. 8 dB, with a traffic volume of 8.000 – 12.000 vehicles per day. The discussed area is about 10 km away from that road. In the vicinity of the area covered by the project, the provincial road no. 213 runs from Słupsk towards Łeba through Główczyce. It is characterized by a significantly lower traffic volume (about 4.500 vehicles per day) than the national road no. 6, hence it was not the subject of the SEPI research. It can be estimated that the road noise around it does not exceed the permissible values in the build-up areas with residential and farm buildings, i.e. 60 dB daytime level and 50 dB at night, with impact ranges ranging from a few to a dozen or so meters from the road's edge. The implementation of the project will change those conditions, as there will be industrial sources of noise in the form of wind turbines.

Electromagnetic radiation

Electromagnetic radiation is a natural phenomenon and is associated with sources common in the environment, while as a result of human activity and technological progress, artificial electromagnetic fields occur. They are part, among others, of information transmission systems, including radio and television, medical devices, household appliances, etc. and electrical supply lines. Under environmental law, emission of electromagnetic fields is environmental pollution of the same extent as waste generation or emission of gases and dust to the air. In the immediate vicinity, there are no transmitting objects or relay stations, whose electromagnetic interaction should be taken into account in connection with the analysed project. However, an overhead power line with a rated voltage of 110 kV, which is the source of the electromagnetic field, runs through the area of the planned project. The values and distribution of this field are not recognized in detail. According to the State Inspectorate for Environmental Protection ("Pola elektromagnetyczne wielkiego miasta z punktu widzenia ochrony środowiska", Biblioteka Monitorowania Środowiska, Warsaw 1996), the electric field intensity around the 110 kV overhead line, depending on the type and construction solutions, does not exceed 3.4 kV/m, and on at least 40% of the route does not exceed 1 kV/m. Whereas the intensity of the magnetic field reaches its highest values of a dozen or so A/m on the axis of the line or in a small distance from the axis (e.g. in the middle of the span where the distance between the wires and the earth is the smallest) and the same values are observed for substation areas.

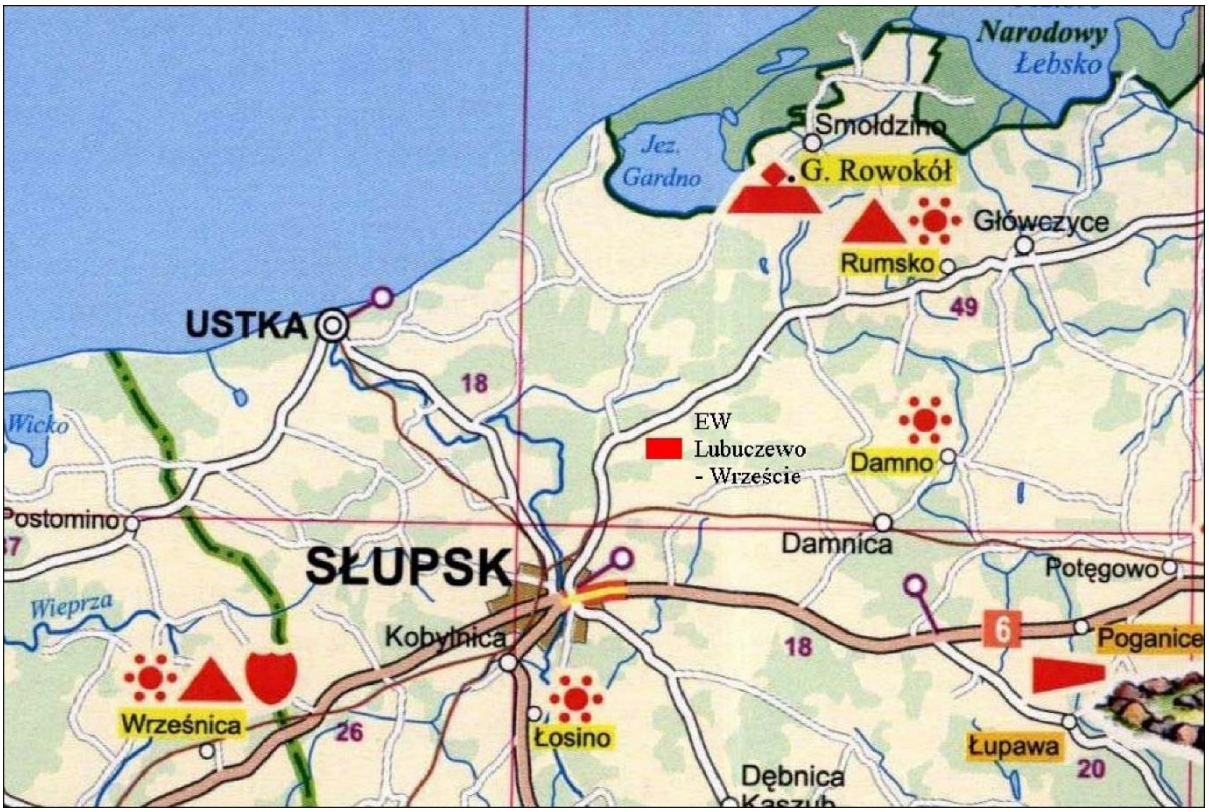
For the wind turbines in question, the energy collection would be carried out by a medium

voltage (about 30 kV) network, made with underground cables. The investor predicts that the transformer station GPZ 110/30 kV and the 110 kV overhead line will be required to receive energy, which will be the subject of a separate project.

4. Description of protected monuments in the vicinity or in the immediate range of the impact of the planned project under the provisions on monuments protection and care

The location of the most valuable archaeological monuments in the country in the area of Słupsk and the space designated for the discussed project are shown in Fig. 7.

Fig. 7 The most valuable archaeological monuments in the country in the area of Słupsk and the investment site (red rectangle)



The above figure does not include the main settlements in the Słupsk district near the village of Machowino (late medieval and early modern periods), the village of Lękwica (Lusatian Pomeranian culture and VII - IX century, and Lusatian culture and early medieval period) and the village of Wiklino (Lusatian Pomeranian culture and the late medieval period as well as the late Roman period of Roman influences), located outside the planned investment area at a distance of 3 - 5 km. The register of monuments includes - located in neighbouring villages - the manor park in Lubuczew (Reg. No. 354; category of the monument - greenery) and the church of Transfiguration of the Lord in Wrześć (Reg. No. 317; sacral monument), but they are beyond the impact range of the designed wind farm.
No information was received to include monuments protected under the provisions on monuments protection and care in the immediate scope of the planned project.

5. Description of the analysed variants of the planned project, including the variant consisting in the project inaction and the most favourable variant for the environment, along with the justification of choice

The land development project includes one variant of the project, concerning the construction of 7 wind turbines in the areas located south of the towns of Lubuczewo and Wrzeście and north of the village of Bukówka, on the southern side of the 213 route Słupsk - Wicko. The four wind turbines will be located close to the Lubuczewo area (EW-1 and EW-2 turbines on plot no. 23/2, EW-3 on plot no. 85, EW-4 on plot no. 76 and 77) and three turbines in the area closer to the village of Wrzeście (EW-5 turbine on plot no. 106, EW-6 on plot no. 112/2 and EW-7 on plot no. 339). Under the foundation of each of the mentioned wind turbines, it is planned to occupy the area in the shape of a square with a side of 25 m and an area of 625 m^2. The concept of detailed location of devices is presented in Fig. 5. A 5 m wide road will be allocated to each turbine to provide access for the service team, and a manoeuvre area of approx. 630 m^2. The investor plans to build roads diverging from the nearest hardened roads of local, communal, district or voivodship importance. Variant solutions concern technical parameters of devices: power of a single 2 - 3 MW turbine, tower height up to 120 m ± 5%, rotor diameter up to 100 m ± 5%. Failure to take the planned project, i.e., discontinuation of the investment consisting in the construction of wind turbines, will result in an increase in the emission of harmful pollutants from other conventional energy sources, primarily from coal-fired power plants.
From one small wind farm with a nominal power of about 660 kW, such as "Cisowo I" near Darłowo, annual energy production is estimated at approx. 1200 MWh, which balances the energy demand for approx. 400 households. Saving for the environment in this case is, among others 432.000 kg of unburnt coal or 480.000 litres of crude oil. Combustion of fuels on the above scale is accompanied by emissions of atmospheric pollutants such as carbon dioxide in the amount of 1.336.000 kg and sulphur dioxide in the amount of 8.520 kg. For a given carbon dioxide emission, this corresponds to the unloading of the area of 185 ha of forests. Seven wind turbines with a total capacity of 14 - 21 MW planned to be located in the area of Lubuczewo and Wrzeście are to produce - according to the investor's expectations - about 35.000 MWh of energy per year, which will result in a correspondingly greater, about 30-fold, environmental benefits.
Demand for electricity (industry, households, exports) should be satisfied taking into account the lowest possible environmental damage, i.e. in accordance with environmental protection regulations aimed at sustainable development. Unconventional, renewable energy sources meet this challenge.
Another aspect includes the economic benefits that the implementation of the discussed project can bring for the local community. Lease of land and taxes will be a source of income, which should have an impact on the improvement of the situation in the commune. During the construction period there will be a possibility of occupational activation of residents in the sphere of, for example, provision of services, which may have a continuation during the operation of the wind farm. Failure to undertake the project will favour the consolidation of the state of apathy in the rural areas of relatively high unemployment.

6. Assessment of the expected environmental impact of the analysed variants, also in the event of an extraordinary environmental hazard

In the area of potential impact of the investment, i.e. in the vicinity of the discussed seven wind turbines, located south of Lubuczewo and Wrzeście and north of the village of Bukówka, there are:
- from the north - agricultural areas, buildings of the village of Lubuczewo, then route no. 213 from Słupsk to Wicko - Łeba/Puck,
- from the east - agricultural and forest areas, further out buildings of the villages of Wiklino and Kukowo,

- from the south - agricultural and forest areas, followed by buildings of the village of Bukówka,
- from the west - agricultural and forest areas, then road no. 213.

Areas protected in accordance with environmental protection regulations and potentially exposed to the burdensome impact of the planned investment are the areas of the nearest residential and farm buildings of the abovementioned village.

The factors, considered in this report, which may worsen the state of the environment in connection with the intended undertaking, are:
- noise emission,
- electromagnetic field,
- littering the landscape,
- waste production,
- emergency situations.

Their impact will affect people, animals, plants, land surface, landscape, and in the event of a major accident, also the water and soil environment. Other elements of the environment, such as surface water, air, climate, material goods and monuments, taking into account interactions between these elements, are not threatened due to the location of the project and the type of intended activity.

The location of the discussed investment, as well as the scale of the project and the estimated emission levels do not indicate the possibility of cross-border impact on the environment.

7. Analysis and assessment of possible threats and damages to protected monuments based on the provisions on monuments protection and care, in particular archaeological monuments, within the area where the project is to be implemented

Due to the fact that no information was received that there were monuments protected under the provisions on monuments protection and care within the area of the planned investment, in particular archaeological monuments, the analysis and assessment of possible threats and damages was omitted in this regard.
However, if during carrying out earthworks or construction works an object capable of presenting archaeological value was encountered, all works that could contribute to the damage or destruction of the monument should be stopped, the monument should be secured along with the place of discovery, and a heritage conservationist or at least the Commune Head should be immediately informed about the finding.

8. Justification of the option chosen by the applicant, with indication of its impact on the environment, in particular on people, animals, plants, water and air, land surface, including land mass movements, climate and landscape, tangible goods, monuments and cultural landscape, covered by existing documentation, in particular a registry or database of monuments, and the interaction between these elements.

The coastal strip from Szczecin and Świnoujście to the Tri-City, and the north-eastern edge of Poland in the Suwałki region are characterized by an extremely favourable distribution of wind speed and energy in the country. The investor planning the project in the commune of Słupsk was primarily guided by favourable wind conditions in the discussed area, which are decisive for the profitability of the investment. The investor is planning to erect a team of wind turbines NORDEX type N90 with a capacity of 2.5 MW each. The location of the wind farm was determined in the land development plan, taking into account the terrain and the anticipated acoustic impacts of the farm on the buildings subject to protection, mainly

housing and farm, as well as the required mutual distances between the devices.
The impact of the investment on the existing acoustic climate will occur both during its construction and operation. At the construction stage, the source of noise will be primarily the highly specialized mechanical equipment (road machines, excavators, bulldozers, cranes and other equipment) necessary for the installation of a wind turbine and, to a lesser extent, vehicles supplying the construction site with building materials (reinforcement, cement, structural elements, etc.). Vehicle exhaust systems will be the source of pollutants entering the air. The level of emissions in this area will depend, among others, on the time that the equipment has been in operation. Along with the completion of the construction, potential nuisances will cease. During the operation of the wind farm there will be no sources of air pollution, and the individual wind turbines will be a source of noise.
The impact on the earth surface will occur mainly during the construction phase during earthworks. Construction of each turbine, as well as cabling, will be accompanied by excavations. The use of construction equipment for the work will require the preparation of temporary access roads and manoeuvring areas. With the completion of the work, the impact will cease. The implementation of the wind farm will to some extent disturb the existing water relations in the soil and water environment, but at the stage of exploitation of the project, a new state of equilibrium will be established. A comparable range of impact will also apply to the landscape.
Impact on people and fauna will occur at the farm's operation stage, while the range of impact has been taken into account when drawing up the site development concept, through the appropriate location of the wind farm away from, among others, places of residence. A description of potentially significant environmental impacts of the planned project is included in the next chapter.

9. Description of potentially significant environmental impacts of the planned project, including direct, indirect, secondary, cumulative, short-, medium- and long-term impact, permanent and temporary environmental impacts resulting from the existence of the project, the use of environmental resources and emissions, and the description of forecasting methods used by the applicant

9.1. Noise emission

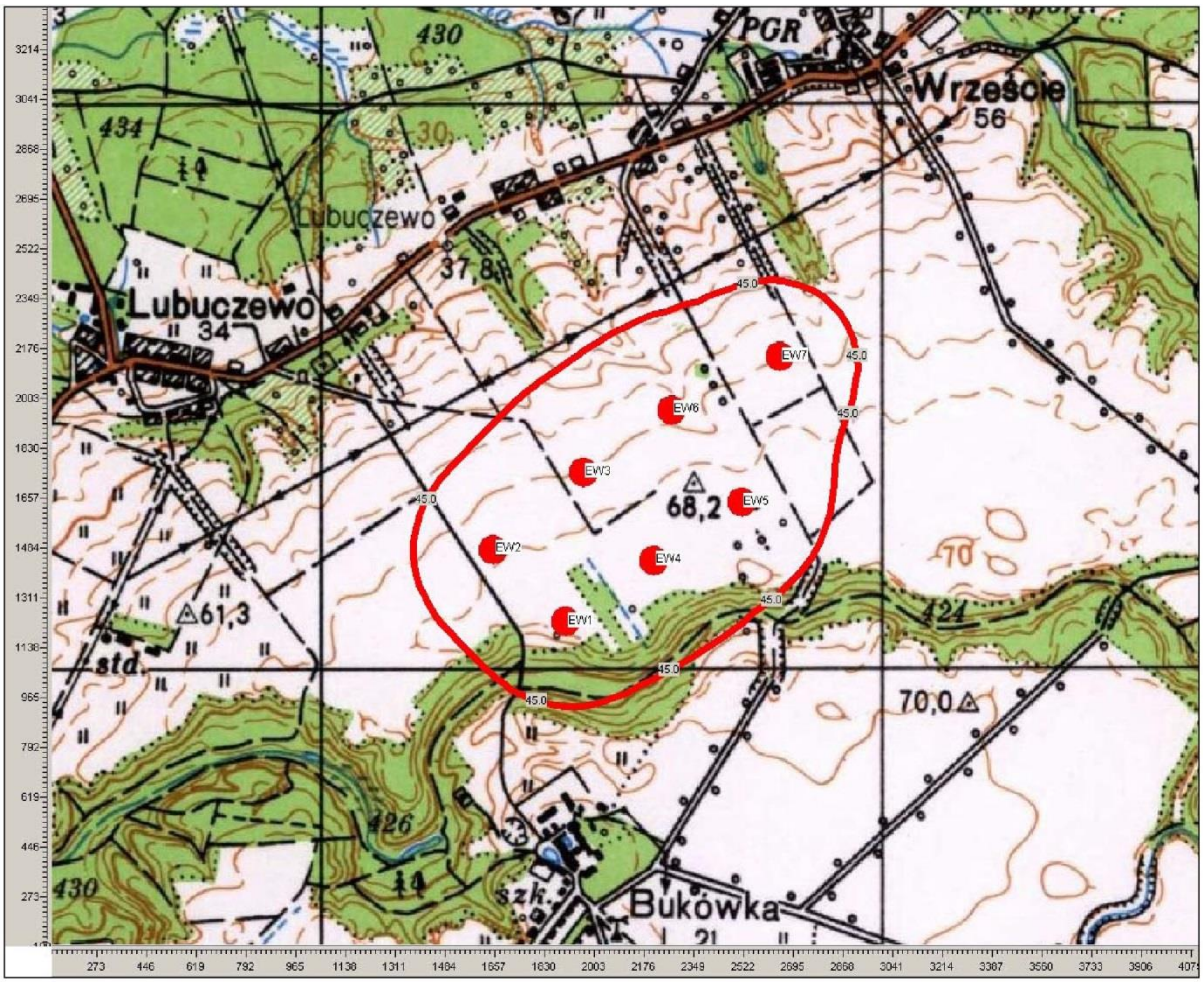
Noise is regulated by the Regulation of the Minister of the Environment of June 14, 2007 on permissible noise levels in the environment. It specifies different permitted noise levels for sites depending on their purpose, noise levels taking into account the type of site or activity being the source of noise, as well as the periods (reference periods) to which the noise levels apply. Among the objects and activities that are the source of noise, the following have been distinguished:
1. in one group:
- roads or railways,
- other objects and activities being the source of noise,
2. in the second group:
- take-offs, landings and flights of aircraft,
- electrical supply lines,
Noise from the wind farm area is included in the group of other facilities and activities being the source of noise.
The regulation contains indicators applicable to setting and controlling the conditions of using the environment (L_{Aeq} D and $L_{Aeq\ N}$) and conducting a long-term policy in the field of protection against noise (L_{DWN} and L_N). According to the above the protection provision

comprises areas of multi-family housing and collective housing, farm buildings and residential and service areas, where the acceptable noise levels are $L_{Aeq\ D}$ = 55 dB during daytime, and $L_{Aeq\ N}$ = 45 dB at night, where $L_{Aeq\ D}$ corresponds to a reference range of the least-favourable 8 hours for the next day's successive days, $L_{Aeq\ N}$ is a reference interval equal to 1 least-favourable hour of the night.

To estimate the degree of nuisance of wind farms in the environment, a forecast of sound propagation was made. For the calculations the computer program LEQ Professional developed by Biuro Studiów i Projektów Ekologicznych oraz Technik Informatycznych Soft-P in Piotrków Trybunalski was used, with the approval of the Institute of Environmental Protection.

In the relation between the noise emitted from a wind turbine and imitated in the adjacent area, the following elements were included in the sound propagation: special elements, taking into account the nature of the source, reduction of noise along with distance, shielding by acoustic obstacles, attenuation through green areas, sound absorption by air. As a result of the calculations, the levels of noise from the turbine and the range of its impact on the environment were determined. The acoustic plan regarding the noise penetration into the environment from the designed wind farm, NORDEX N90 2.5 MW type, is shown in Fig. 8 (against the background of the topographic map) and in Fig. 9 (against the background of the satellite map).

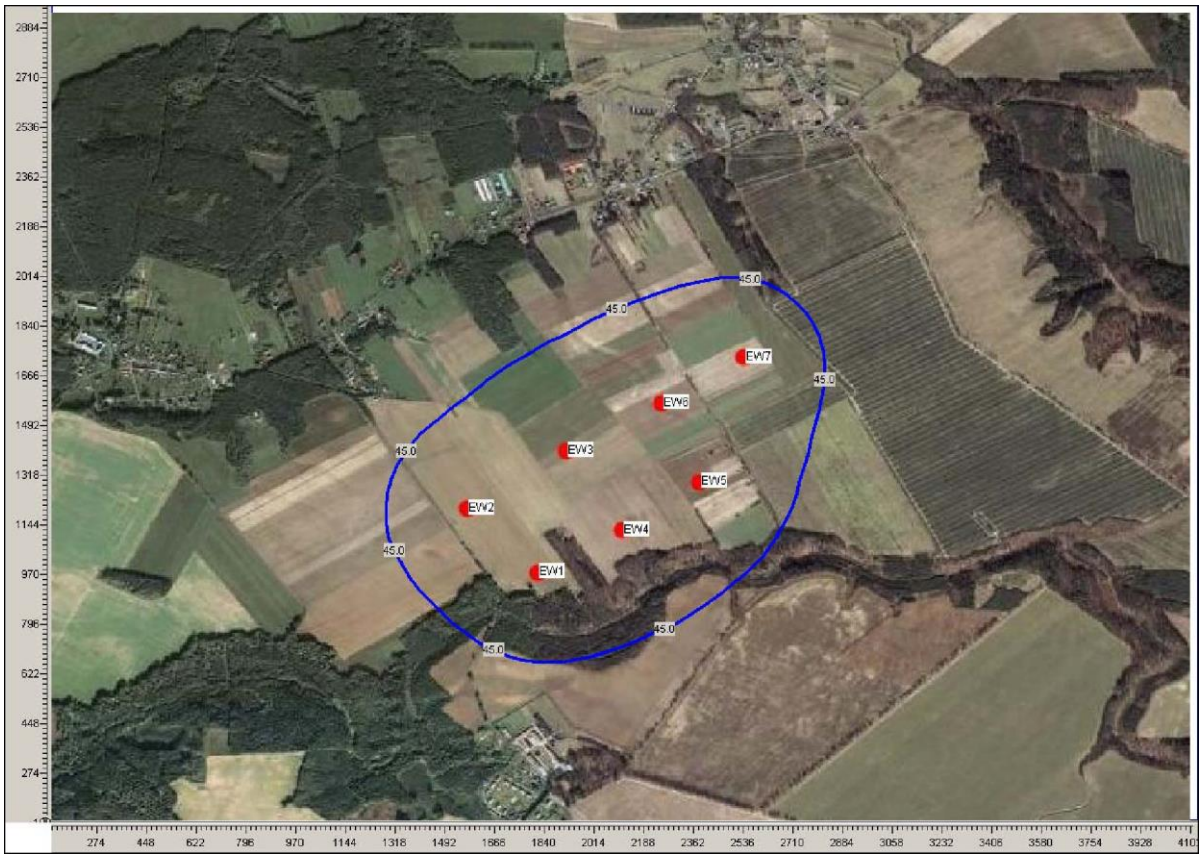
Fig. 8 Acoustic map showing the range of impact of noise from 7 wind turbines in the area of the villages of Lubuczewo and Wrzeście - red isoline is for 45 dB



The limit value for the night (more stringent from an environmental point of view) is

illustrated by isoline 45 dB - the red line in the figure above. The range of the isoline is about 300 m counting from each outermost turbine, and does not include areas subject to the protection of farm and residential buildings.

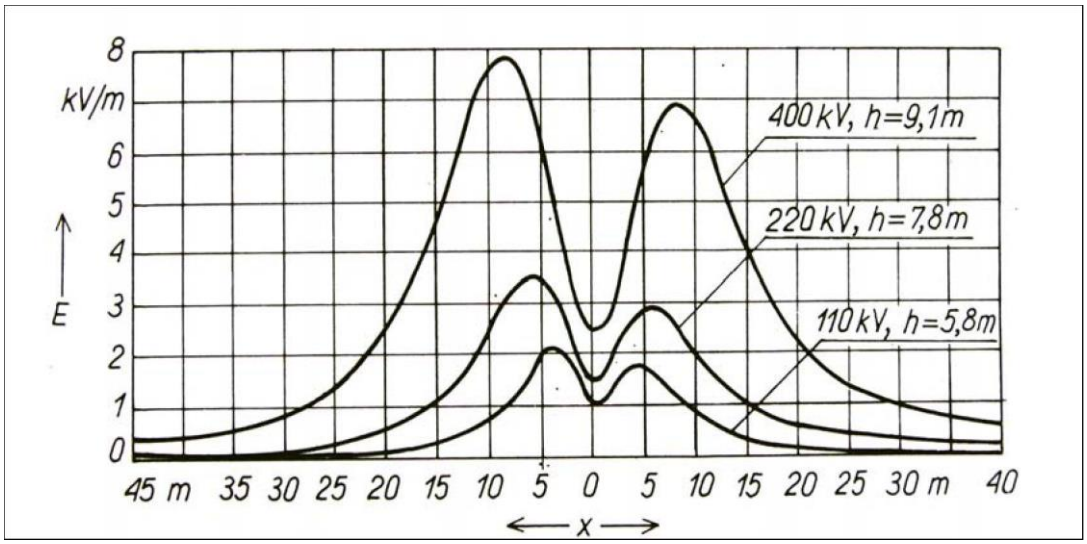
Fig. 9 Isoline 45 dB against the background of a satellite photograph of the Lubaczewo - Wrzeście region



9.2. Electromagnetic radiation

Permissible level of electromagnetic non-ionizing radiation in the environment is specified in the Ordinance of the Minister of Environmental Protection, Natural Resources and Forestry of 11 August 1998 on detailed principles of protection against radiation harmful to people and the environment, acceptable levels of radiation that may occur in the environment, and requirements for performing radiation control measurements.

Fig. 10 Field strength distribution under power lines at different distances "x" from the axis



	kV/m
	400 kV, h=9.1m
	220 kV, h=7.8m
	110 kV, h=5.8m

Pursuant to this regulation, the permissible electromagnetic radiation values for 50 Hz fields produced by stations and electrical suppy lines are determined by the values of such physical quantities as:

• electric component of the 10 kV/m field,
• magnetic component of the 80 A/m field.

Through the area of the investment the underground power supply line SN (about 30 kV) will run, from which the values of electromagnetic fields are not analysed, as they are many times lower than the permissible values.

Electricity from the wind farm near Lubuczewo and Wrzeście will be discharged to the intermediate substation GPZ 30/110 kV, from there by the 110 kV overhead power line to the 110/400 kV substation in the village of Wierzbięcino, where the power lines and GPZ will be a separate project.

9.3. Disruption of landscape

The foundation of seven wind turbines will change the aesthetic values of the agricultural landscape. The impressions related to this will have a subjective character. Supporters of an undisturbed natural landscape will harbour negative feelings. In this case, it should be assumed that wind turbines will be the dominant element of the landscape due to the height of the masts (up to 120 m ± 5%). According to the analysis of the area covered by the project (the total plot area is approx. 56.3 ha) the density of wind turbines will be on average: 1 wind turbine /8 ha, the distances between the newly designed turbines will reach respectively: in the EC system approx. 1.2 km, while in the NS system, approx. 0.7 km, maintaining the distance between them in the range of 400 - 500 m. Positive feelings can be evoked through observation of harmonious movements of the propellers (a fascination comparable with that of fire or water), slender building figures, or the availability of the most modern techniques for obtaining energy from renewable sources in the poor rural region. For visual reasons, it is important to determine the same direction of rotor rotation for all the wind turbines, and to set the same rules for painting them. The NORDEX N90 turbines have one direction of rotation

(clockwise).

9.4. Waste generation

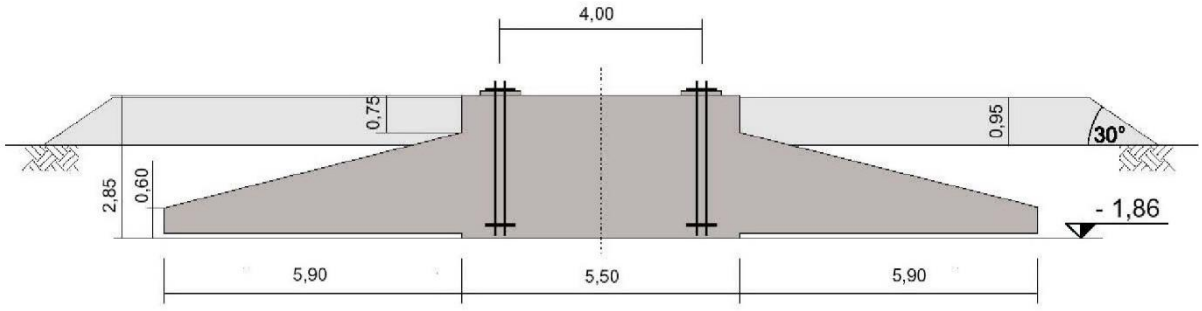
NORDEX N90 2.5 MW wind turbines have been designed with a mechanical gear, hence transmission oil will be used to lubricate the rotation mechanisms. The oil will also be used in the shaft lubrication system, as well as in the cylinders used to rotate the gondola and adjust the blade angle. When replacing such oils, waste from group 13 of the waste catalogue classified as hazardous will be generated, In the hydraulic system of one wind turbine, oil will be used in an amount of approx. 160 dm^3, in the transmission system of approx. 80 dm^3. If the "dry" version of the NN/MV transformers is installed or they are filled with a non-replaceable oil, then no waste from used transformer oil, which also belongs to hazardous waste, will be generated.
The types of waste expected to be produced during the wind farm's operational stage and their corresponding codes are presented in Table 3. The symbol * indicates hazardous waste.

Table No. 3. The types of hazardous waste expected to be produced

Item	type of waste	waste code
1	hydraulic fluid	13 01 13*
2	transmission oil	13 02 08*

Guided by the operational information about existing wind farms it is to be expected that for the designed wind farm, the average amount of hazardous waste generated during the period of device usage should not exceed approx. 0.3 Mg/year. In accordance with the Act on waste, a producer of waste generated as a result of providing services in the field of, among others, maintenance and repair of equipment is the entity that provides the service, unless the contract for the provision of services provides otherwise.
At the stage of investment implementation, waste from construction materials and building elements may occur on a one-off basis, including waste marked with code 17 01 01 and 17 01 82, such as waste from concrete, reinforcing bar and other not mentioned waste. It can be estimated that their number will not exceed 0.7 Mg (0.1 Mg for one turbine).

Fig. 11 Cross-section of a typical circular foundation with a diameter of 17 m for a wind turbine with a tower about 100 m high



The earthworks will be accompanied by waste in the form of soil from excavations marked with code 17 05 04. The quantities of soil from excavations can be estimated as follows:
- for the foundations of the wind farm - approx. 3.500 m^3,
- for cables - approx. 1.500 m^3,
- for access roads and manoeuvring areas - approx. 13.600 m^3.

The investor declares the use of the land as needed and within the limits of the project (e.g. for the construction of access roads) or export to a place agreed with the local authorities.
The Waste Act excludes from the waste category the earth masses removed or moved in connection with the implementation of the investment, if the local spatial development plan, the decision on building conditions or the building permit determine the conditions and manner of managing them. Therefore, the earth masses should be used in the first place, if possible, within the boundaries of the area. If, on the other hand, there was no possibility of using the earth masses on the site, then they should be exported to other places agreed with the local authorities. Considering the protection of utility values of the soil, the top layer (humus) should be collected for agricultural use or used in any other agreed place as above.

9.5. Emergency situations

During the normal operation of newly designed turbines based on NORDEX N90 2.5 MW devices, there is little probability of an emergency situation related to environmental concerns. Potential hazard is the possibility of lube oil leakage from transmission systems and hydraulic fluid leakage, both used in mechanical systems placed in the engine nacelles (according to factory data, about 160 litres of hydraulic fluid and about 80 litres of transmission oil are used in one turbine, also a few kilograms of lubricator in the shaft mounting system and bearings for rotating elements). The penetration of oil and petroleum substances from the nacelle to the ground is unlikely, due to the tight structure of the base and the nacelle housing. To some extent, however, there will be a risk of contamination of the water and soil environment in places surrounding the foundations of individual towers. Potentially possible are also emergency situations regarding the operation of electric and electronic systems, which may, for example, lead to short circuits and fire (Fig. 6). In such situations, there would also be indirect environmental effects that cannot be estimated at this stage.

Photo 6. July 2003, Great Britain, fire at the wind farm located near the NISSAN factory (source: BBC Internet)

Prevention of such situations consists in periodic inspections and maintenance of equipment and subassemblies in a proper technical condition.

9.6. Project liquidation

Currently, the investor is starting construction of wind turbines and is not planning to liquidate them yet. Eventual liquidation of the project may occur, for example, for economic reasons. At the stage of decommissioning, the most important issue will be the restoration of the utility value of the area. If this intention were to occur in the future, then the following

rules should be followed:
- determine the destination of the land,
- dismantle the devices and accompanying installations and segregate the generated wastes according to type, as well as in terms of their reuse,
- ensure proper disposal or reprocessing of waste,
- protect all openings of underground installations against penetration of dirt from the ground surface.

According to the NORDEX device manufacturer's data, total weight of a single tubular tower (six segments) is estimated at approx. 306 Mg. The foundation is embedded with, among others, a load distribution plate (2 pcs.) with a weight of approx. 3.1 Mg, an anchor plate (2 pcs.) - approx. 1.7 Mg, bolts (160 pcs.) - approx. 6.0 Mg and washers, nuts and small elements - approx. 0.4 Mg. In view of the above, liquidation of seven wind turbines may be accompanied by the production of waste with a weight of approx. 2220 Mg. In accordance with the Act on waste, the producer of waste generated as a result of providing services in the field of demolition of facilities is the entity that provides the service, unless the contract for the provision of services provides otherwise.

In accordance with the Environmental Protection Law, the designation of the area is determined on the basis of its actual development and use, it may possibly also be based on the local development plan.

10. Description of the activities envisaged to prevent, reduce or offset harmful environmental impacts

To minimize the result of negative impact on the environment arrangements for protection of surface soil (humus) should be applied through the collection of the surface soil before the start of earthworks at the foundations, excavations as well as temporary and final roads, and the use of its utility values elsewhere. In accordance with the Act on waste, the producer of waste generated as a result of providing services in the field of demolition and repair of facilities as well as maintenance and repair of equipment is the entity that provides the service, unless the contract for the provision of services provides otherwise.

Limiting the amount of generated waste will consist in carrying out the activities of equipment maintenance (including repairs, etc.) by a specialist company that will ensure proper waste handling, including their reuse or disposal.

This wind farm will be located approx. 4 km east of the special bird protection area from the Nature 2000 network marked with the symbol PLB 220002 Dolina Słupi. Within its borders there are at least 22 species of birds from Annex I of the Birds Directive and 4 species from the Polish Red Book. During the breeding season it is inhabited by at least 1% of the national population of birds of the species like red kite ore, fawn, osprey, common sandpiper, goldeneye and merganser. There are many birds from the species: white stork, black stork, loner, lerca and red-backed shrike. Within a dozen or so kilometres north-east and north there are PLH 220023 "Pobrzeże Słowińskie" and PLB 220003 "Ostoja Słowińska", which include the Słowiński National Park, and PLB 990002 Coastal Waters of the Baltic Sea. Wind turbines create a potential risk of birds colliding with the turbines. The investor declares to apply the following solutions and deterrents to mitigate this risk:
- painting the tips of the propellers (on the length of 1/3 of the blade) with orange or red paint,
- tower lighting with white rotating light.

Regardless of this, monitoring of the impact of wind turbines on avifauna inhabitating the region is planned.

Due to the scale and type of activity and related emission volumes, there are no reasons to introduce compensation for the environmental negative impacts of the project on the environment.

11. Indication whether it is necessary to establish a limited use area for the planned project (if it is necessary to define the boundaries of such area, restrictions on the use of land, technical requirements for construction works and ways of using them)

For the discussed project, which is the construction of a wind farm, there is no need to establish a limited use area. Environmental protection law, in art. 135 lists the objects around which an area of limited use can be established. Among the listed are, among others, electrical supply lines and substations. However, the discussed project does not include their construction - the course of power lines and the detailed location of the GPZ station will constitute a separate undertaking.
The 30 kV MV power lines planned for implementation under this project will run underground, at a depth of approx. 1 m. The electromagnetic fields produced by them do not reach the limit values, so there is no basis for introducing restrictions on the use of land with the provisions of environmental protection regulations.
The investment area is located near Lubuczewo and Wrzeście. The total area of the plots is approx. 56 ha, around 4% of which will be occupied for foundations, access roads and manoeuvring areas. There are no restrictions or contraindications to leaving the remaining area (except for wind turbines and access roads) for agricultural use, as this has been the case until now.
Extremely important - in the aspect of acoustic protection of areas of farm and residential buildings – should be a restriction including the prohibition of the presence of such buildings within the limits of the wind turbines' impact range ($L_{Aeq\ N}$ isoline = 45 dB), i.e. on the area of approx.. 230 ha.

12. Presentation of issues in graphical form

The following data and illustrations in this report have been presented in graphical form:
- photographs:
1. One of the first wind farms in Poland, Cisowo I (1999) and II (2002) near Darłowo - page 6,
2. Wind farm in the area of Kołbaskowo, near the Polish-German border - page 7,
3. The profiles of typical wind turbines with the capacity range of 1.2 - 2.5 MW - page 14,
4. NORDEX wind turbine - page 15,
5. Place of the planned location of the wind farm - view from the side of the village of Lubuczewo - page 17,
6. July 2003, Great Britain, fire at the wind farm located near the NISSAN factory (source: BBC Internet) - page 28,
7. Articles "Walka z wiatrakami", „Wiatraki za plecami" posted in "Głos Pomorza" in the years 2002 - 2003 r. - page 32,
8. Subsequent articles from "Głos Pomorza" from 2007, "Przeminęło z wiatrem" and „Obietnice na wiatr są rzucane", indicating the occurrence of conflicts related to wind farms - page 32-33,
9. Articles from October and November of 2007 ("Głos Pomorza") with a positive opinion regarding wind farms and energy reception from wind to the power grid - page 34,
- tables;
1. Leading countries in Europe in terms of the power output of wind power equipment (over 1000 MW in 2007) as of 1999 – 2007 – page 7,

13. Analysis of possible social conflicts related to the planned project

Signs of social conflicts related to this type of undertakings occurred, for example, in the Ustka commune. At the stage of establishing the local development plan for parts of the Ustka commune for the needs of wind farms, the residents of Starkowo protested fearing excessive noise, threats from electromagnetic fields and construction disasters. During the years 2002 - 2003 the local press wrote about the protests (Photo 7). Residents of the area covered by the plan after a meeting with the mayor of the Ustka commune - the author of the plan and the investor's representative, accepted the plan's arrangements.

Photo 7. Articles "Walka z wiatrakami" and „Wiatraki za plecami" posted in"Głos Pomorza" in the years 2002 - 2003

GMINA USTKA. Mieszkańcy nie chcą pół wiatrowych

Walka z wiatrakami

Sesję Rady usteckiej gminy zdominowały kontrowersje wokół lokalizacji pól wiatrowych. Protest złożyli mieszkańcy wsi Starkowo.

Radni poprzedniej kadencji opracowali plany zagospodarowania przestrzennego przewidujące budowę trzech parków wiatrowych: Duninowo-Wodnica, Możdżanowo-Starkowo i Zaleskie. Plany wystawiono do wglądu. We wtorek radni rozpatrywali zgłoszone protesty.

- Jestem właścicielką dwóch działek w pobliżu planowanej wiatrakowni - mówi **Helena Znajdek** ze Starkowa. *- Jeden z wiatraków ma stanąć około 400 metrów od mojego domu. A słyszałam, że nie można ich stawiać bliżej niż 500 metrów, z powodu nadmiernego hałasu. Pomiędzy domem a wiatrakownią jest moja druga działka, na której chcą budować się dzieci. Jak staną wiatraki, nie będą mogły postawić domu na własnej działce. Złożyłam protest. Wójt odpisał, że zagrożenia przekroczenia dopuszczalnej granicy 40 decybeli nie będzie, bo można zastosować urządzenia o mniejszej mocy. Ale już następnego dnia po tej odpowiedzi był u mnie przedstawiciel inwestora i namawiał, bym podpisała zgodę. Niczego nie podpiszę. Mój syn w Niemczech pracował przy takich wiatrakach. Mówił, że jest tam hałas nie do wytrzymania.*

Podobne wątpliwości ma **Renata Rzeczkowska,** także ze Starkowa. *- Słyszałam o polu magnetycznym wokół takich wiatrakowni* - mówi. *- Nieoficjalnie dowiedziałam się, że w ich pobliżu nie można przebywać dłużej niż cztery godziny. Wiatrak ma stanąć niemal na granicy pomiędzy terenem inwestycji a moim polem. To znaczy, że na moim polu będę mogła przebywać tylko 4 godziny? Słyszałam też, że może dojść podczas wichury do oderwania śmigła, a nawet przewrócenia się masztu.*

Protest podpisało 32 mieszkańców Starkowa. Osobne złożyli niektórzy mieszkańcy Wodnicy i Duninowa.

- Jestem zaskoczony, że tych socjologicznych protestów jest i tak niewiele - przyznaje **Witold Sikorski,** główny projektant parków wiatrowych. *- Na razie mamy do czynienia z planem miejscowym. A on ma tylko umożliwić inwestorowi uruchomienie dalszych prac projektowych, w tym także stworzenie raportu o wpływie inwestycji na otoczenie i środowisko. Każda z tych osób będzie stroną w postępowaniu inwestycyjnym i będzie miała wiele możliwości skutecznego protestowania.*

- Nikt nie wybuduje wiatraka, którego potem nie będzie mógł eksploatować - uspokajał **Zbigniew Wojciul,** przedstawiciel inwestora, spółki Polska Energetyka Wiatrowa. *- Nie zainwestujemy przecież miliona dolarów na każdy jeden megawat, jeśli lokalizacje wiatraków zakwestionuje chociażby inspektorat ochrony środowiska.*

Protesty wzburzyły wójta **Tomasza Wszółkowskiego.** *- Nie upewnimy się, że to szkodliwe, jeśli nie będzie raportu* - grzmiał. *- A nie będzie go, jeśli nie pozwolimy inwestorowi dalej pracować. Chcemy zrobić mieszkańców tej gminy bogatymi ludźmi. Niektórzy za lokalizację parków na swoich gruntach będą dostawać nawet kilkukrotność emerytury. Ale błagam, nie rzucajcie mi kłód pod nog, gdy sprowadzam inwestorów.*

(borg)

Fot. SŁAWOMIR ŻABICKI

Radni odrzucili protesty do planu miejscowego. Oznacza to, że PEW będzie mogła rozpocząć przygotowywanie planów budowy trzech parków. Łącznie ma na nich stanąć 120 wiatraków. Wójt Wszółkowski ogłosił, że ma już zapewnienie Zakładu Energetycznego, iż ten kupi wiatrową energię.

Wiatraki za plecami

Przeciwko lokalizacji farmy wiatrowej protestują mieszkańcy Charnowa w gminie Ustka. Zapowiadają złożenie doniesienia o przestępstwie. Nie wykluczają też zwołania referendum w sprawie odwołania władz gminy.

Fot. SŁAWOMIR ŻABICKI

Ryszard Kucharski chciał wspólnie z synem wybudować dom. Sąsiedztwo wiatraków może mu w tym przeszkodzić.

–Na tablicy wywieszono informację o zmianie planu zagospodarowania przestrzennego, ale co z tego, skoro nikt jej nie widział – mówi **Jolanta Kijewska,** sołtys Charnowa. *– Uważamy, że gmina naruszyła procedurę uchwalania zmiany planu zagospodarowania przestrzennego. Nam wiatraki nie przeszkadzają, chcielibyśmy mieć jedynie wpływ na ich lokalizację.*

Mieszkańcy zaskoczeni zostali przedstawionymi im planami. Zgodnie z nimi wiatraki mają stanąć bliżej ich domów niż się spodziewali. *– Nikt nie mówił o szkodliwości urządzeń, teraz okazuje się, że w obwodzie 700 metrów można tylko zboże posiać, bo w takiej odległości przebywać można najwyżej pięć godzin dziennie* – denerwuje się **Ryszard Kucharski**. *– A my przecież tam mieszkamy.*

Mieszkańcy czują się oszukani również przez inwestora. *– Obiecano nam, że wiatraki będą daleko od wsi, że postawią je za torami* – mówi **Halina Pioch**. *– Tymczasem zamierza się je stawiać w naszym sąsiedztwie. Okazuje się, że na działkach które tam mamy nie możemy się budować.*

Inwestor zaprzecza, że kogokolwiek wprowadził w błąd. *– Dokładana lokalizacja wiatraków jest jeszcze sprawą otwartą* – zapewnia **Marek Jaroszyk**, prokurent zarządu firmy Enertrag Polska. *– Poza tym niezależny rzeczoznawca sporządził raport oddziaływania na środowisko. Wynika z niego wprost, że wiatraki nikomu nie szkodzą, a w ich pobliżu można mieszkać i uprawiać ziemię.*

Wicewójt **Zdzisław Lesiecki** przyczynę niezadowolenia mieszkańców tłumaczy kilkoma powodami. *– Konflikt powstał dlatego, że wszyscy mieszkańcy Charnowa chcą mieć wiatraki na własnej ziemi, bo jest dobry interes. Niestety, urządzeń może być tylko kilka.*

Wicewójt odpiera również zarzuty, że procedura uchwalania planu zagospodarowania przestrzennego była utajniona. *– Plan był wywieszony, trzy lata trwała procedura jego uchwalania, każdy miał prawo wnieść swoje uwagi* – mówi. *– Zapewniam, że dbamy o interesy mieszkańców wsi i nie robimy nic przeciwko nim.*

Mieszkańcy Charnowa od uchwały Rady Gminy przyjmującej plan zagospodarowania przestrzennego odwołali się już do Samorządowego Kolegium Odwoławczego. Swój protest zamierzają złożyć również w Naczelnym Sądzie Administracyjnym. O popełnieniu przestępstwa zamierzają powiadomić prokuraturę. *– Jeżeli to nie pomoże, zwołamy referendum w sprawie odwołania wójta i Rady Gminy* – zapowiada radny **Bernard Lipczyński**.

MAGDALENA GRYKO

Photo 8. Subsequent articles indicating the occurrence of conflicts related to wind farms - from 2003 and 2007, both from "Głos Pomorza"

Wójt robi w tył zwrot, czyli wygrali mieszkańcy

Przeminęło z wiatrem

Wójt Ustki chce zmienić uchwałę o zagospodarowaniu przestrzennym Charnowa. W ten sposób zareagował na protesty mieszkańców przeciw lokalizacji farmy wiatrowej.

O buncie mieszkańców pisaliśmy dwa tygodnie temu. Według nich władze gminy oraz inwestor oszukali ich, bo przyjęty plan zagospodarowania sytuuje farmę wiatrową zbyt blisko ich domów. W związku z tym ludzie obawiali się, że nie będą mogli rozbudowywać swoich gospodarstw. Przekonywali także, że przebywanie w bliskim sąsiedztwie wiatraków wpłynie niekorzystnie na ich zdrowie.

Fot. SŁAWOMIR ŻABICKI

Mieszkańcy Charnowa protestowali przeciwko budowie farmy wiatrowej, bo obawiali się o swoje zdrowie.

Podczas czwartkowego spotkania z mieszkańcami Charnowa wójt nie dyskutował. Sam zadeklarował, że wystąpi z wnioskiem o uchylenie uchwały. Ma to nastąpić w czasie gminnej sesji we wrześniu.

– *Wójt całkowicie nas zaskoczył* – mówi **Jolanta Kijewska**, sołtys Charnowa. – *Będziemy czekać, co wyniknie z tych deklaracji.*

Poparcie dla wniosku wójta wyrazili już obecni na zebraniu radni gminni. Niektórzy z nich chcą nawet przyspieszyć działanie i stosowny wniosek wprowadzić jeszcze na sesję sierpniową.

(maz)

WIATRAKI Firma nie płaci rolnikom, bo ma nieustająco przejściowe kłopoty

Obietnice na wiatr są rzucane

Coraz większe zamieszanie wokół ferm wiatrowych w podsłupskiej Krainie w Kratę. Rolnicy nie dostali obiecanych pieniędzy za dzierżawę gruntów pod wiatraki. Inwestor uspokaja: – To przejściowe trudności.

MICHAŁ KOWALSKI
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Ponad 120 siłowni wiatrowych ma stanąć w gminie Słupsk i Ustka w okolicach Wielichowa, Swołowa, Możdżanowa i Starkowa. Inwestycja podzieliła okolicznych mieszkańców. Zwolennicy agroturystyki mówią, że to będzie śmierć regionu. – Nikt do nas nie będzie przyjeżdżał – stwierdza Wojciech Żytko, sołtys Możdżanowa.

Jednak większość rolników z regionu skusiły pieniądze. Za grunt pod siłownię wiatrową. Inwestor – niemiecka spółka CB Wind Energy płaci około trzy tysiące euro rocznie. Umowy podpisano rok temu – wypłaty powinny trafić na konta rolników już na początku tego roku. Jak na razie pieniędzy nie dostali.

– Od kilku dni próbuję się dodzwonić do firmy i nic. Szukam prawnika, by bezkolizyjnie rozwiązać umowę, ponieważ nie wierzę już tym ludziom – mówi nam właścicielka ziemi, którą wydzierżawiła pod wiatraki.

CB Wind Energy obiecuje, że będzie dobrze.

– Uzgodniliśmy z wydzierżawiającymi, że zapłacimy do końca lipca, a ci którzy mają więcej niż jedną siłownię otrzymają pieniądze do końca roku. Mimo wszystko postaramy się uregulować zaległości jak najszybciej – powiedział nam Clemens Barlage, właściciel firmy.

Tłumaczy, że opóźnienia w wypłacie pieniądze są spowodowane przedłużającą się procedurą zatwierdzenia miejscowych planów zagospodarowania przestrzennego. Te, które umożliwiają budowę farm wiatrowych, są obecnie zaskarżone przez wojewodę pomorskiego. Ponieważ nie wiadomo jak sprawa się skończy – sponsorzy Barlage nie chcą mu wypłacić obiecanych pieniędzy.

Właściciel CB Wind Energy wciąż powtarza, że pieniądze będą, bo znalazł jeszcze innych inwestorów, którzy zgodzili się dofinansować interes.

– Sprzedaliśmy im 50 procent udziałów w naszej spółce. Z tych pieniędzy uregulujemy wszystkie zaległości – obiecuje Barlage – Za dzierżawę zapłacimy już w przyszłym tygodniu.

Przypomnijmy, że Barlage obiecuje także wybudowanie fabryki siłowni wiatrowych. Tymczasem w ubiegłym tygodniu z placu budowy zeszła firma Multi-Projekt, bo CB Wind Energy nie zapłacił jej dwóch milionów złotych za wykonane prace. Jej prezes Robert Król stwierdził, że CB Wind Energy to oszuści i mitomani. Barlage żąda teraz przeprosin od Króla.

Tymczasem z firmy niemieckiej odeszła Krzysztofa Gutowska, była prezes zarządu. Nie chciała nam powiedzieć dlaczego.

– Nie spełniała naszych oczekiwań. To była nasza decyzja – mówi Barlage.

Od spółki odwraca się także Mariusz Chmiel, wójt gminy Słupsk.

– Ja popierałem wiatraki, a nie konkretnie pana Barlage – stwierdził w rozmowie z nami. – Od zawsze miałem wrażenie, że jest to mało wiarygodna firma.

Tymczasem z oficjalnej strony internetowej Urzędu Gminy Słupsk wciąż można pobrać umowę dzierżawy na grunty.

Znajdują się tu również materiały reklamowe niemieckiej firmy CB Wind Energy. ■

LICZBA DNIA

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miesięcy temu Clemens Barlage oznajmił, że wybuduje fabrykę wiatraków w Słupskiej Specjalnej Strefie Ekonomicznej. Jak się okazało nie kupił wtedy nawet gruntu pod halę.

Subsequent protests had a different basis (Photo 8). Some landowners affected by the change of plan expressed dissatisfaction with the fact that wind farms will not be located on their plots. The basis for this dissatisfaction was primarily the fact that making the land available for the construction of a wind farm is associated with a fee constituting a regular income of the lessee. In a region with a high unemployment rate, defining locations becomes an existential problem. But the dissatisfaction is also caused by the company not paying farmers for renting land for planned wind turbines.

The presented press articles are an example that the location of wind farms may be controversial.

Photo 9. Articles from October and November of 2007 ("Głos Pomorza") with a positive opinion regarding wind farms and energy reception from wind to the power grid

KOBYLNICA Ogromne skrzydła w gminie

Wiatraki już stoją

Trzy pierwsze elektrownie wiatrowe pojawiły się na polach pomiędzy Widzinem, Kobylnicą i Łosinem. Do końca marca stanie jeszcze ponad 20.

Od kilku dni ponad okolicznymi polami górują dwa ponad stumetrowe wiatraki. Trzeci już prawie jest skończony. Wczoraj robotnicy montowali jego śmigło.

Wszystkie siłownie można już zaobserwować z prawej strony, jadąc drogą w kierunku Poznania.

Jeszcze w grudniu elektrownie wiatrowe będą miały testowy rozruch. Inwestorem farmy wiatrowej jest japońska firma, która chce pod Kobylnicą zbudować do końca marca przyszłego roku aż 24 elektrownie. Wtedy też z siłowni wiatrowych popłynie prąd do sieci.

Każdy wiatrak ma około 90 metrów wysokości, śmigło ustawione w pionie wydłuża go do 140 m. , moc siłowni to dwa megawaty. Już wiosną przyszłego roku w gminie Kobylnica budowę 21 elektrowni wiatrowych rozpoczną też Austriacy. Ich wiatraki powstaną w okolicach Kończewa.

PIOTR KAWAŁEK

LICZBA DNIA

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wiatraków powstanie w gm. Kobylnica.

Budowa wiatraków w gm. Kobylnica.

ENERGETYKA Ekologiczna energia niedługo w naszych domach

Energa kupiła prąd z wiatru

Spółka Energa-Obrót podpisała umowę na zakup energii z budowanych właśnie elektrowni wiatrowych pod Słupskiem. Prąd z wiatru popłynie najszybciej za dwa lata.

Umowa jest zwieńczeniem ponad półtorarocznych prac i negocjacji, jakie toczyły się między Energą a Green Power Polska, firmy z kapitałem japońskim.

– Cieszymy się, że to właśnie nasza spółka zawarła porozumienie z renomowanym, światowym inwestorem – mówi Jacek Śmiech, prezes zarządu Energa-Obrót. – Przedsięwzięcie jest bezprecedensowe w skali kraju. Będzie to największa w Polsce i jedna z największych europejskich elektrowni wiatrowych.

Zakończenie budowy wiatraków planowane jest do końca 2009 roku.

– Szacujemy, że w 2010 roku energia pochodząca z nowej elektrowni pokryje około 20 procent rocznego zapotrzebowania na tak zwaną energię zieloną – mówi Andrzej Lange, Dyrektor Departamentu Rynku Energii w Energa-Obrót. – Wtedy ponad 10 procent sprzedawanej przez nas energii pochodzić będzie ze źródeł odnawialnych.

Zakłady energetyczne w Polsce mają obowiązek kupowania energii od prywatnych producentów oraz pozyskiwania jej ze źródeł odnawialnych, m.in. elektrowni wiatrowych.

W tym roku koncern Energa kupi ponad 850 tysięcy megawatogodzin energii.

(KRAB)

Siłownie wiatrowe stoją już pod Darłowem.

WIELKIE WIATRAKI

Powstająca na terenie gmin Słupsk i Ustka elektrownia wiatrowa składać się będzie ze 104 turbin wiatrowych o mocy 2.3 megawatów każda, co daje w sumie 240 MW mocy elektrowni. Wiatraki będą miały ponad 100 metrów wysokości, a średnica wirnika wynosić będzie prawie 90 m.

The goal of this report on the environmental impact of wind farm in the area of Lubuczewo and Wrzeście is the presentation of the impact the wind farm will have on individual elements of the environment, thus to bring the issue of the actual impact to the fore and contribute to minimise conflicts arising at the interface between technology, people and nature.

14. Presentation of proposals for monitoring the impact of the planned project at the stage of its construction and operation

Taking into account the type of the project and the size of the forecast emissions, there are no circumstances to oblige the investor to monitor the environmental impact of the planned project both at the construction and operation stages. The current state of the art enables remote monitoring of the work of a wind farm, including remote response to irregularities (e.g. turning off the turbine, disconnecting electricity, etc.), which is also indirectly monitoring and preventing emergency situations.
Monitoring as well as controlling the devices will be possible through the automation and work control system of individual wind turbines, including the control of the return of generated energy to the energy system.
Nevertheless, at the project's operational stage, the investor declares monitoring of the impact of wind farms on avifauna.

15. Indication of difficulties resulting from technical shortcomings or gaps in contemporary knowledge encountered in the preparation of the report

During the preparation of the report, no problems - as far as the analysed issues were concerned – regarding the shortcomings of technology or gaps in contemporary knowledge were detected.

16. Summary of the information contained in the report in a non-technical language

The project involves the construction of seven wind turbines of the same type, NORDEX N90, in the area of Lubuczewo and Wrzeście, each with a capacity of 2.5 MW, tower height up to 120 m (± 5%) and rotor diameter up to 100 m (± 5%). The accompanying installation will include devices adapting the electrical energy generated in each individual wind turbine for reception, such as transformers in a turbine's nacelle, 30 kV MV connection cables between wind turbines as well as the GPZ substation, which is a separate investment.
Environmental impacts of wind farms will be mainly: noise emission, electromagnetic radiation, as well as periodic waste generation. For the mentioned impacts:
• *in the field of noise emission*
The source of noise will be the rotation the rotor blades of each wind turbine, as well as the generator and engines operating in the turbine nacelle located on the tubular towers, at a height of up to 120 m (± 5%) above the ground level. The analysis of sound propagation showed that the noise penetrating the environment coming from individual turbines as well as collectively from the entire wind farm does not cover the areas of housing and farm buildings subject to acoustic protection. Noise limits in these areas will not be exceeded.
• *in the field of electromagnetic radiation*
Electricity from the area where the seven wind turbines will be located will be discharged to the GPZ power station, which is a separate project, and then to the Słupsk - Wierzbięcin station. A 30 kV medium voltage underground line will run through the investment area, the values of electromagnetic fields coming from the line being many times lower than the limit values.
• *in the field of waste generation*
During the operation of the wind farm, hydraulic and transmission oils used in the turbine's mechanisms (cylinders, gears) will be generated, and they are classified as hazardous waste. This kind of waste will be produced on average in the amount of approx. 0.3 Mg/year. During the construction phase, waste in the form of earth masses from excavations may be produced, unless a method of dealing with them is specified. Their number is estimated at approx. 18 600 m^3.
The environmental impact would also occur through emergency situations. Selected NORDEX N90 turbines can potentially threaten the soil and water environment due to the possibility of lubricating oil leakage from the transmission systems, and hydraulic fluid leakage, used in the mechanisms placed in the turbine nacelle. The leakage of oils from the nacelle to the ground is unlikely, due to the tight construction of the base and the nacelle housing. Potentially possible are also emergency situations regarding the operation of electric and electronic systems, which may lead to e.g. short-circuits and fire. In such situations, there would also be indirect environmental effects that cannot be estimated at this stage. Prevention of such situations consists in periodic inspections and maintaining the equipment and the turbine units in proper technical condition.

Due to the acoustic protection of areas of farm buildings, housing and related to the stay of children and youth - prohibition of this type of construction existing within the impact range of wind farm should be introduced ($L_{Aeq\ N}$ = 45 dB), i.e. on the area of approx. 230 ha.

The closest Natura 2000 the special protection of birds PLB 220002 Dolina Słupi area, is located approx. 4 km west of the planned wind farm, other areas, such as PLH 220023 Pobrzeże Słowińskie, PLB 220003 Ostoja Słowińska and PLB 990002 Coastal Waters of the Baltic Sea are located a dozen or so kilometres northeast and north. Wind turbines create a potential risk of bird collisions with turbines, hence the investor declares the adoption of

specific solutions to reduce this risk and introduce deterrents (covering the ends of propellers with paint, lighting the tower with rotating light).

To harmonize the landscape values of the discussed area, the rotors of each wind turbine should rotate in the same direction. For all the turbines, one manner of painting and same-colour principle should be applied.

17. Names of the persons preparing the report

The report was prepared by the team consisting of: Ewa Tymińska and Edward Tymiński.

18. Sources of information forming the basis for the report

While preparing this report, legal acts and materials made available by the investor were used, as well as the manufacturer's data and data from open publications, in particular:

1. Collective work edited by Andrzej Tyszecki, Wytyczne do procedury i wykonywania ocen oddziaływania na środowisko, IUCN Poland Foundation, Warsaw 1996,
2. Energetyka a ochrona środowiska - WNT Warsaw,
3. Environmental Assessment Sourcebook, The World Bank, Washington, D.C.
4. A plan for action in Europe - Wind Energy, European Commission, London 1997 - 2004,
5. Renewable Energy for Europe (1999 - 2003) - European Renewable Energy Council, Brussels 2004,
6. Materials from the conference: Energetyka wiatrowa na lądzie i morzu - Sopot 2000,
7. Concerted Action on Offshore Wind Energy in Europe - Final report, December 2001,
8. Energetyka wiatrowa - planowanie i realizacja - Gdańsk 2002,
9. Witold M. Lewandowski, Proekologiczne źródła energii odnawialnej, Wydawnictwa Naukowo- Techniczne, Waraw 2002,
10. Źródła odnawialne OZE - conference in the Ministry of the Environment – Warsaw 2002,
11. Provincial Inspectorate for Environmental Protection in Gdańsk, Ocena roczna jakości powietrza w województwie pomorskim za rok 2006, Gdańsk 2007,
12. Provincial Inspectorate for Environmental Protection in Gdańsk, Raport o stanie środowiska województwa pomorskiego w 2005 r., Biblioteka Monitoringu Środowiska, Gdańsk 2006,
13. Provincial Inspectorate for Environmental Protection in Gdańsk, Raport o stanie środowiska województwa pomorskiego według badań monitoringowych przeprowadzonych w 2003 r., Biblioteka Monitoringu Środowiska, Gdańsk 2004,
14. Pola elektromagnetyczne wielkiego miasta z punktu widzenia ochrony środowiska, Biblioteka Monitoringu Środowiska, Warsaw 1996,
15. Zbigniew Engel, Ochrona środowiska przed drganiami i hałasem, Wydawnictwo Naukowe PWN, Warsaw 2001,
16. Mirosław Szklarczyk, Ochrona atmosfery, Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego, Olsztyn 2001,
17. Wykorzystanie niekonwencjonalnych źródeł energii, 1st Scientific and Technical Conference, Słupsk, 2.12.2004,
18. Materials from the International Conference „Perspektywy rozwoju energetyki wiatrowej na morzu i lądzie" - Bałtycka Agencja Poszanowania Energii S.A., Gdańsk 2005 r.,
19. Jerzy Olczak, Kazimierz Siuchniński, Sprawozdanie z badań weryfikacyjnych grodzisk przeprowadzonych na terenie powiatu słupskiego (jesień 1968 - 1970), UAM Poznań,
20. Polska mapa archeologiczna - największe odkrycia, najcenniejsze zabytki, Wydawnictwo Kartograficzne EKO-GRAF Sp. z o.o., Wrocław 2007.
21. Wind energy leads EU power installations in 2007 - EWEA (European Wind Energy

Association), Press release - Brussels, 4 February 2008

19. Conslusions

It is proposed that in the decision on environmental factors for the project consisting in the construction of seven wind turbines, NORDEX N90 type, each with a capacity of 2.5 MW, along with access roads, maneuvering areas and power infrastructure, located on plots no. 23/2, 76, 77, 85 within Lubuczewo and on plots no. 106, 112/3 and 339 within Września-Kępno in the Słupsk commune, the following conditions regarding environmental protection should be taken into account:

• earth masses necessary to be relocated should be used within the boundaries of the project or in a place agreed with the local authorities,

• in the case of encountering objects that may constitute archaeological monuments during earthworks, work should be stopped and the Heritage Conservator should be immediately notified in order to determine the appropriate supervision,

• within the boundaries of the investment, wind turbines with the same color scheme and the same rotational direction of the rotor blades should be installed.

Prepared by:

Appendix

1. Decision of the Mayor of the Słupsk Commune regarding the imposition of the obligation to prepare an environmental impact report, and its scope, for the project entitled "Construction of 7 wind turbines of the same type with a capacity of 2 to 3 MW, including access roads, maneuvering areas and electricity infrastructure" on plots no. 23/2, 76, 77, 85 within the Lubuczewo area and plots no. 106, 112/3 and 339 within the Wrzeście-Kępno area in the Słupsk commune - a letter dated 9 November 2007 marked with ref. number OŚ/DŚ - 7625/42/5/07.