Western Balkans Environmental Programme

UNDP Serbia

Strengthening capacities in the Western Balkan countries to address environmental problems through remediation of priority hot spots

NATIONAL COMPONENT - SERBIA – Remediation of the Grand Backa Canal

GUIDELINES ON THE ENVIRONMENTAL IMPACT ASSESSMENT FOR WIND FARMS

Belgrade, June 2010

PROJECT:
Strengthening Capacities in the Western Balkan Countries to Address Environmental Problems through Remediation of High Priority Hot Spots

NATIONAL COMPONENT SERBIA – Remediation of the Grand Bačka Canal

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По мери природе

UNDP

GUIDELINES ON THE ENVIRONMENTAL

IMPACT ASSESSMENT FOR WIND FARMS

Belgrade, June 2010

Project Information

UNDP Country Offices in Serbia, Bosnia and Herzegovina, Albania, FYR Macedonia, Montenegro and UNATSCR 1244 of Kosovo, developed a regional programme around nine pollution hot spots in the Western Balkans, driven by the need for improving the quality of the environment. The Project will be implemented over a 30-month period, covering three areas: remediation (construction works), policy dialogue in the area of environmental protection and development of professional services in the environment management sector. While the construction of facilities to alleviate environmental problems and pollution will be the main focus, strengthening and building institutional capacities will be an important element throughout the programme.

The UNDP intervention in the municipality of Vrbas (AP Vojvodina), as agreed at the regional level, is part of a bigger remediation project consisting of: construction of the new, missing part of the main sewage collector, industrial wastewater pre-treatment, the construction of a central wastewater treatment plant (CWTP) and the remediation of the Grand Bačka Canal.

In a regional context, the national Serbian component of the Programme “Strengthening Capacities in Western Balkan Countries to Address Environmental Problems through Remediation of High Priority Pollution Hot Spots - Remediation of the Grand Bačka Canal” involves construction works on the entire missing part of the main sewer collector, Phase IV.1 Ch. km 5+999 - 8+061, Phase IV.2 Ch. km 8+061 – 10+019 municipality of Vrbas and Phase V Ch. Km 10+019 – 12+628 in municipality of Kula. In addition to the construction works, the project also has a significant institutional capacity building component aiming to improve environmental protection management.

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ABBREVIATIONS

CBD	Convention on Biological Diversity
EC	European Commission
EIA	Environmental Impact Assessment
EU	European Union
EWEA	European Wind Energy Association
GIS	Geographical Information System
IBA	Important Bird Areas
ICAO	International Civil Aviation Organisation
IMSI	Institute for Multidisciplinary Research
IPA	Important Plant Areas
MoESP	Ministry of Environment and Spatial Planning
OJRS	Official Journal of the Republic of Serbia
RES	Renewable energy sources
RS	Republic of Serbia
SEA	Strategic Environmental Assessment
SPA	Special Protection Areas (Directive on Birds)
SCI	Sites of Community Importance (Directive on Habitats)
SAC	Special Areas of Conservation (Directive on Habitats)
Toe	Ton of Oil Equivalent
TWh	Terawatt-hour
WBEHSP	Western Balkans Environmental Hot Spot Programme

1. INTRODUCTION

The technical potentials for harnessing renewable energy sources are substantial and exceed those of all other already available sources. Climate change, reduction of CO_2 emissions, depleted fossil fuel reserves and soaring fuel prices have led to increased governments support, through adoption of laws and regulations, stimulation and commercialization of renewable energy sources. Wind energy is booming worldwide and installed capacities are increasing significantly year by year, because wind power is a competitive and cost efficient energy source.

The European Union has set a binding target of 20% of its total energy supply to come from wind and other renewable sources by 2020. In order to achieve this target, more than one third of European electrical demand would have to come from renewables, with wind power expected to deliver 12-14%[1] (out of the total 20%). In 2009, approximately 158 GW[2] of wind turbines were installed across the world, out of which 74,8 GW of wind power in the EU. Germany and Spain lead in electricity production from wind power in European Union in 2009 with 37,500 and 36,188 TWh, while United Kingdom folows them with 9,259 TWh.

Because of the permanent need for additional energy sources in our country, wind energy imposes itself as the ideal new energy branch. It is a known fact that there are localities in Serbia suitable for harnessing wind energy. Wind farms have a short construction lead time, the peak production season coincides with the seasonal electricity consumption peak, while the negative impact on the environment is minimal compared to other energy facilities and technologies.

With the ratification of the Treaty establishing the Energy Community, the Republic of Serbia has undertaken, among other, the obligation to adopt and carry out a plan for the implementation of Directive 2001/77/EC on the promotion of electricity produced from reneweable energy sources.

The construction of a number of wind farms, for which the Energy permits have already been issued, will commence in Serbia this year. Consequently, the number of submitted EIA screening requests (to determine the need to develop EIA) has increased. Because of that, it has been concluded that this kind of guideline would be useful.

Also, the development of guidelines is in accordance with priority thematic areas identified in the report "*Environmental Policy Integration and Capacity Building Needs Assessment*" (UNDP, 2008).

Hereinafter, this document will be referred to as Guidelines. The Guidelines refer to the complete procedure, from submission of the screening requests, request for determining the need for the development of an Environmental Impact Assessment Study, to issuance of

[1] European Wind Energy Association (EWEA), http://www.ewea.org/index.php?id=1551, March 2010
[2] EurObserv'ER 2010, http://www.eurobserv-er.org/pdf/baro195.pdf, February 2010

the decision on its approval. Hereinafter, the Environmental Impact Assessment Study will be referred to as the Study.

The Guidelines are envisioned primarily as a tool which will be used by the staff of institutions tasked with environmental impact assessment and other interested parties. The Guidelines provide basic information concerning the planning process and detailed information concerning the impact assessment process, with identification of the potential impact that wind farms may have on the environment.

The Guidelines include the Republic of Serbia policy guidelines in the area of environmental protection and use of wind energy, an overview of the basic technical features and potential impact of wind farms on the environment. Also listed herein is the legislative framework of the Republic of Serbia for the use of wind power and environmental impact assessment. For the purpose of developing the Guidelines, mainly, the examples from European practice were used and the whole process was presented in the context of the Serbian legislation.

The parties involved in the development of this document were: WBEHSP National Coordinator Dobrila Simić and National Consultant for the Guidelines on the Environmental Impact Assessment for Wind Farms Vera Pullen. Supervision, consultations and support in the development of this document were provided by MoESP, Department for Environmental Impact Assessment, Advisor Sabina Ivanović, MSc; Unit for Renewable and Alternative Energy Sources, Advisor Slobodan Cvetković, MSc and Head of Unit for Strategic Environmental Impact Assessment Miroslav Tošović, in the period from December 2009 to June 2010. The MoESP organizational scheme is provided in Attachment 7.

The explanation of the term wind farm: a wind farm is a facility that generates electrical power from wind energy and consists of one or more production units - turbines. The term “wind farm development“ used in the document, mainly refers to a “wind farm facility”.

2. POLICIES OF THE REPUBLIC OF SERBIA IN THE AREA OF WIND ENERGY USE

The development of renewable energy sources (RES), along with measures designed to improve energy efficiency, are a priority on the national and European level, on both environmental and energy policy grounds. Implementation of the policies in the field of wind energy use has to take into account the protection of the environment.

2.1. Environmental Protection

The framework law in RS in this area is the Law on Environmental Protection (OJ RS, No. 135/04, 36/09).

Directive 2001/42/EC on Strategic Environmental Impact Assessment was adopted in 2001 and aims to identify and assess the environmental consequences of the individual environmental plans and programms at the preparatory stage, before they are adopted. Public institutions and those competent for the environment provide their requirements/opinions on the proposed plans, they are integrated and taken into consideration in the planning process. Once the plans and programmes have been adopted, the general public is informed about the decision and the decision-making procedure. The objective of the environmental impact assessment is to involve the general public and integrate environment-related elements in the planning process. This helps in achieving the set principles of sustainable development. The Directive was transposed into Serbia's legislation in 2004, by the Law on Strategic Environmental Impact Assessment (OJ RS, No. 135/04).

Directive 97/11/EC on Environmental Impact Assessment was introduced in 1985 and amended in 1997. The Directive ensures that the environmental consequences of projects are identified and assessed prior to a permit being granted. The public can give its opinion and all results are taken into consideration in the process of approval of the Environmental Impact Assessment Study. The public is subsequently informed about the decision. The Directive outlines the project categories that are subject to an environmental impact assessment, the procedure to be implemented and the mandatory content of the Environmental Impact Assessment Study. Directive 97/11/EC was transposed into the Serbian legislation in 2004, by the Law on Environmental Impact Assessment (OJ RS, No. 135/04, 36/09).

Considering that environmental impacts do not respect state borders, there is a need for inter-state information sharing and consultations on all major projects (facilities) that may have adverse transboundary impact on the environment. The Convention on Environmental Impact Assessment in a Transboundary Context – Espoo (EIA), is a key one in bringing together all stakeholders to prevent environmental damage before it occurs. The Convention entered into force in 1997. Serbia ratified the Espoo Convention through the Law on Ratification of the Convention on Environmental Impact Assessment in a Transboundary Context in 2007 (OJ RS, International Treaties, No. 102/07).

2.2. Nature Protection

There is a legal obligation to integrate conservation and sustainable use of biodiversity. It is regulated by Serbia's ratification of the Convention on Biodiversity (2001), Convention on the Conservation of European Wildlife and Natural Habitats (2007) and the Convention on the Conservation on Migratory Species of Wild Animals (2007). Serbia's objective is to gain EU candidate status and in this respect to transpose the EU Directives in the area of nature conservation into Serbian legislation.

Nature conservation and sustainable use of biodiversity components are regulated by the following legislation: Law on Environmental Protection (framework law), Law on Environmental Impact Assessment, Law on Strategic Environmental Impact Assessment, Law on Nature Conservation and others. Also prepared were the strategic documents in which conservation of nature and biodiversity acquired a specific place. Along with others, the Sustainable Development Strategy (2008) and the National Environmental Protection Programme were adopted (2010).

For the purpose of implementation of the Convention on Biodiversity in the Republic of Serbia, several documents were developed so far, among which: Harmonisation of National Nomenclature in Codification and Classification of Habitats with the Standards of International Community, Red Book of Serbian Flora 1[3], while the development of the National Strategy and Action Plan on Conservation of Biological Diversity (NBSAP) is underway. Conservation of biological diversity itself is inseparable from the sustainable use of biodiversity components, currently, the possibilites for intensifying the completion of the National Strategy on the Sustainable Use of Natural Resources and Goods are being considered. The same applies to the completion of mechanisms for the economic evaluation of biodiversity components. They are for the purpose of sustainable use and conservation of biodiversity in the Republic of Serbia.

2.3. The Use of Renewable Energy Sources

The programme for the implementation of Serbia's energy development strategy from 2007 to 2015 (amendments, 2009) estimates that the technically usable energy potential of renewable energy sources in Republic of Serbia is very significant and estimated at over 4.3 million toe/year – of which over 2.7 million toe/year can be sourced from biomass, 0.6 million toe/year from unused hydro potential, 0.2 million toe/year from existing geothermal springs, 0.2 million toe/year from wind energy and 0.6 million toe/year from solar radiation[4]. The ratification of the Energy Community Treaty, Serbia has, among other, undertaken the obligation to adopt and enforce the plan for the implementation of Directive 2001/77/EC on the promotion of the use of energy from reneweable sources. There are suitable locations for the construction of wind farms in Serbia, where 1,300 MW production capacities could be installed in the foreseeable future with an annual production of 2,300 GWh. Up to date, the required legislation in the field of renewable energy sources has been enacted, the

[3] Red Book of Serbian Flora 1, group of authors, Institute for Nature Conservation of Serbia, Belgrade 1999
[4] Ministry of Mining and Energy: http://www.mre.gov.rs/navigacija.php?IDSP=299, February, 2010

conditions for the use of RES are defined and future development targets for the energy sector set.

The new EU Renewable Energy Directive 2009/28/EC sets binding national targets which EU member states should achieve by promoting RES in the power, heating and cooling sectors and transport sector, to provide, that, by 2020, at least 20% of the total energy consumed in EU is generated from the renewable sources . The enforcement start date of the new Renewable Energy Directive in RS and other states signatories of the Energy Community Treaty will be determined and coordinated within this community. The construction of 45 MW plants using wind energy is planned until 2012[5]. However, due to substantial investors' interest in this type of facilities in RS and the issued energy permits (2009, 2010), it is quite possible that this planned capacity will be exceeded in practice.

2.4. Practical Conditions for the Use of Wind Energy in Serbia

The Institute for Multidisciplinary Research (IMSI) began intensive research of the energy potentials of wind and solar radiation in 2003. The Atlas of the Sun and Wind Energy Potential in Serbia was finalized in 2008, in accordance with the standard EU methodology (Macro-Scale Analytical Resource Assessment Model - National Level)[6]. Please refer to the Wind Atlas of Serbia in Annex 1.

With the aim of stimulating use of RES, the Republic of Serbia adotped the following by-laws: Decree on Requirements for Acquiring the Status of Privileged Power Producer and Criteria for the Assessment of Compliance with these Requirements (OJ RS, No. 72/09) which sets forth that the "status of privileged producer" is acquired by producing the electric power from renewable energy sources – wind energy; and the Decree on Incentives for the Power Generation from Renewable Energy Sources and Combined Generation of Electricity and Heat (OJ RS, No. 99/09). This Decree prescribes in more details the incentives for the production of electricity from RES and the "feed-in tariff" conditions, the incentives and reimbursement of costs to the buyer of energy from RES. According to this Decree, the purchace price from wind farms is 9.5 c€/1 kWh (euro cents per kWh). The entitlement to the incentives prescribed by this Decree for wind farm generated power is limited to a total installed power of 450 MW in RS.

The aforementioned Decrees also facilitate the practical use of wind energy as a renewable energy source in RS.

[5] http://www.srbija.gov.rs/vesti/vest.php?id=121289, April 2010

[6] Institute for Multidisciplinary Research. http://vetar-sunce.imsi.rs/home.php, March 2010

3. WIND ENERGY AND TECHNOLOGY OF USE OF WIND ENERGY

3.1. Basics of the Technology of Wind Energy Use

Wind turbines generate electricity by harnessing the power of the wind. The wind is a clean and sustainable energy source, it does not create pollution and it belongs to the group of reneweable energy sources. Wind energy technology is developing fast; turbines are becoming cheaper and more powerful, bringing the cost of renewably-generated electricity down.

Almost all wind turbines consist of rotor blades (or propellers) which rotate around a horizontal hub. The hub is connected to a gearbox and generator, which are located inside the nacelle (or gondola). The nacelle houses the electrical components and is mounted at the top of the tower of the wind turbine (see Figure 1):

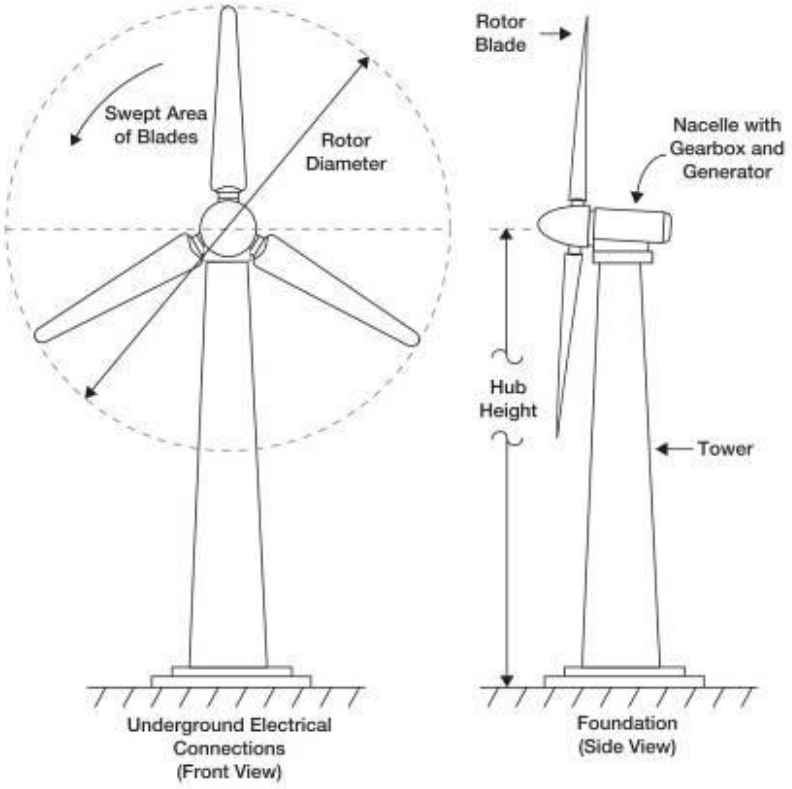


Figure 1: Components of a wind turbine

Tower: towers range from 25 to 120 metres in height (usually around 80 m) and the trend is towards higher elevations. Steel towers typically have a base diameter of 3-7 metres and display a slight tapering to the nacelle. Larger towers have a larger base diameter. Lattice towers are used in some locations.

Nacelle (or gondola): contains the key mechanical components of the wind turbine, including the gearbox and generator. A yaw mechanism is employed to turn the nacelle in the direction of the prevailing wind.

Rotor diameters range up to 80 m, in modern technologies up to 120 m, smaller machines have a diameter including blades of around 30 metres and are typical in developing countries. Wind turbines can have three, two or just one rotor blade. Most have three.

Blades: The blades, which are set in motion by the energy of the wind, are most commonly made of plastic, but can also be made of aluminium or steel. Modern wind turbines typically have three blades. These may vary in rotor diameter from 35 metres upwards. The blades rotate at 10-30 revolutions per minute at constant speed, although an increasing number of machines operate at a variable speed. Power is controlled automatically as wind speed varies and machines are stopped at very high wind speeds to protect them from damage. Most have gearboxes although there are increasing numbers with direct drives.

Transformer: This is a device for changing the voltage of the alternating current. Electricity is typically generated at less than 1000 volts by the wind turbine and the transformer "steps up" this voltage to match that of the national grid. This may be housed either inside or alongside the tower.

Concrete base: Turbines typically have bases of between 7 and 18 m^2 in size (nowadays even larger).

A typical wind power facility has the following components:

- Wind turbines,
- Towers,
- Transformers,
- Internal access roads,
- Transformer station
- Transmission system (power lines and other) connecting the facility to the national grid.

Most wind turbines start operating at a speed of 4-5 m/s (nowadays as low as 3 m/s and the technology is advancing in the direction of a lower start speed) and reach maximum power at about 15 m/s

3.2. Size and Capacity of Wind Farms

Wind energy developments can be installed as individual units i.e. a single wind turbine, or as several power-generating units (wind farm).

Wind farms are interconnected by a medium voltage power collection system and communications network. At a substation, this medium voltage electrical current is increased in voltage with a transformer for connection to the high voltage transmission system.

Spain, Denmark, and Germany are Europe's leading wind energy producers. A large wind farm may consist of a few dozen to several hundred turbines and cover an area of several

hundred square kilometres, while the land between the turbines may be used for agricultural or other purposes. Although this is not relevant for Serbia, a wind farm may be located off-shore to take advantage of strong winds blowing over the surface of an ocean or lake.

Wind turbines can be deployed individually, or grouped in small or larger numbers. Various factors may influence the size of a wind farm, including technical issues relating to the physical properties of the site, the wind resources and the capacity of the local transmission or distribution grid, as well as landscape and heritage considerations and development plan policies.

Commercial turbines range in capacity from a few hundred kilowatts to over 2 megawatts. The crucial parameter is the diameter of the rotor blades - the longer the blades, the larger the area 'swept' by the rotor and the greater the energy output. Currently the average size of the new wind turbines installed is up to 5 MW/wind turbine. The trend is moving towards the installation of larger-scale wind turbines as they can produce electricity at a lower price.

Large-scale wind turbines have rotor diameters in excess of 100 metres, tower heights in excess of 100 metres and are substantial structures weighing hundreds of tonnes. These projects require capital investments and lengthy approval and planning periods, including consultation with the local community and impact assessment on aviation, aesthetics and wildlife. These wind farms are the object of environmental impact assessment.

Small and **micro** wind farms are not the subject of the environmnetal impact assessment and the following description is just general information.

Small-scale wind turbines are particularly suited to off-grid, mobile and hybrid wind and photovoltaic (PV) systems. The PV/wind power combination is effective because wind power availability is highest in winter when available solar power is at its minimum and vice versa. Small-scale wind turbines may vary in size, with a range of models available, from less than 100 watts (W) up to 50 kilowatts (kW).

Micro wind turbines are most often used to charge batteries which run small scale electrical applications in remote locations. Typical applications are lighting, electric fencing, sensing equipment, road signage and electric pumps. Microturbines, less than 100W, are often used to charge 12 volt (V) or 24V batteries, for use on stand-alone systems. Turbines ranging from 0.6kW to 50kW can be used to provide electricity generation for individual houses and businesses, with rooftop models ranging from 0.5kW to 2.5kW in size.

3.3. Wind Energy and the Environment

The use of wind power has a light environmental footprint compared to the much more serious effects of conventional electricity generation, which affects climate change and disturbs the natural balance. Wind power does not produce harmful emissions or hazardous waste, it does not deplete natural resourses, nor does it cause environmental damage through resource extraction, transport and waste management. Wind turbines occupy less than 1% of the land area. Once up and running, existing activities, such as agriculture and ease of access to the site, can continue around them.

A wind farm development (facility) is subject to environmental impact assessment to ensure that the potential effects on the immediate environment (including flora and fauna) are carefully considered before construction of the facility is allowed. In many cases impacts can be avoided or reduced by adjusting the location of the whole development (at the planning stage), the number of turbines or by relocating the wind turbines within the existing boundaries of the development.

The overall impact of wind farms on the natural habitats, birds, bats and other fauna and flora is site specific. Despite this impact, extensive efforts are made to avoid building wind farms in the area of bird and bat migration routes.

To avoid potential disturbance to the local population, local authorities ought to apply strict rules to ensure that wind farms are sited at an adequate distance from nearby residential areas. When selecting a site, developers have to take into consideration the potential landscape and visual impact.

4. POTENTIAL IMPACT OF WIND FARMS ON THE ENVIRONMENT

Wind farms, as facilities for production of electricity, have the potential to impact the natural and urban environment. In designing these facilities, it is possible to avoid or reduce the negative environmental impacts. This is why existing municipality development plans should be considered in relation to the natural, built and geological heritage, particularly if these are protected by law. The potential impact of wind farms on the environment will be addressed in the following paragraphs.

4.1. Natural Heritage

Natural heritage refers to habitats and species of flora and fauna that are located within protected sites designated under national or international categories (World Heritage Sites, Ramsar Sites, IBA, IPA, etc.). EU Member States were under the obligation to classify SPAs (Special Protection Areas under the Birds Directive) and propose SCIs (Sites of Community Importance according to Habitats Directive), by the date of their accession. As a result of this process, the EU's "Natura 2000" network of protected sites for habitats and species was created . Currently, this is not obligatory for Serbia, but it will become by the EU accession and will have to be taken into account in assessing the environmental impact of wind farm developments.

Natural heritage sensitivity relates to impact of the facility on specific habitats, such as habitats of certain species, particularly birds and on the integrity of sites designated for the purpose of their conservation. Natural heritage may be impacted by wind energy developments both during the construction and operational phases. These impacts may be either temporary or permanent. All aspects of the project proposal that might threaten, themselves, or in combination with other proposals, the conservation objectives of the area should be identified.

Competent authorities may approve a wind energy development project only if they are satisfied that it will not adversely affect the integrity of the designated protected area. If necessary, they can request changes of the proposed project or additional development conditions under which the project can be realized. The conditions for nature and environmental protection, as well as parameters for wildlife monitoring shall be prescribed by the **Institute for Nature Conservation of RS/AP.**

In coming to a decision, competent authorities will consider the relevance of the project/facilities using wind resources, including the facilities proposed on designated sites. Their strategic importance in contributing significantly to decreasing dependence on fossil fuels, with subsequent reductions in greenhouse gas emissions should be taken into account.

In circumstances where a wind energy project is likely to have an adverse effect on the integrity of a site of international importance for nature conservation, approval may only be granted where there is no alternative solution and where there are imperative reasons of overriding public interest, including those of a social or economic nature. In such cases, consideration of protection measures to significantly mitigate the negative impact or the

possibility of providing alternative sites for wind energy development should be taken into account.

4.1.1. Habitats

Habitats that may be impacted by wind energy developments include peatlands (blanket bog, temporary ponds, flushes, flood zones and various other wetland habitats including water courses and lakes), sand dune systems, steppes, semi-natural/natural grasslands and woodlands. All are vulnerable, but those located in the highlands particularly so, owing to their location in high rainfall areas where the growing season is short.

The significant potential impacts on habitats that can result in the reduction or loss of biodiversity are:

- Direct loss of habitat due to the construction of development infrastructure, including turbine foundations, supporting facilities, roads, quarries and borrow pits;
- Degradation of habitats through alteration or disturbance, in particular arising from interference with hydrology which may alter the surface or groundwater flows and levels and drainage patterns critical in peatlands and river headwaters;
- Fragmentation of habitats and increased edge effects (effect of edge habitats); and
- Degradation and loss of habitats outside the development site, especially wetland habitats that may arise from pollution, siltation or erosion originating from within the development site.

4.1.2. Plant and Animal Species

Birds

The extent to which birds will be impacted by wind energy developments will vary depending on species, season and location and these impacts may be temporary or permanent.

The species considered to be most at risk are birds of prey, swans, geese and divers. Also endangered are morass birds in the brooding stage and water birds (diving ducks and ducks) in flocks. Potential impacts on migratory birds and local bird movements between egg-laying, feeding and brooding areas require careful consideration.

The following significant potential impacts to birds from wind energy developments have been identified:

- Disturbance during the construction and operational phases leading to the temporary or permanent displacement of birds from the development site and its surroundings;
- Collision mortality;
- Barrier to movement, (studies have shown that bird response may differ and that it is related to the species and/or season); and
- Direct loss or degradation of habitats, particularly in the wetlands.

Other Species

The potential impact on other rare flora, mammals (special attention should be devoted to bats), amphibians and fish also needs to be assessed.

Monitoring and Research Needs

General monitoring of environmental parameters should be avoided, except where specific requirements in relation to environmental issues are part of the permit. Effective monitoring is necessary to provide evidence of compliance with environmental conditions, such as noise limits or wildlife conservation.

The required monitoring/management programmes, which are funded by the investor, can provide information to the competent authorities and/or concerned third parties, on the extent to which the environmental protection conditions are met in the daily operation of the wind farm. In the case of a breach, appropriate remedial action will be required by the authorities. Such a programme would be particularly relevant in the initial stage of operation, during the first two years, possibly with the provision for further monitoring if the problem persists. Environmental monitoring can be carried out either by independent experts, or by the competent institutions at the investor's expense.

Suggested research with regard to the impact of the wind energy developments on the wildlife:

- Effects of inclement weather in attracting birds and bats to lighted wind turbines, e.g. drawing birds (especially migratory birds) and bats during spring and fall migrations within the reach of the rotor blades of the turbines.
- Localized effects on wildlife: habitat fragmentation and loss; effects of noise on both aquatic and terrestrial wildlife; habituation.
- Effects of wind turbine string configuration on mortality e.g. end of row turbine effect, turbines in dips or passes, setbacks from rims/edges of cliffs.
- Effectiveness of deterrents: alternating colors on blades (particularly, effects of black/white and UV gel coats); lights (e.g. colour, duration and intensity of pilot warning lights; lasers); infrasound (Breco Buoys[7], other noisemakers such as predator and distress calls if not irritating to humans, other wildlife, or domestic animals); visual markers on the guy wires.
- Use of acoustic, infrared and radar technologies to detect bird species presence, abundance, flight altitude and movements.
- Accuracy of mortality counts: estimation of the number of carcasses (especially migratory birds) lost due to fragmentation caused by the collision and wind momentum; size and shape of dead bird search areas; possibility of recording collisions acoustically or with radar or infrared tracking.
- Annual variability (temporal and spatial) in migratory routes; the use of the Geographic Information System (GIS) to assess migratory routes and stopovers, particularly for migratory birds and bats.
- Efficiency of seasonal wind turbine shutdowns at preventing mortalities, including the feasibility of using "self-erecting" turbines (easily erected, dismantled and taken down without cranes) during critical periods such as migrations.
- Impact of larger turbines versus smaller models.

[7] The device is used to deter sea birds from oil spills, emitting 30 different sounds (including warning sings) up to 130 dB, generally efficient in scaring birds at a 200 m distance, but may deter birds in a 800m radius. The device may be used at daytime, nightime, in fog, wind or storm.

- Changes in predator-prey relationships due to the placement of potential perching sites in steppe habitats.

Useful literature:

- "Interim guidelines to avoid and minimize wildlife impacts from wind turbines"[8] through: 1) proper evaluation of potential wind energy development sites; 2) proper siting and design of turbines and associated structures within sites selected for development; and 3) pre- and post-construction research and monitoring to indentify and/or assess impacts on wildlife.
- "Guidelines for consideration of bats in wind farm projects"[9] sets out generic guidelines for the planning process and impact assessments to take account of the effect of wind turbines on bats.

4.2. Geology

Required information on the geology of the site:

- A geological and hydrogeological assessment of the suitability of the site;
- A site map of the area in relation to any area or site that has been identified as a geological Natural Heritage Area, a proposed Natural Heritage Area or as a County Geological Site (show the impacts and mitigation measures proposed);
- A site map of the area in relation to areas of significant mineral or aggregate potential;
- Assessment of the potential impact of the facility on groundwater;
- Geotechnical stability analyses of the structure and the site, both in the construction and in the operational phase, with proposed geotechnical solutions and mitigation measures where they are needed. Also, the potential effect of the disposal of excavated materials and whether the facility might cause a landslide should be considered;
- Geotechnical foundation analyses (allowable bearing capacity, settlement, etc.);
- Details of borrow-pits if proposed on the site, details of blasting if foreseen, e.g. prevention or remediation of landslides;
- In order to identify the optimal location for each wind turbine, provisions must be made for carrying out site-specific geological, hydrological and geotechnical investigation works. The investigation works shall be performed in compliance with the requirements of the Law on Geological Investigations and other national regulations.

4.3. Archaeology

The potential impact of the proposed developments on the archaeological heritage of the site should be assessed. This assessment should address the direct effects on the integrity and visual amenity of monuments and include appropriate protection measures, e.g. a study of the existing literature and a field inspection where necessary and in line with the requirements of national legislation in the field of archaeology.

[8] Interim Guidelines to avoid and minimize wildlife impacts from wind turbines, http://www.fws.gov/habitatconservation/wind.pdf, February 2010.

[9] Guidelines for consideration of bats in wind farm projects http://www.eurobats.org/publications/publication%20series/pubseries_no3_english.pdf, February 2010

4.4. Architectural Heritage

The competent authorities should assess the potential impact of the proposed wind energy development on the architectural heritage of the locality and its landscape context, where relevant.

4.5. Noise

There are two distinct noise sources associated with the operation of wind turbines: aerodynamic noise caused by blades passing through the air and mechanical noise created by the operation of mechanical elements in the nacelle - the generator, gearbox and other parts of the drive-train. Aerodynamic noise is a function of many interacting factors including blade design, rotational speed, wind speed and incoming air turbulence which can generate a specific sound. Mechanical noise from a wind turbine is tonal in nature.

Advances in technology and design resulted in reduced noise emissions. Aerodynamic refinements that have been combined to make turbines quieter include the replacement of lattice with tubular towers, the use of variable speed operations and the switch to three-blade turbine designs. Improvements in gearbox design and the use of anti-vibration techniques in the past ten years have resulted in significant reductions in mechanical noise. The most recent direct drive wind turbines have no high-speed mechanical components and therefore do not produce mechanical noise. Turbine noise increases as wind speeds increase, but at a slower rate than the wind generated background noise. The impact of wind turbine noise is therefore likely to be greater at low wind speeds when the difference between noise of the wind turbine and the background noise is likely to be greater. Wind turbines do not operate below the wind speed referred to as cut-in speed, (the lowest wind speed below which no usable power can be produced by a wind turbine, i.e. the speed which activates the energy generating system), which is usually around 5 m/s. Larger and variable speed wind turbines emit lower noise levels at cut-in speed than smaller fixed speed turbines. Noise from wind turbines is radiated more in some directions than others, with areas down-wind experiencing the highest predicted noise levels. At higher wind speeds the noise from wind has the effect of largely masking wind turbine noise.

Good acoustic design and carefully considered siting of turbines will prevent significant increase in ambient noise levels at any nearby noise sensitive locations. Sound output from modern wind turbines can be regulated, thus mitigating noise related problems, albeit with some loss of power. An appropriate balance must be achieved between power generation and noise impact.

Noise impact should be assessed by reference to the nature and character of noise sensitive locations and in accordance with the laws and regulations in the field. In the case of wind energy development, a noise sensitive location includes any occupied dwelling house, hostel, health building or place of worship and may include areas of particular scenic quality or special recreational amenity importance. The prescribed noise limits should also apply to those areas used for relaxation or activities for which a quiet environment is highly desirable. The prescribed noise limits should be applied to locations in the wider surroundings of the wind farm and should take into account both the turbine noise and background noise.

Pursuant to the Rulebook on Permitted Noise Levels in the Environment, the maximum noise limit[10] allowed is 35 dB(A) at nightime and 40 dB(A) at daytime outside public buildings and 30dB(A) at nightime and 35dB(A) at daytime inside public buildings. In areas nearby the wind farms where the noise level is less than allowed, a maximum increase of 5 dB(A) above the existing noise is considered acceptable in ensuring protection of inhabitants in the area.

Generally, noise is unlikely to be a significant problem where the distance from the nearest turbine to any noise sensitive property exceeds 500 metres[11]. Comptetent authorities can seek evidence that the type(s) of turbines proposed will use best current engineering practice in terms of noise creation and suppression.

4.6. Safety Aspects

There are no specific safety considerations in relation to the regular operation of wind turbines. Fencing or other restrictions are not necessary for safety considerations. People or animals can safely walk up to the base of the turbines.

There is a remote possibility of injury to people or animals from flying fragments of ice or from a damaged blade. Most blades are composite structures with no bolts or separate components and the danger is minimised as a result. The build up of ice on turbine blades is unlikely to present problems. Most wind turbines are fitted with anti-vibration sensors, which will detect any imbalance caused by the icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation.

4.7. Proximity to Roads and Railways

In general, turbines may distract motorists while they are under construction or when they are new. Over time, the turbines become part of the landscape and generally do not cause any significant distraction to motorists. Although wind turbines erected in accordance with standard engineering practice are stable structures, best practice indicates that it is advisable to achieve a safety set back from roads and railways of a distance equal to the height of the turbine and length of the blade.

4.8. Proximity to Power Lines

Adequate clearance between structures and overhead power lines should be provided as required by the competent electricity company and in line with the regulations of Republic of Serbia. For example, in Ireland, there is a statutory obligation to notify the electricity distributor of proposed developments within 23 meters of any transmission or distribution line.

4.9. Interference with Communication Systems

Wind turbines, like all electrical equipment, produce electromagnetic radiation, which can interfere with broadcast communications. This interference can be overcome through the installation of deflectors or repeaters. Competent authorities shall request the developer to

[10] Upper noise limit in human environment expressed in A–weighted decibels dB(A)
[11] Recommendations from the Irish Planning Guidelines for Wind Farms

procure the requirements from local and national broadcasters. The same applies to mobile phone operators. Wind turbines must not create electromagnetic interference with the operation of telecommunication networks and must harmonize with the measures for the elimination of electromagnetic interference in the operation of telecommunication networks and signal reception, pursuant to the Law on Telecommunications (OJRS No. 44/03).

4.10. Air Traffic Safety

The siting of wind turbines may have implications for the operations of the communications, navigation and surveillance systems used for air traffic control and aircraft safety. Wind turbine siting may also have implications on flight corridors.

The Civil Aviation Directorate of the Republic of Serbia prescribes the criteria used to determine whether or not any facility is deemed to be an obstacle affecting aircraft operations and provides conditions and approval from the air traffic safety aspect for siting and marking wind farms. In addition, in order to assure the safety and efficiency of aircraft operations in the vicinity of airports, the International Civil Aviation Organisation (ICAO) has defined a volume of air space above which new objects are not permitted[12]. No part of the wind turbine should penetrate this space.

4.11. Shadow Flicker

Wind turbines, like other tall structures, can cast long shadows when the sun is low in the sky. The effect known as shadow flicker occurs where the blades of a wind turbine cast a shadow over a window in a nearby house and the rotation of the blades causes the shadow to flick on and off. This effect lasts only for a short period and happens only in certain specific combined circumstances, such as when the sun is shining at a low angle (at dawn and before dusk), when the turbine is positioned directly between the sun and the affected property upon which the shadow is cast and there is enough wind to ensure that the turbine blades are moving.

Careful site selection, design and planning, as well as use of relevant software for calculating the shadow effect, can help avoid the effect completely. It is recommended that the duration of shadow flicker at neighbouring offices and dwellings within a 500m range should not exceed 30 hours per year or 30 minutes per day[13].

At distances from a turbine that are greater than 10 rotor diameters, the potential for shadow flicker is very low. Where shadow flicker could be a problem, developers should provide calculations to quantify the effect and where appropriate take measures to prevent or mitigate the potential effect, such as by turning off a particular turbine at certain times.

4.12. Windtake

The question of windtake should be dealt with at planning stage, to ensure that any proposed layout of wind turbines takes into account the development potential of an adjoining site for a similar development. In general, to ensure optimal performance and to

[12] http://www.icao.int/anb/FLS/icaosafety.html, February, 2010.

[13] Recommendations are based on research by Predac, an organization promoting energy supply and use, drawn on experience from Belgium, Denmark, France, the Netherlands and Germany.

account for turbulence effects, the minimum distance between wind turbines will generally be three times the rotor diameter (=3d) in the crosswind direction and seven times the rotor diameter (=7d) in the prevailing direction (downwind). Bearing in mind the requirements for optimal performance, a distance of not less than two rotor blades from adjoining property boundaries will generally be acceptable, unless by written agreement of adjoining landowners to a lesser distance. However, where permission for wind energy development has been granted on an adjacent site, the principle of the minimum separation distances between turbines in crosswind and downwind directions indicated above should be respected.

4.13. Decommissioning

Typically, the operational life of a wind turbine is about 20-25 years. Once electricity production is reduced, an assessment must be made as to when the facility will be decommissioned. Decommissioning must be outlined at the planning and design stage. Issues to be addressed include the removal of above ground structures and equipment, landscaping and/or reinstatement of roads and vegetation, as well as measures for the restoration of the environment to its original state to the greatest possible extent. Each case is different, depending on the size of the development and geographic properties of the locality.

5. LEGAL FRAME IN THE FIELD OF WIND ENERGY USE

5.1. Basics of Planning and Construction of Wind Farms

The construction of wind farms and the carrying out power generation activities in this type of facilities is governed by numerous regulations of the Republic of Serbia. The legal framework consists of two main groups of regulations.

The first group of regulations comprises regulations in the field of energy, relating to the procedure for acquiring the right to engage in electricity production, which is accomplished in two steps: acquiring the right to carry out an activity of general interest and acquiring the right to carry out energy sector activities.

Wind energy developments are facilities used for carrying out electricity generating activities. Producers of electricity in developments using renewable sources are considered privileged electricity producers.

The Law on Energy allows the construction of energy facilities provided that the Ministry of Mining and Energy has issued an energy permit. This process precedes the process of acquiring a construction permit. The criteria for issuing an energy permit are also the conditions **for environmental protection** (Art. 30), while the application for an energy permit contains an overview of the possible methods for the environmental protection during construction and operation stage of the energy development (Art. 32). An energy permit is required for all power generation facilities of a capacity greater than 1 MW.

The second group of regulations, include the legislation on planning and construction, which regulate the need to build a specific energy facility and the procedure for acquiring a building permit for such a facility, as well as the procedure for obtaining the right to use the facility. In Accordance with the Law on Planning and Construction, **an environmental impact assessment shall be conducted as part of the preliminary project (design)** (Art. 118). A mandatory requirement for obtaining the building permit for the facility is compliance with requirements/approvals of the competent institutions.

A schematic view of the relation between the Law on Planning and Construction (technical and project documentation), the laws in the field of environmental protection and the Law on Energy for wind farms with ≥ 10 MW Capacity is presented in Figure 2.

The MoESP has the authority to issue building permits for energy production facilities from RES with a capacity of **10 MW or above**, as well as for plants with combined electricity generation (Art. 133). For facilities that are entirely built on the territory of the autonomous province, building permits issuance is under the authority of the autonomous province (Art. 134).

A list of relevant regulations in the field of planning and construction of wind energy developments and carrying out electricity generation activities in the Republic of Serbia is given in Annex 2.

Figure 2: A schematic view of the relation between the Law on Planning and Construction (technical and project documentation), the law in the field of environmental protection and the Law on Energy, for wind farms with ≥ 10 MW capacity.

ENVIRONMENTAL PROTECTION	PLANNING AND CONSTRUCTION	ENERGY
	Preliminary work	
	Preliminary feasibility study with general project (design)	↔ Energy permit
Strategic Environmental Impact Assessment (SEA) ↔	Planning documentation	
	Location permit	
Environmental Impact Assessment (EIA) ↔	Feasibility study with preliminary project (design)	
	Main project (design)	

5.2. List of relevant regulations in the area of environmental protection

1) Law on Environmental Protection ("OJ RS", No. 135/04, 36/09)
2) Law on Strategic Environmental Impact Assessment ("OJ RS", No. 135/04)
3) Law on Environmental Impact Assessment ("OJ RS", No. 135/04, 36/09)
4) Law on Ratification of the Convention on Environmental Impact Assessment in a Transboundary Context ("OJ RS", – International Treaties, No. 102/07)
5) Decree on Establishing the List of Projects Subject to Impact Assessment and the List of Projects that May Require Environmental Impact Assessment ("OJ RS", No. 114/08)
6) Rules on the Contents of the Request for the Need to Conduct an Environmental Impact Assessment and Contents of the Request for Determining the Scope and Contents of the Environmental Impact Assessment Study ("OJ RS", No. 69/05)
7) Rules on the Contents of the Environmental Impact Assessment Study ("OJ RS", No. 69/05)
8) Rules on the Procedure for Public Review, Presentation and Public Debate on the Environmental Impact Assessment Study ("OJ RS", No. 69/05)
9) Rules on the Work of the Technical Committee for the Evaluation of the Environmental Assessment Impact Study ("OJ RS", No. 69/05)
10) Rules on the Content, Layout and Procedure for Managing the Public Book on Environmental Impact Assessment Procedures Enforced and Decisions Adopted ("Official Journal RS", No. 69/05)
11) Law on Nature Protection ("Official Journal RS", No. 36/09)
12) Law on National Parks ("Official Journal RS", No. 39/93, 44/93, 53/93, 67/93, 48/94)
13) Rules on Registry of Protected Natural Resources ("Official Journal RS", No. 30/92)
14) Decree on Conservation of Natural Rarities ("Official Gazette RS", No. 50/93, 93/93)
15) Rules on the Protection of Strictly Protected and Protected Wild Species of Plants, Animals and Fungi ("Official Journal RS", No. 5/10")

16) Rules on Categorization of Protected Natural Resources ("Official Journal RS", No. 30/92)
17) Law on Protection from Noise in the Environment ("Official Journal RS", No. 36/2009)
18) Rules on Permitted Noise Level in the Environment ("Offfficial Gazette RS", No. 54/92)
19) Law on Ratification of the Convention on the Conservation of European Wildlife and Natural Habitats ("Official Journal RS", – International Treaties, No. 102/07)
20) Law on Ratification of the Convention on the Conservation on Migratory Species of Wild Animals ("Official Journal RS", – International Treaties, No. 102/07)

6. ENVIRONMENTAL IMPACT ASSESSMENT

6.1. Strategic Environmental Impact Assessment

The subject of the Strategic Environmental Impact Assessment[14] are the strategies, plans, programmes and grounds in the field of spatial and urban planning or use of land, agriculture, forestry, fishing, hunting, energy, industry, traffic, waste management, water management, telecommunications, tourism, conservation of natural habitats and wildlife, establishing the framework for the approval of future development projects prescribed by regulations governing environmental impact assessment.

The Strategic Envionmental Impact Assessment in the Republic of Serbia is regulated by the Law on Strategic Environmental Impact Assessment (Official Journal, No. 135/04), which prescribes the terms and conditions, the method and the procedure for carrying out an assessment of the impact of various strategies, plans, programmes and baseline documents on the environment, in order to ensure the protection of the environment and the promotion of sustainable development by integrating the fundamental principles of environmental protection into the procedure of the preparation and adoption of the plans and programmes.

The plans and programmes that envisage the use of smaller areas on local level or in the case of minor amendments to plans and programmes which are not required to undergo the prescribed approval procedure, a decision on carrying out a strategic impact assessment is made by the body in charge of the development of the plan and programme (if established) ,and if it (the body) identifies that there are possibilities of significant environmental impacts based on the criteria prescribed by this law. .

The plans and programmes, as defined in this law, are all development or other plans and programmes, baseline documents , including any amendments thereof, that a national, provincial or local authority develops and/or adopts, or prepares them for the relevant adoption procedure in the National Assembly or the Government of the Republic of Serbia, i.e. in the parliament or the executive authority of the autonomous province, or local self-government unit, as well as plans and programmes based on regulations.

The criteria for determining the possibilities of significant environmental impact of the plans and programmes and for deciding to conduct a strategic assessment are contained in the Annex to the Law.

The procedure for carrying out the strategic assessment consists of the following stages (described in more details in the law):

1) Preparation phase including:
   - deciding to conduct a strategic assessment,
   - selecting the entity responsible for conducting the strategic assessment report,
   - participation of stakeholder bodies and organizations;

[14] Prescribed by the Law on Environmental Protection (OJRS, No. 135/04, 36/09)

2) Strategic assessment report;
3) Decision making procedure including:
   - participation of stakeholder bodies and organizations
   - participation of the public,
   - report on the results of consultations with stakeholder bodies and organizations and the public,
   - evaluation of the strategic assessment report,
   - approval of the strategic assessment report.

Strategic assessments performed for plans and programmes at various levels of hierarchy must be harmonised between themselves and with the environmental impact assessments, as well as with environmental protection plans and programmes. The grounds of the strategic assessment are the plan or programme determining the framework for development of a given sector, i.e. its characteristics, goals and spatial aspect.

6.2. Environmental Impact assessment

The environmental impact assessment is a preventive environmental protection measure which is based on the development of a study, consultations with the participation of the public and analysis of alternative measures, for the purpose of collecting data and foreseeing any adverse effects of specific projects on the life and health of humans, on the flora and fauna, on land, water, air, climate and landscape, on material and cultural goods and the interaction of these factors, as well as for the purpose of establishing and proposing measures for the prevention, mitigation or remediation of harmful effects, taking into consideration the feasibility of these projects.

The Law on Environmental Impact Assessment (OJRS, No. 135/O4, 36/09) governs the impact assessment procedure for projects that can have significant impact on the environment, the contents of the environmental impact assessment, the participation of stakeholder bodies and organizations and the public, transboundary information-sharing for projects that can have a significant impact on the environment of another state, supervision and other issues relevant for the environmental impact assessment.

Impact assessment is required for projects in the planning or implementation stage, changes in technology, reconstruction, expansion of capacities, decommissioning and removal of projects that can have a significant impact on the environment, as well as for projects that have been realised with no prior environmental impact assessment, which do not have a building permit or are being used without a use permit.

Impact assessment is carried out, among other, for projects in the field of energy, as well as for projects that are planned on a protected natural property and in the protected surroundings of real cultural assets.

The Decree determines that environmental impact assessment is a mandatory requirement for construction of power plants with $\geq$50MW capacity (List I), and optional for construction of wind energy developments (facilities used for converting wind power into energy) with

≥10 MW capacity (List II). A general overview of the procedure for the assessment of the impact of wind farms on the environment in the Republic of Serbia can be seen in Figure 3.

The procedure for the assessment of the impact of wind farms on the environment consists of the following stages:

1) Making a decision on the need for impact assessment (Annex 3)
2) Determining the scope and contents of the impact assessment study
3) Making a decision on approving the impact assessment study.

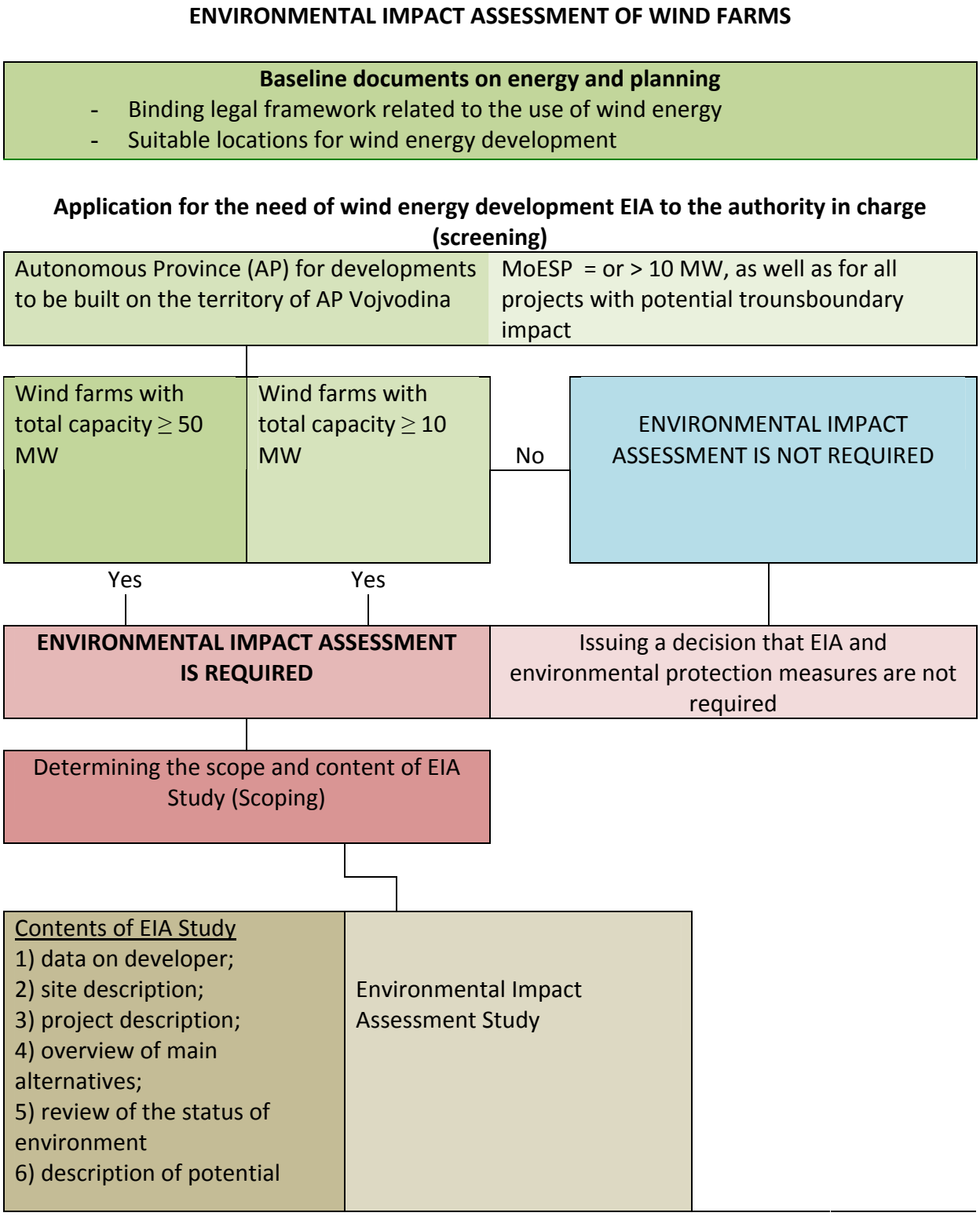
A schematic view of the environmental assessment procedure is presented in Figure 4, Chapter 6.3.

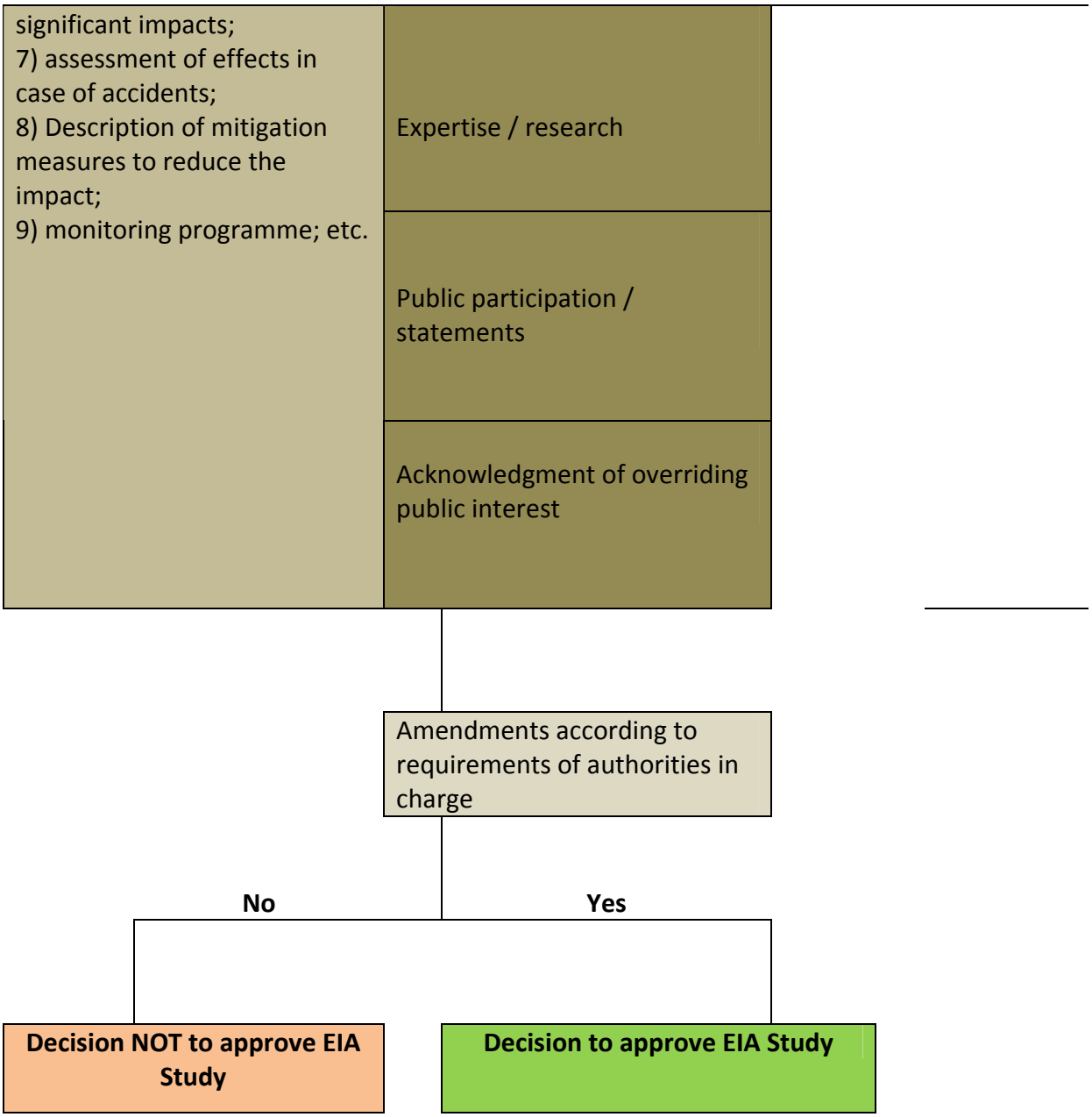
All projects with potential transboundary impact are under the jurisdiction of MoESP, while:

- the environmental impact assessment for facilities which require the issuing of a building permit by a national authority is carried out by MoESP,
- the environmental impact assessment for facilities requiring the issuing of a building permit by a body of the autonomous province is carried out by the Provincial Secretariat for Environmental Protection and Sustainable Environment,
- the environmental impact assessment for projects requiring the issuing of a building permit by the local self-government body is carried out by the local self-government body in charge of environmental affairs.

The impact assessment study can be conducted by a legal entity and entrepreneur provided that they are registered with the appropriate register for conducting activities pertaining to design, engineering and conducting studies and analyses.

Figure 3: General overview of the environmental impact assessment for wind farms in the Republic of Serbia





6.3. Overview and Description of the Process

An environmental impact assessment is a document analysing and assessing the quality of environmental factors, their vulnerability in a certain area, the reciprocal impact of existing and planned activities, forecasting the direct and indirect harmful effects of a development (wind farm) on environmental factors, as well as the measures and requirements for the prevention, mitigation and remediation of harmful effects on the environment and human health. The legal frame is given in Chapter 5.

The procedure of the issuance of energy permit precedes the procedure of the issuance of building permit. An overview of the environmental protection measures during the construction and operation of a wind energy development represents the baseline for issuance of the energy permit and will be an integral part of the environmental impact assessment study for wind farms.

A public presentation and public consultation on the Study. The public consultation is held in the premises of the local self-government body in charge of environmental affairs. At the same time, public access to the development project is ensured in the premises of MoESP and the local self-government authority on whose territory the development is to be built. The competent authority (MoES/AP) informs the developer, stakeholder bodies and organizations and the public about the time and venue where public access will be provided and of the public presentation and public debate on the Environmental Impact Assessment. The public consultation may be held no earlier than 20 days from the date on when the public was informed. The developer participates to the public presentation and public consultation on the Environmental Impact Assessment.

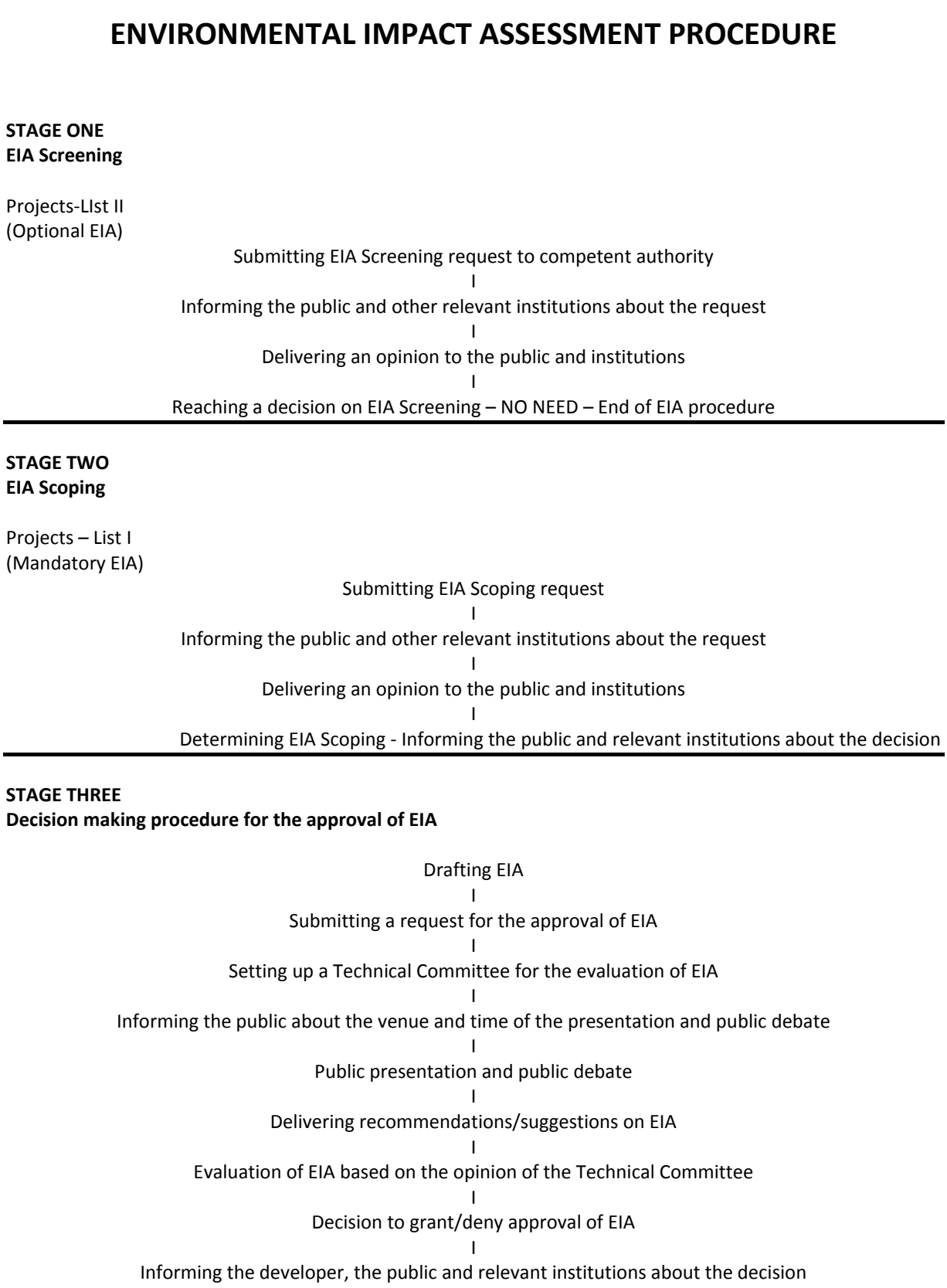
Upon completion of the public consultaTion, based on the opinion of stakeholder bodies and organizations and interested public, the authority in charge delivers an overview of the opinion to the developer, with proposals for amendments to the Environmental Impact Assessment.

For the evaluation of the Environmental Impact Assessment, the authority in charge sets up a technical committee to analyse and evaluate the Impact Assessment Study. Following consultations and public review, the authority in charge delivers the Environmental Impact Assessment to the Technical Committee, with a systematized overview of the opinions of stakeholder bodies and organizations and interested public and a report on the finalized procedure of impact assessment. The Technical Committee examines the Environmental Impact Assessment, along with the systematised overview of the opinions of stakeholder bodies/organisations and interested public, prepares a report on the finalized impact assessment procedure and evaluates the suitability of the measures envisaged for the prevention, mitigation and remediation of potential harmful effects of the project on the environment , on the site and its surroundings, during construction works, operation of the development, accidents and decommissioning of the facility. The Technical Committee may require the developer to make amendments to the Environmental Impact Assessment. The Technical Committee is obliged to submit a report with an evaluation of the Environmental Impact Assessment and a decision proposal to the authority in charge.

The competent authority is obliged to inform the stakeholder bodies and organisations and the public about the decision on granting/rejecting approval of the Environmental Impact Assessment, on:
1) contents of the decision;
2) main reasons on which the decision is based;
3) key measures that the developer is required to undertake for the purpose of preventing, mitigating or remediating harmful impacts.

The developer and the interested public may appeal this decision by means of a contentious-administrative procedure

Figure 4. Schematic view of the procedure for the assessment of environmental imact



7. CONTENTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY

The contents of the Environmental Impac Assessment (Annex 6) are prescribed pursuant to the Rules on Contents of the Environmental Impact Assessment ("Official Journal RS", No. 69/05).

The checklist in Annex 4 and the checklist in Annex 5 can be used as additional tools to verify the likely impact of wind energy developments.

The **Environmental Impact Assessment** must contain:

1) data on developer;
2) description of the planned project development site;
3) description of project;
4) overview of main alternatives considered by the developer;
MONITORING (proposal: wind potential, monitoring the bird and bat species and numbers in a given area, layout of routes and number of overflights, existing noise level, etc.)
5) overview of the state of the environment on the site and its surroundings (micro and macro location);
Proposal:

a) NATURAL HERITAGE
b) GEOLOGY
c) ARCHAEOLOGY
d) ARCHITECTURAL HERITAGE
e) NOISE
f) SAFETY ASPECTS
g) PROXIMITY TO ROADS AND RAILROADS
h) PROXIMITY TO POWER LINES
i) INTERFERENCE WITH COMMUNICATIONS SYSTEM
j) AIRCRAFT SAFETY
k) SHADOW FLICKER
l) WINDTAKE
m) DECOMMISSIONING

6) description of potential significant environmental impact;
Proposal: along with the description of the environmental impact of the project with respect to the parameters set forth in the Rules, also describe impacts, if any, according to the previous list (bullet 5);
7) environmental impact assessment in case of accident;
8) description of measures foreseen for the purpose of preventing, mitigating and, wherever possible, remediating any significant harmful effects on the environment;
9) environmental impact monitoring programme;
Proposed monitoring parameters: noice (current state and during test operation), wildlife (birds, bats, etc.), wildlife (birds, bats, etc.). Please note that the requirements pertaining to nature and environment protection, as well as parameters for

monitoring the living world are prescribed by the **Institute for Conservation of Nature of RS/AP**.

10) non-technical brief overview of data listed in items 2 to 9;
11) data on technical shortcomings or lack of required expertise and skills or inability to collect adequate data.

The Environmental Impact Assessment also contains basic information on its authors, on the responsible person, the date of completion, the signature of the authorized person and verification of the signature with the stamp of the licensed organization that produced the study.

Note: In developing an Environmental Impact Assessment, special attention must be devoted to the impact on birds because the Law on Conservation of Nature ("Official Journal RS", No. 36/09) prescribes the obligations of the project developer and the user of natural resources (Art. 10): *the developer, i.e. the legal entity, entrepreneur or natural person using the natural resources, carrying out construction and other work, activities and interventions in nature, shall act in compliance with the environmental protection measures defined in the plans, projects and programmes and in accordance with the project--technical documentation, taking care to avert or minimize any hazard or harm to the natural environment. The Ministry shall issue an approval only if, in the light of all available evidence and the statutory opinion of the Institute for the Conservation of Nature, it has been established that the developments, works and activities will not have a significant impact on the integrity of an environmentally important area from the aspect of conservation goals.*

Article 80 of the Law prescribes the measures for the protection of migratory species, among other also for the construction of electric power systems which cut off the regular datime-nightime and seasonal migration routes of wildlife, cause fragmentation of habitats or other interferences with their regular life cycle. Electric power systems shall be constructed in application of special construction and technical-technological solutions in order to mitigate negative impact.

Art. 81 of the Law prescribes measures for the conservation of birds and bats on wind energy development sites in order to avoid their habitats and migration routes. In building high structures in the proximity of important environmental areas, compliance with technical-technological measures is a requirement (eg. lighting the structure), in order to mitigate negative impact.

8. CONCLUSION

Electricity generated from wind is a renewable resource, the production of wind power does not cause any harmful emissions and is generally considered as a technology that has positive effects on the conservation of the environment. The use of wind power in the Republic of Serbia is expected to grow considerably.

By detailed planning, adequate site selection and disposition of wind energy developments potential negative impact on wildlife habitats (birds, bats and other) might be minimized. Conditions related to the conservation of nature and the environment, as well as parameters for wildlife monitoring are prescribed by the Institute for Nature Conservation of RS/AP.

Guidelines on the Environmental Impact Assessment for Wind Farms (with one or more generation units) is primarily envisaged as a tool to be used by the staff of institutions implementing environmental impact assessments process , as well as all other interested parties. The Guidelines give an overview of the legal framework, basic information concerning the planning process and detailed information and guidelines concerning impact assessment, identifying the potential effects that wind farms may have on the environment. In developing the Guidelines, the recommendations and examples from current European practice were used, while the whole procedure is presented in the context of the Serbian law.

REFERENCES

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5) Rules on Public Access, Presentation and Public Debate on Environmental Impact Assessment ("Official Journal RS", No. 69/05)
6) Rules on Requirements and Criteria for the Conducting Environmental Impact Assessments for Facilities and Operations ("Official Journal RS", No. 49/01)
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21) Law on Ratification of the Convention of Conservation of Migratory Species of Wild Animals ("Official Gazette RS", – International Treaties, No. 102/07)
22) Law on Planning and Construction ("Official Gazette RS", No. 72/09)
23) Law on Spatial Planning of the Republic of Serbia ("Official Journal RS", No. 13/96)
24) Urban plans of local self-governments units– Rulebook on Contents, Modes of Completion, Modalities for Implementing Expert Inspection of Urban Plans, as well as on

Requirements and Modalities for Public Access to the Plan (“Official Journal RS”, No. 12/2004)
25) Law on Energy ("Official Journal RS", No. 84/04)
26) Law on Ratification of the Treaty establishing the Energy Community between the European Community and the Republic of Albania, Republic of Bulgaria, Bosnia and Herzegovina, Republic of Croatia, Former Yugoslav Republic of Macedonia, Republic of Montenegro, Romania, Republic of Serbia and the United Nations Interim Administration Mission in Kosovo pursuant to Resolution 1244 of the United Nations Security Council ("Official Journal RS", No. 62/06) Decree on Conditions for Electricity Supply ("Official Journal RS", No. 107/05)
27) Decree on Conditions for Electricity Supply ("Official Journal RS", No. 107/05)
28) Rules on Criteria for Issuing Energy Permits, Contents of Application and Procedure for Issuing Energy Permits ("Official Journal RS", No. 23/2006)
29) Rules on Requirement with respect to Expert Staff and Procedure for the Issuance and Revocation of a Permit for Carrying Out Energy-Related Activities ("Official Journal RS", No. 117/05, 40/06 and 44/06)
30) Decree on Amendments to the Decree on Determining an Energy Development Implementation Programme of the Republic of Serbia until 2015 for the period from 2007 2012 (Official Journal, No. 72/09)
31) Decree on Privileged Electricity Producers ("Official Journal RS", No. 72/2009)
32) Decree on Incentives for the Generation of Power from Renewable Energy Sources and Cogeneration of Electricity and Heat (“Official Journal RS”, No. 99/09)
33) Energy Development Strategy of the Republic of Serbia ("Official Journal RS", No. 44/05)
34) Energy Development Strategy Implementation Programme of the Republic of Serbia ("Official Journal RS", No. 17/07)
35) Law on Public Enterprises and Carrying Out Activities of Public Interest ("Official Journal RS", No. 25/00, 25/02, 107/05 and 108/05)
36) Law on Air Traffic ("Official Journal RS", No. 12/98, 5/99, 44/99, 5/00, 70/01)
37) Law on Waters ("Official Journal RS", No. 46/91, 53/93, 54/96)
38) Decree on the Fee for Use of Water, Fee for Protection of Water and Fee for Extraction of Materials from Waterways for 2009 ("Official Journal RS", No. 27 /07)
39) Rules on the Content of the Technical Documentation to be Submitted in the Procedure for Obtaining Water Management Approval and Water Management License ("Official Journal RS", No. 3/78)
40) Law on Geological Surveys (“Official Journal RS”, No. 44/95)
41) Law on Telecommunications (“Official Journal RS”, No. 44/03)
42) European Commission, Guidance on Environmental Impact Assessment, Screening, June 2001 http://ec.europa.eu/environment/eia/eia-guidelines/g-screening-full-text.pdf, November 2009
43) http://www.environ.ie/en/Publications/Environment/Miscellaneous/FileDownLoad,1804,en.pdf, November 2009
44) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001L0042:EN:NOT, November 2009
45) http://www.windatlas.dk/europe/landmap.html, November 2009
46) EU Directive 85/337/EEC: http://ec.europa.eu/environment/eia/eia-legalcontext.htm, November 2009

47) Ministry of Environment and Spatial Planning: http://www.ekoplan.gov.rs/src/Glavna-0-document.htm, November 2009
48) Agency for Environmental Protection of the Republic of Serbia http://www.sepa.gov.rs, November 2009
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50) Ministry of Mining and Energy of the Republic of Serbia: http://www.mem.gov.rs, November 2009
51) Energy Agency of the Republic of Serbia: http://www.aers.rs, November 2009
52) Provincial Secretariat for Energy and Mineral Resources http://www.psemr.vojvodina.gov.sr, November 2009
53) Institute for Multidisciplinary Researc . http://vetar-sunce.imsi.rs/home.php
54) European Wind Energy Association: http://www.ewea.org
55) Global Wind Energy Council: http://www.gwec.net
56) American Wind Energy Association: http://www.awea.org
57) Renewable UK, formerly known as British Wind Energy Association http://www.bwea.com/ref/tech.html
58) http://www.energysavingtrust.org.uk/Generate-your-own-energy/Wind-turbines
59) http://money.cnn.com/news/newsfeeds/articles/marketwire/0597926.htm
60) http://www.therenewableenergycentre.co.uk/wind-power/
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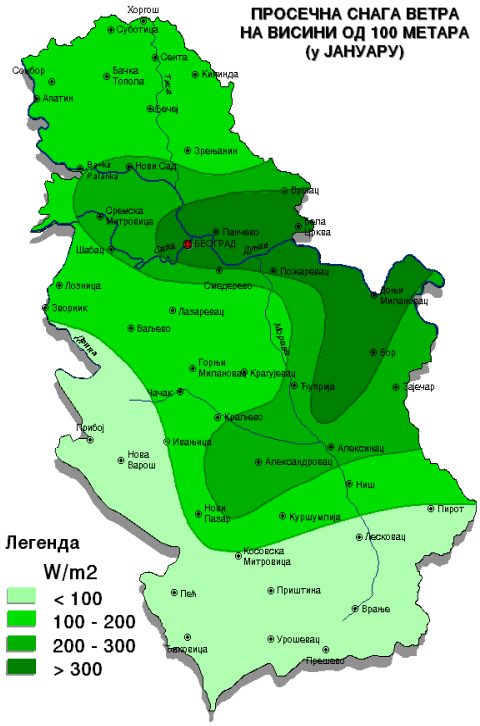
ANNEXES

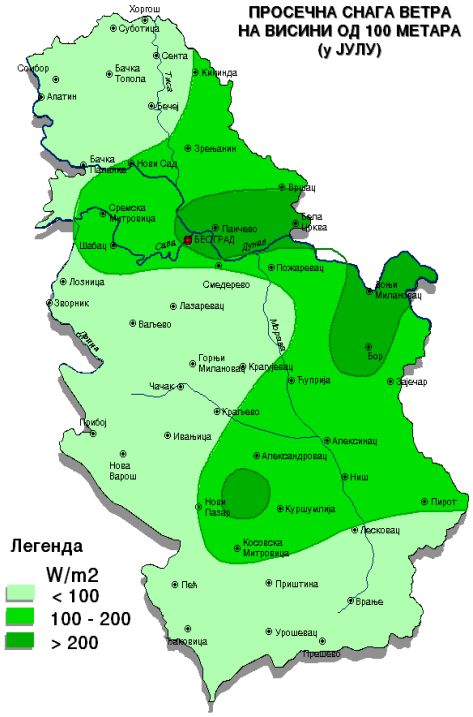
ANNEX 1. WIND ATLAS OF SERBIA

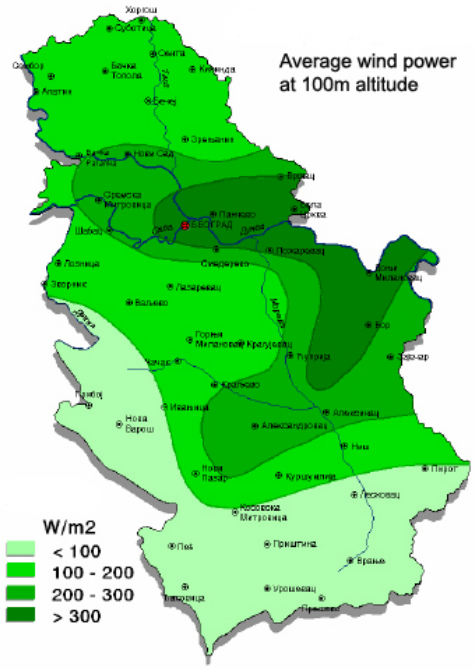
Average wind power at 100 m[15] altitude, January and July.

Average wind power at 100 m altitude (in January)



Average wind power at 100 m altitude (in July)





[15] Institute for Multidisciplinary Research: http://vetar-sunce.imsi.rs/home.php, March 2010

ANNEX 2: LIST OF RELEVANT REGULATIONS IN THE FIELD OF PLANNING AND CONSTRUCTION OF WIND ENERGY DEVELOPMENTS AND PRODUCTION OF ELECTRICITY IN THE REPUBLIC OF SERBIA

1) Law on Planning and Construction (“Official Journal RS” No. 72/09)
2) Law on Spatial Planning of the Republic of Serbia ("OJ RS", No. 13/96)
3) Urban plans of local self-governments units– Rulebook on Contents, Development Modalities, Modalities for Carrying Out Expert Inspection of Urban Plans, as well as on Conditions and Modes for Public Access to the Plan (“Official Journal RS”, No. 12/2004)
4) Law on Energy ("Official Journal RS", No. 84/04)
5) Law on Ratification of the Treaty establishing an Energy Community between the European Community and the Republic of Albania, Republic of Bulgaria, Bosnia and Herzegovina, Republic of Croatia, Former Yugoslav Republic of Macedonia, Republic of Montenegro, Romania, Republic of Serbia and the United Nations Interim Administration Mission in Kosovo in accordance with Resolution 1244 of the United Nations Security Council ("Official Journal RS", No. 62/06) Decree on Conditions for Electricity Supply ("Official Journal RS", No. 107/05)
6) Decree on Conditions for Electricity Supply ("Official Journal RS", No. 107/05)
7) Rules on Criteria for Issuing Energy Permits, on the Contents of the Application and Procedures for Issuing Energy Permits ("Sl. glasnik RS", br. 23/2006)
8) Rules on Requirements for Expert Staff and Procedure for the Issuance and Revocation of a License for Carrying Out Energy-Related Activities ("Official Journal RS", No. 117/05, 40/06 and 44/06)
9) Decree on Amendments to the Decree on Determining the Energy Development Strategy Implementation Programme of the Republic of Serbia until 2015 for the period from 2007 to 2012 (Official Gazette No. 72/09)
74) Decree on Privileged Electricity Producers ("Official Journal RS", No. 99/2009)
10) Decree on Incentives for the Generation of Power from Renewable Energy Sources and Cogeneration of Electricity and Heat (OJ RS, No. 72/09)
11) Energy Development Strategy of the Republic of Serbia ("Official Journal RS", No. 44/05)
12) Energy Development Strategy Implementation Programme of the Republic of Serbia ("Official Journal RS", No. 17/07)
13) Law on Public Enterprises and Conducting Activities of General Interest ("Sl. glasnik RS", br. 25/00, 25/02, 107/05 i 108/05)
14) Law on Air Traffic ("Official Journal RS", No. 12/98, 5/99, 44/99, 5/00, 70/01)
15) Law on Waters ("Official Journal RS", No. 46/91, 53/93, 54/96)
16) Decree on Fees for Water Use, Water Conservation and Removal of Material from Waterways for 2009 ("Official Journal RS", No. 27 /07)
17) Rules on the Contents of Technical Documentation Submitted in the Procedure for Obtaining a Water Management Approval and Water Management License ("Official Journal RS", No. 3/78)
18) Law on Geological Surveys (“Official Journal RS”, No. 44/95)
19) Law on Telecommunications (“Official Journal RS”, No. 44/03)

ANNEX 3: CONTENTS OF THE REQUEST FOR ENVIRONMENTAL IMPACT ASSESSMENT SCREENING

1. Information on Developer

Business name, personal name; registered office address, address of residence; telephone number; fax; e-mail.

2. Characteristics of the Development

(a) size of development;
(b) possible cumulative effects with other developments;
(v) use of natural resources and energy;
(g) generation of waste;
(d) pollution and causing discomfort;
(đ) risk of accidents, particularly with regard to substances used or techniques applied, in accordance with regulations.

3. Development Location

Environment sensitivity in given geographical areas that may be exposed to harmful impact of the project, particularly with regard to:
(a) existing land use;
(b) relative scope, quality and regeneration capacity of natural resources in the given area;
(v) absorption quality of environment, with particular attention paid to bogs, coastal areas, mountain and woodland areas, designated areas (natural and cultural assets and densesly populated areas)

4. Characteristics of Potential Impact

Potential significant impacts of the project, in particular:
(a) scope of impact (geographic area and numbers of population exposed to risk)
(b) nature of transboundary impact;
(v) scale and complexity of impact;
(g) likelihood of impact;
(d) duration, frequency and likelihood of repeated impact.

BRIEF PROJECT DESCRIPTION

No.	Question	YES/NO Brief Project Description	Will it have significant consequences? YES/NO and why?
1	2	3	4
1.	Does implementation, operation or decommissioning entail activities that will cause physical changes on the site (topography, use of soil, changes in waterways)?		
2.	Does implementation or operation of the development entail utilisation of natural resources such as soil, water, materials or energy, particularly resources that are not renewable or are hard to provide?		
3.	Does the project involve utilisation, storage, transportation, handling or manufacturing materials that may be harmful to human health or environment or that may cause concern over existing or potential risks to human health?		
4.	Will solid waste be generated by the project during works, operation or following the decommissioning?		
5.	Will the development produce emission of pollutants or any hazardous, toxic or discomforting air contaminants?		
6.	Will the project cause noise and vibration, emisson of light, heat energy or electromagnetic radiation?		
7.	Does the project lead to risk of soil or water contamination by pollutants emitted on the soil or into surface- or groundwaters?		
8.	During the implementation or operation of the development, will there be any risk of accidents that may endanger human health or environment?		
9.	Will the project lead to social changes, e.g. in the demographic sense, in the traditional way of life, employment?		
10.	Are there any other factors that should be analysed, such as development that is to follow, that could lead to effects on		

	environment or cumulative impact with other, existing or planned activities on the site.		
11.	Are there any areas, on the site or in its proximity, designated by international or domestic regulations due to their ecological, landscape, cultural or other values that can be affected by the impact of the project?		
12.	Are there any areas, on the site or in its proximity, important or sensitive due to ecological reasons, for instance, bogs, waterways or other bodies of water, mountain areas or woodlands, that can be polluted by the implementation of the project?		
13.	Are there any areas, on site or in its proximity that are used by protected, important or sensitive species of fauna and flora, e.g. for habitation, hatching, growing up, resting, spending winters and migration, which can be polluted by the implementation of the project?		
14.	Is there any surface or groundwaters on site or in its proximity that can be affected by the project impact?		
15.	Are there areas or natural forms of high ambient value on the site or near it that can be affected by the project impact?		
16.	Are there any routes or objects used for recreational purposes or other objects on the site or in its vicinity that can be affected by the project impact?		
17.	Are there any transportation routes that can be clogged or that can cause environmental issues on the site or near it, which can be affected by project impact?		
18.	Is the project located on site where it is likely to be visible to a large number of people?		
19.	Are there any areas or sites of historic or cultural significance on the site or in its proximity that can be affected by project impact?		
20.	Is the project located on a site in a previously undeveloped area which will suffer loss of green surfaces on its account?		
21.	Is land on the project site or in its proximity utilised for houses, gardens, other private purposes, industrial or commercial activities, recreation, as public open space, for public		

	buildings, agriculture, woodlands, tourism, mining or other activities that can be affected by the project impact?		
22.	Are there plans for future use of land on site or its vicinity that can be affected by project impact?		
23.	Are there densely populated or built areas on the site or in its vicinity that can be affected by project impact?		
24.	Are there any areas occupied by specific (sensitive) land use on the site or in its proximity, such as hospitals, schools, places of worship, public buildings that can be affected by project impact?		
25.	Are there any areas with important, high quality or rare resources (e.g. groundwaters, surface waters, woodlands, agriculture, fishing, hunting and other areas, designated natural assets, mineral stock etc.) on the site or in its proximity that can be affected by project impact?		
26.	Are there areas on or near the site already suffering from pollution or environmental damage (e.g. where existing legal environmental norms have been overstepped) that can be affected by project impact?		
27.	Is the project site endangered by earthquakes, ground settling, landslides, erosion, floods or recurring climate conditions (e.g. difference in temperature, fog, strong winds) that can lead to the project causing problems in the environment?		
Summary of project characteristics and its location with indications of the need for conducting an Environmental Impact Assessment:			

ANNEX 4: CONTENTS OF THE REQUEST FOR ENVIRONMENTAL IMPACT ASSESSMENT SCOPING

1. Information on Developer
Business name, personal name; registered office address, address of residence; telephone number; fax; e-mail.

2. Project Description
(a) description of physical properties of projects and requirements for land use in the implementation phase and in the day-to-day operation phase ;
(b) description of the main properties of the production procedure (nature and amount of material utilisation);
(c) assessment of the type and amount of expected waste materials and emissions as a result of regular project operation:
- water pollution;
- pollution of air and soil
- noise, vibration;
- light, heat, radiation, etc.

3. Overview of the main alternatives examined by the developer and the most important reasons for decision-making, taking into consideration environment impact.

4. Description of environmental factors likely to incur significant exposure to risk as a result of project implementation, including:
(a) population;
(b) fauna;
(v) flora;
(g) soil
(d) water
(đ) air;
(e) climate factors;
(ž) buildings;
(z) real cultural assets and archaeological findings;
(i) landscape and
(j) relations betweem the listed factors.

5. Description of potential significant environmental impacts of the project (direct and indirect, secondary, cumulative, short-term, medium-term and long-term, permanent, temporary, positive and negative) which can be a result of:
(a) the existence of the project;
(b) use of natural resources;
(v) emission of pollutants, causing discomfort and waste removal;

as well as description of forecasting methods used in the evaluation of environmental impact.

6. Description of measures envisaged for the prevention, mitigation or remediation of any significant harmful effects on the environment.

7. Non-technical summary of information from 2 to 6.

8. Data on potential difficulties (technical shortcomings or lack of adequate expertise and skills) which the developer encountered.

PART I
Project characteristics

No.	Question	YES/NO	What characteristics of the project surroundings can be affected by the impact and how?	Can there be significant consequences? Why?
1	2	3	4	5
1.	Does the implementation, operation or decommissioning of the development entail activities that will cause physical changes on the site (topography, land use, between bodies of water etc.)?			
1.1	Permanent or temporary changes in the use of land, surface layer or topography, including the increase in intensity of utilisation?			
1.2	Clearing existing land, vegetation or buildings?			
1.3	Occurrence of a new aspect of land use?			
1.4	Preliminary works, e.g. wells, land probes?			
1.5	Construction works?			
1.6	Bringing the site into a satisfactory condition following the cessation of the project?			
1.7	Temporary locations for construction works or housing construction workers?			
1.8	Surface buildings, structures or land works, including cutting linear objects, filling or pits?			
1.9	Underground works, including mining and tunneling?			
1.10	Drainage works?			
1.11	Desilting?			
1.12	Industrial and crafting production processes			
1.13	Storage facilities for goods and materials?			
1.14	Facilities for treatment or storage of solid waste or liquid effluents?			
1.15	Facilities for long term housing of			

	on-site workers?			
1.16	New road, railroad or river transportation during construction or exploitation?			
1.17	New road, railroad, air traffic, water transportations or other transportation infrastructure, including new or altered routes and stations, ports, airports etc?			
1.18	Closing or diverting existing transportation routs or infrastructure leading towards changes in traffic movement?			
1.19	New or diverted transmission lines or ducts pipelines?			
1.20	Costruction of barriers, dams, exhausts, regulation or other changes in hydrology of waterways or aquifers?			
1.21	Waterway crossings?			
1.22	Pumping or transferring water from groundwater or surface sources?			
1.23	Changes in waterways or on the surface of land affecting drainage or outflow?			
1.24	Transportation of staff or materials for construction, drive or complete cessation?			
1.25	Long term works on dismantling, decommissioning or reinstatement?			
1.26	Ongoing activities during decommissioning that can have environmental impact?			
1.27	Influx of people to the area, temporary or permanent?			
1.28	Introducing new animal and plant species?			
1.29	Loss of indigenous species or genetic and biological diversity?			
1.30	Other?			
2.	Will the installation or operation of the facilities within the project entail utilisation of natural resources such as land, water, materials or energy, particularly those resources that are not renewable or are hard to renew?			
2.1	Land, particularly unbuilt or			

	agricultural land?			
2.2	Water?			
2.3	Minerals?			
2.4	Rock, gravel, sand?			
2.5	Forests and utilisation of wood?			
2.6	Power, including electric, and liquid fuels?			
2.7	Other resources?			
3.	Does the project entail use, storage, transportation, handling or production of substances or materials that can be harmful to human health or environment and cause concern over existing or possible risks to human health?			
3.1	Does project entail utilisation of substances or materials that are toxic or hazardous to human health or environment (flora, fauna, water supply)?			
3.2	Will the project cause alterations in the occurrence of diseases or impact disease transmitters (e.g. diseases transmitted by insects or waterborne diseases)?			
3.3	Will the project impact the wellbeing of the population, e.g. by altering living conditions?			
3.4	Are there any particularly vulnerable groups of the population that can be affected by project implementation, e.g. hospital patients, the elderly?			
3.5	Other causes?			
4.	Will any solid waste be generated during implementation, operation or decommissioning?			
4.1	Waste rock, dump of removed surface layer or mining waste?			
4.2	City waste (from residences or commercial waste)?			
4.3	Hazardous or toxic waste (including radioactive waste)?			
4.4	Other industrial processing waste?			
4.5	Surplus products?			
4.6	Waste silt or other silts as results of treatment of effluents?			
4.7	Construction waste or debris?			
4.8	Surplus of machinery and equipment?			
4.9	Contaminated ground or other			

	material?			
4.10	Agricultural waste?			
4.11	Other type of waste?			
5.	Does project implementation entail emission of pollutants or any other hazardous, toxic or unpleasant substances into the air?			
5.1	Emissions from stationary or mobile fossil fuel burning sources?			
5.2	Emissions from production processes?			
5.3	Emissions from handled materials, including storage and transport?			
5.4	Emissions from construction activities, including facilities and equipment? Dust or unpleasant odours generated by handling materials including construction materials, sewage and waste?			
5.5	Emissions caused by waste incineration?			
5.6	Emissions caused by burning waste out in the open (e.g. cut material, construction waste)?			
5.7	Emissions from other sources?			
6.	Does project implementation involve generating noise and vibration and emitting light, heat or electromagnetic radiation?			
6.1	Due to operation of equipment, e.g. machines, ventilation facilities, crushers?			
6.2	From industrial or similar processes?			
6.3	Due to construction works and removal of construction and other facilities?			
6.4	From blasts or pile driving?			
6.5	From construction or drive traffic?			
6.6	From lighting or cooling systems?			
6.7	From sources of electromagnetic radiation (efects on nearest sensitive equipment and people are included)?			
6.8	From other sources?			
7.	Does the implementation of the project lead to risk of land or water contamination due to emission of pollutants into the soil or sewage, surface and groundwaters?			
7.1	Due to handling, storage, utilisation or leakage of harmful or toxic matters?			

7.2	Due to leakage of sewage and other effluents (treated or untreated)?			
7.3	By deposition of pollutants emitted into the air, soil or water?			
7.4	From other sources?			
7.5	Is there any longterm risk from pollutants in the environment from these sources?			
8.	During implementation and operation of the project, can any risk of accidents arise that can impact human health and environment?			
8.1	From blasts, leakage, fire etc. during storage, handling, utilisation or production of harmful or toxic matters?			
8.2	For reasons bezond the limits of usual environment protection, e.g. failures in pollution controle systems?			
8.3	For other reasons?			
8.4	Because of natural disasters (e.g. floods, earthquakes, landslides etc)?			
9.	Will the project lead to social changes, e.g. in demographics, traditional way of life, employment?			
9.1	Changes in size of the population, age range, structure, social groups?			
9.2	Displacement of population or demolition of houses and settlements and public objects in settlements, e.g. schools, hospitals, social structures?			
9.3	Through settlement of new inhabitants or creation of new communities?			
9.4	Making increased demands on local infrastructure or services, such as housing, education, healthcare?			
9.5	Creating new jobs during construction or exploitation or causing job losses with consequences to employment rates and economy?			
9.6	Other causes?			

10.	Are there any other factors to be considered, such as further development that can lead to effects on the environment or cumulative influence with other existing and planned activities on the site?			
10.1	Will the project lead to pressures towards further development that can have significant environmental impact, e.g. increased population, new roads, new development of accompanying industry capacities or public services etc?			
10.2	Will the project lead to development of accompanying structures, supporting development or development encouraged by the project that can have environmental impact, e.g. accompanying infrastructures (roads, electric power supply, solid waste or treatment of waste waters etc), development of settlements, extractive industry, supplies etc			
10.3	Will the project lead to subsequent use of the location that will have environment impact?			
10.4	Will the project enable future development following the same model?			
10.5	Will the project have cumulative effect due to proximity of other existing or planned project with similar effects?			

PART II

Properties of the wider area where project implementation is proposed

For each project characteristic listed, it has to be considered whether some of the listed environmental components could be affected by project impact.	
QUESTION:	Are there any environmental features on or around the project site that can be affected by project impact:
	1) protected areas designated by international, national or local regulations, due to their natural, landscape or other values, which can be affected by project impact; 2) other areas important or sensitive due to their ecology, e.g. bogs, waterways or other bodies of water, mountain areas, forests and woodland; 3) areas used by protected, important or sensitive types of flora and fauna, e.g. for growth and development, mating, resting, wintering, migration, which can be affected by project impact; 4) internal surface waters and groundwaters; 5) protected natural assets; 6) routes or objects used for public access to recreational or other facilities; 7) transportation routes prone to clogging or those that can cause environmental problems; 8) Areas in which real cultural assets are located;
QUESTION:	Is the project located on a site where it will likely be visible to a large number of people?
QUESTION:	is the project located on a previously unbuilt site, where the loss of green areas will occur?
QUESTION:	Is the project site or the surrounding grounds that will be affected by the project impact used for certain private or public purposes?
	1) houses, gardens and other private property; 2) industry; 3commerce; 4) recreation; 5) public open spaces; 6) public buildings; 7) agriculture; 8) forestry; 9) tourism; 10) mines, quarries etc.
QUESTION:	Are there any plans for future utilisation of land on site or its vicinity that could be affected by project impact?
QUESTION:	Are there any areas on site or in its surroundings that are densely populated, that could be affected by project impact?

QUESTION:	Are there any areas of sensitive land use on site or in its vicinity that can be affected by project impact?
	1) hospitals; 2) schools; 3) places of worship 4) hospitals.
QUESTION:	Are there any areas on site or in its vicinity with important, high quality or dwindlling resources that could be affected by project impact:
	1) groundwaters; 2)surface waters; 3) forests; 4) agricultural land; 5) fishing area; 6) tourist area; 7) mineral stock.
QUESTION:	Are there any areas on the project site or in its proximity that are already suffering from pollution or environmental damage, e.g. where existing legal environmental standards have been exceeded, which can be affected by project impact.
QUESTION:	Is the project site likely to be affected by earthquakes, subsidence, landslides, erosion, floods or extreme climate conditions, such as temperature differences, fogs, strong winds, that can lead to the project causing environmental problems?
QUESTION:	Are the project's emissions likely to have consequences on the quality of environmental factors:
	1) climate, including micro-climate and local and broader climate conditions; 2) hydrologic – e.g. amount, flow or levels of groundwaters and waters in rivers and lakes; 3) pedological – e.g. amount, depth, humidity; 4) geomorphological – e.g. stability or erosiveness;
QUESTION:	Is it likely that project will impact accessibility or availability of resources, locally or globally:
	1) fossil fuels; 2) waters; 3) mineral stock, rock, sand, gravel; 4) wood; 5) other non-renewable resources 6) on-site infrastructural capacities - water, sewage, production and transmission of electricity, telecommunications, routes for waste disposal, railroads.

QUESTION:	Is it likely that the project will impact human health and the wellbeing of the community?
	1) Quality and toxicity of air, water, food products and other pruducts for human consumption; 2) rates of disease and mortality of individuals, community or population due to exposure to pollution; 3) occurrence or distribution of disease carriers, including insects; 4) vulnerability of individals, communities or pupulation to diseases; 5) individuals' personal feeling of safety; 6) cohesion and identity of the community; 7) cultural identity and unity; 8) minority rights; 9) housing conditions; 10) employment and quality of jobs; 11) economic conditions; 12) social institutions et al.

ANNEX 5: CHECKLIST FOR POTENTIAL IMPACT OF WIND FARMS ON NATURE CONSERVATION

Annex 5 is an overview of the potential impact on nature, which might have to be taken into consideration in the process of environmental monitoring/research in order to assess the impact of the wind farm development on the environement[16]. The list is not final, i.e. it can be expanded if needed.

The impact on the living world must be examined from the temporal, spatial and cumulative aspect:

Temporal
- Pre-installation
- Construction
- Operation
- Decommissioning

Spatial
- On site/off site buffer area/area of influence
- Cable route
- Other (eg construction site, spoil disposal sites)

Cumulative:
- During the operation of the development, over time
- In combination with other wind farms
- In combination with other projects/activities

[16] Wind farm development and nature conservation, English Nature, RSPB, WWF-UK, BWEA, March 2001

CHECKLIST OF POSSIBLE IMPACTS OF RELEVANCE TO NATURE CONSERVATION

#	*Impact on the living world*	*Time frame*	*Yes/No*
1	Direct habitat loss (eg. on site, cable route) and associated biological impacts (eg. reduced biodiversity, loss of feeding/breeding habitats)	c/o	
2	Habitat damage (eg. on site, access roads, cable route, anchoring) and associated biological impacts (eg. reduced species diversity, loss of feeding/breeding habitat, changes in livestock management regimes)	p/c/o/d	
3	Introduction of new substrate/habitat	c/o	
4	Interference with geological/geomorphological processes (eg. slope processes)	c/o	
5	Interference with hydrological processes (eg. increased run-off from upland sites, increased erosion)	c/o	
6	Pollution (particularly toxic)	p/c/o/d	
7	Disturbance to mobile species (eg. mammals and birds during migration, feeding, breeding, etc.) i) shadow flicker ii) noise iii) vibration iv) lighting	 i) o ii) c/o/d iii) c/o iv) c/o	
8	Bird collision	o	
9	Associated infrastructure: i) Access (tracks/roads) ii) Visitor centres (disturbance) iii) Overhead power lines	 i) p/c/o/d ii) c/o/d iii) c/o	
10	Vehicle movemements (disturbance)	p/c/o/d	

p = pre-construction, c = construction phase, o = operation phase, d = decommissioning

In addition to the above impacts, there are landscape, cultural impacts and impacts of associated infrastructure, which could be indirectly linked to nature conservation (eg. change in land use etc.).

ANNEX 6: CONTENTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY

The Rules on the Content of the Environmental Impact Assessment Study ("Official Journal RS", No. 69/05) prescribes in more detail the content of the Environmental Impact Assessment. The Environmental Impact Assessment contains (Art.2):

1) data on developer;
2) description of the site designated for project implementation;
3) description of the project;
4) overview of the main alternatives considered by the developer;
5) overview of the status of the environment on the site and in its close surroundings (micro and macro location;
6) description of the potential significant impact of the project on the environment;
7) environmental impact assessment in the event of an accident;
8) description of measures envisaged for the prevention, mitigation and, where possible, remediation of any significant harmful impact on the environment;
9) environmental monitoring programme;
10) non-technical brief overview of data listed in item 2) to 9);
11) data on technical shortcomings and lack of adequate expertise and technical skills or the inability to collect adequate data.

The Environmental Impact Assessment also contains basic information on its authors, on the responsible person, the date of completion, the signature of the authorized person and verification of the signature with the stamp of the licensed organization that produced the study.

The description of the site designated for the implementation of the project contains in particular (Art. 3):
1) a copy of the map of the land lots designated for the development of the project, with the layout of all structures;
2) data on the required land surface area in m2 during construction works, with the description of the physical properties and a cartographic view in the required scale, as well as of the surface area which will be covered when the project is finalized;
3) overview of the pedological, geomorphological, geological and hydrogeological and seismological properties of the terrain;
4) data on water-supply sources (distance, capacity, endangeredness, sanitary protection zones) and on the basic hydrological properties;
5) overview of climate properties with the appropriate meteorological indicators;
6) description of flora and fauna, natural properties of special value, (protected) rare and endangered plant and animal species and their habitats and vegetation;
7) overview of the main properties of the landscape;
8) overview of real cultural assets;
9) data on population density, concentration and demographic properties in relation to the structures and activities;

10) data on existing commercial and residential structures and infrastructure and suprastructure facilities.

Depending on the features of the area, the site description also contains descriptions and data on other protected areas, areas designated for scientific research, on archaeological findings, particularly vulnerable areas, special purpose areas and similar.

The project description contains in particular (Art. 4):
1) description of preliminary works on project implementation;
2) description of the structure, the planned production process or activities, their technological and other properties;
3) overview of the type and quantity of required energy and fuels, water, raw materials, construction materials required and other;
4) overview of the type and quantity of gases, water and other fluid or gaseous pollutants released, viewed by technological unit, including emissions into the air, discharges into surface or groundwater recipients, deposit of materials on the land, noice vibrations, heat, radiation (ionizing and non-ionizing) and other;
5) overview of the waste treatment technology (processing, recycling, depositing and similar);
6) overview of the environmental impact of the proposed solution and that of other technological solutions considered.

The overview of the main alternatives (Art. 5) considered by the developer, with an explanation of the main arguments for choosing a particular solution and the impact of that choice on the environment contains:
1) location or route;
2) production processes or technology;
3) methods of work;
4) site maps and draft projects;
5) type and choice of materials;
6) schedule of project implementation;
7) operation and decommissioning;
8) start and end date;
9) production volume;
10) pollution monitoring;
11) regulation of waste disposal;
12) regulation of access and roads;
13) responsibility and procedure for environmental management;
14) training;
15) monitoring;
16) contingency plans;
17) procedure for decommissioning, restoration of the location and its further use.

The description of the environmental factors (Art. 6) that are likely to incur significant risk as a consequence of project implementation consists of, specifically:
1) population;
2) fauna and flora;

3) land, water and air;
4) climate factors;
5) buildings, real cultural assets, archaeological findings and ambient complexes;
6) landscape;
7) mutual relation of listed factors.

The description of potential impacts of the project on the environment (Art. 7) contains a qualitative and quantitative overview of the potential changes to the environment during the implementation of the project, regular operation and in the event of a contingency, as well as an assessment of whether these changes are of a temporary or permanent nature, particularly with regard to:
1) air, water, land quality, noise level, vibration intensity, hat and radiation;
2) population health;
3) meteorological parameters and climate properties;
4) ecosystem;
5) population density, concentration and migration;
6) designation and use of the surface areas (built and unbuilt surfaces, agricultural, forest and water land use and similar);
7) public utility infrastructures;
8) natural properties of special value and real cultural properties and their surroundings and similar;
9) landscape features of the area and similar.

The Environmental Impact Assessment also contains an **overview of hazardous substances, their quantities and properties, preventive measures, alertness and accountability measures in case of accident, as well as measures for the elimination of the consequences of the accident, i.e. remediation** (Art. 8).

The description of the measures for the prevention, mitigation and remediation of any significant adverse environmental impact (Art. 9) encompasses measures that will be undertaken for the regulation of the space, the technical-technological, sanitary-hygienic, biological organizational, legal, economic and other measures. The description of the measures set forth in para. 1 of this Article contains:
1) measures foreseen by the law and other regulations, norms and standards and deadlines for their enforcement;
2) measures that will be undertaken in the case of accident;
3) plans and technical environmental protection solutions, (recycling, treatment and disposal of waste substances, recultivation, sanation and other);
4) other measures that can contribute to the prevention or mitigation of harmful environmental effects.

The environmental monitoring programme (Art. 10) contains:
1) overview of the status of the environment prior to the start of project operations on locations where environmental impacts are expected;
2) parameters for the assessment of harmful environmental effects;
3) locations, methods and frequency of the measurement of set parameters.

ANNEX 7: MoESP ORGANIZATIONAL SCHEME

	MINISTER			Agency for Environmental Protection	
	CABINET	SECRETARIAT		Sector for Monitoring and Evaluation	
Sector for City Planning, Spatial Planning and Housing	Sector for Construction, Investments and Building Land	Sector for Planning and Management	Sector for Conservation of Natural Resources	Sektor za evr. integraciju, međ. saradnju i upravljanje projektima / Sector for European Integration, International Cooperation and Project Management	Sektor za kontrolu i nadzor / Sector for Auditing and Supervision
Section for Implementation of City and Spatial Plans	Building Department	Unit for Legal and Administrative Affairs	Department for Nature Conservation	Department for European Integrations and International Cooperation	Section for Legal and Administrative Affairs
		Unit for Strategic Programme and Planning Documents	Section for the conservation of biological resources Section for designated areas Section for the conservation of biodiversity		
Section for Housing Affairs	Department for Normative Affairs, Building Land and Legalization	Department for Integrated Permits	Department for Geological Research and Land	Department for Project Management	Protection of the Environment from Pollution
				Unit for Project Preparation Unit for Project Implemenation and Monitoring	
Group for Preparation of Spatial and City Plans	Unit for Investments	Department for Impact Assessment	Section for Water Protection	Section for Climate Change	Protection and Use of Natural Properties and Resources and Land Protection

		Protection of natural properties and use of resources Industrial and infrastructural facilities and works			Natural properties Natural resources and land
	Department for Administrative Affairs in the Field of State Survey and Real Estate Cadastre	Waste Management Department	Section for Air Protection	Department for Harmonization of Regulations	Protection of Waters from Pollution and Fishing
		Industrial waste Public utility waste and special waste routes			
		Risk Management Unit			Management of Hazardous Waste and Other Waste
		Unit for Standards and Cleaner Production			Cooperation of the Inspection with International Networks
		Unit for Strategic Environmental Impact Assessments			Chemicals, Biocides and Seveso
					Belgrade Niš Pančevo
		Unit for Protection from Noise and Vibrations			Building Inspectorate Department of the Republic
					Belgrade NIš Unit for Dams and Enforcement of Decisions
					City Inspection Department of the Republic
					Belgrade Niš