COUNCIL OF EUROPE

CONSEIL DE L'EUROPE

Strasbourg, 23 November 2020 **T-PVS/Files(2020)6**
[files06e_2020.docx]

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

40th meeting
Strasbourg, 30 November -4 December 2020

_____

Specific Sites - Files open

Wind farms in Balchik and Kaliakra –Via Pontica (Bulgaria)

- REPORT BY THE GOVERNMENT -

Document prepared by
The Ministry of Environment and Water, Bulgaria

- November 2020 -

REPUBLIC OF BULGARIA

MINISTRY OF ENVIRONMENT AND WATER

Wind farms planned near Balchik and Kaliakra
– Via Pontica (Bulgaria) –
Progress since July 2020

23 November 2020

1. Introduction

The Case „Windfarms planned near Balchik and Kaliakra – Via Pontica (Bulgari)“ has been monitored by the Bureau and Standing Committee of the Bern Convention for years and, as part of this process, Recommendation No 130 (2007) has been issued.

At its 37th meeting held in 2017, taking into account the judgment of the Court of Justice of the European Union, delivered on 14 January 2016 on case C-141/14 (Kaliakra), the Standing Committee decided to "leave the dossier open" and following the proposal of the NGO – complainant, assigned to the Secretariat to organize an on-the-spot appraisal (OSA) to assess the need to update Recommendation 130 (2007).

At its 39th meeting held in December 2019, the Standing Committee examined the implementation of Recommendation No 200 (2018) on planned wind farms near Balchik and Kaliakra and other wind farms on the Via Pontica (Bulgaria) route", adopted as results of report delivered by on-site mission hold in May 2018.

The Committee requested the Bulgarian authorities to ensure a professional communication and collaboration with the NGO community, and to keep the Bureau informed on the progress in the implementation of Recommendation No. 200 (2018).

2. Implementation of Recommendation No 200 (2018).

Recommendation to the Bulgarian Government:

1. The comprehensive independent assessment of the impact of operational windfarms in the Kaliakra area which was recommended by the Bern Convention Standing Committee in 2015 (amplifying paragraph 5 of Recommendation No. 130 of 2007) should be undertaken without delay, according to scientifically appropriate methods to be agreed in advance. It should include information from the current collision mortality monitoring but should also address other impacts such as displacement, barrier effects, disturbance and habitat change; and it should arrange to draw on collaborative sharing of information between windfarm operators, regional authorities, NGOs, academic researchers and others. An interim report of the results should be transmitted to the Bern Convention Bureau before February 2019, and a final report before August 2019;

2. A broader regime for on-going monitoring and assessment of potential impacts of the Kaliakra area windfarms during their operation should be developed, ensuring that it inter alia:
- *follows scientifically appropriate methods agreed in advance,*
- *addresses all types of potential impacts, including collisions, disturbance, displacement, barrier effects and habitat changes,*
- *includes observations at both windfarm sites and comparable areas with no windfarm developments, so as to provide "control" comparisons,*
- *is coordinated across all the Kaliakra installations,*
- *is undertaken in conjunction with research by NGOs, supported by data-sharing agreements,*
- *takes the opportunity to undertake related research where it would be appropriate and cost-effective to associate this with the field efforts already being made on monitoring and assessment,*
- *makes information about the methods and systems used available in a form which would allow these to be replicated at other windfarm sites elsewhere,*
- *feeds results and insights (through the authorities) into national processes for planning and assessment of future developments;*

Implementation approach:
Bulgarian government has informed the Standing Committee that in order to comply with the recommendation the Ministry of Environment and Water (MoEW) signed a contract No Д-30-45 from 10.06.2019 with independent expert with professional qualifications and practical experience in analysing available data on bird species and expertise in field studies of bird species, processing, summarizing and validating of their results, and making evaluations as a result of the analyses.
The specific purpose of the contract is to ensure fulfilment of points 1 and 2 of Recommendation 200 (2018) of the Bern Convention.

With our progress reports from 19 February and 23 July 2020 we have provided to the Secretariat two documents prepared by the independent expert in implementation of Activity 1 and 2 of the contract namely:

1. 'Report on the Methodology for Assessing accessible information on the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria', and
2. 'Report on the Methodology for a monitoring of the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria'.

Herewith we provide for the consideration of the Standing Committee the **'Final Report on the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria'** elaborated by the independent expert. The report was put under consideration with the Complainant, windfarm's owners and the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences during a web meeting organised by the Ministry of Environment and Water. The comments provided during the meeting are reflected in the report.

3. Conclusion

In the light of the information presented we consider that Bulgarian government is fulfilled the obligation set under point 1 of Recommendation 200 (2018) of the Bern Convention.
Information for the other implemented recommendation could be found in Bulgarian progress report from 28 February 2019, which was discussed at 39th Standing Committee meeting.

Bulgaria continue to make efforts to meet the objectives of the Bern Convention and to implement mitigation measures in order to protect birds and their habitats.

- July 2020 -

REPUBLIC OF BULGARIA

MINISTRY OF ENVIRONMENT AND WATER

Wind farms planned near Balchik and Kaliakra
– Via Pontica (Bulgaria) –
Progress since December 2019

23 July 2020

4. Introduction

The Case „Windfarms planned near Balchik and Kaliakra – Via Pontica (Bulgari)“ has been monitored by the Bureau and Standing Committee of the Bern Convention for years and, as part of this process, Recommendation No 130 (2007) has been issued.

At its 37th meeting held in 2017, taking into account the judgment of the Court of Justice of the European Union, delivered on 14 January 2016 on case C-141/14 (Kaliakra), the Standing Committee decided to "leave the dossier open" and following the proposal of the NGO – complainant, assigned to the Secretariat to organize an on-the-spot appraisal (OSA) to assess the need to update Recommendation 130 (2007).

At its 39th meeting held in December 2019, the Standing Committee examined the above-mentioned "opened dossier" on this case, which resulted in the adoption of Recommendation No 200 (2018) on planned wind farms near Balchik and Kaliakra and other wind farms on the Via Pontica (Bulgaria) route", which is based on the results and the recommendations formulated by the on-site mission held in May 2018, and which complements Recommendation 130 (2007) by providing of guidance on concrete steps which have to be taken in order to improve its implementation.

The Committee requested the Bulgarian authorities to ensure a professional communication and collaboration with the NGO community, and to keep the Bureau informed on the progress in the implementation of Recommendation No. 200 (2018).

5. Implementation of Recommendation No 200 (2018).

Recommendation to the Bulgarian Government:

1. The comprehensive independent assessment of the impact of operational windfarms in the Kaliakra area which was recommended by the Bern Convention Standing Committee in 2015 (amplifying paragraph 5 of Recommendation No. 130 of 2007) should be undertaken without delay, according to scientifically appropriate methods to be agreed in advance. It should include information from the current collision mortality monitoring but should also address other impacts such as displacement, barrier effects, disturbance and habitat change; and it should arrange to draw on collaborative sharing of information between windfarm operators, regional authorities, NGOs, academic researchers and others. An interim report of the results should be transmitted to the Bern Convention Bureau before February 2019, and a final report before August 2019;

2. A broader regime for on-going monitoring and assessment of potential impacts of the Kaliakra area windfarms during their operation should be developed, ensuring that it inter alia:

- *follows scientifically appropriate methods agreed in advance,*
- *addresses all types of potential impacts, including collisions, disturbance, displacement, barrier effects and habitat changes,*
- *includes observations at both windfarm sites and comparable areas with no windfarm developments, so as to provide "control" comparisons,*
- *is coordinated across all the Kaliakra installations,*
- *is undertaken in conjunction with research by NGOs, supported by data-sharing agreements,*
- *takes the opportunity to undertake related research where it would be appropriate and cost-effective to associate this with the field efforts already being made on monitoring and assessment,*
- *makes information about the methods and systems used available in a form which would allow these to be replicated at other windfarm sites elsewhere,*
- *feeds results and insights (through the authorities) into national processes for planning and assessment of future developments;*

Implementation approach:

As Bulgarian government already informed the Standing Committee that in order to comply with the Recommendation the Ministry of Environment and Water (MoEW) signed a contract No Д-30-45 from 10.06.2019 with independent expert with professional qualifications and practical experience in analysing available data on bird species and expertise in field studies of bird species, processing, summarizing and validating of their results, and making evaluations as a result of the analyses.
The specific purpose of the contract is to ensure fulfilment of points 1 and 2 of Recommendation 200 (2018) of the Bern Convention.

With our previous progress report from 19 February 2020 we have provided to the Secretariat 'Report on the Methodology for Assessing accessible information on the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria' prepared by the independent expert in implementation of Activity 1 of the contract. Unfortunately, the work on the contract implementation is still ongoing due to COVID-19 crisis, but we still expect all the activities to be completed before the next Standing Committee meeting.
Herewith attached to the report we provide to the Secretariat 'Report on the Methodology for a monitoring of the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria' prepared by the independent expert in the implementation of **Activity 2** of the contract.

Report on the Methodology for a monitoring of the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria (Activity 2)

Author:

Mag. Dr. Stefan Schindler

Hauptstraße 21/3

3013 Tullnerbach,

Austria

Requester:

Bulgarian Ministry of Environment and Water (MOEW)

Date: 07.02.2020

Introduction

The Ministry of Environment and Water commissioned the preparation of a **"Full-scale independent impact assessment of the exploitation of wind parks in the region of Kaliakra, pursuant to Recommendation 200 (2018) of the Standing Committee of the Bern Convention"** in three steps, termed "activities".

As described in the report on Activity 1 (12/2019), existing studies and past reports, monitoring databases and current monitoring program results are being reviewed and will be synthesized for impact assessment in the final report (Activity 3). At the current state of assessment, it can be stated that there is a large quantity of information highly relevant for this impact assessment, which has not been considered by the Standing Committee of the Bern Convention in former analyses.

Numerous aspects requested by the Standing Committee have already been investigated during former studies and ongoing monitoring activities in the Kaliakra area. Consequently, the presented report aims to improve and standardize the ongoing monitoring activities.

The presented report corresponds to the second step (Activity 2) requested by the MOEW :

"Proposal for appropriate scientific methods for impact assessment of the exploitation of existing wind farms in the region of Kaliakra.

a. **Drawing up a proposal for appropriate scientific methods for assessments of impacts such as: displacement, barrier effects, disturbances, change/loss of habitats;**

b. **Drawing up a proposal for a "regime" of ongoing monitoring and monitoring on potential impact assessment both of places of exploitation of wind energy farms in the region of Kaliakra and of comparable zones, free of wind turbines;**

c. **Presenting the proposals to stakeholders."**

Comments on MOEW requests

a. **"Drawing up a proposal for appropriate scientific methods for assessments of impacts such as: displacement, barrier effects, disturbances, change/loss of habitats;"**

Apart from collision mortality, other types of potential wind energy impacts on sensitive bird species have to be considered in the context of conservation concerns. To cover these additional impact types, the Committee used the terms displacement, barrier, disturbance and habitat loss effects, which are also repeated in the MOEW request.

As already stated in the report on Activity 1, all of the mentioned impact types relevant for Activity 2 result from disturbance, except habitat loss due to turbine foundations and infrastructure.

From a scientific perspective, disturbance occurs, if an action provokes any form of avoidance behaviour. In contrast, in the context of conservation concerns and environmental legislation applied to the case, disturbance is only relevant, if significant impact on a species local population is indicated.

Scientifically sound and effective assessment of wind energy impact types requires species-specific adaptation of monitoring methodology and is particularly difficult concerning rare and endangered species (Stewart et al. 2007; BirdLife International 2013).

The MOEW also requested a proposal for comprehensive and ongoing monitoring measures for the Kaliakra wind farm area as recommended by the Committee:

b. "Drawing up a proposal for a "regime" of ongoing monitoring and monitoring on potential impact assessment both of places of exploitation of wind energy farms in the region of Kaliakra and of comparable zones, free of wind turbines;"

During Activity 1 review of existing reports on local wind energy impacts already indicated, that these reports provide an appropriate base for EIA, which will be assessed in the final report, complemented by an expedient proposal for a comprehensive monitoring program. The additional benefit of comparative observations at wind farm areas and control sites in a post-construction monitoring program is scientifically questionable and will be finally discussed in the EIA (Activity 3).
In this context it should also be mentioned, that comparative observations have been already conducted in the past in the Kaliakra region. As an example, during the Autumn Migration Study by Traxler et al. (in prep 2020), observation data from four observation sites along a gradient from Cape Kaliakra (Mitsubishi WF) crossing EVN wind farm and two control points in the western mainland were collected and analyzed.
As shown in the report on Activity 1, a comprehensive risk assessment is possible based on available information from existing studies. Hence, the focus of Activity 2 lies on the proposal of an improved and standardized monitoring methodology as part of the integrated early warning system.

c. "Presenting the proposals to stakeholders."

The third aspect requested by MOEW aims at presenting the monitoring concept to the stakeholders. The presented report (Activity 2) allows implementation of recommendations and preliminary feasibility tests on data collection during ornithological surveys by operators. The final report will include further specifications of methods to obtain appropriate data and assess specific impact types and effects on target species. In this context, the EIA final report (Activity 3) will act as an appropriate starting point for a joint discussion process on monitoring methods.

Methods applied in Activity 2

After reviewing the available reports and current monitoring activities in the scope of Activity 1, the structure of databases was evaluated during Activity 2 to identify potentials for optimization.
In that context the most relevant ongoing observation activities are part of the integrated early warning system, established in 2018. The observation efforts made by operators cover the complete area of Kaliakra SPA and neighbouring wind farms. Consequently, the spatial scope and the amount of field work spent on these observations represents a great opportunity to facilitate a comprehensive assessment of relevant wind energy impacts on local and migrating bird species. Another advantage of the existing structures of the early warning system is the central coordination and data collection network of highly experienced field ornithologists. The field workers have great knowledge on the local site conditions and are experienced in observing present target species. The ongoing early warning system in Kaliakra is one of the most comprehensive observation programs in long-term systematic data collection for wind farms in Europe.
The benefits of systematic collection and synthesis of empirical evidence for decision making have already been demonstrated (Sutherland et al. 2004; The Cochrane Collaboration 2013; Haddaway 2015).

Results

The available datasets for the Kaliakra area have been collected during more than a decade in different monitoring programs.

The implementation of the early warning system in 2018 can be seen as a turning point for regional coordination of monitoring activities with great potential for coordinated monitoring activities and standardisation of protocols.

The main focus of the early warning system in Kaliakra wind farms lies in collision avoidance of birds. At the same time the high intensity of field observations within the early warning system already provide numerous systematically collected data since 2018. The improvements and standardizations of monitoring methods proposed in this report offer the opportunity to optimize the output of observation efforts.

As mentioned above, general recommendations concerning the protocols used for ornithological surveys as part of the integrated early warning system are already provided in the subsequent paragraphs. Relevant formal requirements for a dataset to allow more advanced quantitative analysis are summarized in this report. For each aspect proposals to improve and standardize the field protocol are presented. The currently used parameters by field ornithologists in the early warning system, are represented by 12 columns listed in Tab. 1, completed by additional parameters to facilitate secondary data processing. The results of Activity 2 will be discussed and optimized after finalizing the EIA during Activity 3.

Homogeneity of the dataset

Long-term observations at Kaliakra wind farms can improve the illustration of seasonal and annual patterns of flight and habitat utilization patterns, if data are collected following recommended standardized protocols.

A first step to further improve homogeneity of the datasets is the revision of vantage point IDs. There are multiple cases of similar coordinates applying to different vantage point IDs. It is recommended to create a central database of georeferenced vantage points with standardized IDs and ensure accessibility by field ornithologists. In this way, the set of standard vantage points in the Kaliakra area should be reduced to a minimum, while still covering the area of interest. Simultaneously, comprehensive analysis of habitat utilization and flight movement patterns is facilitated, as for long-term analyses the total number of observation hours at each vantage point will increase substantially without producing inconsistent data.

For each observation event the exact time of beginning and ending should be separately noted for the different vantage points. This is necessary to acquire comparable data on space use patterns in an occurrence-per-time unit format. Moreover, each observation session should be subdivided into intervals of 15 minutes. Each specimen present during an interval results in one count of the target species, independent from the duration of presence. This concept offers the opportunity for more detailed comparative analysis of space use.

Spatial range of observations

Currently, each observation within a 3,000 m radius around vantage points is entered in the datasheet, which is appropriate for the early warning system. Identification of species by human observers significantly declines at a distance of 2,000 m (SNH 2013). For that reason, standardized protocols typically exclude observations from >1,000 m distance. By adding an additional column in the datasheet, observations within and outside a 1,000 m standard circle will be separated to improve specific further analysis.

Weather conditions

The only climate parameter assessed in the current protocol is cloudiness, which is mainly used as a proxy for visual detectability and sight radius of observers. This could be done more precisely by a direct evaluation of visibility. Also, integration of the parameters temperature, wind speed and direction can be filled into the field protocol once for each monitoring session without additional effort. For identification of secondary influence factors on bird species behaviour, these parameters are highly valuable and can be used to separate wind energy impacts from abiotic environmental effects.

Overview on field work effort per vantage point

For further analyses of species temporal and spatial utilization at observed sites, also a documentation of total observation hours spent per day and vantage point is necessary. For this purpose, a third data sheet should be attached to the documentation form including the following parameter columns in the given format:
date (mm/dd/yyyy), vantage point ID, start of observation (hh:mm), end of observation (hh:mm); observer (name)
This information should also be made available for the past from observers geotracking data.

Optional efforts for potential target species

In very rare events **single breeding individuals** (eg. special large breeding birds, mainly endangered raptors) can be identified by visible plumage features (eg. results of shooting). Under this rare circumstances it is helpful to record this individual features and additionally age, sex or other individual characteristics. This method can facilitate investigation of potential disturbance effects on local breeding birds. Nevertheless, practical application of the method is difficult and will work out in extremely rare cases.
Mapping of flight movements on 1:25,000 maps might be useful to investigate specific research questions on target species.
However, even for experienced ornithologists, this methods require the observers full attention and should not compromise the effectiveness of the early warning system. Hence, mapping of flight movements should be strictly limited to sensitive target species of specific local conservation concern.

Tab. 1: Parameters for monitoring protocols. Currently collected parameters are marked green, while additionally recommended parameters are marked red.

	unit	**Protocol currently used by ornithologists**
Parameters for an entire monitoring session		
observer	name	yes
date	mm/dd/yyyy	yes
time (start / end)	hh:mm	
coordinated of the vantage point	xx,yy	
weather conditions		
temperature	°C	
cloudiness	%	yes
wind speed	Beaufort	

wind direction	16-wind compass rose	
visibility	3 categories	
further comments,	e.g. particular migration events, disturbances or interruption of the monitoring	
Parameters for observed specimen		
time	hh:mm	yes
counts	counts per interval	
location	xx,yy	yes, with x- and y-coordinates
species	abbrev.	yes
number of individuals	counts	yes (flock size)
age & sex (if feasible)	juv/prem/ad & f/m	
minimum distance from vantage point to bird	m	yes
minimum distance from vantage point to bird > 1000m	yes/no	
direction from vantage point or transect to detected bird	8-wind compass rose	yes
behavior	active flight, soaring, resting, territorial behavior…	yes
flight altitude	m	yes
flight direction	16-wind compass rose	yes
flight route	See map	

All these parameters should be standardized and described in detail according to the monitoring protocol in a second sheet, attached to the data form to facilitate a standardized documentation by different observers and to allow independent but scientifically sound interpretation of the data by extern analysts. Field ornithologists should be explicitly instructed to fill in the data form recalling the detailed description of parameters. Senior ornithologists should check for completeness of protocols at a random basis to ensure a constant quality of data.

Summary

During Activity 1 it could already be shown, that integral monitoring recommendations formulated by the Standing Committee can sufficiently be answered by analysing existing reports and datasets. This is mainly due to the extensive observation efforts made by operators to maintain the integrated early warning system but also other preliminary studies of wind farm impacts conducted inside the Kaliakra area.

Hence, the proposals made in the presented report on Activity 2 aim at maximizing the output of field observation data.

As a result for Activity 2, a detailed proposal for improvement of the field protocol within the early warning system is provided. Further optimization and finalization of recommendations will be performed in the final report on environmental impact assessment (Activity 3).

Applied efforts in this context improve local impact prediction accuracy but will also provide important references for planning and assessment processes of future wind energy projects.

In the long term, the recommended improvement of methodology offers the chance to
- increase information gain by monitoring (by improvement of data structure)
- improve guidelines for Strategic Environmental Assessments and Environmental Impact Assessments by utilizing experiences made in the Kaliakra area

References

BirdLife International (2013) Wind Farms and Birds: an updated analysis of the effects of wind farms on birds, and best practice guidance on integrated planning and impact assessment. Bern Convention, Strasbourg

Haddaway NR (2015) A call for better reporting of conservation research data for use in meta-analyses. Cons Biol 29:1242-1245

SNH (Scottish NaturalHeritage) (2013) Recommended bird survey methods to inform impact assessment of onshore wind farms. *SNH Guidance. Scottish Natural Heritage, Battleby*. 37

Stewart GB, Pullin AS, Coles CF (2007) Poor evidence-base for assessments of windfarm impacts on birds. Environ Cons 34:1-11

Sutherland WJ, Pullin AS et al (2004) The need for evidence-based conservation. TREE 19:305-308

The Cochrane Collaboration (2013) History. Available from https://www.cochrane.org/about-us (accessed July 2019)

Traxler, A., Jaklitsch, H., Plank, M., Iliev, M., Gerdzhikov, G., Zarkov, A., Barzov, J., Dimitrov, D., Katrandzhiev, V., Mitev, D., Staneva, A. (in prep.): Ornithological survey in EVN windfarm Kavarna and adjacent areas in autumn 2015. Part 1: Diurnal Birdmigration. Part 2: Collision Monitoring. BIOME on behalf of EVN Naturkraft GmbH.

19 February 2020

1. Introduction

The Case "Windfarms planned near Balchik and Kaliakra – Via Pontica (Bulgari)" has been monitored by the Bureau and Standing Committee of the Bern Convention for years and, as part of this process, Recommendation No 130 (2007) has been issued.

At its 37th meeting held in 2017, taking into account the judgment of the Court of Justice of the European Union, delivered on 14 January 2016 on case C-141/14 (Kaliakra), the Standing Committee decided to "leave the dossier open" and following the proposal of the NGO – complainant, assigned to the Secretariat to organize an on-the-spot appraisal (OSA) to assess the need to update Recommendation 130 (2007).

At its 39th meeting held in December 2019, the Standing Committee examined the above-mentioned "opened dossier" on this case, which resulted in the adoption of Recommendation No 200 (2018) on planned wind farms near Balchik and Kaliakra and other wind farms on the Via Pontica (Bulgaria) route", which is based on the results and the recommendations formulated by the on-site mission held in May 2018, and which complements Recommendation 130 (2007) by providing of guidance on concrete steps which have to be taken in order to improve its implementation.

The Committee requested the Bulgarian authorities to ensure a professional communication and collaboration with the NGO community, and to keep the Bureau informed on the progress in the implementation of Recommendation No. 200 (2018).

2. Implementation of Recommendation No 200 (2018).

Recommendation to the Bulgarian Government:

1. The comprehensive independent assessment of the impact of operational windfarms in the Kaliakra area which was recommended by the Bern Convention Standing Committee in 2015 (amplifying paragraph 5 of Recommendation No. 130 of 2007) should be undertaken without delay, according to scientifically appropriate methods to be agreed in advance. It should include information from the current collision mortality monitoring but should also address other impacts such as displacement, barrier effects, disturbance and habitat change; and it should arrange to draw on collaborative sharing of information between windfarm operators, regional authorities, NGOs, academic researchers and others. An interim report of the results should be transmitted to the Bern Convention Bureau before February 2019, and a final report before August 2019;

2. A broader regime for on-going monitoring and assessment of potential impacts of the Kaliakra area windfarms during their operation should be developed, ensuring that it inter alia:

- *follows scientifically appropriate methods agreed in advance,*
- *addresses all types of potential impacts, including collisions, disturbance, displacement, barrier effects and habitat changes,*
- *includes observations at both windfarm sites and comparable areas with no windfarm developments, so as to provide "control" comparisons,*
- *is coordinated across all the Kaliakra installations,*
- *is undertaken in conjunction with research by NGOs, supported by data-sharing agreements,*
- *takes the opportunity to undertake related research where it would be appropriate and cost-effective to associate this with the field efforts already being made on monitoring and assessment,*

- *makes information about the methods and systems used available in a form which would allow these to be replicated at other windfarm sites elsewhere,*
- *feeds results and insights (through the authorities) into national processes for planning and assessment of future developments;*

Implementation approach:

As Bulgarian government already informed the Standing Committee that in order to comply with the Recommendation the Ministry of Environment and Water (MoEW) signed a contract No Д-30-45 from 10.06.2019 with independent expert with professional qualifications and practical experience in analysing available data on bird species and expertise in field studies of bird species, processing, summarizing and validating of their results, and making evaluations as a result of the analyses.
The specific purpose of the contract is to ensure fulfilment of points 1 and 2 of Recommendation 200 (2018) of the Bern Convention.

In the implementation of **Activity 1** of the contract the independent expert provided to the Ministry of Environment of Water the following report which herewith we provide to the Secretariat.

Report on the Methodology for Assessing accessible Information on the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria

Author:

Mag. Dr. Stefan Schindler

Hauptstraße 21/3

3013 Tullnerbach,

Austria

Requester:

Bulgarian Ministry of Environment and Water (MOEW)

Version: 22.11.2019 as revision of version 30.7.2019

Content

1. Introduction

Climate change and biodiversity loss, if not averted immediately, may inflict severe impacts on ecosystem processes, functions and services that are crucial for human welfare. Increasing renewable energy deployment and expanding the current protected area network represent key solutions to these challenges, but conflicts may arise over the use of limited land for renewable energies as opposed to biodiversity conservation (Pogson et al. 2013; Pouzols et al. 2014; Meller et al. 2015). Development of wind power, one major type of renewable energy, is strongly increasing in Europe and elsewhere (AWEA 2014; EWEA 2015; Wang et al. 2015). Impacts on biodiversity by wind power are strongly contingent on the location of the wind turbines. Consequently, conflicts between nature conservation, local communities and wind energy companies are frequent, in terms of biodiversity conservation, in particular with regard to the impact of wind energy on birds and bats (Loss et al. 2013; Wang et al. 2015). Different kinds of impacts can occur and some of them are difficult to assess, particularly for rare and for endangered species (Stewart et al. 2007; BirdLife International 2013). A comprehensive assessment of impacts on biodiversity should take into account cumulative impacts: several wind farms may impact in concert (Masden et al. 2010), and additional causes of threat such as climate change may add additional impact due to range shifts, changes of migration routes and stop over areas, and habitat loss (Bastos et al. 2015). Thus, current impact assessments which usually are done on a case-by-case basis may fail when not considering neighbouring wind parks and interactions with other pressures related to global change.

The benefits of systematic collection and synthesis of empirical evidence for decision making has already been demonstrated (Sutherland et al. 2004; The Cochrane Collaboration 2013; Haddaway 2015) and environmental policy makers as well as assessors are increasingly seeking for evidence synthesis to support their decisions (Perrins et al. 2011). The lack of comprehensive empirical data and of evidence-based knowledge syntheses of biodiversity impacts and the effectiveness of mitigation measures might hamper the long-term development of the wind power industry by reaffirming negative stereotypes and public opposition (Masden et al. 2010; BirdLife International 2013; May et al. 2015; Wang et al. 2015). An optimized information flow through science-policy-interfaces requires structuring holistic environmental policy questions into specific research questions that are suitable for scientific assessment (Pullin et al. 2009, 2016).

2. The Kaliakra case and the recommendations of the Bern convention

2.1. Chronology of the case

The Kaliakra wind farms are situated close to the Black Sea coast in North-eastern Bulgaria. Subsequent to submission of "**Recommendation No. 130 (2007) of the Standing Committee on the windfarms planned near Balchik and Kaliakra, and other wind farm developments on the Via Pontica route (Bulgaria)**", the chronology of the case was described by the Third Chamber of the Court in its judgement on Case C-141/14, on January 14th,2016 as follows:

"On 18th December 2007, in accordance with the Birds Directive, the Republic of Bulgaria established the Kaliakra SPA. Nevertheless, that protection area covered only two thirds of the territory of the Kaliakra IBA. The Republic of Bulgaria also set up the Belite Skali SPA to the west of the Kaliakra SPA and outside the Kaliakra IBA. Furthermore, that Member State proposed to the Commission that a site of Community interest be designated under the name 'Kompleks Kaliakra' including almost the entire area covered by the Kaliakra and Belite Skali SPAs.

Following complaints submitted by the Bulgarian Society for the Protection of Birds (Bulgarsko druzhestvo za zashtita na ptitsite) concerning the insufficient scope of the geographical area covered by the Kaliakra SPA and the adverse effects of several business projects on natural habitats and habitats of bird species, the Commission sent a letter of formal notice on 6th June 2008 to the Republic of Bulgaria requesting that it address the failure to fulfil its obligations under Article 4(1) and (2) of the Birds Directive in respect of six SPAs, including the Kaliakra SPA. Since the Commission was not satisfied with the various replies submitted by the Republic of Bulgaria, it sent a second letter of formal notice on 1st December 2008 requesting the Republic of Bulgaria to remedy its failure to fulfil its obligations under Article 4(4) of the Birds Directive and the combined provisions of Articles 2(1) and 4(2) and (3) of Directive 2011/92 and of Annex III thereto, in so far as that Member State had authorised the installation of several wind farms within the Kaliakra IBA. The Republic of Bulgaria replied to those letters of formal notice on 30th January 2009 and subsequently submitted additional information on several occasions.

On 30th September 2011, the Commission sent a supplementary third letter of formal notice to the Republic of Bulgaria which, first, was designed to consolidate the two previous letters of formal notice and, secondly, contained new requests concerning the territories of the Kaliakra IBA, the Belite Skali SPA and the Kompleks Kaliakra SCI. That letter raised two sets of issues: the insufficient geographical scope of the territory of the Kaliakra SPA and the effects of several projects on the Kaliakra SPA, the Belite Skali SPA, the Kompleks Kaliakra SCI and the

area which should have been classified as an SPA, according to the IBA inventory, but which had not been so classified.

On 30th January 2012, the Republic of Bulgaria informed the Commission that the projects listed by it had been, for the most part, approved before that Member State's accession to the European Union or before the inclusion of the areas concerned in the Natura 2000 network, with the result that EU law was not applicable to those sites.

By letter of 22nd June 2012, the Commission delivered a reasoned opinion in which it complained that the Republic of Bulgaria had failed to fulfil its obligations under Article 4(1), (2) and (4) of the Birds Directive, Article 6(2), (3) and (4) of the Habitats Directive and the combined provisions of Articles 2(1) and 4(2) and (3) of Directive 2011/92 and of Annex III thereto.

The Republic of Bulgaria replied to that reasoned opinion and, on the basis of additional information, informed the Commission that it had taken a series of measures designed to correct the shortcomings identified.

As it took the view that the situation remained unsatisfactory, the Commission brought the present action on 24th March 2014."

In its judgement on the case in 2016, the Third Chamber of the Court declared, that:

"by failing to include all the territories of the important bird areas in the special protection area covering the Kaliakra region, the Republic of Bulgaria has **failed to classify as special protection areas the most suitable territories in number and size for the conservation**, first, of the biological species listed in Annex I to Directive 2009/147/EC of the European Parliament and of the Council of 30th November 2009 on the conservation of wild birds and, secondly, of the migratory species not listed in that annex but regularly occurring in the geographical sea and land area where that directive applies, with the result that that Member State has failed to fulfil its obligations under Article 4(1) and (2) of that directive;

by **approving the implementation of the projects 'AES Geo Energy', 'Disib' and 'Longman Investment'** in the territory of the important bird area covering the Kaliakra region which was not classified as a special protection area, although it should have been, the Republic of Bulgaria has failed to fulfil its obligations under Article 4(4) of Directive 2009/147;

by approving the **implementation of the projects 'Kaliakra Wind Power', 'EVN Enertrag Kavarna' and 'Vertikal — Petkov & Co'**, and of the 'Thracian Cliffs Golf & Spa Resort', in the territory of the special protection areas covering the regions of Kaliakra and Belite Skali respectively, the Republic of Bulgaria has failed to fulfil its obligations under Article 6(2) of Council Directive 92/43/EEC of 21st May 1992 on the conservation of natural habitats and of wild fauna and flora;

by **failing, first, to assess properly the cumulative effect** of the projects 'Windtech', 'Brestiom', 'Eco Energy' and 'Longman Investment' in the territory of the important bird area covering the Kaliakra region which was not classified as a special protection area, although it should have been, and, secondly, by none the less **authorising the implementation of the 'Longman Investment' project**, the Republic of Bulgaria has failed to fulfil its obligations under Article 4(2) and (3) of Directive 2011/92/EU of the European Parliament and of the Council of 13rd December 2011 on the assessment of the effects of certain public and private projects on the environment and point 1(b) of Annex III to that directive, and under Article 2(1) of that directive, respectively;

Dismisses the action as to the remainder(...)."

Subsequent to the judgement of the Court, during the On-the-Spot Appraisal (OSA) documented by Pritchard (T-PVS/Files(2018)25), which took place on May 15 – 16th 2018, the progress of Recommendation No 130 (2007) implementation was assessed and commented. The OSA mission report includes clear proposals on the way towards implementation of missing aspects.

According to the OSA mission report, the following of the Committees most important recommendations have been apparently implemented by Bulgarian authorities until May 2018:

1. The Kaliakra SPA was extended to the originally identified area.
2. Efforts to mitigate potential bird mortality (early warning system and joint protocol for turbine shutdown) appear to be effective, as monitoring data suggests low levels of collision mortality.
3. A Strategic Environmental Assessment (cf. Gove et al. 2013; Hayes et al. 2015) and a Habitats Directive Appropriate Assessment were completed for the National Renewable Energy Action Plan in 2012. According to the strategy, wind energy developments limited to areas of low risk for birds will meet the national wind energy generation target.
4. Some progress was made in improving impact assessment processes and corresponding guidance documents have been produced.
5. Windfarm developments in sensitive locations no longer receive direct state subsidies and are currently prohibited in Natura 2000 sites and some other sensitive locations due to implementation of relevant paragraphs into SPA Designation Orders.
6. All unimplemented wind energy development consents in the Kaliakra area have expired due to legislation changes.

Apart from that, a need for action was seen concerning the following aspects:

1. Initiating a comprehensive assessment of windfarm impacts.
2. Scientific clarification of wind energy impact types and population effects on geese.

3. Mitigation or compensation measures targeting other relevant impact types (in addition to collision mortality).
4. Restart the finalisation process of an Integrated Management Plan for the three Natura 2000 sites in the Kaliakra area.
5. Focus on the topics cumulative effects, international best practice guidance and peer review to improve impact assessment and mitigation.
6. Find back to a relationship of trust and a constructive dialogue among some stakeholders.

Based on the findings from the OSA, the Standing Committee submitted the revised Recommendation No 200 (2018) to the Bulgarian authorities.

2.2. National Renewable Energy Action Plan and Prohibitions set for Natura 2000 sites

The Bulgarian authorities developed a National Renewable Energy Action Plan (Ministry of Economy, Energy and Tourism, 2011) as main instrument to ensure the achievement of the national renewable energy targets. The plan aims to ensure a smooth transition towards a low-carbon economy based on modern technologies and greater use of renewable energy sources. It has been drawn up in accordance with the requirements of EU-Directive 2009/28/EC on the promotion of the use of energy from renewable sources and is based on an integrated approach to the country's public and social life, taking into account the development of the various economic sectors and the protection and preservation of the environment.

As pointed out in the OSA mission report in 2018, according to the National Renewable Energy Action Plan, future wind energy development is limited to areas of low risk for sensitive bird species and is explicitly prohibited in Natura 2000 sites, including SPAs in the Balchik and Kaliakra region.

2.3. The early warning system

For wind farms sited in proximity to potentially vulnerable bird populations, appropriately implemented shutdown can significantly reduce collision mortality, see e.g. Ronconi et al. (2004), Smallwood et al. (2007, 2009), Cook et al. (2011), de Lucas et al. (2012) and Tomé et al. (2017). At the Conference of Wind Energy Impacts on Wildlife 2019 in Stirling, Scotland, the Integrated Bird Protection System (IBPS), jointly implemented in 2018 to cover 114 operational wind turbines at Kavarna, was presented by Dr. Pavel Zethendjiev (Professor at the Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Sofia) and discussed by an international professional audience. The IBPS focusses on the 95 wind turbines located within the Kaliakra SPA and covers 19 additional turbines in its close proximity. It is composed of ROBIN RADAR, BIRD SCAN MS1 and Deltatrak radar units combined with visual field observations and local meteorological data. Such set of components can effectively reduce collision risk, as shown at a wind farm site in Portugal (Tomé et al. 2017). Currently, human field observations are used as a reference during field trials of

fully automated shut-down systems at developmental stage (KNE 2019). For the Kavarna area, first results of the concomitant collision monitoring program might suggest that the performance of IBPS is satisfying. Due to the history of the specific case, apart from efficiency of implemented measures, comprehensibility and transparency have to be considered as highly important. The IBPS documentation follows standard protocols, which include:

- Visual observation protocol:

  maintained by field ornithologists, during daily observations. The information registered contains date, hour, species observed, number in the flock, observation point, coordinates, cloudiness of the sky, distance to the bird, attitude, flight direction, name of the observer, bird behaviour

- • Shutdown protocol

  registers the functioning of Turbine Shut Down System, date of stop and start, species observed, number of the birds, wind farm where the stop order has been issued, identification of the turbine or group of turbines, ordered by, wind direction

- • Collision monitoring protocol

  contains information for the date, turbine number, searcher name, finding (if any), English and Latin name, status, after Red data Book and IUCN, what is found and details for the condition of remains

- • Daily field protocol

  start/end time of searches under turbines, turbine identification code, terrain conditions, carcasses found.

The documentation is published online at https://kaliakrabirdmonitoring.eu/ in the following input formats:

- Weekly bulletins

  database, maintained by senior field ornithologist

  (1) Registered observed bird species by numbers;

  (2) Issued shut down orders by date: wind farm; turbine or group of turbines, species, number of birds stop time, re-start time;

  (3) Confirmed collision mortality of target species

  (4) Maps of the registered flocks and birds.

- Monthly Bulletins

prepared by the senior field ornithologist, containing the summarised information, registered on monthly basis.

- Winter report

  results and analyses of the winter bird survey

- Spring report

  covering spring migration season

- Autumn report

  covering autumn migration season

- Annual report

  summarized monitoring activities, observations and conclusions

Additionally, a methodology report on IBPS is provided.

Due to the high public interest in the case on the EU level, publication of English translations of all documents is highly recommended as a step to increase transparency and further scientific analysis of the data but not least also to facilitate restoration of trust among stakeholders. Availability and structure of data obtained from visual observations still has potential for improvement. A detailed overview and request for improvement are given in the document

"Report on the Methodology for a monitoring of the Impacts of Wind Energy Development on Birds in the Region of Kaliakra, Bulgaria." (Schindler, in prep.)

Impact mitigation by early warning systems is not limited to collision risk, as deterring effects of operational turbines are reduced. Avoidance behaviour due to potential barrier or disturbance effects is very likely to be lower towards curtailed turbines or other static vertical structures. To pay attention to other types of impacts Apart from collision monitoring, this causality should also be investigated and assessed during each IBPS shut-down event.

2.4. Wind power installations in the Kaliakra area

In the region, 230 wind turbines are installed; thereof 95 are located in the SPA Kaliakra (Figure 1).

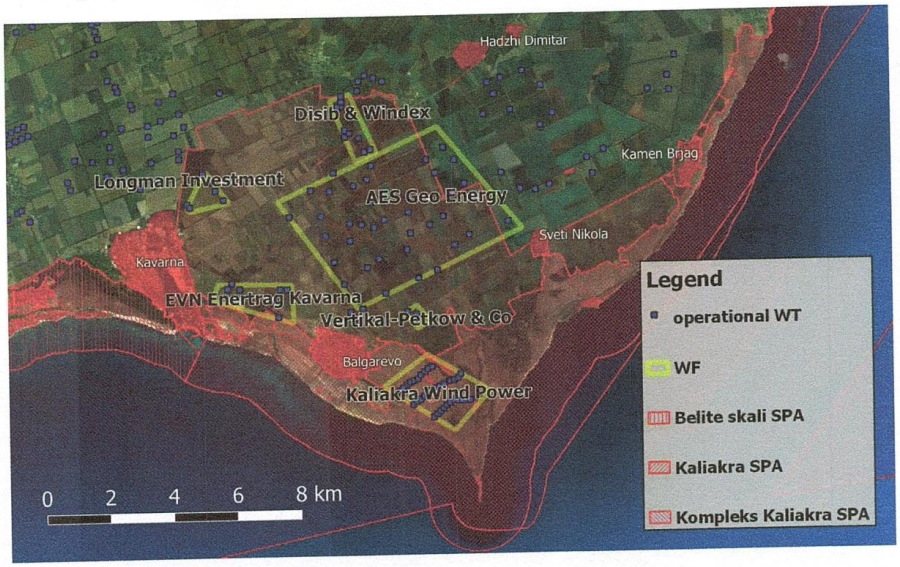

Figure 1: Overview of the Special Protection Areas in the Kavarna wind energy area. The area of wind farms objected to in the legal process are outlined in yellow.

52 wind turbines are operated by AES Geo Energy Ltd., of which 33 are located within the SPA, 3 are operated by Vertical - Petkov & Co Ltd., 10 are operated by Disim Ltd. and Windex Ltd., 35 by Kaliakra Wind Power Ltd., 6 by Longman Investment Ltd. and 8 by EVN ENERTRAG Kavarna Ltd. (Table 1).

Table 1. Wind turbines in operation in the SPA Kaliakra, their operators, location (village), impact assessment and operational life.

Operators	Number of WT	Villages concerned	Impact Assessment	Date of commissioning	Operational life
AES GEO ENERGY Ltd.	33	Bulgarevo, Sveti Nikola, Hadji Dimitar, Rakovski, P. Chunchevo	Decision on Environmental Impact Assessment No 1-2 / 114/2007	15.03.2010	25 years
VERTICAL - PETKOV & CO Ltd.	3	Balgarevo	Decision on Environmental Impact Assessment № 1-2/101/2005	02.03.2011 and 23.05.2011	20-30 years
DISIM Ltd. and WINDEX Ltd.	10	Rakovski, Hadji Dimitar, Kavarna	n.a.	13.06.2008, 18.06.2008, and 25.03.2009	Partly 35 years, partly unknown
KALIAKRA WIND POWER Ltd.	35	Balgarevo	Decision on Environmental Impact Assessment No 2-2 / 101/2005	20.06.2008	30 years
LONGMAN INVESTMENT Ltd.	6	Kavarna	n.a.	2005 & 2007	n.a.
EVN ENERTRAG KAVARNA Ltd.	8	Kavarna, Balgarevo	n.a.	n.a.	n.a.

2.5. Study aim

In the most recent document (Recommendation No. 200 (2018), the Standing Committee expresses the need for action of the Bulgarian Government to conduct a comprehensive independent assessment of the impact of operational windfarms in the Kaliakra area, according to scientifically appropriate methods to be agreed in advance. This assessment should include information from the current collision mortality monitoring but should also address other impacts such as displacement, barrier effects, disturbance and habitat change; and it should arrange to draw on collaborative sharing of information between windfarm operators, regional authorities, NGOs, academic researchers and others.

Furthermore, a broader regime for on-going monitoring and assessment of potential impacts of the Kaliakra area windfarms during their operation should be developed, ensuring that it inter alia (i) follows scientifically appropriate methods agreed in advance, (ii) addresses all types of potential impacts, including collisions, disturbance, displacement, barrier effects and habitat changes, (iii) includes observations at both windfarm sites and comparable areas with no windfarm developments, so as to provide "control" comparisons, (iv) is coordinated across all the Kaliakra installations, (v) is undertaken in conjunction with research by NGOs, supported by data-sharing agreements, (vi) takes the opportunity to undertake related research where it would be appropriate and cost-effective to associate this with the field efforts already being made on monitoring and assessment, (vii) makes information about the methods and systems used available in a form which would allow these to be replicated at other windfarm sites elsewhere, and (viii) feeds results and insights (through the authorities) into national processes for planning and assessment of future developments.

In response of the concerns raised by the Bern convention, the aim of this report is to present a method for (i) assessing the impacts of the Wind farms in the Kaliakra area by screening, describing, assessing and discussing available evidence, (ii) defining relevant knowledge gaps and (iii) to develop a broader regime for on-going monitoring and assessment activities.

3. Methods

3.1. Conceptual guidelines

The assessment is guided by the standards set by Birdlife International (2013) for wind park impact assessments, Steward et al. (2007) for reviewing such impacts and CEE (2018) for conducting evidence syntheses in general.

According to BirdLife International (2013), Environmental Impact Assessment (EIA) is a crucial process to reduce conflict with nature conservation, because it allows:

- Developers to identify and modify proposals to avoid, minimise or compensate for impacts on birds and their habitats;
- Regulators to make informed decisions about whether or not consents should be given, and what conditions to impose; and
- The public to engage with project development so that legitimate concerns can be taken into account, leading to greater acceptance and legitimacy of projects through the consents process.

3.2. Description of relevant terms of the assessment

The following terms will be used in the assessment (cf. BirdLife International 2013, CEE 2013, Masden & Coe 2016):

Scoping

A scoping processes should include all relevant stakeholders to ensure all relevant issues are taken into account in the assessment, and that the appropriate level of baseline information is gathered. This should also focus EIAs on the key issues that need information and assessment. Developers should seek to follow the avoidance-mitigation-compensation-enhancement hierarchy and demonstrate this through the EIA.

Baseline and Comparator

Baseline monitoring to inform EIA needs to use consistent and recognised methodologies, ideally using a Before After Control Impact (BACI) model or a Before After Gradient study. Baseline surveys onshore need to be undertaken for a minimum one year period. Desk-top studies of existing information can be useful to identify potential issues for further baseline study and analysis and to understand the level of scrutiny that the project will need to pass and so the level of information required. Desk-based study cannot, however, be an alternative to field studies specifically addressing the project and its potential impacts. Baseline studies need to include the full wind farm area and a suitable buffer, as well as any control/reference area.

Collision risk and collision mortality

Collision mortality equals the number of birds that experience severe or lethal injuries when hit by the blade or colliding with other parts of the wind turbine while passing the airspace occupied by wind farms. Although collision events with birds are generally quite rare, there have been well-noted cases where inappropriately sited wind turbines, together with poor wind farm design, have led to significant collision mortality for sensitive species. Risk is dependent largely on location, topography and species present. Large soaring birds seem to be particularly vulnerable with research showing griffon vulture *Gyps fulvus*, golden eagle *Aquila chrysaetos* and red kite *Milvus milvus* to be at considerable risk. Weather conditions can affect collision likelihood, and the frequency of adverse conditions at sensitive times (e.g. during migration) may be influential. Wind farms in locations

intersecting flight routes between feeding and breeding or roosting locations can also significantly increase risk. Empirical evidence of flight avoidance responses to wind turbines remains sparse. Avoidance of entire wind farm areas has been observed by some species offshore. Habituation (or attraction) to the presence of wind turbines, if and where it occurs, may increase collision risk over time, if bird use of areas within the wind farm footprint increases.

Collision risk modelling

Assessment of impact on populations should always be the end objective of EIA with regards to birds – and over which geographic scale this should apply may be directed by legislation concerning designated sites and protected species (for example, Natura 2000 sites in the EU). Collision risk modelling provides a quantitative method of assessing collision effects, although uncertainty within the modelling framework needs to be accounted for (Vasilakis et al. 2016). The Band model (Band et al. 2007) is frequently used, but further models have been developed and are available to use. These models vary in their suitability for different situations and circumstances, due to the specific case or development they were designed for. Therefore it is important that the most appropriate model or method is used or adapted for the question at hand, and in some situations this may not always be the most frequently used model (Masden and Coe 2015). This is particularly important as all wind energy stakeholders (developers, consultants, regulators, advisers and conservation organisations) must have confidence in the methods used. Collision risk models can be used based on data collected pre- or post-construction. However, continued lack of comprehensive empirical data on avoidance rates still hampers unbiased assessment. The probability of weather events that change these avoidance rates is a key variable that needs to be considered. The use of matrices and models to help assess and predict disturbance impacts is evolving. Population models (including Population Viability Analysis) can be useful tools in aiding this analysis, although they are heavily dependent on the amount of demographic data available. This is likely to be a growing area of development in the coming years.

Displacement

Displacement of birds can occur during construction, operation and decommissioning of wind turbines, either due to the presence of the structures themselves and/or associated infrastructure or human activity associated with wind farms. The extent of any effects is variable between species and species groups, as is the degree of habituation (if any occurs). However, some generalisations are possible for some species groups. Displacement has potential impacts on breeding productivity and survival. The level of impact will depend on availability of unaffected habitat in the area or region. Long-term studies are still needed to gain a clearer perspective about the extent, duration and significance of displacement effects on birds.

Barrier Effects

Barrier effects can be caused by wind turbines disrupting links between feeding/roosting/nesting areas, or diverting flights, including migratory flights, around a wind farm. They have the potential to have fitness costs for individuals (with potential knock-on effects on breeding productivity, mortality and population size) and affect how birds use the landscape, as demonstrated by radar studies. Barrier effects are only likely to be significant for very large projects, or clusters of projects, or in situations where they cause disruption to daily flights, e.g. for breeding birds with high energy demands that cannot be compensated for.

Disturbance

Disturbance of birds can occur during construction, operation and decommissioning of wind turbines, either due to the presence of the structures themselves and/or associated infrastructure or human activity associated with wind farms. The extent of any effects is variable between species and species groups, as is the degree of habituation (if any occurs). In DIRECTIVE 2009/147/EC on the conservation of wild birds the term particularly applies on disturbances "[§ 5d] (...) during the period of breeding and rearing, in so far as disturbance would be significant having regard to (...) [§ 2] maintain the population of the species (...) at a level which corresponds in particular to ecological, scientific and cultural requirements."

Habitat Loss

Habitat loss from the turbine footprints is likely to be small, but can add up when associated road and grid infrastructure are included. This may be significant, particularly for large developments densely sited on sensitive or rare habitats, or where multiple projects affect the same habitat.

Indirect Effects

Indirect effects on birds may arise through effects on habitats and/or prey species. Effects on prey abundance and availability may be direct, or mediated via changes in habitats. This may increase or decrease habitat and food availability for some bird species and accordingly reduce or increase the magnitude of a particular risk (e.g. displacement or collision risk). The challenge is to assess these indirect effects along with the direct impacts and the difficulty lies in translating an effect, or cumulative effects, into their ultimate impacts. Other indirect effects can relate to increased accessibility of an area due to the road network constructed in wind farms.

Post construction monitoring

Post construction monitoring at wind farms needs to be able to show any short, medium and long-term effects from the project, and address all the relevant impacts identified in the EIA. These studies also need to be designed to evaluate the effectiveness of any mitigation measures and validate predicted impacts presented in the EIA. Displacement monitoring needs to incorporate pre-, during and post-construction surveys using comparable methods and with adequate statistical

'power' to be able to detect change. Mortality monitoring methods, analysis and technology have developed considerably in the last ten years, including the use of trained dogs and improved correction modelling.

Cumulative impacts

When undertaking assessments, 'significance' of impacts is a key consideration, with particular reference to population impacts at the appropriate spatial scale. Cumulative Impact Assessment (CIA) is an integral and important part of the EIA which is often overlooked or poorly implemented. As the industry develops further this will have a rising importance. Multiple small impacts to individual survival and productivity can have a profound impact on sensitive bird populations. CIA needs to include all relevant planned or existing projects that affect the bird populations in question and whose impacts have not been fully mitigated, in order to avoid problems of 'baseline creep' (where reductions in population levels due to previous projects are not taken into account and form the baseline population for subsequent EIAs, thereby ignoring cumulative impacts). Regulators need to be aware of and avoid the potential for 'salami slicing' whereby developers avoid EIA requirements by splitting large projects into smaller units to avoid screening thresholds.

Mitigation

There are a variety of mitigation measures that can be employed to reduce potential impacts on birds. These include micro-siting of individual turbines and infrastructure to avoid areas used by sensitive species, orientation of rows of turbines in parallel to common flight lines, undergrounding of associated power lines, or modifying turbine type and operation (such as increasing cut-in speeds or using radar/observer early-warning shut-down systems). Careful use of lighting and acoustic deterrence can modify bird behaviour around the wind farm, whilst implementation of management protocols and plans can reduce human disturbance during construction and operation. Finally site management plans can be used to modify habitats in and around the wind farm to reduce risks to birds, whilst enhancing their overall conservation value (cf. Marques et al. 2014; May et al. 2015).

Compensation

Provision of compensation should always be a last resort, where avoidance and mitigation cannot remove potential impacts. If it includes provision of new habitat this should be in place and working before the damage occurs, should be as close to the removed habitat as possible, and potentially be of a greater extent than that removed to take into account uncertainties over its utility. Collision mortality 'compensation' may include provision of measures elsewhere to increase populations of a species in a compensatory manner. Compensation for projects that affect Natura 2000 sites in the EU will only be allowable in very limited circumstances, defined by Article 6 of the Habitats Directive.

3.3. Methodological approach of the assessment

As a first step a scoping process is conducted to assess the size, scope, content, and availability of the available evidence. The scoping process also includes field trips to the study area in particularly relevant periods such as spring migration/breeding period, autumn migration and midwinter. The next step is the elaboration of a methodological protocol that elaborates the specific methodological details for the full assessment on the topic in a rigorous, transparent, and reproducible way. The protocol is essential to minimise bias that might result for instance from spontaneous methodological decisions made by the reviewer (CEE 2013). Here also the definitive scope of the assessment will be operationalized in collaboration with selected stakeholders in order to maximize relevance and targetedness.

The assessment is dealing with the syntheses of evidence for impacts of the wind farms on birds in the Kaliakra area. In doing so, the following kinds of impact are differentiated:

- collision,
- displacement,
- barrier effects,
- disturbance, and
- habitat change.

In detail, the questions are: (i) what is the impact on different taxa or guilds of birds, (ii) are there any differences of impact among different wind parks and wind turbines in the area (cf. Wang et al. 2015), (iii) and what is the effectiveness of mitigation measures applied and potentially available (Birdlife International 2013; Marques et al. 2014; May et al. 2015).

The components of the research question will have four definable elements, often referred to as the "PICO" or "PECO" (Population, Intervention/Exposure, Comparator, Outcome) elements (CEE 2013, 2018), which will be defined in the protocol of the assessment: (i) *Population (= unit of study, e.g. ecosystem, species):* Birds (other impacted organisms such as bats will not be considered); (ii) *Exposure (= proposed management regime to which the populations are exposed):* wind turbines and other infrastructure related to wind power generation in wind farms; (iii) *Comparator (= either a control with no intervention/exposure or an alternative intervention or a counterfactual scenario):* Before After Control Impact (BACI), pre-post-monitoring, treatment-control designs (Stewart et al. 2007); (iv) *Outcome (=all relevant outcomes from the proposed intervention that can be reliably measured):* change in abundance, change in fitness, change in space use.

The geographical focus is limited to the wind parks of the area of Kaliakra.

Development of inclusion criteria and search strategy

It is important to define the kinds of evidence (e.g. study content and designs) that will be considered valid to be included in the assessment (Stewart et al. 2007). Loss et al. (2013) for instance, excluded all studies that focused only on a particular bird group, sampled at fewer than three turbines or grouped turbine collisions with collisions from other objects, such as power lines and vehicles. Also the methods to be used for critical appraisal, data extraction and synthesis and to specify potential effect modifiers and reasons for heterogeneity in the literature need to be defined (CEE 2013).

The assessment relies on a comprehensive search of multiple information sources attempted to capture an un-biased sample of both published and grey literature, using terms and sources identified during scoping and tested for comprehensiveness using a sample of relevant known studies [9]. Evidence will be provided by (i) stakeholders (i.e. Bulgarian authorities, Bern Convention, operators, NGOs), (ii) by systematic searches in scientific and other databases and (iii) by dedicated specific websites (Table 2,3). The search strategy aims at balancing sensitivity (getting all information of relevance) and specificity (the proportion of detected articles that are relevant). In a first step, a high-sensitivity and low-specificity approach is necessary to capture all or most of the relevant articles available, to reduce bias, and to increase repeatability in capture. Thus, typically large numbers of articles are rejected (Stewart et al. 2007; Schindler et al. 2013b). During the test phase of the search strategy, a first idea of strength of the evidence base will be obtained (CEE 2013) and the search strength will be improved until it covers a sample of important studies. Search terms relating to both birds and wind energy were used to identify potentially relevant studies. Due to the different search functionalities of the sources used, the exact search strings to be deployed will vary across databases. Full details of each search string, including any wildcards, Boolean operators (e.g. AND or OR), nesting (brackets), phrase searching and limits used, will be provided in the final report.

Table 2. Potential search terms for the assessment. Columns are specifying categories and will be combined with Boolean operator "AND", rows under a column header are specifying alternative terms that will be combined with "OR". Full terms are presented for clarity purposes. The definitive search terms for the assessment will be defined after a scoping process and full terms will be replaced by wild card characters (e.g. "abundan*" instead of "abundance" and "abundant").

Population	Exposure	Outcome	Geography
Bird	wind power	Abundance	Bulgaria
Biodiversity	wind turbine	Richness	Pontic flyway
Avian	wind farm	Diversity	Via pontica
Raptor	Windfarm	Collision	Kaliakra
Stork	wind park	Survival	Balchik
Pelican	Windpark	Mortality	Kavarna
	wind energy	Fitness	

Table 3. Literature databases to be potentially searched, including scientific resources, subject specific resources and the internet.

Basic scientific resources	Internet	Subject specific resources
ISI Web of Knowledge	Google Scholar	http://www.aesgeoenergy.com/site/index.html
Scopus	Google (Top 100)	https://www.rspb.org.uk/our-work/our-positions-and-casework/casework/cases/kaliakra/
		http://bspb-redbreasts.org/en/Technical-reports-and-documents-related-to-the-project.html

3.4. Conducting the Assessment

The assessment follows largely CEE guidance and standards for reviews (CEE 2013). The process of article screening and selection will be thoroughly recorded. Designed spreadsheets will contain the original information of scrutinized studies such as location, subject, intervention/exposure, study design, outcomes, source of bias and conclusions. The critical appraisal of the primary studies (cf. CEE 2013) will specify study relevance for the research questions and study reliability in terms of selection bias, performance bias, and assessment bias (cf. Stewart et al. 2007; CEE 2013). For this purpose study characteristics such as temporal and spatial repetition, sampling method, intra-treatment variation, consistency and appropriateness of sampling, statistics, and result presentation will be assessed and specified (Stewart et al. 2005, 2007; Schindler et al. 2013a). To synthesize the evidence extracted from the primary literature, initially a narrative synthesis of the data will be elaborated, and extracted cases will be grouped into hierarchical categories for each sub-question. The exact categories will depend on the quality and type of data retrieved during the data extraction stage. We will also test for differences among taxonomic group, location of the wind farm (e.g. steppe habitat, agricultural habitat), turbine position, turbine design, time since wind farm commenced operation (cf. Stewart et al. 2007). Narrative and qualitative outcomes from all sub-questions and implications for mitigation measures and strategies will be discussed with the stakeholder group.

Aspects assessed in each document

Each document will be summarized in a fact sheet. In doing so, the following aspects will be described:

Bibliography:

Authors, Title, Publication year, requester

Methodology:

Type of assessment: Pre-construction, post-construction

Covered impacts: collision, barrier effect, habitat, displacement, disturbance

Temporal coverage: years covered, spring migration, autumn migration, breeding populations, wintering populations

Spatial coverage: macroscale (flyways), mesoscale (area in and around the wind parks), windpark scale (which wind parks are considered (AES, EVN, Mitsubishi, others), microscale (e.g. avoidance behaviour at specific turbines)

Mitigation measures: radar etc.

Results:

Significance of impacts: collision, barrier effect, habitat, displacement, disturbance

Study quality

Overall relevance

4. References

AWEA (2014) US Wind Industry Fourth Quarter 2014 Market Report. American Wind Energy Association

Band, W., Madders, M., Whitfield, D.P., 2007. Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas M, Janss FEG, Ferrer M (Eds), Birds and Wind Farms Risk Assessment and Mitigation. Quercus, Madrid, pp 259–275.

Bastos R, Pinhanços A et al. (2015) Evaluating the regional cumulative impact of wind farms on birds: how can spatially explicit dynamic modelling improve impact assessments and monitoring? J Appl Ecol, in press. DOI: 10.1111/1365-2664.12451

BirdLife International (2013) Wind Farms and Birds: an updated analysis of the effects of wind farms on birds, and best practice guidance on integrated planning and impact assessment. Bern Convention, Strasbourg

CEE (Collaboration for Environmental Evidence) (2013) Guidelines for Systematic Review and Evidence Synthesis in Environmental Management. Version 4.2. Environmental Evidence: www.environmentalevidence.org/Authors.htm/Guidelines 4.2.pdf

CEE (Collaboration for Environmental Evidence) (2018) Guidelines and Standards for Evidence synthesis in Environmental Management. Version 5.0 (AS Pullin, GK Frampton, B Livoreil & G Petrokofsky, Eds) www.environmentalevidence.org/information-for-authors. [accessed July 2019]

Cook, A. S. C. P., Ross-Smith, V. H., Roos, S., Burton, N. H. K., Beale, N., Coleman, C., Daniel, H., Fitzpatrick, S., Rankin, E., Norman, K. & Martin, G. (2011) Identifying a Range of Options to Prevent or Reduce Avian Collision with Offshore Wind Farms using a UK-Based Case Study. BTO Research Report no. 580. The British Trust for Ornithology, AEA Group, the Met Office and the University of Birmingham Centre for Ornithology under contract to the Department of Environment, Food and Rural Affairs (DEFRA). Thetford, UK.

de Lucas, M., Ferrer, M., Bechard, M. J. & Munoz, A. R. (2012) Griffon vulture mortality at wind farms in southern Spain: Distribution of fatalities and active mitigation measures. Biological Conservation, 147: 184-189.

EWEA (2015) Wind in power. 2014 European Statistics. Brussels: European Wind Energy Association.

Gove, B., Langston, R. H. W., McCluskie, A., Pullan, J. D., & Scrase, I. (2013). Wind farms and birds: an updated analysis of the effects of wind farms on birds, and best practice guidance on integrated planning and impact assessment. RSPB/BirdLife in the UK. Technical document T-PVS/Inf, 15.

Haddaway NR (2015) A call for better reporting of conservation research data for use in meta-analyses. Cons Biol 29:1242-1245

Hayes, G., Gove, B., & Whitaker, S. (2015): Avoiding ecological 'constraints' in wind energy. 'IAIA15 Conference Proceedings' Impact Assessment in the Digital Era. 35th Annual Conference of the International Association for Impact Assessment 20 - 23 April 2015. Firenze Fiera Congress & Exhibition Center. Florence, Italy.

Loss SR, Will T, Marra PP (2013) Estimates of bird collision mortality at wind facilities in the contiguous United States. Biol Cons 168:201-209

Marques AT, Batalha H et al (2014). Understanding bird collisions at wind farms: An updated review on the causes and possible mitigation strategies. Biol Cons 179:40-52

Masden EA. & Cook ASCP (2016) Avian collision risk models for wind energy impact assessments. Environmental Impact Assessment Review 56:43-49.

Masden EA, Fox AD et al (2010) Cumulative impact assessments and bird/wind farm interactions: developing a conceptual framework. Environ Impact Assess Rev 30:1-7

May R, Reitan O et al (2015) Mitigating wind-turbine induced avian mortality: Sensory, aerodynamic and cognitive constraints and options. Renew Sust Energy Rev 42:170-181

Meller L, Thuiller W et al (2015) Balance between climate change mitigation benefits and land use impacts of bioenergy: conservation implications for European birds. GCB Bioenergy 7:741-751

Ministry of Economy, Energy and Tourism (2011). National Renewable Energy Action Plan. 229 pp. http://pvtrin.eu/assets/media/PDF/EU_POLICIES/National%20Renewable%20Energy%20Action%20Plan/203.pdf

Perrings C, Duraiappah A et al (2011). The biodiversity and ecosystem services science-policy interface. Science 331:1139-1140

Pritchard, D. [BC Committee appointed expert] (2018). Council of Europe: Convention on the Conservation of European Wildlife and natural Habitats, Standing Committee, T-PSV/Files(2018)25, 4 September 2018: Wind farms in Balchik and Kaliakra –Via Pontica (Bulgaria) Report of the on-the-spot appraisal (15-16 May 2018)

Pogson M et al (2013) How does bioenergy compare with other land-based renewable energy sources globally? GCB Bioenergy 5:513-524

Pouzols M, Toivonen T et al (2014) Global protected area expansion is compromised by projected landuse and parochialism. Nature 516:383-86

Pullin AS, Frampton G, Görg C et al (2016) Diversity of methodological approaches to knowledge synthesis to address different types of questions on biodiversity and ecosystem services. Biodiversity and Conservation 25(7), 1285-1300

Pullin AS, Knight TM, Watkinson AR (2009) Linking reductionist science and holistic policy using systematic reviews: Unpacking environmental policy questions to construct an evidence-based framework. J Appl Ecol 46:970-975

Ronconi, R. A., St Clair, C. C., O'Hara, P. D., Burger, A. E., Day, R. H. & Cooper, B. A. (2004) Waterbird deterrence at oil spills and other hazardous sites: potential applications of a radar-activated on-demand deterrence system. Marine Ornithology, 32: 25-33.

Schindler S, Kropik M et al (2013a) Floodplain management in temperate regions: Is multifunctionality enhancing biodiversity? Env Evid 2:10

Schindler S, Livoreil B et al (2013b) Final knowledge assessment reports of the 3 case studies and lessons learned. Deliverable 3.1 of the EU-FP7-project KNEU, contract No.265299. http://biodiversityknowledge.eu/documents?layout=edit&id=88

Smallwood, K. S. & Thelander, C. G. (2008) Bird mortality in the Altamont Pass Wind Resource Area, California. Journal of Wildlife Management, 72(1): 215-223.

Smallwood, K. S., Thelander, C. G., Morrison, M. L. & Rugge, L. M. (2007) Burrowing owl mortality in the Altamont Pass Wind Resource Area. Journal of Wildlife Management, 71: 1513-1524.

Stewart GB, Pullin AS, Coles CF (2005) Effects of wind turbines on birds. CEE protocol 04-002. (SR4). Collaboration for Environmental Evidence: http://www.environmentalevidence.org/completed-reviews/effects-of-wind-turbines-on-bird-abundance

Stewart GB, Pullin AS, Coles CF (2007) Poor evidence-base for assessments of windfarm impacts on birds. Environ Cons 34:1-11

Sutherland WJ, Pullin AS et al (2004) The need for evidence-based conservation. TREE 19:305-308

The Cochrane Collaboration (2013) History. Available from https://www.cochrane.org/about-us (accessed July 2019)

Tomé, R., Canário, F., Leitão, A. H., Pires, N., & Repas, M. (2017). Radar assisted shutdown on demand ensures zero soaring bird mortality at a wind farm located in a migratory flyway. In Wind Energy and Wildlife Interactions (pp. 119-133). Springer, Cham.

Vasilakis DP, Whitfield PD, Schindler S, Poirazidis KS, Kati V (2016) Reconciling endangered species conservation with wind farm development: cinereous vultures (*Aegypius monachus*) in south-eastern Europe. Biological Conservation 196, 10-17

Wang S, Wang S, Smith P (2015). Ecological impacts of wind farms on birds: Questions, hypotheses, and research needs. Renewable and Sustainable Energy Reviews 44:599-607