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NON-TECHNICAL SUMMARY
500 MW FULLY PERMITTED WIND FARM IN MELITOPOL AND PRIAZOVSK DISTRICTS OF ZAPORIZHIA REGION, UKRAINE, IN THE VILLAGE SETTLEMENTS OF DEVNINSKOE, DOBRIVKA, DUNAEVKA, GIRSIVKA, MORDVINIVKA AND NADESHINE VILLAGE COUNCILS, OUTSIDE THE BOUNDARIES OF THE VILLAGES

RAMBOLL ENVIRON

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Non-Technical Summary
500 MW fully permitted wind farm in Melitopol and Priazovsk districts of Zaporizhia region, Ukraine, in the village settlements of Devninskoe, Dobrivka, Dunaevka, Girsivka, Mordvinivka and Nadeshine village councils, outside the boundaries of the villages

CONTENTS

1. THE PURPOSE OF THE STUDY

This document summarizes the information included in the environmental assessment report of the undertaking which consists in the construction of the Wind Farm with technical infrastructure in Zaporizhia Region, in Priazovsk and Melitopol Districts, in the village councils of Devninskoe, Dobrivka, Dunaevka, Girsivka, Mordvinivka and Nadeshdine, south-eastern Ukraine. Further, a high voltage overhead power transmission line will cross territory of the Nove village council, also outside the village. The planned investment will consist of up to 167 WTGs with output power of 3.45 or 3.6 MW. The total target capacity of the whole project is up to 601.2 MW, however, the Investor currently holds the technical conditions for the connection of 500 MW only and hence less wind turbine generators will be installed in order not to exceed the permitted value. Extension of the wind farm to the full theoretical capacity is possible later, following the extension of the technical conditions for grid connection

The wind farm will be connected to one transformer station, which will carry the task of transforming the energy from the WTGs to high voltage, from which the wind farm will be connected to the power grid via a high voltage power line 330 kV.

2. LAND OWNERSHIP BACKGROUND INFORMATION

In Soviet times (until 1991 and then for several years following Ukrainian independence), all of the agricultural land in Melitopol and Priazovsk districts was comprised of collective farms. When the collective farms were broken up, each former participant in the collective farm was given an equal portion of land from the former collective farm (the equation for division of the collective farm land was roughly total number of members in the former collective farm divided by total land in the former collective farm). These individual land plots (called 'PAI' in Ukrainian) averaged from 6-12 hectares in size. Once the collective farms were divided, not all of the new landowners wanted to farm their land however. Land owners that were not interested in farming their land then began to lease out their land plots to those people that were interested in farming the land, which very often tended to be the former collective farm director. Over a number of years then, a pattern of agricultural land usage developed where each village council came to be farmed by 1-2 individuals or companies that the Company refers to as 'main farmers'. This was the land ownership/use structure that Eurocape was introduced to in 2009 when it started working in the districts and is the land ownership/use structure that predominates today, in all seven village councils where Eurocape owns/leases/has servitude rights over the land.

The Company's legal rights to the specific portions of land vary depending on the planned use and can be presented as following:

- 'Wind turbine' land plots: such are leased directly from the district administrations as this was previously district reserve land (not in private ownership);
- 'additional foundation pad land plots' which have been acquired (in all but one case, in which the right to use the land plot was granted by the Court) from the land plot owners based on the voluntary compensation agreements;
- 'sub-station land plot': leased directly from regional land resources as this was previously district reserve land;
- 'infrastructure support land plot': leased directly from regional land resources as this was previosuly district reserve land;
- 'access road' land: leased from regional land resources as this land was previously in state ownership;

- 35 kV cable servitude land: servitude (third party use rights) from both regional land resources and private land plot owners, depending upon whether the land plot is publicly or privately owned;
- 330 kV PTL servitudes: both with public and private counter-parties (land plot owners), depending upon whether the land plot owner is public or private;
- triangle road plot leases/servitudes: with private land owners or public land counter-parties, depending upon the ownership pattern of the underlying land plot.

In general, land plots have tended to be leased from state-owned counter-parties and then servitude rights established with private land plot owners, other than as regards additional foundation plot lands, which have been acquired from private land plot owners based on the voluntary compensation agreements. In cases where servitudes have been established with land plot owners, the agreed financial compensation has been such that the land plot owners and land plot users come to an arrangement among themselves. Also, the sizes of the servitude land plots tend to be quite small and so tend to be inconsequential to 'main farmers' (either individual or legal entities), who are typically farming thousands of hectares and sometimes as many as 10,000-15,000 hectares.

The only time that the Company will primarily interact with land plot users as opposed to land plot owners relates to temporary and one-time compensation for land use during the wind turbine installation period, as damage to planted crops doesn't impact the land plot owner but rather the land plot user/main farmer. Such periodical land use has already been negotiated and agreed upon with four land users for the first phase of the development. 28 land plots of a total area of 2.332 ha have been identified as needed for temporary purposes (such as space needed for storage of blades or mounting of cranes) during construction. The average probability of that land was estimated based on actual prices of planted crops in 2017 as 1.68 UAH/m^2 and compensation price was agreed with land users above the market price. The same compensation scheme will be adopted in the phase 1B and next phases of the Project development.

3. THE DESCRIPTION OF THE PLANNED UNDERTAKING

The subject development consists in the construction of a wind farm in the vicinity of Melitopol, south-eastern Ukraine along with technical infrastructure. The wind farm in its fully permitted configuration will consist of between 138 and 144 wind turbine generators (WTG) of type GE 137 3.6, Vestas V112 3.45 MW and Vestas V126 - 3.45 MW.

The entire scope of the investment will include the following components:

- 167 WTGs with integrated transformers,
- Cable inside the WTG tower,
- Underground cable network,
- Internal access roads,
- Main Transformer Station (MTS) with auxiliary equipment,
- Overhead high voltage power transmission line, which transmits the energy from the MTS to the receiving point of the public operator.

The project area of construction of the 330kV overhead transmission line from the wind farm MTS to Melitopol Substation is located within the lands of Nadezhdyne Village Council (Pryazovske District), Mordvynivka and Nove Village Councils (Melitopol District) in Zaporizhia Region.

A typical WTG consists of the following elements: foundations, tower, nacelle and rotor.

The foundations of the WTGs at the subject wind farm will be made of reinforced concrete. These will have truncated cone shape, being about 3 m thick at the central part and approx. 1.1 m in the most outermost part. The part of the foundation above the soil surface will have a diameter of approximately 6 m. Each base will be supported by reinforced concrete piles. Each foundation will require approximately 800 m^3 of excavation and around 1140 m^3 of concrete.

The GE 137 turbine has a rotor of 137 m diameter and shall be installed at a hub height of 110 m. The V-112 turbine has a rotor of 112m diameter and shall be installed at a hub height of 119m. The V-126 turbine has a rotor of 126 m diameter and shall be installed at a height of 117 m.

The route of 35 kV cable lines from the WTGs to 35/330 kV MTS, with the total length of 311 km, is situated in the lands of Pryazovske and Melitopol Districts in Zaporizhia Region. At the MTS the voltage is transformed to 330 kV and then, with use of the overhead PTL the electrical energy is transferred to the buses of 330/150 kV at Melitopol Substation.

The purpose of the construction of "Wind Farm' is the production of electricity from a renewable source - wind.

Expected types and amounts of pollution and other nuisances that will be created during the construction, operation and decommissioning of the Wind Farm are described in detail in Chapter 10.

4. CUMULATIVE IMPACTS ON THE ANALYZED AREA

Based on the information provided by the Company, the nearest projects of similar nature are:

- a development of a 200 MW wind farm in a distance of approximately 40-60 km to the east of the Project area, in the vicinity of Botievo, Priazovsk District, Zaporizhia Region, Ukraine;
- a Swedish project of approximately 50 MW is located about an hour drive to the west of the proposed EuroCape Wind Park in Kherson Region;

These are at this stage of assessment considered as located out of the potential area of the Project influence.

5. THE DESCRIPTION OF THE NATURAL ENVIRONMENTAL COMPONENTS AT THE PROJECT DEVELOPMENT AREA AND IN ITS VICINITY

In accordance with the physical-geographical zoning of Ukraine, the territory of Zaporizhia Region is located within the Steppe Zone. The surveyed territory, including the wind park area and the buffer areas within 5-20 km, are included in the Medium Steppe Zone and to the Area of Steppe South-Western Slopes of the Pryazovska Upland.

The climate of the region is mildly continental. The wind potential of the construction site is assessed as high. The construction site belongs to Wind Region 4 and Group A (sea coasts and steppes). The recurrence rate of wind is 26% at a speed under 1 m/s, 51% at a speed of 2-5 m/s and 12% at a speed of 8 m/s and over.

The plots for deployment of the wind power plants are located within the northern slope (margin) of the Black Seaside Depression, which is a monocline. The Precambrian granite-gneissic crystalline basement is inclined southward and deeply sunk.

In the area of the investment, there is no industry that contributes to the deterioration of air quality.

The study area is located in the Azov Seaside Geomorphologic Region. This is a territory limited by Donetsky Ridge in the north, the Azov Sea in the south, the Molochna River with the estuary in the west and the Mius River in the east. The surveyed area is located in the Dnipro-Molochna hydrogeological region.

The flora of coastal territories of the Molochny Estuary Wetland includes about 700 species of vascular plants of 91 families (33 of the species have a protected status). The major part of the 330 kV PTL Route between the MTS and Melitopol Substation consists of various agrophytocenoses (agricultural fields, fallow land, pastures, etc.) covered with synanthropic spontaneous plant associations.

Outside the area of examinations a series of nature protection forms have been established:

- UA071 Molochnyj Liman (or Molochnyi Estuary),
- UA072 Molochna river valley,
- UA070 Utlyuk lyman.

In the years 2010, 2012, 2014 and 2016 birds monitoring were conducted at the development site and in its vicinity. The monitoring programs included aerial observations from transects and points a the development site and in the buffer zone. Studies of the ornithological situation on the route of the 330 kV PTL were conducted in all seasons of 2016.

Monitoring of bats was also carried out at the development site. Research of bats activity was carried out in 2011-2012 and in 2016.

6. THE DESCRIPTION OF PROTECTED HISTORIC MINUMENTS IN THE NEIGHBORHOOD OR IN THE DIRECT IMPACT RANGE OF THE PLANNED UNDERTAKING

Within the planned wind farm the following high cultural and historic value areas were distinguished:

- Girsivka Village - Archaeological stands: remains of a Scythian settlement (IV century B.C.)., Common graves and memorial complexes (local category of protection): a common grave of the Soviet warriors and the monument to the fellow-villager warriors (63 persons buried),
- Dunaivka Village - Common graves and memorial complexes (local category of protection): the monument to the fellow-villager warriors,
- Mordvynivka Village - Archaeological finds: remains of a Sarmatian settlement near the village. Historical heritage: the blindage which housed the command posts of Streletskaya Division 118 and Artillery Regiment 117, the place where Votan German defence line was broken through by the Soviet troops (the memorial tablet).

The planned elements of the investments will not degrade or devastate the high value landscape areas. One Scythian burial was removed during the preparation phase of the wind farm construction (the burial was located in the planned technological road route). The works were conducted after prior consent and were supervised by the national historic preservation authorities. Three more Scythian burial mounds were excavated in summer, 2016 as they were considered to be too close to future planned operations and the conservative/responsible decision was deemed to be to excavate the site. The excavations were performed by trained and licensed architects. We are not aware of any other potential conflict issues with Scythian burial mounds.

7. LANDSCAPE CHARACTERISTICS

The only areas of high landscape value, where construction work will be conducted and the wind farm's direct and indirect impact will occur, include:

- northern part of Molochny Estuary, where an overhead power transmission line will be constructed. Part of the farm is located in the Molochny Estuary National Park.
- small valley of Dzhekelnia river between Nadjeżdno and Girsivka villages, where the substation and power distribution cables are planned.

8. THE DESCRIPTION OF THE PREDICTED ENVIRONMENTAL IMPACTS IF THE INVESTMENT IS NOT UNDERTAKEN

In a case if the investment is not undertaken the project development area would not be affected by development of access roads, assembly/service yards and WTGs. One could conclude that the natural conditions would not change in the area as well. However, such variant could not be considered the most beneficiary for the environment.

The investment is expected to generate approximately 1,83 GWh of electricity per annum. The production of such an amount of energy in a conventional power plant would be assisted by emission of:

- 522 ton/a of particulate matter;
- 3,131 ton/a of NOx;
- 2,087 ton/a of SO_2;
- 4,860,000 ton/a of CO_2[1)]

and additionally generation of approximately 234,576,000 ton/a of ash[2)]. Although wind farms cannot entirely replace conventional power plants, supply of a certain amount of energy to the power grid leaves space for equivalent reduction of energy production by conventional plants and consequently avoidance of air emissions and generation of solid waste.

Further, the Investor executes a social program in the villages surrounding the development sites. The investment program includes among others development of natural gas supply network, improvement of water supply to the villages and other social projects. Such investment program is aimed at improvement of living conditions in these villages. If the project is not implemented the investment program would be stopped and a chance for the local societies to improve their life would be reduced.

1) calculated based on emission factor for coal fired CHP published by Department of Energy and Climate Change at http://chp.decc.gov.uk/cms/chp-emission-reductions/

2) calculated based on assumption of 99% effectiveness of emission controls

9. THE DESCRIPTION OF ANALYZED VARIANTS

An alternative variant assumed construction of the 222 wind turbines type eviag V-90-2.500 with a tower of 100 m and a rotor diameter of 90 m. For such variant noise and shadow flicker analysis were completed and did not reveal any extensive negative impact.

In order to protect the natural values as well as to reduce threats for birds and bats, a spatial optimization of the WTGs allocation was performed. The number of WTGs was reduced from 222 to 167, which results in reducing its impact on the local ecologic and physiognomic landscape. The spatial optimization of the WTGs on the wind farm made it possible to group them in three zones, divided by nature corridors, which enable birds and bats migration without collisions with the turbines.

The investor's variant of the planned project involves the construction of 167 wind turbines located on agricultural land near the village: the village councils of Devninskoe, Dobrivka, Dunaevka, Girsivka, Mordvinivka and Nadeshdine, south-eastern Ukraine. Areas used directly for the planned 167 WTGs will form a small part of the leased parcels, which will be sited foundations, with an area of approx. 625 m^2 (at each tower) and access roads with a width of about 5 m. The WTGs would be built within the borders of an open area serving agricultural functions. Current land exploitation level and type would not be subject to any changes, aside from spots taken by turbine foundations, assembly/service yards and roads.

10. THE ENVIRONMENTAL IMPACT OF THE ANALYZED VARIANTS

It has been found that the wind farm (at the stage of its construction, exploitation and liquidation) can potentially exert an impact of the following environmental components:

- Acoustic climate (by noise emission) - at the stage of construction, exploitation and liquidation,
- Ground surface (by excluding a part of the area from the current way of its use, loss of soil quality and waste generation) - at the stage of construction, exploitation and liquidation
- Surface and ground waters (by their pollution) - at the stage of construction and liquidation
- Air (by air pollution - at the stage of construction and liquidation, or improving air quality - stage exploitation),
- electromagnetic fields (emissions and radiation of the electromagnetic fields) – at the stage of exploitation
- People’s living and health conditions (by noise, dust and disturbing the current living conditions) - at the stage of construction, exploitation and liquidation
- Flora and fauna (by destroying habitats and disturbing the functioning of the population) - at the stage of construction, exploitation and liquidation
- Landscape (by causing visible changes in it) - at the stage of construction, exploitation and liquidation
- Material goods, monuments and cultural landscape (by damages or decreasing the value of material goods, damages to monuments and changes in cultural landscape) - at the stage of construction, exploitation and liquidation.

10.1 The acoustic climate

The conducted specialist acoustic impact analysis shows that:

During the phase of construction and liquidation means of transportation and work of construction machine will be sources of noise. Because of their sort-term and local character no special environment protection solutions are predicted. The optimization of conducted works is recommended only (switching off engines during breaks at work, shorten commuting routes, operating technically efficient equipment, conducting nuisance works exclusively during the day, locate the auxiliary construction sites as far from residential areas as possible).

The investment exploitation will be accompanied by noise generation (noise generated by a rotor's operation, aerodynamic noise related to air masses flow passing in a direct vicinity of the blades). The calculation model is provided within the boundaries of the distances from the WTGs in the 11 zones in the direction of situation of the village settlements. In none of the potentially affected dwellings even the critical value of 45 dB (A) during night time and 50 dB(a) during the day is exceeded. Taking into account the location of the MTS the noise level at its border station will not exceed 45dB(A) and will not be inconvenient for the inhabitants. During good weather conditions the noise level emitted by power lines is always lower than the acoustic background, so not possible to scale. In bad weather conditions (high humidity, drizzle) in a distance of 10 m from the power line axis route, noise level should not be higher than 45dB(A), and it gets smaller when the distance grows. Consequently if the power line is constructed outside residential areas, its operation will not cause nuisance.

10.2 The ground surface

At the construction stage the use of construction machines will be limited to the time of construction of WTGs foundations and assembly of towers, blades and nacelles, construction of assembly/service yards, local access roads, buildings, transformer stands and other civil and technical structures at the MTS and construction of supporting pylons of the overhead PTL. Potentially use of the machines may generate subsurface impacts with hydrocarbons originating from uncontrolled leakages of technological fluids (e.g. hydraulic oils, coolants, lubricants) or fuel (while refuelling or on-site storage of fuels). As the worst case scenario a spill of stored fuel can be assumed.

During exploitation phase of the project the major waste streams will be generated by WTGs service and maintenance. In order to reduce uncontrolled spillage of transformer oil at the MTS, the transformers should be placed on secondary containments (tight concrete tanks). Wastes generated during wind farm exploitation should be collected at dedicated places at the MTS or other site out of the wind farm. Collected wastes should be transferred off the site by certified waste company for final treatment.

The impact during the liquidation phase will consist in generating wastes modifications and soil contamination by leaks from construction machines.

10.3 Surface waters and groundwater

During construction works and in the phase of liquidation of the investment a threat to surface waters and groundwater may be posed by improper storage of construction materials and failures of machine and means of transportation resulting in leaks of exploitation liquids (including petroleum substances).

During exploitation phase of the project the subsurface impacts may be generated by:

- uncontrolled spillages of oils during WTGs maintenance;
- uncontrolled spillages of oils, fuel or other technological fluids from cars and specialized equipment used for WTGs service or maintenance;
- accidental release of transformer oil at the MTS.

Due to the maintenance-free nature of the work of the wind farm the planned investment will not be the source of creation or domestic sewage or industrial applications. At the MTS and administrative and technical facility, a small amount of sanitary sewage will be created, which after treatment in an on-site wastewater treatment plant will be discharged to surface waters. Discharged effluent will meet the permissible parameters as imposed by a Permit for Special Water Use which will be issued by the authorities. Impact on groundwater of the planned station and administrative facilities will be negligible, consisting of local limiting infiltration on paved areas.

10.4 Air

During construction works and in the phase of liquidation of the investment short-term and local air pollution with flue gases and dust from transportation and construction machines will occur. Such will be comparable to any other construction operations and is not expected to create an excessive air pollution impact.

Exploitation of the wind farm will not generate any air pollution. On the contrary, the production of energy from renewable sources, namely wind, will avoid the release of pollutants that would be generated in a conventional power plant with similar power. This positive impact will be maintained throughout the life of the wind farm.

10.5 Electromagnetic field

During construction and liquidation will not be used device that could cause electromagnetic radiation.

Exploitation of the investment will not cause any hazard to the environment with respect to electromagnetic field emission and radiation. Wind turbines and network infrastructure do not generate electromagnetic fields posing risk to the environment. The most significant source of electromagnetic field are transformer stations (or a station, depending on project design) and the 330kV line. In the case of the transformer station, situating them outside the residential areas and fencing of the station will guarantee that proper electromagnetic conditions are kept outside the station. In the case of HV line, it is crucial to conduct detailed measurements depending on the construction of the supporting piles and to set up on this basis a minimum distance from the line to residential areas (this distance will be between a few and several dozens of meters and will need to meet requirements of the Ukrainian Electrical Code).

10.6 Human living conditions and health

During construction works and in the phase of liquidation of the investment there will come out impacts of noise, air pollution and vibrations. Wind turbines are built on farmland, far away from the nearest houses. There will also be a threat to human health associated with the construction works and the movement of vehicles on public roads. Their elimination will ensure the appropriate organization of work, marked areas for work, determination of optimal routes carrying materials and - if possible - to limit travel and work machines daytime.

The exploitation of the investment will not exert a major negative impact on human living conditions and health. The environmental quality standards will be met. The impact of noise and electromagnetic fields and radiation does not exceed the applicable standards. The shadow flicker and ice/blade throw effect will occur only during exploitation phase of the development. Based on theoretical calculations, for the WTGs of a hub height of approximately 117 m the ice throwing distance is approximately 364.5 m. The threshold value is 30 hours/year and 30 min/day of

shadow impact at each dwelling. At two dwellings these demands are exceeded slightly, however, the wind turbines responsible for this effect will be equipped with a system which will limit their operations so the threshold values will not be exceeded.

10.7 Flora and fauna

The construction stage will have an adverse impact on birds, however most of the negative impact will be short term and reversible. The impact will be related to the construction works, vegetation clearance, installation of the turbines, PTL pylons and towers as well as transport. The installation of turbines will require clearance of arborescent vegetation in the 60 m strip along the tower in both ways. Due to observed lack of shelters for bats which could be potentially destroyed during construction of the wind turbines, there are no specific restrictions in this respect. Monitoring of activity of bats and of changes in the environment during the construction of the wind farm should be performed.

The operation stage of the wind farm can include the following impact on birds:

- Collision mortality: direct mortality due to collision with WTGs;
- Habitat change or habitat loss: birds lose breeding and feeding grounds, due to direct taking over of the area by the wind farm infrastructure.
- Birds displacement due to disturbance: birds change or abandon areas used as feeding, breeding or roosting grounds as a result of new, unknown elements in their environment;
- The barrier effect: birds significantly modify their passage route as a result of WTGs presence.

Another negative impact of the project on ornithofauna is the operation of the 330 kV power line, which may include:

- Mortality due to collision.
- Deterrence - impact of the presence of the object on behavior and flight changes.
- Interaction of the electromagnetic field.
- Fragmentation and destruction of habitats as a result of the construction of lines.
- Accumulation of overhead lines.

In order to assess the Project impact on birds and bats a long term monitoring of these species has been undertaken. Monitoring of birds included observations in all seasons of the year. Analysis of the monitoring results clearly indicated that the risk for the birds is limited, either due to behavior of the observed species (such as flight altitude range, breading areas, and migration paths) or small number of species considered of particular European or national importance.

The environmental impact of wind turbines on bats can be:

- mortality due to collision with a power plant or pressure injury
- loss or alteration of flight route
- loss of feeding places
- destruction of hiding places
- cumulative impacts

Bats present in the Project area were also monitored. Monitoring observations revealed:

- small quantity of bats of local aggregation,
- slight (by quantity and intensity) feeding movements in the territory of the wind farm area,
- lack of intensive transit migration routes.

All of the above give grounds for estimation of the collisions with the wind turbine generators as low. Negative impact on migrating bats is also assessed as low.

The liquidation phase will be short term and reversible. Plants after construction is completed will be in a few months restored to its previous state. After dismantling of the wind farm, also avifauna will resume to its previous state prior to the construction of the farm.

10.8 Landscape, cultural Landscape and historic monument

In the phase of construction esthetic values of landscape will be lowered temporarily. But it will be a short-term impact. However, no impact of the construction stage is predicted on other protected monuments. Since none of them is in the direct neighborhood of the investment.

During exploitation:

- wind turbines will be a new element in the landscape and cultural landscape of the municipality. Its assessment is dependent on the observer.
- the wind turbines are visibility to several kilometers, depending on the viewpoint.
- Working wind turbines will have no impact on historic buildings.

In the liquidation phase of the investment esthetic values of landscape will be lowered temporarily. But it will be a short-term impact.

10.9 The impact of material goods

The investment will be developed in the rural area distant from the human settlements. No negative impact on material goods is expected at the construction stage of the project. The positive impact will be development of local roads for transport of goods which, however, will serve local society for local transport as well. The impact is assessed as positive.

Exploitation of the project will have a positive impact on material goods. This will apply:

- Development of energy-related infrastructure in the area,
- Increased lease income for individuals leasing land for the construction of wind farms and auxiliary infrastructure,
- Economic advantages connected with the increased income generated from property tax,
- Limited land development options caused by the realization of the investment,
- Decrease of the value of lands located in a close proximity to the realized investment.

Liquidation of the project may have an indirect negative impact on material goods through the loss of influence of the community on account of property taxes.

10.10 The analysis of a possible serious failure and its impact on environment

At the construction stage the main threat for the environment and the society may be related to uncontrolled emission of hazardous substances to soil and groundwater as a result of e.g. spillage of oil or other machine fluids. Such risk can be substantially reduced by implementation of organizational and technical measures, such as use of non-obsolete machines, performing works by properly skilled staff and maintaining a spill response kits at the construction sites.

The local environment may be affected negatively at the stage of farm exploitation as a result of a fire, or an electric or mechanic malfunction of the WTG. Such occurrences may result in an uncontrolled emission of pollutants to soil, water, and air. Only an immediate and effective intervention can limit the scope of damages. Such unfavorable events can be prevented or to a greater extent controlled by means of:

- Maintaining devices and installations in a satisfactory condition,
- Performing systematic technical checks.

In an emergency situation (construction-related disaster) the construction of wind turbines may be destroyed (they may, for example, fall down). Such an event is, however, extremely unlikely, as the design of the turbines complies with all the durability and load-related norms. What is more, within the wind farm, only brand-new turbines will be installed and will be regularly monitored and maintained. A construction-related disaster may result in soil, as well as surface and underground waters contamination as a result of lubricant and oil leaks. It has to be pointed out that thanks to the properly designed servicing procedures, the aforementioned event is highly unlikely.

Due to their remarkable height, wind turbines may be struck by lightings. The edges of rotor blades are especially vulnerable. Generally, blades are very delicate and vulnerable, so in order for them to be utilized in an optimal manner, they have to be equipped with an anti-lightning installation. Otherwise, they can be easily destroyed, posing threat to environment and nearby citizens. Wind turbines installed within the scope of the investment will be equipped with such a system, which will protect all of the turbine, starting from foundations, up to rotor blade edges. The system will ensure that lightning strikes are diverted from susceptible turbine elements and safely guided to the ground.

10.11 The analysis of a possible transboundary environmental impact

Taking into account the location of the project and its maximum impact range on the basis of noise emission calculations it is found that the impact of the wind farm will concern only the area to which the investor has a legal title and does not go beyond the borders of Ukraine.

11. MAJOR ENVIRONMENTAL IMPACT OF THE PLANNED UNDERTAKING AND METHODS OF ITS PREDICTION

As presented in chapter 10 the project will not generate any major negative impacts on the environment.

A significant positive impact will be the avoidance of air emission which would be generated if the comparable amount of energy is produced by a conventional, coal-fired power plant. The wind farm due to use of wind energy does not generate any air emission, hence improves the air quality. Also the impact on material goods of the project has a positive character – the auxiliary infrastructure of the wind farm, namely road network, will be used by local inhabitants.

The environmental impact assessment at particular stages of the project execution was conducted on the basis of prediction methods by analogy, expert knowledge, cartographic analysis methods. Acoustic and shadow flicker calculations were conducted with the use of the WindPro program.

12. PREVENTION, REDUCTION AND NATURE COMPENSATION OF NEGATIVE ENVIRONMENTAL IMPACTS

The following measures are predicted in order to prevent and reduce negative impacts of the project on nature and environment.

At the construction stage:

- Construction and assembly works, connected with the realization of the planned development and transportation of construction materials will be conducted mainly during the day, that is between 06:00 and 22:00 hrs, excluding periods of construction, which from a technological point of view is required continuity of works and excluding the transport of wind turbines (oversized).
- Exploitation and parking of mechanical equipment indispensable for the realization of the undertaking will be conducted so as to eliminate the possibility of soil pollution and groundwater with petroleum products.
- Construction and assembly sites will be equipped with absorbents.
- Construction and assembly work will be carried out under the supervision.
- Transportation vehicle traffic will be planned so as to reduce its routes through built-up areas.
- The construction site will be organized so as to reduce its negative impact on the neighbouring areas.
- The construction time of particular investment stages will be shortened to an indispensable minimum by the proper planning of a construction process.
- Operated machines and devices will be in a good technical condition.
- Earth masses will be used for organizing the site of Wind Farm (soil from excavations for foundations, cable ditches and of other construction waste) and next will be transferred for use to natural persons, and only if there is no other possibility, they will be dumped at a landfill.
- Earthworks will be conducted so as to prevent excavations against precipitation water inflow.
- Construction-assembly materials and prefabricated elements must possess certificates and meet appropriate standards.
- Construction works will be conducted with taking into account a rational area management, care of preserving its nature values and maintaining the possibility of its former use.
- Works which can change the natural area relief will be reduced to minimum.
- Works will be conducted in such a way as to prevent irrational use of the ground surface.
- After completion of construction the earth's surface will undergo restoration and brought to the state before the commencement work.
- Execution of cable trenches and foundations will be monitored for any archaeological finds.
- In the case of crossing watercourses electricity cables and telecommunications will be performed transition by jacking, directional drilling or the casing pipe.
- Construction sites will be equipped with portable toilets with tight tanks elected.
- The wastes generated at construction-assembly sites during the realization of the undertaking will be managed in accordance with the principles defined in the currently binding law in that scope.
- The generated wastes will be stored separately taking into account rules of managing wastes suitable for re-use.
- The waste storage place will be protected against blowing apart and an unfavorable impact of changeable weather conditions, isolated from third party access.
- The wastes will be transferred for disposal only to those entities that meet formal and legal requirements as to recovery or disposal and collection and transportation of that type of wastes.
- To reduce threats to people’s health in connection with the conducted construction works and earthworks, the proper works organization, the marking of works sites should be applied and rules of safety and health at work should be followed.
- Employees will have the appropriate qualifications and rights and will be equipped with protective clothes.
- When conducting excavations for the foundations of the turbines must be protected from the area in front of the entry of animals in the area of construction works.

At the exploitation stage:

- Within the wind farm guarantee access to absorbents neutralizing leaks

- Conduct ongoing monitoring of the plant and its associated equipment in order to reduce the risk of failure.
- Faulty turbines, which can cause elevated noise levels should be immediately repaired.
- Waste from the operation of the wind farm will be collected and stored within the reach of third parties.
- In the event of significant mortality of birds in connection with the operation of the investment we advise to take appropriate preventive action.

13. THE COMPARISON OF THE PROPOSED TECHNOLOGY WITH THE ODER TECHNOLOGY

Ukraine although it is not a member of the EU, must join in the efforts to stop climate change. To fulfill the EU's objectives for the share of energy from renewable sources is required in the dynamic development of wind energy in order to meet 11% renewables target for electricity production in 2020. The proposed technology of generating electricity by wind farm is commonly used in the world and is becoming increasingly popular in the country. Wind turbines do not pollute the air, soil or water.

The most up-to date technical solutions will be adopted at the site. The wind turbine generators planned for the site belong to top-level technical construction and are used widely in Europe and around the world.

14. THE EXPECTED SOCIAL IMPACTS

The project development area has a rural character where growing of crops is the major agricultural profile. Melitopol, the second largest in the Zaporizhia Region city is the only place in the area with developed industry, educational facilities and health care objects. It has been observed during the years, that population of Melitopol gradually decreases and such trend is likely to occur at the rural areas.

The Melitopol district, according to the publicly available information, occupies territory of 1,780 km^2 and has a population of approximately 49,700 (2015). The Capitol of the District is situated in Melitopol, which, however, has a status of a separate administrative unit. Melitopol is the largest city in the site area as well as the second largest city in the Zaporizhia Region. Melitopol has an area of 51 km^2 and its population (as for 2015) counts 156 thousand.

The Priazovsk district has an area of 1,947 km^2 and population of approx. 27,630. The Capitol of the district is Priazovske settlement with a population of approximately 7,000.

The village councils where the Project will be developed can be characterized as following:

- *Devninskoe Village Council* occupies an area of 4236 ha. Population of the village is 579;
- *Dobrivka Village Council* occupies an area of 4758 ha. The Village Council has 510 inhabitants;
- *Dunaivka Village Council* occupies territory of 7048 ha. Population of the village is 504;
- *Girsivka Village Council* occupies an area of 8081 ha. The population of the village is 1045;
- *Mordvynivka Village Council* occupies territory of 6552 ha which is inhabited by 1198 people;
- *Nadeshdine Village Council* occupies an area of 6000 ha. The population of the Village Council is 500; and
- *Nove Village Council* has an area of 4723 ha and population of 2884.

During the construction phase of the Project, the citizens of the village councils may be exposed to various environmental impacts, such as vibrations, noise and air pollution. It is not expected that any of these impact may exceed set thresholds and be a nuisance for the citizens inhabiting the nearby built-up areas. Wind turbines will be built on agricultural areas that are located remarkably far from housing estates.

A procedure that may interfere with the everyday life of the citizens may be the transportation of construction materials and elements of the WTGs to the site, and excess of soil from the site. These transports will predominantly use public roads and will also cross the villages in proximity of the construction site. Noise generated by moving trucks reaches 82 dB(A) and gives the noise level of 55 dB(A) at a distance of approx. 90m. Hence, the citizens of the villages crossed by a transport can be exposed to noise exceeding slightly the permitted value, even taking into account that most of the houses are distant from the roads and are often separated from the roads by a barrier of trees and bushes. Such noise impact, however, will be of a temporary and short-term character and is not expected to cause the local population to complain. Further, traffic of heavy trucks may also generate vibrations and fugitive emissions, both primary (emission from fuel combustion) and secondary (dust generation). These are not considered as an issue of potential social concern as during the dry periods of year a fugitive emission of dust occurs anyway (dust raised by wind blow) in the rural areas and vibrations generated by heavy trucks are not expected to reach houses which are approx. 20 m distant from the roads.

During the operational phase of the Project the citizens may be exposed to various impacts described above, such as noise, shadow flicker, electromagnetic fields and threat of ice throw during winters. As indicated in the previous sections, such impacts will not exceed permissible levels, hence the impact on living conditions of individuals shall be neutral.

Execution of the project is expected to generate positive social impacts among others thanks to:

- Implementation of an infrastructure investment project for beneficiary of the nearby villages (construction of gas line, improvement of water supply, refurbishment of villages' facilities, donations to Village Councils etc);
- Creation of substantial number of workplaces;
- Bringing Western Europe standards in terms of cooperation with local societies and stakeholders engagement.

All of the above will improve quality of life in the neighbouring villages and likely will also make people happy to stay there instead of relocate to more attractive locations in Ukraine and abroad, hence will positively influence living conditions

15. THE MONITORING OF THE DEVELOPMENT

15.1 The pre-investment monitoring

The realization of the undertaking has been preceded by conducting the following nature analyses:

- Assessment of birds and bats monitoring,
- Assessment of noise emission into the environment,
- Assessment of shadow flicker effect.

15.2 The monitoring at the construction stage

Nuisance resulting from construction works will be of a temporary and short-term character. Thus there is no need to conduct the monitoring of the project at its construction stage. The proper

course of construction works and the following of health and safety regulations will be supervised by the Construction Supervision Office.

15.3 The monitoring at the exploitation stage

Because of the need to confirm the accuracy of conclusions drawn from the pre-investment monitoring is recommended to perform a post-construction monitoring of birds and bats. After the completion of the construction, it is advisable to conduct control measurements of noise levels at the nearest protected areas acoustic accordance.

16. INDICATING DIFFICULTIES WHILE PREPARING THE REPORT

The authors of the report have not encountered any greater difficulties resulting from technological shortcomings or gaps in contemporary knowledge while preparing the report.

Attention should be paid primarily to incomplete knowledge of the actual impact of wind turbines on birds. In the case of birds, among others, the uncertainty of forecasting concerns the real impact of the construction phase and liquidation of the investment, the lack of a reliable methodology for calculating potential mortality, lack of comprehensive data on the collision of particular species, etc.

The source of uncertainty is the ongoing evaluation of the accuracy of the calculation model in acoustic modeling, resulting from the assumed simplifications.

The analyses conducted in the report have shown that the construction and exploitation of „Wind Farm with technical infrastructure in Zaporizhia Region, in Priazovsk and Melitopol Districts, in the village councils of Devninskoe, Dobrivka, Dunaevka, Girsivka, Mordvinivka and Nadeshdine, south-eastern Ukraine" will not cause the exceeding of the permissible environmental standards and will not have a negative impact on IBA sites at the construction, exploitation or liquidation stages.