

Kelmé wind farm II

Non-Technical Summary



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1. Short description of the project

JSC Windlit plans to install a wind farm with up to 34 wind turbines (WTGs) in the Kelmė district municipality, specifically in the Kelmė rural and Kražiai elderships. The total capacity of the planned wind farm will not exceed the cumulative capacity specified in the connection conditions (168-198 MW). The nominal capacity of a single WTG will range from 5.5 to 8 MW, depending on the chosen model, with a rotor diameter of up to 180 meters and a height of up to 250 meters measured to the highest point of the structures. Out of the 34 land plots under consideration, more than ten have already been designated for the planned economic activity as undeveloped, uninhabited plots of land managed under lease agreements.

2. Legal basis and background

An Environmental Impact Assessment (EIA) is a process which ensures that projects that are likely to have a significant effect on the environment are adequately assessed before they are allowed to proceed and facilitates the participation of the relevant authorities and the public in environmental decision making. Annexes (I and II) to the Law on Environmental Impact Assessment of Proposed Economic Activity of the Republic of Lithuania (EIA law) list the types of proposed economic activities that fall under the scope of EIA legislation.

In accordance with Article 7, Paragraph 11 of the EIA Law, which stipulates that the organizer of the planned economic activity or the preparer of the EIA documents may commence the environmental impact assessment without the screening procedure, the organizer of the planned economic activity decided to initiate the environmental impact assessment procedures. An EIA report was completed for the wind farm in the Kelmė district, and in 2022, the EPA submitted the final conclusion that the EIA report indicates that the development of the wind farm in the Kelmė district municipality complies with the requirements of environmental protection, public health, cultural heritage protection, fire safety, and civil safety regulations.

3. Site location and description

The plots for the development of WTGs are located in the Kelmė district municipality, within the elderships of Kelmė rural (Palėpšai, Ustronė, Vėgėlynė, Žebriai villages) and Kražiai (Adošiškės village, Baubliai, Bielsiškiiai, Butkiškė, Dausyniškė, Dvarvietė, Ganyprova, Kiaunariškiai, Mietkalnis, Oreliškė, Pakalniškiai II, Pupėnai, Sodalė I, Žibuokliai villages, and Malinava village settlements), approximately 3.6-11 km west of Kelmė, at least 35 km northeast of Šilalė, and at least 28 km northwest of Raseiniai. It is planned that the wind farm will consist of 34 wind turbines.

For the development of WTGs, it is planned to reconfigure 34 land plots. The planned land plots for the wind farm development are situated away from urbanized areas, with the nearest residential environment/houses located no closer than 0.3 km from the planned wind turbine construction sites. The nearest public facility is the Kražiai Žygimantas Liauksminas Progymnasium in Kelmė district, located approximately 3.4 km to the north of the nearest planned wind turbine.

According to the General Plan's renewable energy development scheme, the areas for wind farm development fall within the wind energy development areas.

4. Description of the planned activity

The EIA report indicates that six alternatives for the development of the wind farm were analysed during the assessment. Based on the conducted EIA and the identified impacts on individual

environmental components, and after applying measures to mitigate the environmental impact, all planned WTGs can be implemented. The alternatives differed from each other in the number of wind turbines (ranging from 21 to 34 units) and the technical parameters of the WTGs. The construction of one wind turbine, No. VE34, was abandoned. According to the conclusions of the Lithuanian Ornithological Society, this turbine could negatively affect birds, and it may also have a negative impact on the landscape. Therefore, based on specialists' recommendations, it was excluded during the assessment process.

The planned sequence of construction work is as follows: installation of the necessary infrastructure (preparation of access roads; construction of service electrical cable lines); installation of wind turbine foundations or supports; assembly of wind turbine structures; synchronization of mechanisms and electrical equipment, site cleanup, restoration of surfaces and soil layers damaged during construction.

The main elements of the wind turbines are the foundation, which supports the entire wind turbine; the tower, which houses the electrical cables and provides access to the nacelle for technical maintenance; the stator (generator, rotor), control equipment, and gearbox; and the blades, which help the rotor transfer wind energy to the generator.

The planned wind turbines will be equipped with the most modern and latest technologies, manufactured in specialized factories, certified to meet European Union requirements, transported to the planned area for development, and assembled on-site. During construction, special-purpose concrete will be used for pouring foundations, along with steel rods. Once the foundations are formed, the wind turbine towers, which can be either steel or concrete, will be mounted on them. Subsequently, other structures will be assembled—the rotor and blades will be assembled on the ground, and the entire structure will then be lifted and attached to the top of the tower. The blades are made from fiberglass and epoxy resins.

The operation of the wind turbines will be autonomous, controlled in an automatic mode. The operation of electrical equipment and other turbine mechanisms will be monitored by automatic sensors, with data continuously transmitted to the wind turbine control center via remote communication. The wind turbine monitoring system will ensure maximum safety. In the

event of a malfunction, the turbines will automatically shut down. Maintenance and servicing of the wind turbines will be carried out by the manufacturer's service teams under a contractual agreement.

Water, land, soil, and/or biodiversity resources will not be used. It is planned to use one of the alternative energy sources that never deplete, which is wind energy. During the operation of the planned WTGs, the use and storage of chemicals and preparations (including hazardous chemicals/preparations), radioactive materials, and hazardous/non-hazardous waste are not anticipated.

5. Summary of the impacts and mitigation measures

5.1 Physical pollution (noise and shading)

An assessment of potential noise effects associated with the proposed development has been undertaken using the WindPRO software. Noise dispersion calculations were performed for six wind turbine model alternatives, considering day, evening, and night periods. According to the noise dispersion calculations presented in the Environmental Impact Assessment report, it was determined that the noise level of the planned wind turbines, considering the six wind turbine model alternatives, does not exceed the noise limit values set by Hygiene Standards in the nearest residential environment during all periods of the day. Additionally, noise dispersion calculations were performed considering previously planned wind turbines located within a 2 km radius of the planned wind turbines. The noise dispersion calculations showed that the 45 dBA noise contour of the planned and previously planned wind turbines will not reach the nearest residential environment.

An assessment of shadow flicker associated with the proposed development has been undertaken using the WindPRO software. Shadow flicker dispersion calculations were performed for six wind turbine model alternatives. Based on the shadow flicker dispersion calculations for these six wind turbine model alternatives, it was determined that in some of the nearest residential homesteads, the shadow flicker may exceed 30 hours per year (including cumulative effects). Therefore, it is planned to

implement a shadow reduction (shadow shutdown) mechanism, aimed at reducing shadow flicker in residential areas. This system will stop the rotation of wind turbines during the most intense sunlight hours, thereby eliminating shadow flicker in residential homestead areas. The wind turbine manufacturer plans to integrate a shadow reduction software program into the wind turbine control system.

Mitigation measures

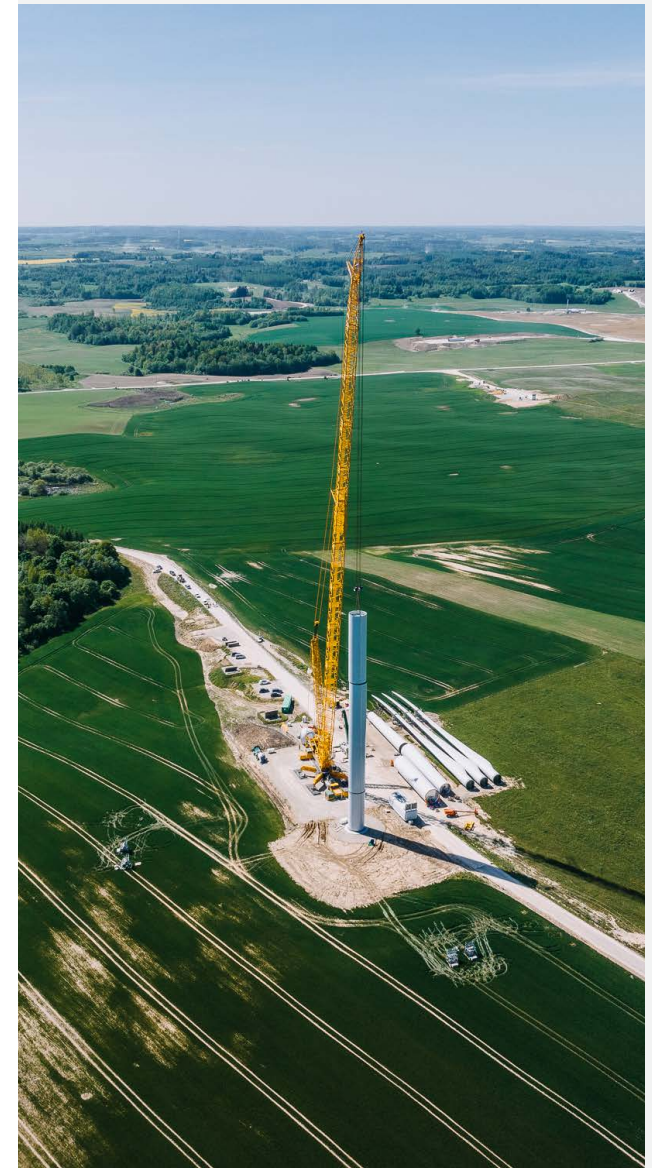
- Work mode limitation has been planned for some of the wind turbines due to the exceedance of noise limit values (detailed information is provided in the Environmental Impact Assessment report section - 2.8.2.1. Noise).
- Sanitary protection zones will be established around the wind turbines. The proposed area for the sanitary protection zone approximately ranges from 520 hectares to 915 hectares, depending on the chosen alternative (wind turbine model and the number of wind turbines).
- It is planned to implement a shadow flicker mitigation device (shadow shutdown).

5.2 Public health

The public health status been reviewed and analysed. During the EIA, the physical factors were assessed—noise, shadow flicker, infrasound, electromagnetic radiation, and vibration. Economic and social factors, as well as psycho-emotional impacts, were also discussed.

Noise dispersion calculations for the planned wind turbines were performed, considering six alternatives, as well as cumulative noise dispersion calculations considering previously planned/operational wind turbines. It was determined that the noise level, both without background noise and considering the noise created by operational and other planned wind turbines in the vicinity, will not exceed the noise limit values specified in Hygiene Norm HN 33:2011 during any period of the day, both beyond the boundaries of the established sanitary protection zones and in the nearest residential areas.

Negative impacts on the nearest residential environment due to shadow flicker from the planned wind turbines are also not anticipated after implementing mitigation measures.



It is planned to establish sanitary protection zones based on the 45 dBA contour lines obtained from the noise dispersion modelling results, considering the evaluated wind turbine alternatives and considering the operation of the planned wind turbines at maximum load, i.e., when all the planned wind turbines operate continuously throughout the year (365 days), with wind speeds of 10 m/s. The area of the sanitary protection zones approximately ranges from 520 hectares to 915 hectares, depending on the chosen alternative (wind turbine model and number).

Residential, public, and other types of buildings and/or territories do not fall within the boundaries of the proposed sanitary protection zones. It is accepted that compliance with the limit values for environmental pollution factors caused by economic activities, which may affect public health, as set by public health safety regulations, ensures an acceptable impact on public health. These limit values are established based on dose-response assessments of these factors and are considered harmless to human health.

Mitigation measures

- It is planned to establish sanitary protection zones for planned WTGs based on the 45 dBA contour lines obtained from the noise dispersion modelling results.

5.3 Biodiversity

A significant negative impact on the neighbouring biotopes and vegetation has not been identified. The planned area consists of agricultural land, and the necessary infrastructure for the activity (access roads, electricity supply cables) will be laid alongside existing roads and through private land plots and/or state land. To thoroughly assess the potential impact on birds and bats, the organizers of the planned economic activity consulted the Lithuanian Ornithological Society, which conducted observations and studies in the planned area in 2020 and 2021 and provided results on the ornithofauna present in the planned activity area.

The studies found that the territory of the planned wind farm is predominantly inhabited by common agricultural landscape bird species. Rare and protected bird species can be found along stream edges, in small lakes, marshy areas, and in the wetlands or meadows within the territory. Birds nesting in the surrounding forests and marshes use the planned area for feeding. The studies

also determined that the intensity of bird migration flows in the future wind farm area is low.

Furthermore, the studies revealed that the planned wind farm area is attractive for bats to breed and feed. Shallow water bodies, marshy areas, abundant greenery, and deciduous forests provide good habitats for bats to breed and feed, although bat migration in the planned wind farm area was not active.

Mitigation measures

- A monitoring program for birds and bats will be prepared.
- According to the bird and bat monitoring program, if significant negative impacts of the planned economic activity on birds or bats are identified during research, either before the start of operation or while the wind farm is already in operation, measures to mitigate the negative impact would be proposed (for example, increasing the wind turbine speed from the factory-set level to 5.5–6 m/s from sunset to sunrise during the period from June to September 15th, as there is a threat to breeding bats;).
- It is planned not to change the habitat's terrain, hydrological regime, vegetation composition, etc.
- Before the start of construction, 100 bat boxes will be installed in specially designated areas, away from the wind farm.
- It is planned to locate and identify birds of prey nests in the surrounding areas, monitor the abundance of bird breeding until the wind farm begins operation and while it is operational, and conduct more detailed studies of local bird species that are sensitive to wind turbines and protected breeding species in the wind farm area and surrounding areas using telemetry devices and visual observations.

5.4 Protected areas and areas of high ecological value

The planned area does not fall within any reserves, Natura 2000 sites or other protected areas. The nearest protected area of Natura 2000 is BAST - Pamedžiokalis Forest, this forest is located about 2.5 km from the planned territory. The nearest protected of Natura 2000 is PAST area - the Dubysa River Valley, it is located about 18 km from the planned territory. The closest regional parks to the proposed wind turbines - Varniai, Kurtuvėnai, Dubysa, and

Tytuvėnai regional parks, they are situated at significant distances (13-18 km).

5.5 Soil pollution and erosion

The planned economic activity will be carried out after forming separate plots for engineering infrastructure (some of which have already been formed), with an area reaching about 0.25 hectares. Therefore, there will be no significant impact on the land or soil.

Mitigation measures

- During construction, the excavated soil will be used for levelling the local terrain, forming embankments for entrances and access roads, and temporary soil storage will be arranged on-site without transporting it out of the area.
- Detailed engineering geological surveys will be conducted while preparing the technical projects for the wind turbines.

5.6 Landscape and visual

The area for the planned economic activity falls into landscape visual structure types marked with indices V3H1-c and V1H2-b. The V3H1-c landscape is characterized by a very pronounced vertical division (a highly hilly and deep valley landscape with four to five levels of videotop complexes). The V1H2-b landscape is characterized by a weak vertical division (an undulating landscape with gently sloping valleys and two levels of videotop complexes).

The nearest regional parks to the planned wind turbines, Varnių, Kurtuvėnų, Dubysos, and Tytuvėnų, are located at a significant distance (13-18 km), therefore, the visual impact on them will not be significant.

The greatest possible impact of installing wind turbines in the planned area will be visual impact to the landscape. For a detailed assessment of the impact on the landscape, a landscape impact assessment was prepared.

The landscape assessment was based on field studies and photo documentation, with visualizations prepared and visual impact zones delineated, considering the visual characteristics of the planned wind turbines. The assessment, following the methodology for determining the significance and contrast degree of visual impact and the nature of the impact from selected

viewpoints, determined that the planned wind turbines would have the most significant visual impact within the park area itself. Additionally, a moderate degree of visual significance and contrast was identified for the Butkiškė settlement and the landscapes along the Kražiai-Kelmė (No. 2104) and Kiloniai-Kelmė (No. 2124) roads (due to cumulative impact).

According to the conducted landscape impact assessment, it has been determined that the nearest landscape panorama viewpoint is Medžiokalnį lookout, which is approximately 2.5 kilometers away from the planned wind farm. From this point, the vertical viewing angle can range from 0 to 2.6 degrees, but does not reach 2.8 degrees; therefore, the impact on the landscape is not significant.

After conducting an expert assessment of the landscape impact, the landscape was evaluated from two viewpoints. The first viewpoint was chosen from the Kražiai settlement. Observing from the first viewpoint, the aesthetic value of the landscape features was rated at 33 points without the planned wind turbines and 33 points with the planned wind turbines. The second viewpoint was chosen from the road Kražiai – Kelmė (No. 2104), near the city of Kelmė. From this viewpoint, the aesthetic value of the landscape features was rated at 53 points without the planned wind turbines and 55 points with the planned wind turbines. Based on the number of points, the landscape observed from the first viewpoint is classified as low aesthetic quality, while from the second viewpoint it is classified as medium aesthetic quality. According to the difference in the number of points collected, it is concluded that the planned wind turbines will not have a negative impact on the visual and aesthetic quality of the landscape.

For the second assessment, a methodology for determining the significance of visual impact, contrast level, and nature of impact from the selected viewpoints was used. The assessment determined that the planned wind turbines will have a moderate visual significance but will exhibit a high contrast level within the wind farm area itself (viewpoints No. 2, 3). This is due to the short observation distance (from 0.5 to 1.5 km).

Although the wind turbines' impact on the Kražiai settlement is not significant, there are landscape observation points in the settlement that are frequently visited (Medžiokalnį, Vytauto Hill). Therefore, the wind turbine No. 34, which is planned to be in the closest and most open area, will be cancelled.

Mitigation measures

- During the construction of the wind turbines, the local terrain will not be altered. The existing roads will be used as efficiently as possible and will be maintained regularly.
- When designing the wind turbines, as natural colours as possible will be used to minimize contrast with the surrounding environment.
- It is planned to design wind turbines No. 11, 12, and 29 with smaller parameters. Wind turbines No. 11 and 12 will have a total height of up to 220 meters, while wind turbine No. 29 will have a total height of up to 200 meters. In this way, all the edge wind turbines (No. 12, 11, 25, 24, 29) will be noticeable at the same height (with a similar vertical viewing angle).
- It is planned to prepare a landscape monitoring program by the day the construction permit is obtained and to reassess

the visibility of the wind turbines within 2-3 years after their construction. This reassessment will focus on their visibility from the Kiloniai – Kelmė road (No. 2124) due to cumulative impact and from the Kražiai – Kelmė road (No. 2104) due to the planned wind turbines No. 07 and 17.

- When designing the wind turbines, it is essential to use colours that are as natural as possible to minimize contrast with the surrounding environment. If necessary (as determined during monitoring), bio architectural compositions of strip deciduous and coniferous plantings should be formed alongside specific sections of the mentioned roads (near residential areas). During the work and when determining the precise planting locations, consultations with landscape architects are planned.



5.7 Hydrology and Hydrogeology

The area where the planned economic activity is to be carried out is bordered by the river Kražantė (identification code: 14010160) from the west to the south, and by the river Obelynė (identification code: 14010176) on the western side. The northern part is traversed by the river Vilbėnas (identification code: 14010192) and the river Kalnyčia (identification code: 14010171). The river Kuprė (identification code: 14010184) flows from the southern side and the river Laukė (identification code: 14010187) flows from the southeast, with the Butkiškės pond (identification code: 14050065) located near Butkiškė.

The locations for the development of wind turbines have been chosen outside the boundaries of the protective zones of surface water bodies. The planned activities are intended to be carried out in such a way that all distances are maintained, and all restrictions established by the laws of the Republic of Lithuania are observed.

The area of operations does not fall within flood threat and risk zones. The construction of wind turbines and the necessary engineering infrastructure will be carried out without disrupting the hydrological regime of surface water bodies, therefore significant physical impact on surface water bodies is not anticipated.

Mitigation measures

- In places where the planned underground electric cable will cross a surface water body, it will be installed by drilling under the bed of the water body, with the directional drilling site being set up outside the boundaries of the surface water body protection zone, in compliance with the requirements established by legal acts.
- The drainage systems and facilities located around operations will be protected and properly repaired/restored if they are damaged during the construction of wind turbines. If necessary, some of the drainage systems will be reconstructed and restored, and during the technical project preparation stage, a part of the project for the damaged or modified drainage structures will be prepared.

5.8 Air pollution

The planned economic activity will not have a negative impact on the air and climate. Minimal impact on the ambient air might occur

during the construction of wind turbines and the installation of infrastructure due to emissions from internal combustion engine vehicles to be used, however, the construction work is expected to be short-term, and the amount of emissions will be insignificant and will not affect the current air quality.

5.9 Water / Wastewater

The activity will not use water resources, and no industrial or domestic wastewater will be generated. The construction of wind turbines and the necessary engineering infrastructure will be carried out without disrupting the hydrological regime of surface water bodies, so significant physical impact on surface water bodies is not anticipated. In places where the planned underground electric cable will cross a surface water body, it will be installed by drilling under the bed of the water body, in compliance with the requirements established by legal acts. Significant negative impact on surface and groundwater and its environment is not anticipated, therefore no mitigation measures are planned.

5.10 Waste

Small amounts of metal and mixed construction waste may be generated during the planned construction of wind turbines (foundation construction). This waste will be placed in special containers and transported for further processing under contracts with waste management companies. During the operation of the wind turbines, no waste (hazardous, non-hazardous, radioactive) is expected to be generated. Waste is anticipated only during repair and/or reconstruction and technical maintenance. Such waste will not be accumulated on-site; it is planned to be handed over for disposal to waste management companies registered in the State Register of Waste Managers. At the end of the wind turbines' operational period, if the economic operator decides to cease activities, the wind turbines will be dismantled and removed from the site, and the resulting waste will be disposed of in accordance with the provisions of legal acts regulating waste management.

5.11 Fire and extreme events

The greatest risk has been identified in cases of extreme meteorological conditions, such as severe storms or hurricanes.

To mitigate the risk of this potential hazard, preventive measures are planned for the wind turbines. Considering the resistance of the planned WT structures to physical impacts, the planned use of safety and control systems, and the probability of extreme natural phenomena occurring in the PEI area, emergency situations are unlikely.

Mitigation measures

- Lightning protection and earthing systems will be installed.
- The wind turbines will be protected against extreme meteorological conditions – an anti-corrosion coating will be installed to protect against marine corrosion; a flexible structure and multi-cylinder damping anchors will be installed in the wind turbines to enhance resistance to earthquakes.
- WTGs are equipped with an automatic braking system consisting of two independent braking systems (automatic and manual).

5.12 Cultural heritage and protected areas

The location of the planned economic activity does not fall within the territories of cultural heritage objects and their protection zones according to the Cultural Heritage Register map.

5.13 Traffic and transport

The site will be equipped with service areas and access roads for wind turbines. Local access roads are intended to be used, and where there is no access to the planned wind turbine site, separate sections of access roads will be constructed. New access roads will not be built in protected areas, wetlands, shoreline protection zones of surface water bodies, or other areas where such activity is prohibited.

During the construction period, contracts may be made with specialized service providers for road maintenance and watering. The use of chemicals to reduce road dust is recommended exclusively in sections close to homesteads and only if there are complaints from residents about dust.

It should be noted that once the construction of the wind turbines is completed, the access roads to the wind turbines will be used infrequently, only during the maintenance of the wind turbines.

Mitigation measures

- The roads will be strengthened and renovated as needed.
- If road sections and/or bridges are damaged during the transportation of wind turbines, they will be properly repaired and restored to their previous condition.
- To reduce dust on gravel roads during construction, the access road surface may be watered in dry weather.

If it becomes clear during the performed activity that the impact on the environment is greater than was assessed during the EIA procedure, the operator will be obliged to immediately apply additional measures to reduce the environmental impact or reduce the scope of the activity / terminate the activity.




6. Glossary


BAST	Special Areas of Conservation are designated areas that are protected under the European Union's Habitats Directive. These areas are established to conserve natural habitats and species of wild fauna and flora that are considered to be of European importance.
EIA	Environmental Impact Assessment.
EPA	Environmental Protection Agency under the Ministry of Environment of the Republic of Lithuania.
General Plan	General Plan of the Kelmė District Municipality territory, approved by the decision of the Kelmė District Municipality Council on March 29, 2013, Decision No. T-94.
Natura 2000	A coherent network of special areas of conservation of habitats which is composed of sites hosting the natural habitat types of community interest and habitats of the species of community interest, and which enables the natural habitat types and the species' habitats to be maintained and, where appropriate, restored to a favourable conservation status in their natural range. The Natura 2000 network includes special areas of conservation of birds.
PAST	Special Protection Areas are designated areas under the European Union's Birds Directive. These areas are established to protect and manage habitats for rare and vulnerable birds, as well as for regularly occurring migratory bird species.
Protected area	A land and/or water area which has clearly defined boundaries, an acknowledged scientific, ecological, cultural and other value and for which a special protection and use regime/procedure has been established by legal acts.
Reserve	A protected area established for the preservation of the natural and/or cultural sites valuable from a scientific or cultural point of view, the territorial complexes and objects/properties of natural and cultural heritage located therein, the landscape, biological diversity, and gene pool. Preservation of the properties located in these areas shall be ensured without terminating economic activities therein.
Restoration site	A protected area intended for the protection, restoration, enhancement and limited use of natural resources, formerly impoverished by human activities.
Sanctuary	A protected area set up in order to preserve and conduct research of the natural or cultural territorial complexes of particular scientific value, ensure the unaffected course of natural processes or maintenance of authenticity of cultural properties, and promote protection of the territorial complexes of natural and cultural heritage. The principal designation of land use shall be established as conservational in these areas, with termination of economic activities therein.
State (national and regional) park	A large protected area which is complex from the natural, cultural and recreational points of view and is particularly valuable, and whose protection and management is related to the designation of the area's functional and landscape management zones.
VENBIS	Map of Wind Energy Development and Areas Important for Biodiversity.
WTG	Wind turbine generator.

7. Contacts



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