

Non-Technical
Executive Summary

KORSZE WIND FARM
PROJECT, POLAND



Introduction

EDP Renovaveis, the third largest wind power operator around the world has completed development of a 70 MW wind farm in a vicinity of the town of Korsze, northern Poland, Warmińsko-Mazurskie Voivodeship. The aim of this non-technical summary is to ensure that information about the expected environmental and social impacts of the wind farm are disclosed to enable meaningful public and stakeholders engagement process.

Attached to this documents is a non-technical resume which was an integral part of the Environmental Impact Assessment report, prepared for the purpose of an environmental impact assessment conducted by the Korsze authorities prior to issuance of an environmental decision necessary for the wind farm to be developed.

General project presentation

EDP Renovaveis is a leading international wind power developer, with a number of active wind farms located in the USA, Brazil, Spain, France, Belgium, Portugal and Poland. Installed capacity of EDP wind energy increased four-fold between 2005 and 2007, and now the company is among the top three firms in the world in terms of growth in this sector.

As a leading wind developer, the company is committed to guide the business activity in accordance with the sustainable development principles of the EDP Group which among others include:

- Efficient use of resources, including the development of cleaner and more efficient energy technology and development of energy generation means based on renewable sources;
- Environmental protection with minimization of the environmental impact of all business activities and participation in initiatives that contribute to the conservation of the environment;
- Support social development.

Additional information on EDP sustainability can be found here:
<http://www.edprenovaveis.com/Sustainability/AboutSustainability>.

EDP has established a set of guidelines to minimise environmental impact during various development phases in the construction of new wind farms, including project design phase, construction phase, operating phase and finally decommissioning phase. In Poland, EDP Renovaveis already operates one of the biggest Polish wind farms in the vicinity of the village of Margonin, near the Notec River, central Poland. This wind farm consist of 60 wind turbine generators of a nominal capacity 2 MW each (120 MW in total). The Company has implemented and certified an environmental management system in accordance with ISO 14001 standard, to address systematical approach to management of environmental issues at the Margonin wind farm. Similar environmental management system is under development for the Korsze wind farm and is intended for certification by the end of 2012.

The Korsze wind farm, although smaller than the Margonin one, is still one of the largest operating wind farms in Poland. It consists of 35 wind turbine generators (WTGs) type Gamesa G90 of a nominal capacity 2 MW each. Total installed capacity of the Korsze wind farm is therefore 70 MW. The G90 WTGs are modern wind turbines of a tubular tower construction and nacelle housing all mechanical and electrical equipment necessary to transform wind energy into electrical energy. The WTGs installed at the site are 100 m tall,

their rotor diameter is 90 m. Electrical energy generated by the WTGs is transferred via an underground cables to a Transformer Substation (TS) and underground high voltage line (UHVL) between the wind farm TS and the Distribution System Operator TS in the suburbs of the town of Korsze. The cables routes pass in majority along the existing in-field and public roads. The WTGs are operated automatically and do not need any staff to be present at the site on permanent basis. However, access to the individual WTGs is still needed for service and maintenance purposes. Therefore, the WTGs are connected with the public road network with access roads, finished with the service yards. These roads and yards are made of broken stone, which allows partial infiltration of rainwater into the soil thus avoiding construction of additional rainwater sewage system.

The subject wind farm is a single development of this type in the area of at least 50 km radius, although in the neighboring commune of Sępopol a 60 MW wind farm is in a planning phase and another two wind farms are planned in the commune of Reszel. Therefore no cumulative impact of the wind farms was studied in details while the Korsze wind farm development, however, a good management practice will require to take this wind farm into account while assessment of environmental and social impacts of the wind farms developed in the neighboring communes.

Wind turbine generator description

A typical wind turbine generator consists of a tower and a nacelle comprising a rotor and measurement apparatus. The rotor is composed of the blades and an axle, attached to each other by bearing. The blades are moved by the wind and transmit this force to the bearing, which is connected to a multiplier that increases the axle speed. The mechanical energy is transferred from the multiplier to an electricity generator, which transforms it into electricity for subsequent injection into the grid.



Source: www.gamesacorp.com

The wind turbines installed at the Korsze wind farm of Gamesa producer are installed on 100-metre towers with blades of 90 m of diameter. The maximum height of the turbines reaches 145 m (tower plus blades). Each of the turbines can generate 2 MW of power.

Production of electricity with utilization of wind power does not generate any emission of particulate matter, gaseous pollutants or greenhouse gases. Therefore WTGs are considered as clean energy sources which use allows substantial reduction of pollutants and carbon dioxide, which is believed to be responsible for global warming effect.

Project Location

The Korsze wind farm is situated in the vicinity of the town of Korsze, Kętrzyński County (*powiat*), Warmińsko-Mazurskie Voivodeship (*województwo*), northeastern Poland. The wind farm is located to the south of Korsze and consists of 4 groups of WTGs, all of which are located in the areas of a rural character.

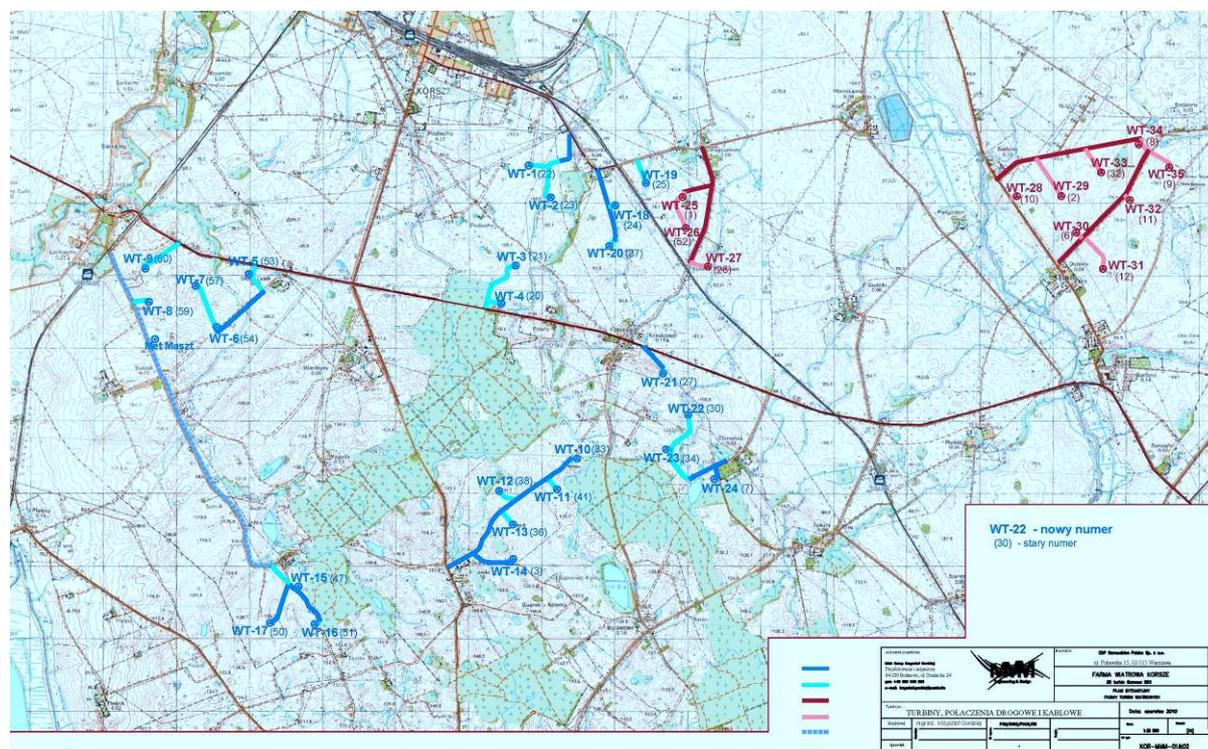


Fig. 1. Wind farm “Korsze”

The areas of the investment are located outside major and dense forest complexes, marshy areas, areas identified as valuable for scientific interest. During the inventorying and observation works completed to date, the areas have not been found to be important for birds (attractive feeding grounds, routes of regular migration passages, routes of regular passages to feeding grounds or roosting places).

The nearest nature protection zone of the European Natura 2000 network (PLB280015 Ostoja Warmińska) is situated approximately 5 km to the north of the wind farm. This protection zone was established mainly to protect storks, however, more than 93 bird species exist there. Other protected zones in the area of the wind farm are:

- “Torfowiska źródłiskowe koło Łabędnika” Natura 2000 zone No. PLH280047, approximately 9 km to the northwest of the site;
- nature reserve “Sątopy-Samulewo”, approximately 2.5 km to the east of the site;
- landscape protection zone “Dolina Rzeki Guber”, which borders with the easternmost part of the wind farm.

Rationale for this Project

In line with European Climate Change Program, many European countries, including Poland, have adopted national programmes aimed at reducing emissions. These cover various policies, adopted at the European level as well as national levels, includes among others:

- Planned increase in use of renewable energy (wind, solar, biomass)
- Improvements in energy efficiency in e.g. buildings, industry, household appliances;

The main regulations of EU countries to reduce emissions is the cost-effectively Emission Trading Scheme of carbon dioxide and legislation tackling with emissions of fluorinated greenhouse gases.

In March 2007, the EU approved an ambitious climate change and energy plan to limit greenhouse gas emissions by at least 20 % by 2020 (comparing to 1990 levels) and achieve, by 2020, a target of 20 % of total EU primary energy use through renewable energy. In January 2008, the European Commission proposed an energy and climate package to achieve objectives of reducing greenhouse gas emissions and boosting renewable energies by 2020. Currently, the UN are attempting to finalise a legally binding global climate treaty to succeed the Kyoto Protocol in 2013.

Poland, currently is finalizing formal approval of its energetic policy until 2030 "Polityka energetyczna Polski do 2030 roku". Based on this draft document Poland plans to increase the fraction of renewable sources in total energy consumption by at least 15 % by 2020 with its further growth. Currently the percentage of energy produced through renewable energy is significantly smaller.

The development of wind energy is one of the measures to be implemented which leads to the limitations of air emissions and increase of production of energy from renewable source. The main benefit is that wind turbines convert the wind's kinetic energy to electricity, while producing none of the emissions to the air. Conventional energy sources, mainly based on various types of coal incineration, when producing energy generate emissions of greenhouse gases, SO₂, dust and others.

Exploitation of the subject wind farm is therefore a measure to avoid the emissions to the atmosphere of the comparable amounts of pollutants. Although wind generated energy cannot entirely replace these generated by conventional sources it allows to reduce production from conventional sources reducing at the same time amounts of emitted pollutants and CO₂.

Legislative Context and Public Consultations

The public consultation process is governed in Poland by the environmental law. This law (*Environment Protection Act* at the time of the wind farm development and currently the *Act on Disclosure on Environmental information, Public Participation In Environment Protection And On Environmental Impact Assessments*), unlike the similar laws in some other European countries, appoints the authorities as responsible to carry out the public consultations. Such consultations are needed at the stage of planning procedure aiming at establishment or change of the local zoning plan in order to make industrial developments possible. Another obligatory public consultations are arranged at the later stage of the development, when technical assumptions of the development are already known and the development is in need of an environmental impact assessment. In light of current regulations, environmental impact assessment is conducted if the development is classified according to the respective order of the Minister of Environment as such which always or

potentially may impact the environment. The EIA is also obligatory if the development may impact Natura 2000 area or integrity of such areas. The law currently in force also allows the authorities to repeat the environmental impact assessment at the later stage, before construction permit for the development is being granted.

The size and nature of the subject wind farm classifies it as a development that potentially may impact the environment. For such developments, a need for a full scope environmental impact assessment is judged by respective authorities, in the subject case by the Mayor of the town of Korsze. The following actions were undertaken:

- on June 25, 2008, the Mayor of Korsze informed the society about a commencement of the environmental impact assessment of the subject project. That information was sent to the directly involved citizens and was also posted on the information boards at the villages and the Town Office, as well as the town's official web page (<http://korsze-ugim.bip-wm.pl/public>).
- After completion of the EIA procedure the respective information was made available by the Mayor of Korsze to the public in the form of announcements on the information boards in the Town Office as well as in the village expressing interest, and on the web page;
- After the completion of the EIA administrative procedures, information on the acceptance of the EIA and issuing of the decision on the environmental status of the investments were published.

Within the EIA procedure, the authorities at the County level (Kętrzyn County Office, and Province Sanitary Inspection Authorities) were broadly consulted.

Apart from the official consultations conducted by the authorities, the company also maintained regular contacts with local inhabitants during the entire project development period. Although such action had an informal character, information on the project was distributed among the local society. In particular, the citizens were informed that any comments or grievances can be submitted to the company via a Town Office, where a public grievance form was available, or, after completion of the TS construction directly to the company representatives being present there.

Following preparation of the EIA reports the investor has been granted an environmental decision and further a building permit. The environmental decision in principle followed the environmental constraints defined in the local zoning plan for the wind farm development area, and, defined general conditions applicable for the wind farm designing. The wind farm design fit the environmental decision thus no repeat of environmental impact assessment was needed and required by the authorities before the building permit.

Based on the building permit the EDPR conducted the construction works which were finished in October 2011. All of the WTGs has already been granted operational permits.

Social impacts

Development of the Korsze wind farm has not required any displacement of the people or business - no physical or economical resettlement had taken place. The land for the project purposes was achieved based on lease contracts signed with the land owners.

The project has direct socio-economic impacts on development of the Korsze commune and local inhabitants. The following direct impacts have been identified:

- increase of the commune tax income;
- increase of the annual income of land leasers;

- unemployment reduction by employing local inhabitants at the wind farm during construction;
- improvement of the local communication routes.

The negative impact is related to decrease of the land area used for agricultural purposes, however, this is compensated by the land lease fees.

The company has implemented measures to compensate any damages that could result from the construction works undertaken. In general, any works-related damages reported by the land owners were immediately verified on-site by the company representative assisted by the land owner. Then the range of damages and a compensation level was negotiated between the parties. Agreed compensation was paid to the victim. As reported by the company representatives in all cases occurred so far, the agreement between the parties was achieved and no court trials had taken place.

What will be the impacts during operation?

The wind farms that comprise WTGs taller than 30 m are, according to the Polish environmental law subject to a formal assessment of environmental impacts generated during construction, operation and decommissioning (EIA – environmental impact assessment). For the wind farms of capacity exceeding 100 MW, such assessment is obligatory, and for smaller wind farms a need for this is due to authorities decision. The EIA is conducted as a part of an administrative procedure aimed at issuance of a decision on environmental constraints needed to approve a development (environmental decision).

In case of the Korsze wind farm the authorities decided that a full-scope EIA is necessary. On request of EDPR an EIA report was elaborated which formed a background for impact assessment by the authorities. Having the impact assessed, the authorities granted the project the environmental decision which was then taken into account while the wind farm designing, applying for a building permit and then construction.

Even having the positive environmental decision, EDPR conducted a number of additional studies in order to better understand and address environmental impacts of the wind farm. Below, a summary of the EIA findings and these additional studies is presented.

Noise generation

Emission of noise is considered to be one of the major environmental impacts of wind farms. In order to address this issue, as a part of the EIA report a noise dispersion study was conducted. That study investigated with use of a theoretical acoustic model a spatial distribution of noise around a single WTG of a type considered that time for installation at the wind farm. The results of calculations indicated that in a distance of 500 m no breaches of a permissible noise level at night for single family houses should occur. Because the permissible noise level during the day is less restrictive than this for nighttime and no WTG was planned to be located in a distance less than 500 m from single family houses it was concluded, that the wind farm will not cause any excessive impact on the protected areas.

The WTGs ultimately selected for installation at the wind farm are slightly different than these considered by the EIA report. In order to verify an expected noise impact the company requested another acoustic analysis to be conducted for actual wind farm geographical and

technical configuration. This analysis indicated, that the nominal noise emission from all of the WTGs working at the time is likely to cause breaches of the acoustic standards at five receptors located in the villages of Długi Lasek, Trzeciaki, Chmielnik, Podlechy and Olszynka, where noise level may reach up to 46 dB(A) comparing to permissible level 45 dB(A) during nighttime. According to the report it is possible to reduce the noise level below the permissible level applying a noise reduction mode available for the G90 WTGs to seven out of 35 WTGs installed.

The company is aware of the fact that the noise distribution modeling gives only approximation of the reality and the actual noise impact may differ from that modeled. Therefore the company intends to continue noise monitoring from the operating wind farm. Such monitoring will comprise of:

- fulfilling an obligation that was set up by the environmental decision to conduct the noise measurements at the receptor points located at the residential areas, during both day and night;
- conduct noise measurements at the locations where the citizens complain excessive noise nuisance.

Should the monitoring indicate breaches of the permissible noise levels the company will work out and implement appropriate corrective measures that may include operation of the certain WTGs in reduced noise emission mode or turning some of them off under the certain meteorological conditions.

Birds and bats

The impact on birds was broadly discussed in the EIA report, mainly based on the literature data. As part of the assessment the authors of the report also recalled some on-site inventories of flora and fauna, including birds inventory. The conclusions of the report were that the project development area was not of particular importance for the birds and, consequently, a risk of significant impact of the wind farm on birds is small. It should be mentioned here, that at the time of EIA report elaboration no specific standards or guidelines for wind farm assessment on birds existed in Poland.

In order to better evaluate a potential for the wind farm impact on birds, in 2010 the company requested two more on-site assessments of the wind farm potential to significantly impact birds. The first session of observations were conducted in the period April-July 2010 and the second in the period between March 1, 2010 and February 28, 2011. The methodology applied to the on-site monitoring followed the guidelines for wind farm impact assessment on birds issued by the Polish Wind Energy Association. During the field works 57 bird species were observed, among which 51 species were of strict species preservation, moreover, 10 species were listed in Annex 1 to the bird directive and 2 species were listed in the Red Book of Animals. The observed species were found to be typical for rural areas and the site was assessed as not important as a breeding area for birds in a scale of the country. The birds routes and altitude of flying was also observed and any significant risk of birds collisions with the WTGs was identified.

The EIA report also discussed an issue of bats collision with the WTGs based on extensive literature review. No bats monitoring had been conducted for the purpose of the EIA report, but it must be noted, that such monitoring was not required by law or common practice at the time of the EIA report elaboration. The review of literature, however, did not indicate any particular risk of the wind farm impact on bats.

As a measure to more detailed assessment of the wind farm impact on bats the company requested another bats monitoring, which took place in 2010. The monitoring was conducted in accordance with temporary Guidelines on Wind Farm Impact on Bats prepared based on

the EUROBATS convention recommendations. The monitoring was conducted in the spring and summer period via recording of bat sounds and their computer analysis. Three species of bats were observed, however none of them in the planned locations of the WTGs.

The company is aware of a potential impact of the wind farm on birds and bats. Therefore the company intends to continue birds and bats monitoring, mainly aimed at assessment of mortality rate of these animals, fulfilling this way one of requirements that was set up by the environmental decision.

Landscape

Wind turbine generators as a tall objects impact the visual properties of the area. Such impact cannot be assessed using the measurable tools, since perception of the WTGs has a subjective character, some people appreciate them as evidence of modern and ecological technology, some other assess them negatively as a strange objects in the landscape. However, a general rule apply that protects the landscape elements of particular cultural or natural importance from being affected by the visual impact of the WTGs.

An issue of the wind farm impact on the landscape was broadly discussed in the EIA report. As discussed in the report, the wind farm is situated in an area of a general, rural character. The site is crossed by a few overhead power lines which already introduce industrial elements into the visual properties of the area. Location of the particular WTGs was analyzed in the EIA report to identify potential visual conflict with the existing historical buildings and places present in the area. No such conflict was identified with respect to valuable places in the villages of Garbina, Warnijkajny and Dolina Gubra. Some visual impact exist with respect to gothic churches in the villages of Gudniki, Karsków and Łankiejmy.

More detailed assessment of the wind farm impact on the landscape was conducted again in 2010 and also did not indicate any particularly significant visual impacts of the wind farm on the surrounding areas.

The company while designing the wind farm implemented measures recommended by the good management practice to reduce visual impacts of the wind farm. These in particular include use of the same type of WTGs at the wind farm, painting the WTGs uniformly in neutral colors (except for the blades which must have been painted in red paths due to a need to secure air traffic safety), reduction to a minimum ancillary structures etc.

Shadow flicker effect

The shadow flicker is an effect visible for an observer in a shadow zone of operating WTG. Rotating blades of the WTG cause repeatable appearance of shadow with a frequency depending on rotational speed of the blades, i.e. on the wind speed. This effect can be very much annoying for an observer exposed to it for a longer period of time.

The shadow flicker effect is not regulated by the Polish environmental law at all. Therefore it was not assessed by the EIA report, however, a separate study was requested by the company in 2010. With use of a mathematical model it was assessed that some residential areas in the vicinity of the wind farm can be affected by the shadow flicker effect for certain period during the year.

The company intends to monitor this effect by collecting grievances of affected people. If, such effect appears to be very intensive, some mitigation measures can be implemented by the company, such as turning-off some of the WTGs in certain periods of the day or year, or planting fast growing tall plants as a barrier for the flickering effect.

Electromagnetic magnetic fields

The issue of electromagnetic fields was addressed in the EIA report. Taking into account that the electrical equipment (generator, transformers etc.) is placed inside nacelle of the WTGs and the generated electricity is transferred to the TS via underground cables, no risk of generation of electromagnetic field exceeding the permissible values was identified.

Additional information and grievance procedure

The company is willing disclose information on environmental and social impacts generated by the Korsze wind farm. The disclosure package that will contain among others this NTS, full version of the EIA report and reports on other environmental studies conducted for the wind farm to date, as well as the results of post-construction monitoring will be published on the company webpage at <http://www.edprenovaveis.com/>, under the link sustainability/EDPR in the community/Polonia sustainability/Korsze.

The Company welcomes ongoing comments and suggestions on the project. Attached in the appendix is a form for comments.

All requests for additional information related to the wind farm should be addressed to the Environmental Specialist of EDP Renovaveis:

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