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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

30th meeting
Strasbourg, 6-9 December 2010

**Implementation of Recommendation No. 110/2004
on minimising adverse effects of above-ground electricity
transmission facilities (power lines) on birds**

REPORT BY THE NGOS

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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

29th meeting
Bern, 23-26 November 2009

**Follow-up of Recommendation No. 110 (2004) on
minimising adverse effects of above-ground electricity
transmission facilities (power lines) on birds**

REPORT BY THE NGO

Document prepared by

Mr Bernd Schuerenberg, Mr Richard Schneider, Mr Hans Jerrentrup

**Recommendation No. 110 (2004)
“Protecting Birds from Power Lines”**

**Progress achieved and status of implementation since 2004
&
Recommended steps forward**

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TABLE OF CONTENTS:

Literature

1. Introduction

- 1.1 Recommendation No. 110 (2004)
- 1.2 Scope of this report
- 1.3 Summary

2. Recommendation No. 110 (2004) - a concretisation to existing EU directives

3. Status and progress achieved in the different member states

- 3.1 General and questionnaire
- 3.2 Situation and status in the different member states

4. Summary of the findings and conclusions

- 4.1 Information and experience exchange
- 4.2 Time span from first steps to completion
- 4.3 The urgency for bird-safe pylon configurations for new power lines
- 4.4 Earth cabling
- 4.5 Maturity of technical standards
- 4.6 Trans-national review of technical standards
- 4.7 Technical standards for wooden power poles
- 4.8 Retrofitting of existing dangerous pylons
- 4.9 Completion dates for retrofitting of existing dangerous pylons
- 4.10 Pin-type insulators forever?
- 4.11 Multi-national working groups / task force
- 4.12 Needed research and dissemination of results
- 4.13 “Low risk countries”
- 4.14 Development of bird-safety products
- 4.15 Possibilities opening up by the INTERREG Ivc program
- 4.16 Transition and Consolidation Phase

5. Recommended steps forward

ANNEX:

- A.1 Germany
- A.2 France
- A.3 Spain
- A.4 Portugal
- A.5 Italy
- A.6 Switzerland
- A.7 Austria
- A.8 Hungary
- A.9 Czech Republic
- A.10 Slovak Republic
- A.11 Belgium
- A.12 Netherlands
- A.13 United Kingdom and Ireland
- A.14 Denmark
- A.15 Norway
- A.16 Sweden
- A.17 Finland
- A.18 Poland
- A.19 Baltic States
- A.20 Greece
- A.21 Balkan States
- A.22 Bulgaria
- A.23 Rumania
- A.24 Iceland
- A.25 Ukraine
- A.26 Kazakhstan

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1. INTRODUCTION AND SUMMARY

The feature story “Price of power” by J. Lowen (2008), which can be found on the internet site of BirdLife (www.birdlife.org), provides a good introduction to the world-wide problem of electrocution and collision with power lines, and to the urgency of political and technical effort, in order to reduce and eliminate these major mortality factors for birds.

In 2002, a short information booklet was written by HAAS & NIPKOW for the Convention of Migratory Species (CMS). In the meantime, this booklet, which informs about electrocution of birds on medium-tension power lines and about the suggested practices for bird safety, is available in six languages. It is part of Resolution 7.4 (*Electrocution of Migratory Birds*) adopted by the Bonn Convention (CMS) in 2002.

This subject received a more thorough treatment in the BirdLife report prepared in 2003 for the Bern Convention: HAAS, D., NIPKOW, M., FIEDLER, G., SCHNEIDER, R., HAAS, W., SCHUERENBERG, B.: *Protecting Birds from Power Lines - a practical guide to minimising the risks to birds from electricity transmission facilities*; Nature and Environment No. 140, Council of Europe Publishing (2005), 60 pages. It familiarises the reader with the problems of electrocution and collision, with habitat impacts, and with the state-of-the-art of mitigation methods for bird safety on dangerous power poles. Based on this report, the Bureau of the Bern Convention formulated Recommendation No. 110 (2004): *Protecting Birds from Power Lines*, which was adopted in 2004.

The present report is an input for the 2009 session of the Bern Convention. It covers only the aspect of “electrocution” and analyses the status and the progress achieved in the different member states / contracting parties to the Bern Convention in the last five years since Recommendation No. 110 (2004) had been adopted and issued. This report has been slightly updated for the 2010 session.

1.1 Recommendation No. 110 (2004)

The relevant sections of Recommendation No. 110 (2004) concerning “electrocution” are repeated below:

Recommendation No. 110 (adopted on 3 December 2004) on minimizing adverse effects of above-ground electricity transmission facilities (power lines) on birds:

.....

.....

Recognising the importance of maintaining energy supplies and for actions taken to protect birds to be proportionate in terms of cost and to avoid reduction in overall level of safety of transmission lines or in stability of supply;

Referring to the information presented in the report T-PVS/Inf (2003) 15: *Protecting Birds from Power Lines - a practical guide to minimising the risks to birds from electricity transmission facilities*,.... informing of the negative impact on many species of wild bird (including migratory species) across Europe and the world, from electricity transmission lines, conductors and towers (including those associated with the railways infrastructure) through increased mortality due to electrocution,

Concerned that a significant number of bird species suffering from electricity transmission facilities are listed in Annex II to the Convention, and that the threat is increasing due to the continuing construction of dangerous electricity transmission facilities;

Concerned particularly that, without action to minimize threats to birds from electricity transmission facilities, many populations and potentially (threatened) species, including globally threatened species such as *Aquila adalberti* may be severely affected;

Recognising that, especially in arid zones, electrocution of birds on transmission lines can cause disastrous forest fires affecting both wildlife and people and for which electric utility companies can expect to be made liable;

Aware that technical solutions are available to eliminate or to reduce transmission line electrocution

(.....) risk posed to birds and that such solutions which are safer for birds also correspond to a better energy supply and therefore are an advantage to supplying companies; most existing facilities do not incorporate such solutions;

Desiring to raise awareness among the public, developers and decision-makers of the serious, widespread risks posed to birds by power lines and that these can readily be minimised;

Recommends that the Contracting Parties to the Convention:

1. take appropriate cost-effective measures to reduce bird mortality from electric transmission facilities taking into account Resolution 7.4 of the Seventh meeting of the Parties of the CMS, applying those cautions to cases where non-migratory species may be affected;
2. apply as far as possible the measures for bird safety suggested in the report mentioned in the *consideranda* above, and in particular those suggested in the enclosed Appendix 1, taking into account that, to ensure appropriately located and safe constructions, the following measures need to be considered:

To avoid electrocution

- a) banning of the most dangerous types of pole
- b) use of state-of-the-art recommended technical standards for bird safety for new and retrofitted facilities

.....

3. consider replacing underground overhead power lines in areas of exceptional high interest for birds, particularly in protected areas and in areas designated for Natura 2000 and Emerald Networks for their bird interest.
4. systematically collect information with respect to (collisions and) electrocutions on electricity transmission lines;
5. communicate to the Standing Committee the relevant steps that have been adopted or envisaged concerning the implementation of this recommendation as well as on the outcome of measures adopted;

.....

Examples of measures that may be considered as appropriate for minimising the negative impacts on birds of electricity transmission facilities are listed for implementation by Contracting Parties. Additional standards, including stricter standards, may be adopted by Contracting Parties. The design and route of electricity transmission lines is critically important to avoiding deleterious impacts on birds.

In considering these examples of possible bird mitigation measures, it is recognised that the electricity industries in Contracting Parties will necessarily have to work at actions that might be taken to protect birds in a wider context. This includes cost, stability of supply and overall safety of transmission lines.

A. Criteria for Environmental Assessment

.....

B. Precautions for route selection for electricity transmission lines

.....

C. Technical Standards to protect birds from electrocution

Newly erected power poles and technical hardware should be constructed to exclude the possibility of bird electrocution. Cross-arms, insulators and other parts of medium voltage (1 kV – 60 kV) power lines should be constructed so that birds are not able to perch near energised

power lines that may be hazardous.

Mitigation measures should be undertaken on existing power poles and technical hardware in the medium voltage range in locations of particular importance for birds.

Power poles for medium voltage (1 kV – 60 kV) should reflect the state-of-the-art in design for bird safety and should follow the detailed design guidelines and criteria described in the catalogue “Vogelschutz an Freileitungen”, VDEW-Verlag, 2nd edition, 1991 (comments on section 8.10 *Bird Protection* of German Industry Norm VDE 0210/12.85).

The following describes the most widely used types of power poles worldwide, their potential risk and steps towards mitigation. Recommendations are made for power poles made of concrete, steel, composite steel and wood. This report is based on standards set up by the (German) VDEW (1991) as well as studies carried out by the NABU National Working Group on Electrocutation (2002).

{in the following, the suggested practices for bird safety are presented; this is not repeated}

D. Priorities for research to enable impacts of electricity transmission lines to be minimised

- (a) Research and monitoring should be implemented by national governments and the energy utility companies, in consultation with relevant experts, to improve our understanding of the impacts of electricity transmission installations. This will be an iterative process that will inform decision-making, appropriate route selection and design of installations. The result of research should be published in international scientific journals, including a summary, preferably in English, to ensure wider dissemination including to electro-engineering periodicals.
- (b) Research and monitoring requirements should encompass the following:
 - i effects and potential population level impacts on birds of electrocution,
 - ii effectiveness of different designs of installation at minimising bird mortality, while taking account of their cost effectiveness, including durability.
- (c) There need to be incentives to ongoing technological development of electricity transmission installations which minimise impacts on birds e.g. while being durable
- (d) A useful subject for further study is to look in detail at individual case studies to evaluate examples of conflict resolution, case law, or trends in casework throughout the Council of Europe area.

Notes and comments by the authors to Recommendation No. 110 (2004):

1. In Recommendation No. 110 (2004), bird safety on railway supply lines is expressly included. In Germany, the railways had been completely exempted in § 53 German Nature Conservation Law (2002) from any bird safety requirements. The new German Nature Conservation Law has corrected this flaw, and only existing railway lines are exempted. Deutsche Bahn have developed their technical guidelines, including mitigation methods for existing lines in priority zones.
2. Recommendation No. 110 (2004) is closely associated with the Birds Directive (1979), which is potent community law. In the opinion of W. BREUER (ref. [2-2]), Recommendation No. 110 (2004) is a concretisation, where the Birds Directive applies (see chapter 2, below). In other words, Resolution No. 110 (2004) has already some legal status! This is in contrast with some cautious wording in Recommendation No. 110 (2004).
3. For new power lines, there must be a change-over to bird-safe power pole configurations, or to under-ground cables, in order to comply with community law. This step is unavoidable. Recommendation No. 110 (2004) demands the ban of the most dangerous types of power poles,

but does not set any target dates, when the ban must be in effect. The lack of such target dates is an open invitation to ignore or to de-prioritise Recommendation No. 110 (2004).

4. The same applies for the mitigation measures on the large numbers of existing, dangerous power poles. If there are no proportionate target dates, this is an open invitation to ignore Recommendation No. 110 (2004) or to under-perform. It is always better to define clear target dates and / or a set of well-defined milestones, which can be relaxed in justifiable cases.
5. Does it help the electricity companies, if Recommendation No. 110 (2004) is formulated too cautiously? The authors of the present report doubt that, because clear requirements and clear completion dates, respectively a set of well-defined milestones, are essential for any major industrial project. They are prerequisite for good industrial planning and efficient strategies. E.g. in the end, the lack of demanding milestones is counter-productive. Improving bird safety on existing dangerous power poles is a major industrial project - even a multi-national industrial project with many actors involved!
6. Point 4 of Recommendation No. 110 (2004) concerns the systematic collection of information on electrocution cases. With a few positive exceptions, this part of the recommendation has failed, because no one was made responsible, and because no resources were allocated to do so in a professional manner.
7. Point 5 of Recommendation No. 110 (2004) concerns the reporting of progress and experience gained with bird safety measures. The present report was written to underline the importance of such progress reporting.

In the past 5 years, no official feed-back has reached the initiators of Recommendation No. 110 (2004). For reasons of cohesion and common progress, reporting requirements must be taken serious and clearly defined reporting milestones (e.g. every two years, and upon completion of important steps) must be imposed. Such reporting discipline is extremely beneficial for all involved parties.

1.2 Scope of this report

This report only deals with “electrocution on power poles”, without implying that “collision with overhead conductor wires” is a minor problem. The reason for doing so is given below:

“Electrocution” is a problem, which can and must be resolved by:

- proven bird-safe designs /configurations of all new medium-tension power poles
- proven and technically mature mitigation methods to be applied to existing dangerous power poles.

In other words, typical industrial processes are involved:

- development processes, which shall lead to proven and mature solutions and products, and also to mature and recognised technical standards. Once the solutions and products have been developed and approved, they are ready for large scale use.
- an implementation process, which includes the planning and the logistics of implementing the bird safety measures on large scale.

From ornithological side, research is needed to monitor the effectiveness of the various bird safety measures, and to monitor the effectiveness of new, bird-safe power pole configurations. Existing expertise must be maintained, held up-to-date, and extended.

“Collision”, on the other hand, is not limited to medium-tension power lines, and bird safety against collision involves quite different disciplines, such as good planning and environmental impact assessment, taking into account local and regional flight movements, flyways, and geo-morphological situations and effects. These findings will lead to decisions, such as under-ground cables vs. over-head power lines, best routing, best suited tower constructions, necessary marker system to be attached to the over-ground conductor wires. - This is distinctly different from developing and introducing good technical solutions and bird-safety products to be implemented in large numbers. For the problem of

collision, a different set of specialists is involved. More and sometimes very demanding case-by-case research is involved.

In the presented report dealing only with electrocution, the following topics are addressed:

1. Status and maturity of the mitigation methods (see legend to Figure 1.2-1, below)
2. Have all dangerous pole / cross-arm configurations been correctly recognised? (see legend to Figure 1.2-2, below)
3. Status of bird safety (with respect to electrocution) in the different member and observer states.
4. cross-border and trans-national exchange of information and experience between different utilities, and between utilities and NGOs
5. Status of ornithological research with respect to electrocution in the different member states
6. What can be done, in order to overcome start-up difficulties in some member states? What can be done, in order to improve progress in the different member states?

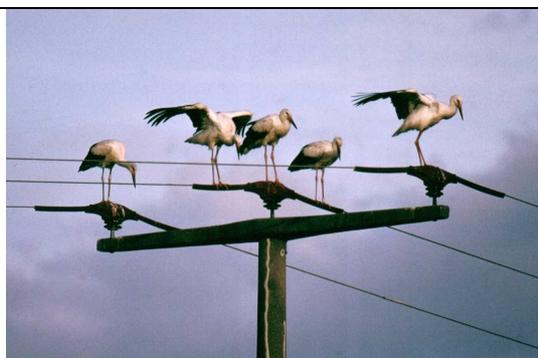


Fig. 1.2-1: Insulating hoods for upright (pin-type) insulators - a success story in Germany (photo: Walter Feld)

Legend: In Germany, insulating hoods for pin-type insulators are the most important and most effective mitigation method. These hoods are an unmatched solution for the most dangerous “killer poles” – those with upright insulators. Bird losses on such protected power poles are extreme exceptions. Insulating hoods were first introduced in 1986 and have been technically improved since. The performance of some products promises a life-time well in excess of 30 years.

In the last years, some German utilities have quietly decided to change over to perches of various designs, instead of insulating hoods. Perches above the cross-arms are considered inferior to insulating hoods. The different designs of the perches have neither been reviewed, nor approved by experts.

Despite the excellent bird safety offered by insulating hoods, the utilities apparently had second thoughts after the hoods had been introduced so successfully. They seem to be the following:

- cost reasons;
- the pin-type insulators + cable sections at the pole cannot be inspected from helicopter, if covered by hoods;
- the clamping system is suspected by some utilities to damage the cables, not so by others;
- some utilities claim that dust, insect droppings, etc. accumulate on the pin-type insulators, if they are covered with hoods and not exposed to rain; other utilities have not confirmed this.

Because possible negative effects of hoods were never discussed openly with the experts of the NGOs, the authors recommended to the German Ministry for the Environment to request from the utilities an official and thorough **Technical Assessment and Experience Report** of the insulating hoods - a report covering all pros and cons. Also aspects of power line maintenance, such as inspection cycles, replacement cycles etc. must be taken into consideration.

This example illustrates, that bird-safety products and their technical optimisation need to be followed up closely - even 24 years after their first introduction in 1986.



Fig. 1.2-2: Steel grid pylons with double (redundant) strain-type (horizontal) insulators, in Germany commonly in use. They are grossly underestimated “killer poles”. (photo: Haeusler)

Legend: In Germany, this configuration is quite often used for end poles, junction poles, corner poles, and for traffic safety reason, when roads are crossed. In the past, the electrocution risk posed by this configuration was grossly underestimated. However, with the recovery of the populations of the White and Black Stork, Eagle Owl and White-tailed Eagle in Germany, it became apparent that this configuration is a real killer.

Not until mid-2004, it became apparent by careful analysis of electrocution cases, that the U-shaped metal piece, which connects the insulator ends and the conductor wire on the high-voltage side, is large enough for White Storks, Black Storks, Eagle Owls, Red Kites, etc. to land on. From this location, grounded elements are in close reach - in particular if the strain-type insulators are too short, as in fig. 1.2-2.

Up to now, no convincing mitigation methods have yet been found for this power pole configuration. In Germany, this type of power pole is still being erected in significant numbers, although its high level of risk is known and despite of §53 German Nature Conservation Law.

To their great surprise, the authors had to learn that the French energy distribution company ERDF can completely do without double (redundant) strain-type insulators, by applying a different engineering concept to their power lines, which ensures equivalent traffic safety. Also in Spain, the authors have not seen this type of power pole configuration.

This example is suited to illustrate the following:

- that careful examination of each possible electrocution case, including a careful pathological examination of the recovered corpses, is of major importance in order to reconstruct the cause of the accident. There is still a continuing need for such research. If there had been adequate funding for these activities, the problem of the redundant strain-type insulator configurations could have been recognised some 15 years earlier. Instead, large numbers of power poles with this dangerous insulator configuration have been erected since - and are still being erected.
- that cross-border information exchange is still minimal and must be improved
- that some engineering effort must be invested by the utilities, in order to find acceptable bird-safe design solutions, and / or validated mitigation methods for this construction.

1.3 Summary

In this report, the following aspects relating to “electrocution on medium-tension power poles” are covered:

Chapter 2 This chapter addresses legal aspects. With respect to the electrocution problem, Recommendation No. 110 (2004) is seen by some legal experts as a special concretisation to the Birds Directive (1979). This should provide sufficient legal leverage for this cause.

Chapter 3 The awareness of the electrocution problem, status and progress achieved since December 2004 in the different member states are compiled. Interviews were made with representatives of the different national NGOs, or the information is based on literature and other sources. Some government reports were already available and were used. All information, obtained about the different countries, is compiled in the ANNEX section. The objective of the ANNEX is to gather and compile enough information, in order to draw conclusions and to elaborate recommended steps forward.

Chapter 4 Conclusions and findings from chapter 3 and the ANNEX section are presented, and serve as input to Chapter 5.

Chapter 5 Necessary steps forward are identified and elaborated. A main concern is how to initiate and to manage a successful and efficient start-up in a number of member states.

2. RECOMMENDATION NO. 110 (2004) - A CONCRETISATION TO EXISTING EU DIRECTIVES

With respect to the electrocution problem on medium-tension power poles, Recommendation No. 110 (2004) outlines what needs to be done, in order to minimise the risk of electrocution:

- the most dangerous types of power poles shall be banned, or positively expressed: new power poles shall be bird-safe by design
- existing (and new) dangerous power poles shall be made bird-safe or retrofitted according to recommended mitigation methods.

Dangerous power pole configurations of medium-tension power lines are a major threat to quite a large number of species of large birds, including a significant number of protected and endangered species.

In France, the Ligue pour la Prot ection des Oiseaux (LPO-BirdLife France) has on several occasions appealed to the European Commission, because of menacingly high numbers of casualties suffered by endangered species of raptors. This was an important reason for Electricit  de France (EDF) to seriously seek progress in bird safety.

With respect to electrocution, Recommendation No. 110 (2004) is closely linked with the Birds Directive 79/409/EC, issued on 02 April 1979. W. BREUER (2008) (ref. [2-2]) came to the conclusion, that Recommendation No. 110 (2004) must be seen as a special concretisation to the Birds Directive. W.BREUER further mentions a ruling of the European Court concerning Article 5 of the Birds Directive (ref. C-103/00, dated 30.01.2002). According to this ruling, "intentional killing" and knowingly accepting that birds get killed are seen as the same offence against Article 5 of the Birds Directive. This legal aspect needs to be followed up and confirmed.

The above clarifies, that with respect to electrocution Recommendation No. 110 (2004) is more than just a "recommendation". It is more or less existing community law to be followed up more vigorously!

The following are interesting aspects:

- The German railways still use over-head power lines and catenary systems, which are dangerous by design. Alternatives, which are bird-safe, exist at no or negligible extra cost (ref. SCHNEIDER, H. (2008)). In this case, "intentional killing" in the sense of the above court ruling applies. *)

*) In August 2009, §53 German Nature Conservation Law was improved. New railway lines are no longer exempted.

- If the introduction of new bird-safe power pole configurations is unduly delayed beyond a commensurate period, “intentional killing” in the sense of the above court ruling may apply.
- Also for the mitigation of existing dangerous power poles, one may speak of “intentional killing” in the sense of the above court ruling, if there is no commensurate progress in bird-safety. Because in some countries, the number of dangerous power poles is discouragingly high, proportionate, intermediate progress must be the criteria.

Unfortunately, Recommendation No. 110 (2004) does not defined any reasonable completion dates or milestones (= intermediate completion dates) to be achieved. Now, six years after Recommendation No. 110 (2004) was adopted by the Standing Committee, this short-coming should be corrected. Today, there is sufficient experience, in order to define useful and proportionate milestones.

It is always beneficial, when the legal aspects are clarified and the rules are known. This clearly strengthens the position of the national and regional authorities in charge.

But beyond legal aspects, there are other issues which must also be addressed. Everybody is aware, that the change-over to new, bird-safe power pole configurations can be associated with considerable start-up problems in a number of member states. Rather than threatening legal action, the magnitude of these problems should be taken serious. The authors of this report see the following possibilities to overcome the initial problems:

- (a) A Community-wide project should be planned and implemented, which allows all member states to participate, to contribute and to benefit from know-how and experience.
- (b) The European infrastructure funds for the improvement of the power distribution infrastructure should serve as vehicle to introduce new, bird-safe power pole configurations. Else, the infrastructure programs are in open conflict with the Birds Directive - an absolutely non-acceptable situation.

It can already be anticipated, that quite soon a stage will be reached, when the Bureau of the Bern Convention can no longer coordinate all activities needed towards the implementation of Recommendation No. 110 (2004). At some stage, most responsibility must be transferred to another body within the European Commission, which is endowed with more resources and personnel - for the authors a regrettable, but eventually unavoidable step.

Before this point, is reached, the Bern Convention should give more punch to Recommendation No. 110 (2004). This can be achieved with the following:

1. officially clarify the legal status of Recommendation No. 110 (2004) in relation to existing Community Law, such as Birds Directive, Fauna-Flora-Habitat Directive, etc.
2. review the feed-back from the different member states, and establish with the support of experts realistic sets of milestones for the different member states. These should be negotiated at the 2010 session of the Standing Committee. Milestones can be for example:
 - agreement on bird-safe power pole configurations to be used on new power lines
 - agreement on technical standards for mitigation methods to be used on existing power lines.
 - Agreement on criteria, where ground cables are mandatory
 - completion of bird-safety measures in protected areas,
 - etc.
3. Reach agreement within the EU, that the infrastructure programs shall not finance dangerous medium-tension power lines.

And beyond this, the following should be encouraged and supported:

4. cross-border and trans-national working groups of NGOs + utilities, in order to improve communication, and the exchange of know-how and experience.

5. definition and preparation of European projects, that aim to support and to coordinate the introduction of bird-safety in a larger number of member states (e.g. via an INTERREG IV C project - see outlines given at the end of Chapter 4).

3. STATUS AND PROGRESS ACHIEVED IN THE DIFFERENT MEMBER STATES

3.1 General

In the following section 3.2, respectively in the ANNEX section, the situation and the status of bird safety in a number of member states /contracting parties to the Bern Convention is analysed and described, as seen from NGO side. Section 3.2 was written with best knowledge and with the purpose to illustrate and to identify the need for further action and decisions.

The topics addressed in section 3.2 comprise the following:

- awareness of the electrocution problem
- awareness of Recommendation No. 110 (2004) (at NGOs, governmental agencies, utilities)
- actions in response to the requirements of Recommendation No. 110 (2004) (risk assessment, bird-safety implementation planning, legislative / administrative steps forward; etc.)
- status of the respective national legislation and technical standards
- status of scientific work and research related to bird-safety (existing, on-going, still necessary)
- communication and co-operation (information exchange between NGOs, utilities, governmental agencies; national working groups; cross-border information exchange; meetings and seminars)
- Reporting and documentation (documentation of electrocution cases; publishing of the results of investigations; technical evaluation and experience reports on different bird-safety materials; etc.)

Much useful information had already been compiled in the richly illustrated book HAAS & SCHUERENBERG (Hg.): *Stromtod von Voegeln* (Electrocution of Birds), 2008, 300 pages. This book is a comprehensive compendium, that covers the various aspects associated with the electrocution problem:

1. Legislation and International Agreements
2. A close look at bird-safety (state-of-knowledge with respect to current technical solutions and pole configurations)
3. Field research and implementation of bird-safety (in Germany)
4. Research and special phenomena
5. Exemptions for the German railways (the wrong philosophy of the German railways)
6. Bird-safety international
7. Bird-losses due to collision (three contributions).

Because this book had to be financed privately, it is available only in German. Unfortunately, there is no book currently available in English, which covers the electrocution problem and its associated aspects with comparable authority and thoroughness.

Such basic publications are extremely important and must receive better public support, as stipulated in section D of Recommendation No. 110 (2004).

In chapter 4, some findings derived from the ANNEX section are presented, in order to establish, what needs to be done, which steps can and need to be taken. The recommended steps forward are in chapter 5.

3.2 Situation and status in the different member states

In the ANNEX, we have compiled all accessible information from the various Contracting Parties and observer states. From the start, the ANNEX section was conceived as a living document. It shall be updated regularly and whenever new information becomes available.

The information given in the different sections of the ANNEX are not intended to contradict official statements. The ANNEX shall be seen as an independent and complementary assessment.

The ANNEX starts with Germany for simple reasons: (1) the authors are most familiar with the situation and status in Germany, and (2) important initiatives originated in Germany (CMS resolution 7.4; § 53 German Nature Conservation Law, VDEW-Catalogue of Mitigation Methods; Recommendation no. 110 (2004) of the Bern Convention). All of them proved extremely important.

4. SUMMARY OF THE FINDINGS AND CONCLUSIONS

In the current issue of our report, not all member states could be covered yet or dealt with in full depth in the ANNEX. This will successively change with each update of this report.

The purpose of the ANNEX section was not completeness (although this would have been desirable), but to gather enough information in order to draw conclusions and to elaborate recommendations and necessary steps forward.

4.1 Information and experience exchange

There is one finding, which we want to flag up with urgency: the information exchange between the different countries must be improved significantly.

As an example, we were shocked about how little is known in Germany about the French bird safety activities, and vice versa, despite direct neighbourhood!

Technical standards have been established in France, Czech Republik, Slovakia, etc.; technical standards are under critical update in Germany, and the same takes also place in Hungary. But there has been no cross-border or trans-national exchange of information and peer reviews, which are an important give and take.

The publications to the CMS resolution 7.4 (2002) (ref. [1-4]) and to Recommendation No. 110 (2004) of the Bern Convention (ref. [1-3]) are the only common link, up to now. This underlines the importance of such publications, but there is significantly more experience and technical know-how, which is not contained in these two publications.

4.2 Time span from first steps to completion

The time span needed from first steps up to the end of bird-safety implementation is like a long and exhausting marathon. The following estimates are given to illustrate this statement:

Germany	~ 40 years
France	~ 40 years
Hungary	> 40 years
Spain	> 40 years

If start-up problems can be avoided; if experience is shared; if the implementation is run and managed like a well-organised industrial project, the time span could be cut to approximately 25 (- 30) years - this is still a very sobering fact to be kept in mind.

For this reason, we have to press hard, that at least all new medium-tension power lines use only bird-safe power poles, or are buried under-ground, and will not aggravate the situation.

4.3 The urgency for bird-safe pylon configurations for new power lines

The definition and introduction of safe power pole configurations for all new medium-tension power lines must have utmost priority.

The past 5 years were not used by all Contracting Parties to start and complete this important task. The Bern Convention should request binding completion dates from all parties.

4.4 Earth cabling

Under-ground cabling (burying) of medium-tension lines is an important alternative to over-head power lines. The Bern Convention should contract a consolidated / peer reviewed Technical Review and Assessment Report on the state-of-the-art of this important technology, including comparative life cycle cost for under-ground cables versus those for over-head power lines. At the time being, there is no reliable document available to governmental agencies or NGOs for decision-making.

Earth cables solve the problem of both, electrocution and collision. Independent experts should define the hot spots or the criteria, where earth cabling should become mandatory.

4.5 Maturity of technical standards

Even in “advanced” countries, like France, Germany, Spain, Czech Republic, etc., the technical standards for bird safety are not yet mature. They will still need updates and consolidation in the years to come, in order to incorporate new findings and improved / new technical solutions.

The technical standards depend to a good extent on the results of ornithological research. For example in Germany, several species of large birds have returned or had been re-introduced successfully, like Eagle Owl (*Bubo bubo*), White Stork (*Ciconia alba*), Black Stork (*Ciconia nigra*) and White-tailed Eagle (*Haliaeetus albicilla*). These large birds are currently “testing” the adequacy of the bird-safety provisions and of the power pole configurations in Germany. It already became obvious that the VDEW-Catalogue of Technical Mitigation Methods from 1991 must be improved, and that some new technical solutions must be sought.

4.6 Trans-national review of Technical standards

The benefit of cross-border and trans-national peer reviewing of the respective national bird safety standards is obvious and should become routine in Europe of today.

The technical solutions used on power lines are quite conservative. The readiness for innovation is limited. Therefore cross-border and trans-national information exchange and reviews can be an important stimulus for innovation.

4.7 Technical standards for wooden power poles

In a number of countries, wooden power pole constructions are dominating. The bird safety of these constructions should be reviewed in detail, and if necessary, a specific bird safety standard or “good practices” should be elaborated for wooden power poles. In the currently available technical standards, wooden constructions have not received adequate attention.

In a number of countries, wooden poles are the preferred solution, as they are inherently safer (no phase-to-ground shorts !), and mitigation methods are less expensive, e.g. only one insulating hood over the middle pin-type insulator, while metal and concrete pylons with pin-type insulators require three insulating hoods, one over each insulator.

4.8 Retrofitting of existing dangerous pylons

This task is the real and demanding challenge.

There are different approaches:

- in Germany, all existing pylons of recognised dangerous configuration / design must be made bird-safe within a 10 years period.
- In other countries, the strategy is to retrofit in priority zones (protected areas; areas where protected or endangered species are at risk; around nesting sites; etc.).

The German approach is well-suited for the conditions in Germany.

In case of the other approach, research is needed in order to justify the adequacy of the planned extent of mitigation measures, and, upon implementation, to prove the adequacy of the extent of the

mitigation measures. Research on population dynamics indicates, that also the risk for the wider ranging roamers (= young adults without breeding territories) must be taken into account. In the end, also the second approach will require large, contiguous zones, where pylons must be safe for birds.

4.9 Completion dates for retrofitting of existing dangerous pylons

§ 53 German Nature Conservation Law is an exceptional law, because for the first time a firm completion date for retrofitting / mitigation has been made legally binding. The deadline is in 10 years after §53 became valid (i.e. at the end of 2012). Without this deadline, retrofitting on large scale would probably have failed.

However, there is one possible and advisable improvement: Instead of a single completion date, there should have been a series of milestones leading towards the completion of the retrofitting program, and also a certain amount of progress monitoring. In Germany, a number of utilities let the first years go almost unused. We owe it to the steadfastness of the ministry, that the situation is back on track and that no relaxations were granted.

Binding completion milestones are pre-requisite for progress and successful completion. The milestones may differ from country to country, due to their specific circumstances and because the effort must be proportionate.

It is almost a management rule: The more demanding the completion dates, the more industry will optimise and streamline their industrial processes. This holds up to a realistic limit.

4.10 Pin-type insulators forever?

Metal and concrete pylons with unprotected pin-type insulators on their cross-arms are the most dangerous types of power poles. In literature, they are often called “killer poles”. In many countries, in particular in the ex-Warsaw Pact, these poles were standard for several decades – and they are still being built. Their huge numbers are a discouraging legacy. The change-over to bird-safe pylons will be difficult to achieve, or may even fail due to political opposition.

It is recommended, that the European Council in a first step calls for technical expert opinion, how a change-over could be achieved in these countries, or whether proven and effective mitigation methods must be applied to both, existing and new pylons.

4.11 Multi-national working groups / task force

The initiative of APRECIAL, a regional French NGO, to install a mixed, multinational task force with ornithologists and with technical staff from the electric industry, can only be supported.

- task force meetings: once per year
- conferences to present progress in research and in technical implementation: once every 3 – 4years
- multi-national meetings jointly with conservationists and technical staffs to improve information exchange and cooperation, and to encourage multinational “networks”: at various occasions.

There are already a number of positive examples of cooperation between conservationists / ornithologists and technical staff of utilities. It is a special desire of APRECIAL, that such cooperation is further developed and encouraged.

4.12 Needed research and dissemination of results

Although mentioned in Recommendation No. 110 (2004), research has not received adequate support. There are some positive exceptions, e.g. sizable number of publications on electrocution itself, and on electrocution affecting population dynamics of protected and endangered species. These publications came mainly from universities in Spain and Italy, and were published in internationally renowned scientific journals.

In other countries, ornithological research, field studies, veterinary-pathological investigations, etc. are left to voluntary work and mostly remain piecemeal and unpublished.

The lack of thoroughly investigated electrocution cases, and the many electrocution cases, that go poorly reported and investigated, are a large loss for research. This situation is seen with increasing concern.

With the book HAAS & SCHUERENBERG (2008) a compendium on bird-safety was written for the benefit of both, conservationists, and engineers and technicians. Unfortunately, this privately financed book is only available in German.

From technical / engineering side, a minimum of reporting effort and feed-back is necessary. A technical compendium on bird-safety as complement to HAAS & SCHUERENBERG (2008) is long awaited.

A Technical Evaluation and Experience Report on the Insulating Hoods is overdue, because insulating hoods are in some countries the most important mitigation method. They were first introduced 24 years ago, in 1986.

Information exchange requires a minimum of up-to-date reporting, but also meetings and symposiums as platforms (see also 4.11, above).

4.13 “Low risk countries”

Some countries may consider themselves as “low-risk countries” with respect to electrocution losses (e.g. UK, Ireland, Iceland, Sweden), and feel that more important issues are on their agenda. Nevertheless, a minimum of response to Recommendation No. 110 (2004) should be requested:

- identification of species potentially suffering electrocution losses (including waders, gulls, corvids)
- survey of dangerous power pole configurations and extent of their use
- strategy of introducing bird safety on new power lines.

Electrocution is not easily observable, and the tendency is to under-estimate this problem.

The rule “100 birds killed → 10 birds found → 1 bird reported” is not too wrong.

4.14 Development of bird-safety products

The development of bird-safety products, the validation of their effectiveness, and their environmental qualification testing for lifetime verification are demanding tasks. The supplier(s) of novel product need guidance and support from the end users (i.e. the utilities). However, nobody feels responsible, if there is more than one power distribution company.

Without predictable production planning and orders, such products are not attractive for suppliers. In larger companies, bird safety products remain neglected product side lines.

4.15 Possibilities opening up by the INTERREG IVc program

The INTERREG IVc program (“Innovation and Environment – Regions of Europe sharing solutions”) was conceived for trans-national projects, which involve a larger number of participating countries, than the previous INTERREG III projects.

Typical for INTERREG IVc is the involvement of authorities and state institutions, which shall lead and manage the respective projects. Such projects of up to 4 years duration must be well-planned and organised. They must follow the project rules of INTERREG IVc, including project management requirements, progress reporting and control, reporting and dissemination of results, meetings and presentation of results.

The emphasis is on efficient project management and shall ensure an adequate pace, good quality of the results and successful dissemination.

The different electricity companies and / or power distribution companies the participating countries and experts from the NGOs will be integrated as project partners.

The authors know of no other program, which can provide such ideal possibilities to:

- consolidate ornithological research about electrocution, including appropriate reporting
- improve technical reporting and trans-national exchange of engineering experience and specialised know-how
- validate new constructions and mitigation methods
- boost the implementation of bird safety in “start-up” countries.

INTERREG IVc proposal opportunities open up every few years. In our case, proposal preparation will require approx. one year, due to the large number of involved parties and due to the complexity of the subject.

The first steps should be gained by smaller cross-border activities, in order to gain the necessary experience and to form some sort of “core team” for a larger and more demanding INTERREG IVc project.

4.16 Transition and Consolidation Phase

At the end of 2010 / beginning of 2011, at least 4 countries will have updated and detailed national technical guidelines. Together with a significant amount of experience in these countries, the overall situation and outlook can be characterised as follows:

In about two years time, the ‘advanced countries’ should be in the position to finalise and to cross-review their technical guidelines, to perform and document their evaluation of bird safety products and other technical solutions, to report, document and publish their know-how for subsequent know-how transfer.

The next two years must be used as a Transition and Consolidation Phase – a transition from the initial phase of start-up, experimentation and early implementation to large-scale implementation, which must be run at a faster pace and like a n industrial project.

The outcome of this Transition and Consolidation Phase will be essential for the Large-Scale Implementation Phase, and in the end for the success of Recommendation No. 110 (2004). Because of its importance, agreements must be reached with those Contracting Parties, which can contribute by delivering the needed know-how and documentation.

In parallel to sorting out the know-how about bird safety requirements and technical solutions and in parallel to the associated documentation effort, cross-border activities must start, in order to start the necessary networking of technical and ornithological experts and in order to organise a ‘core team’ or group of experts for the know-how exchange and transfer in the Large-Scale Implementation Phase.

During the Transition and Consolidation Phase, it is also advisable to start to involve also those departments of the European Commission, which are in charge of power transmission infrastructure and of European technical standards.

The recommended steps forward in chapter 5 concentrate mainly on the needs of a successful Transition and Consolidation Phase.

5. RECOMMENDED STEPS FORWARD

The following steps forward are currently recommended to the Bern Convention:

- (1) Clarify the legal status of Recommendation No 110 (2004) with respect to the Birds Directive concerning bird safety new power lines, respectively on existing power lines.
- (2) **The ‘advanced’ countries are requested to consolidate and to finalise their technical standards, and the publication of technical and ornithological research, in a format suitable for know-how transfer. These activities shall be completed in 2 years time (i.e. by the end of 2012)**

- (3) The Contracting Parties are encouraged to support a European task force to peer-review and to cross-seminate the different national technical standards on bird safety, and later on to form a group of experts for know-how transfer and exchange during the Large-Scale Implementation Phase.
- (4) Negotiate as binding milestone a deadline of 2 years for the identification of bird-safe power pole configurations for new (and reconstruction of existing) power lines, and for their introduction into national regulations. This shall apply for all Contracting Parties.
- (5) Support member and observer states, if so requested, with expert advice, how to proceed with bird safety.
- (5) Negotiate with the EU Commission, that infrastructure funds for power transmission infrastructure are only granted, if bird-safety is fully respected.
- (6) Negotiate with USAID, that bird safety is respected on new power lines in Bosnia.
- (7) Contract an expert report on the state-of-the-art of earth cabling, to be disseminated to decision makers and NGOs.
- (8) Encourage and remind all Contracting Parties to support useful technical and ornithological research, related with bird-safety and effects of power lines.
- (9) Negotiate improved progress reporting (including new research, national planning, implementation, and monitoring). It is recommended to repeat the follow-up of Recommendation No. 110 (2004) up to the end of a successful Transition and Consolidation Phase, and than to adopt a regular 2-years reporting cycle.
- (10) The Bureau of the Bern Convention to join forces with the European Commission, in order to cope with the increased coordinating and supporting tasks, and with the increased reporting needs and trans-national and cross-border information exchange.

ANNEX:

A.1	Germany
A.2	France
A.3	Spain
A.4	Portugal
A.5	Italy
A.6	Switzerland
A.7	Austria
A.8	Hungary
A.9	Czech Republic
A.10	Slovak Republic
A.11	Belgium
A.12	Netherlands
A.13	United Kingdom and Ireland
A.14	Denmark
A.15	Norway
A.16	Sweden
A.17	Finland
A.18	Poland
A.19	Baltic States
A.20	Greece
A.21	Balkan States
A.22	Bulgaria
A.23	Rumania
A.24	Iceland
A.25	Ukraine
A.26	Kazakhstan

NOTES:

- The authors are aware, that the ANNEX section of this document is neither perfect nor complete. As a living document, the ANNEX section will be successively updated, amended and improved.
- Some Government Reports (Croatia, Czech Republic, Germany, Hungary, Iceland, Serbia, Sweden, United Kingdom) were already available in 2009 and provided some valuable inputs for this ANNEX section.
- This report only covers electrocution.

A.1 Germany

In Germany, bird safety on medium-tension power poles has an intermittent tradition of almost 100 years. In the 1960s up to the mid-1980s, this tradition was abandoned, and a huge number of dangerous pylons were built – the cause of today’s problems with bird-safety.

The subject of bird-safety was taken up again with vigour in 1975. With an expected completion date of all necessary technical measures by approximately 2015, this means that **40 years of intensive effort** were necessary, in order to correct wrong technical decisions and disregard of bird safety requirements in the 1960s to mid-1980s.

National legislation:

Germany is in the fortunate situation, that §53 was introduced in the German Nature Conservation Law in 2002. Except for sentence (3), §53 is fully in line with Recommendation No. 110 (2204). Most important, §53 sets a firm deadline for the completion of the mitigation measures on the existing power lines:

- (1) For the protection of bird species, all new power poles and technical elements of medium-tension power lines must be constructed such, that birds are protected against electrocution.*
- (2) On all existing power poles and technical elements of medium-tension power lines, which are highly dangerous to birds, the necessary mitigation measures must be applied within 10 years time.*
- (3) Sentence (1) and (2) do not apply for the medium-tension over-head catenary system of the railways.*

The exemption of the German Railways from any responsibilities with respect to §53 German Nature Conservation Law was difficult to understand. Even new electrified railway lines were not required to respect bird safety, even though it was shown that this can be achieved without extra cost (see SCHNEIDER, H. (2008), ref. [1-4]). This is in conflict with the Wild Birds Directive, in particular with Article 5 (as outlined in chapter 2).

The new German Nature Conservation Law was issued in Aug. 2009: §53 will become §41. Only sentence (3) was changed: The German railways are only exempted from retrofitting existing over-head lines, but new supply lines and over-head systems must be safe for birds. Obviously, the conflict with Article 5 of the Wild Birds Directive (1979) was recognised and corrected.

Technical standards:

A Joint Working Group of representatives of the utilities and of the NGOs elaborated the “VDEW-Massnahmenkatalog” (Catalogue of Technical Mitigation Methods): first issue in 1986, second and improved issue in 1991.

After this achievement, a big strategic mistake was made on NGO side. With the technical solution more or less resolved, no immediate need for the Joint Working Group was seen and communications with the utilities came to a halt and important contacts were lost.

In 2002, § 53 was introduced into German Nature Conservation Law. In the explanatory part of §53, the “VDEW-Massnahmenkatalog” (Catalogue of Technical Mitigation Methods), 2nd issue, 1991 was made applicable as technical standard. At this stage, the Catalogue of Mitigation Methods should have been critically reviewed and improved. This ideal opportunity was not used.

This lacking presence of the NGOs may have tempted the association of German electricity distributors to issue in December 2005 a “down-grade” of Catalogue of Mitigation Methods with cheaper and less effective or even non-effective mitigation methods, and to recommend to their members to sign agreements with regional (unsuspecting) authorities, based on the down-graded document.

Fortunately, the conflict did not escalate. A successful symposium on bird safety in April 2006, the preparation of the book on bird safety by HAAS and SCHUERENBERG (January 2008), the background activities of the Ministry of the Environment, and the obvious conflict with Resolution 7.4

(Bonn Convention) and with Recommendation No. 110 (2004) (Bern Convention) have probably led to a change in attitude.

Now, towards the end of 2009, a new Joint Working Group will take up its work, in order to improve and to expand the current Catalogue of Mitigation Methods. Towards the end of 2010, the improved technical standard is expected to be available. The working group was convened with experts from the utilities, from the NGOs and from the state institution for bird protection, under the stewardship of the German Ministry of the Environment. The inclusion of the state institutions is a welcome improvement, because these state institutions should later-on be involved in the monitoring of progress and of the effectivity of the technical measures.

The update of the Catalogue of Technical Mitigation Methods will include not only mitigation methods, but also the definition of bird-safe power pole configurations for new power lines, and it will include also a review of available bird-safety materials and products.

Some of the topics to be dealt with are given below:

(1) The application of insulating hoods over the upright (pin-type) insulators on concrete and metal power poles proved to be the most important and most effective single mitigation method in Germany. In HAAS & SCHUERENBERG (2008) (ref. [2-1]), the insulating hoods are justly called a “success story for bird safety”. With the insulating hoods, the worst “killer poles” were, and still are made bird-safe very effectively. This measure was a prerequisite for the successful re-introduction of the Eagle Owl (*Bubo bubo*) in Middle and Northern Germany, and for the successful re-introduction programs of the White Stork (*Ciconia alba*) in different parts of Germany. The reappearance of the Black Stork (*Ciconia nigra*) and the spread of the White-tailed Eagle (*Haliaeetus albicilla*) are also part of this success story. It is easy to understand, that attempts to quietly deviate from this recognised mitigation method are seen with great concern.

(2) Only in recent years, the high danger of concrete and metal poles with redundant strain-type (horizontal) insulator configurations was recognised (see Fig. 1.2-2 of chapter 1.2). Convincing technical solutions are not yet available or approved. The effort and cost for the mitigation of these insulator configurations is expected to be high and will affect the deadline defined in §53 German Nature Conservation Law. Realistic estimate for their mitigation: by approximately 2015.

(3) An open issue are those power poles, which were and still are inadequately retrofitted, before the new technical standard will be elaborated and approved in 2010.

The fact, that § 53 German Nature Conservation Law refers to dangerous constructions, and not to other criteria, such as surrounding habitat, presence of endangered or protected species, was a wise decision.

Status in Germany:

In Germany, a large number of electric utilities and electricity distribution companies exist - some very large, others very small. The trend towards more small regional distribution companies continues. The readiness to implement § 53 German Nature Conservation Law differs greatly. The firm completion date defined in § 53 German Nature Conservation Law is very valuable to convince the slow ones.

Over several years, FIEDLER (2008) monitored the progress of bird-safety in the different states of Germany and of the different utilities. Some of his findings:

- The percentage of under-ground cabling varies significantly in the different regions. This seems to depend strongly on the philosophy of the respective electricity company. Overall, the percentage should be higher.
- Some mitigation measures known to be inadequate / ineffective are still being used.
- Fiedler came to the conclusion, that in some states of Germany the 2012 deadline cannot be met, unless more political pressure is built up.

Due to the steadfastness of the German Ministry of the Environment, the deadline for the mitigation measures in 2012 was not relaxed.

Recent activities of the NGOs:

In the early 2000s, the NABU-Working Group “Birds and Powerlines” came to the conclusion, that § 53 needs to be followed up more closely. Among others there were tendencies to knowingly misinterpret the agreed Catalogue of Technical Mitigation Methods. For this reason, the following activities were undertaken:

- A symposium was held in Muhr / Bavaria in spring 2006 with a wide range of contributions and with a clear message: Industry had enough time since 1991 (voluntary agreement), respectively since 2002 (§53 Nature Conservation Law). There must be more progress.
- During the preparation for and following the symposium in Muhr, so much valuable information and so many contributions were received, that D. Haas and B. Schuerenberg decided to compile a book. In the end, HAAS & SCHUERENBERG (2008) (ref. [2-1]) became a richly illustrated, 300 page compendium, which covers the state-of-knowledge from ornithological / nature conservation side in a thorough and very comprehensive manner. Due to the complexity of the subject, the book had to be organised in seven main chapters (blocks):
 1. Legislation and International Agreements
 2. A close look at bird safety (the bird safety of the different power pole and insulator configurations is analysed)
 3. Field research and implementation of Bird Safety (in Germany)
 4. Research on special phenomena
 5. Exemptions for the German Railways
 6. Bird Safety International
 7. Bird Losses due to collision (two recent investigations)

The intention was to set high standards with this carefully written and comprehensive compendium. It was expected that in due time a similarly comprehensive compendium would follow from the technical / industrial side.

- In a letter to the German Ministry of the Environment, the authors of this report have asked for a Technical Evaluation and Experience Report of the insulating hoods, which have proved so beneficial in Germany. 23 years after their first introduction, such a report is overdue.
- Two working meetings were held in 2008 and 2009 with French counter-parts in Alsace: A bird safety problem, which is quite specific and common in Germany are the redundant horizontal (strain-type) insulator configurations, which are seemingly necessary to fulfil traffic safety requirements. To our surprise, this problem does not exist in France. The French fulfil traffic safety requirements with single horizontal insulator configurations by using another engineering approach for their power lines. Apparently, no effort has yet been spent for useful cross-border communication neither between NGOs, nor between engineers of the utilities. Hopefully, the review cycle of the VDEW-Catalogue of Mitigation Methods will be used to take up such cross-border communication and exchange of experience.

Research activities:

Research on bird safety is almost unfunded and left to volunteers on NGO side. Even for the NGOs, the topic is too specialised, too interdisciplinary, and not mainstream.

- The careful reconstruction of electrocution accidents is elementary for the understanding and proof of effectiveness of mitigation methods. These activities have almost come to a stop.
- Video sequences of birds on power lines (landing, take-off, activities while on the poles, etc.) are basic research for bird safety. These activities have almost come to a stop.
- The huge amount of data gathered by German Eagle Owl specialists (6000 recoveries of killed or dead Eagle Owls!) has not seen recent analysis. Apparently, the value of these data is not

understood. In Italy, SERGIO et al (2004) (ref. [A.5-1]) impressively demonstrated, what can be done with even much smaller data sets.

- The book HAAS & SCHUERENBERG (2008) (ref. [2-1]), which is the most thorough treatment of bird safety at the time being, had to be financed privately. It is only available in German, because a translation into English was not affordable.

Although Recommendation No. 110 (2004) recognises the importance of research of bird safety, there is yet no incentive to do so in Germany.

A.2 France

In France, work on electrocution and collision started in 1980. It is estimated, that a satisfactory situation will be achieved by 2020 (to be confirmed). In the end, some **40 years** will be needed to eliminate the electrocution problem to an acceptable level.

Historical outlines:

In **1980**, the Ligue pour la Protection des Oiseaux (LPO) started to work on electrocution and collision.

In **1992**, the “Protocol Lignes”, an agreement between Electricité de France (EDF) and the French Ministry of the Environment was signed.

In **2003**, the L’Oiseau magazine published the bird losses found under power lines during 1982 – 2002: a total of 4,744 birds of 153 species (electrocution and collision losses). The list of the killed raptors and owls is presented in Table A.2-1. The large majority of raptors and owls were killed by electrocution.

In **2004**, representatives of EDF confirmed, that **European authorities had approached EDF several times on this matter, and that this is why EDF is seriously interested in progress**. In the same interview in L’Oiseau magazine, EDF stated that 90 % of all new power lines are now routed under ground - which is a huge step forward to solve the problems of electrocution and collision. Note: In another interview, the authors of this report were told, that the cost difference between over-head power lines and under ground cables are neutral, if all life cycle cost are taken into account. However, the current existing over-head power lines will remain in use for several decades to come - and their mitigation is the real challenge.

Because bird losses due to electrocution and collision were still unacceptably high and still endangering some species, the “Comité National Avifaune” (CNA) was created in 2004. Participants are two NGOs (LPO and France Nature Environnement (FNE)), Electricité de France (EDF), and Réseau de Transport d’Electricité (RTE). The agreement was to collaborate in a cooperative manner with the objectives:

- to ensure that all actions and good engineering practices shall be equally applicable in all regions of France
- to set up and agree an implementation plan and milestones to be achieved.

In **2005**, the Comité National Avifaune (CNA) issued an information sheet “Oiseaux et lignes électriques” (birds and power lines) for the conservation groups and for the staff of EDF and RTE. In the same year, EDF and RTE joined the European LIFE-project “Birds of the Basses Corbières”.

After constant lobbying of LPO, the mitigation measures for bird safety in the Grandes Causses region were started in summer 2005. A total of 64 Griffon Vultures plus one young Black Vulture had so far been killed by power lines in this region.

In **2006** (to be confirmed), EDF issued the technical standards / good practices for the power lines, which are valid in all of France.

Table A.2-1: Raptors and Owls killed on power lines in France 1982 – 2002 (ref.: L'OISEAU magazine no. 5 (2003), p.11)

Number	Species	
7	Honey Buzzard	<i>Pernis apivorus</i>
95	Black Kite	<i>Milvus migrans</i>
38	Red Kite	<i>Milvus milvus</i>
2	Bearded Vulture	<i>Gypaetus barbatus</i>
50	Griffon Vulture	<i>Gyps fulvus</i>
1	Black Vulture	<i>Aegypius monachus</i>
32	Shot-toed Eagle	<i>Circaetus gallicus</i>
7	Marsh Harrier	<i>Circus aeruginosus</i>
3	Goshawk	<i>Accipiter gentilis</i>
19	Sparrowhawk	<i>Accipiter nisus</i>
492	Buzzard	<i>Buteo buteo</i>
20	Golden Eagle	<i>Aquila chrysaetos</i>
1	Booted Eagle	<i>Hieraaetus pennatus</i>
24	Bonelli's Eagle	<i>Hieraaetus fasciatus</i>
26	Osprey	<i>Pandion haliaetus</i>
490	Kestrel	<i>Falco tinnunculus</i>
3	Merlin	<i>Falco columbarius</i>
8	Hobby	<i>Falco subbuteo</i>
14	Peregrine	<i>Falco peregrinus</i>
16	unidentified raptor	
1,348	Subtotal Raptors	
69	Barn Owl	<i>Tyto alba</i>
1	Scops Owl	<i>Otus scops</i>
127	Eagle Owl	<i>Bubo bubo</i>
3	Little Owl	<i>Athene noctua</i>
41	Tawny Owl	<i>Strix aluco</i>
12	Long-eared Owl	<i>Asio otus</i>
1	Short-eared Owl	<i>Asio flammeus</i>
1	unidentified owl	
255	Subtotal Owls	
1,603	Total number of killed raptors and owls	

Apart from the raptor groups, “Cigognes de France” and APRECIAL (*) also contributed significantly to the success-oriented partnership with EDF and ERDF (Branch of RTE, responsible for power lines up to 40 kV). In Alsace, ever since famous for its storks, the White Stork was near extinction: 9 breeding pairs were left in 1983. With a combination of different measures, the stork population was brought back to 270 breeding pairs in 2007.

It is characteristic of the French NGOs, that there are many independent regional players, like APRECIAL, which are very active, young and dynamic, and regionally very successful. They are loosely organised within LPO and FNE.

APRECIAL has achieved very much on regional level (Département level), and developed over the years good and reliable co-operation with ERDF (operates the electricity grid), with the préfetures (local governments / administrative centres), with the majors in the region, with the fire departments, schools, etc. Several important and useful agreements were signed, e.g.

- all dead birds must be delivered for veterinary inspection and careful documentation (important material for research is saved this way)
- the fire departments provide an agreed amount of free support, e.g. for mounting / repairing safe nesting platforms, for banding of young storks, for emergency inspections of the nests.

The experience and the agreements developed by APRECIAL have already spread to neighbouring Départements.

For the authors of this report, two working meetings in Alsace were a revelation, that cross-border exchange of experience and know-how must be significantly improved and encouraged.

In particular, the EDF technical standards for bird safety are worth reviewing. E.g. the highly dangerous pylon configurations with redundant strain-type insulators are not used at all in France. Traffic safety requirements can also be met with single strain-type insulators.

(*) APRECIAL = Association pour la Protection et la Re-introduction de la faune sauvage et de la Cigogne en Alsace et Lorraine (founded in 1983)

A.3 Spain

In the mid-1980s, Dr. D. Haas made first investigations in Spain:

- first survey of the power lines in the Coto Donana National Park
- inspection of the Imperial Eagles in the collection of the Biological Station of the Donana in Seville. The search for electrocution burn marks revealed for the first time, that a very high percentage of the Imperial Eagles were killed by electrocution – a shocking finding.

After that, Spanish biologists quickly took over. Today, the awareness for the electrocution problem is high. Much effort has already been spent to improve bird safety – but Spain is a huge country, and quite some time will still be needed to eliminate the electrocution problem to an acceptable level. HEINZE (2008) (ref. [A.3-6]) gave evidence that much still needs to be done. On trips in Spain between 1999 and 2005, a total length of 126 km of power lines were inspected. Altogether, 238 electrocuted birds were recorded. Also other recent papers indicate, that the progress of large-scale mitigation programs is not fast enough.

All in all, **40 years** from first steps to acceptable bird-safety will probably be needed in Spain.

Spain with its magnificent fauna of birds of prey, and with its importance for the White Stork (breeding population; staging during migration, and increasing wintering population) has ever since been the focus of attention with respect to the electrocution problem.

Spanish ornithologists and university research delivered an impressive number of important publications to the electrocution problem. They comprise surveys of power lines and mitigation methods, investigations how to improve the effectiveness of mitigation programs vs. cost, and several publications how electrocution affects population dynamics of several protected and endangered species of birds of prey. In the list of literature, some examples of these publications are included: see ref [A.3-1] to [A.3-5].

A number of interesting mitigation methods have been thought up and tested. Their technical evaluation and assessment of suitability for long lifetimes could be important contributions.

National legislation on bird-safety on power lines was last reported to be due to be passed.

Further in-depth interviews are needed.

A.4 Portugal

In response to Recommendation No. 110 (2004), Portugal has become active.

SPEA-BirdLife Portugal and SEO-BirdLife Spain collaborate and exchange experience.

Further information will be given in the next issue of this report.

A.5 Italy

The effort for bird-safety and the status achieved in Italy went quite unnoticed. In the next issue of this report, this missing information will be supplied.

Starting in 2000, a series of useful publications appeared in renowned journals (e.g. RUBOLINI et al. (2001) (ref. [A.5-1]); SERGIO et al. (2004) (ref. [A.5-2]); RUBOLINI et al (2005) (ref. [A.5-3])), indicative of on-going university research.

In particular, SERGIO et al (2004), in collaboration with the Department of Applied Biology, Seville / Spain, analysed electrocution losses, habitat requirements, and population dynamics of the Eagle Owls (*Bubo bubo*) in two regions of Italy. A low-risk population (capable to absorb electrocution losses) in the Trento region, and a high-risk population (near extinction, mainly due to electrocution) in the Abruzzo region were analysed, and recommendations for bird-safety were elaborated.

To which extent, the recommended mitigation measures were applied, and which results were obtained, is eagerly awaited.

A.6 Switzerland

The Swiss, who take some pride in their well-renowned Swiss Bird Station in Sempach, have so far acted quite proactive. For the pragmatic minded Swiss, it was no problem to adopt and adapt good regulations and technical standards from their neighbours. In 1994, an Article 30 (Bird Safety) was amended to the Swiss regulation SR 734.31:

“If local need requires, measures shall be taken such, that birds on cross-arms can not cause shorts to ground or phase-to-phase short circuits.”

In 1997, a catalogue of mitigation measures was jointly elaborated by the VSE (Association of Swiss Electricity Companies), the Swiss Inspectorate of High-Voltage Transmission Lines, the Federal Agency of the Environment, SVS-BirdLife Switzerland, and the Swiss Bird Station in Sempach. The catalogue of mitigation measures and good practices is currently under review and update.

It was relatively easy to introduce bird-safety on new power lines; the real problem are the mitigation measures on existing power lines.

In Switzerland, there is a number of regionally operating electricity companies. They are currently faced with all kind of problems, so that mitigation measures for bird safety receive only reduced attention / low priority. To a good extent, this is owed to the fact, that the VSE-Catalogue is only seen as a “recommendation” and that there is no binding deadline for the completion of the mitigation measures. Swiss conservationists are envious of §53 German Nature Conservation Law, because it includes a binding 10-years deadline, which makes a big difference!

In 2007, the Swiss Bird Station in Sempach had elaborated for the Federal Agency of the Environment (BAFU) a plan of 12 large and contiguous priority zones for the protection of the White Stork and of the Eagle Owl - two species which are most at risk of electrocution. It is recommended, that in these 12 regions large scale mitigation shall be started, cognizant support given, and the success monitored and documented.

A.7 Austria

The situation in Austria and the efforts to improve bird-safety on Austrian power lines will be described in the next issue of this report.

A.8 Hungary

Work on electrocution started some 20 years ago. The program “Accessible Sky” (ref. [A.8-1]) is planned to end in 2020. By that time approx. one third of the dangerous pylons will be retrofitted. Further effort will eventually be needed, in order to reach an adequate level of bird-safety. Overall a time span of **40 – 45 years** will have passed from first steps up to satisfactory bird safety.

In 2004, MME-BirdLife Hungary compiled and issued the report “Medium-Voltage Power Lines and Bird Mortality in Hungary” (ref [A.8-2]). This report has set standards for good and concise reporting. Some of the information given:

- The five relevant Hungarian electric utility companies are owned by E.on, RWE, and EDF.
- Basic data of the medium-tension power grid: 53,000 km length; nearly 650,000 power poles – of which 215,000 are considered “dangerous due to their location”. An estimate of the power poles, which are “dangerous due to their configuration” is not given.
- Pictures of the most common power pole configurations are given.
- In November 2004, a nation-wide survey on a total of 325 km of power lines (i.e. 4,067 poles) was organised. The results are presented: 581 electrocuted birds (322 thereof were of protected and strictly protected species).
- Based on the results of the survey, a cautious estimate of the overall electrocution losses in Hungary was made: annually approx. 30,000 birds are killed by electrocution in Hungary. This number does not take into account the removal of carcasses by scavengers, nor does it take into

account the losses on those 430,000 poles, which are “less dangerous due to their location”. With such factors included, the result might be at least twice as high.

- Since 1991, MME with help from various sides is coordinating an insulation program. As low-cost solution, cross-arm insulating covers were developed specifically for the triangular power poles, which are very common in Hungary. From 1991 to 2004, MME had supplied to the electric utilities cross-arm covers for more than 38,000 poles. By March 2008, this number had increased to cross-arm covers for 50,000 poles. These covers significantly reduce electrocution losses, although they are no perfect solution.
- In collaboration with the electric utilities, safe breeding platforms were installed for the White Storks. Later on, also breeding platform for Saker Falcons were constructed and installed.

Since 2004, MME have carried out another 4 nation-wide power line surveys. A total of 2,183 carcasses of electrocuted birds were found.

It is reported, that the Bonn Convention (resolution 7.4 in 2002) and the Bern Convention (Recommendation No. 110 (2004)) were of great help for the new agreement reached between MME-BirdLife Hungary, the Ministry of the Environment and Water (MEW), and all relevant electric utility companies (ref. [A.8-1]). The new “Accessible Sky” agreement is a **voluntary commitment**. It was agreed:

- “to use only bird-friendly methods in managing newly constructed power lines”. E.g. the very common triangular pylons with pin-type insulators shall no longer be used in new power lines from 2010 onwards.
- For the existing power lines, “MME and MEW are preparing a detailed map of dangerous power lines, which indicates ‘priority categories’ for each site. The priority categories will be defined according to observed mortality rates, and the distribution of priority bird species”.
- “Based on these data, a timetable will be agreed by each party. The electric companies involved promised a bird-friendly transformation of all dangerous power lines in Hungary by 2020.”

The “Accessible Sky”-program “will be financed by European and Hungarian funds, and by the electric companies themselves. Mr. Péter Ólajos, Member of the European Parliament created the idea and successfully coordinated the agreement.”

In the mean-time, MME-BirdLife Hungary have produced the priority map in late 2008, as part of the “accessible Sky” agreement.

Currently running projects include two LIFE Nature projects, focussing on Saker Falcon and Red-footed Falcon, with the aim to insulate a total of 910 km of medium-voltage power lines.

Legislation:

In December 2008, the Act on Nature Conservation No. 53 (1996) was amended to allow only bird-friendly technologies on new or fully renewed power lines.

Technical standards:

Currently, the technical standards (“best available technology”) are under review and will see major improvement. They shall be completed in 2010, and will incorporate the explicit recommendations given in the CMS brochure (ref [1-4]), in Recommendation No. 110 (2004) (ref [1-3]), and in HAAS & SCHUERENBERG (2008) (ref [2-1]). The new technical standard will define three categories of new poles:

- not recommended
- can be used
- recommended.

Earth cabling is the absolute exception in Hungary:

- 11 km in Borsodi Mezőség (LIFE Nature)

- 80 km in Hortobágy National Park (Structure Fund).

Research:

There are no research activities in this field at the universities. Whatever is researched comes from MME-BirdLife Hungary.

Hungary is seen as an important reference and pace maker for bird-safety in this part of Europe. The very active and professional Hungarian NGOs should receive the needed support, in order to reach good results.

A.9 Czech Republic

In the Czech Republic most of the medium-voltage power poles are of dangerous design.

The Czech Republic is one of the proactive states with respect to bird safety. Czech bird protection organisations started investigations on bird losses on power lines in the 1970's. First steps against electrocution were taken in the 1980's:

- Perches 0.5 m above the upright insulators
- Plastic bird rejectors
- Insulating hoods.

It is mentioned in the Government Report, that the insulating hoods used in the Czech Republic had only limited life and also other problems - to be followed up.

During 1998 – 2001, mainly the areas of the Peregrine Falcon and of the Saker Falcon were retrofitted (in total 7,000 km with approx. 8,000 power poles).

In 2003, the area of the Czech Republic was divided into 3 “conflict zones”, depending on the prevailing bird density and density of power lines.

In 2009, the largest energy supplier in the Czech Republic, Czech Energy Company (CEZ), agreed to retrofit the power lines in the Bird Areas of the Natura 2000 network and at other hot spots (approximately 3,300 km in total).

Legislation:

Since 2004, Section 5a, § 6 of Act No. 114/1992 Coll. Oblige the electric utilities, that protective means must be furnished, which effectively prevents electrocution of birds on new or reconstructed power lines.

Technical Standards:

The Ministry of the Environment is currently developing guidelines for the nature conservation authorities, including mitigation methods in line with Recommendation No. 110 (2004).

A.10 Slovak Republic

It is known, that Slovakia has been one of the proactive states with respect to bird safety. The Government Report outlines, how deeply the State nature Conservancy of SR in activities for bird safety on power lines. The Government Report illustrates this with the annual work plan of 2008.

In the Slovak Republic (SR), there are three major electricity companies:

- Eastern Energy Company
- Central Energy Company
- Western Energy Company

There is an established cooperation with the 3 utilities:

- Agreed time table of activities in the priority zones
- Cooperation in new mitigation methods
- Participation in the LIFE project “Conservation of Aquila heliaca in the Slovak Part of the Carpathian Basin”, which includes modifications to electric poles of the 22 kV power lines.

The Government Report mentions Raptor Protection of Slovakia as one of the actively involved NGO's.

Legislation:

§ 4.4 and § 4.5 of Act No. 543/2002 Coll. on Nature and Landscape Protection were introduced in 2002:

(4.4) Everyone who constructs or carries out scheduled reconstruction of overhead electricity lines is obliged to use such technical solutions that prevent from killing birds.

(4.5) If killing birds on electricity lines or telecommunication facilities is verifiable, the nature protection body may rule, that an administrator of electricity lines or telecommunication facilities has to adopt measures to prevent killing birds.

Furtheron, the regional environmental offices shall request in the Environment Impact Analyses that “appropriate constructions” are used. In sites of high importance for birds, power lines shall be routed underground.

The law also requires that killed or injured birds must be reported to the authorities, who shall take further steps.

Technical Standards:

In 2006, new technical solutions were suggested. In 2007, detailed guidelines were elaborated for the regional authorities, including bird safety on medium-voltage power poles.

A.11 Belgium

In the Flemish part of Belgium, there is only one large utility. The medium-tension power grid is completed under ground, which avoids all problems with electrocution on medium-tension power poles and collision with the aerial wires.

However, in the Walloon part of Belgium, there are quite a number of unprotected medium-tension power lines, and bird casualties due to electrocution have been reported from this part of Belgium. How the Belgium government wants to proceed with these unprotected power lines, and how the Belgium government has responded to Recommendation No. 110 (2004) is not known to Natuurpunt–BirdLife Belgium.

Recommendation No. 110 (2004) is known to Natuurpunt–BirdLife Belgium, but there are more urgent issues which keep Natuurpunt–BirdLife Belgium busy, like wind farms and bird collision with high-voltage power lines.

Further information on the situation and bird safety activities in the Walloon part will be given in the next issue of this report.

A.12 Netherlands

In the Netherlands, almost all medium-tension power lines have been buried under-ground. To which extent this also holds for the Limburg region must yet be checked.

A.13 United Kingdom and Ireland

In the UK, the problem of electrocution on medium-tension power poles is considered negligible compared to bird losses due to collision with conductor wires of the different power lines. Therefore, there have been no activities concerning bird safety on medium-tension power poles.

It is worthwhile to address the difficulties of observing “electrocution”. Probably only 1 in 10 electrocuted birds is found, and only one of 10 found birds is actually reported. This means that probably only 1 percent of the electrocution losses actually appear in the statistics. A very unnoticed dying.

The control centres of the utilities only record the more dramatic phase-to-phase short-circuits, which lead to automatic interruption or even failure of a power line. The far more frequent phase-to-ground shorts, which do not trigger automatic interruptions, are also fatal, but go mostly unnoticed.

It is the mortality rate which counts, and not absolute numbers of casualties. The mortality rate due to electrocution may determine, whether such small raptor populations, like the Red Kite, the Goshawk, the Peregrine Falcon, or even the Golden Eagle and Osprey in the UK can increase their numbers, hold their numbers, or will decrease. Recent research has shown that small populations are not only vulnerable to losses of breeding adults, but also to losses of the roamers – young adults yet without breeding partners and breeding territories. The wider ranging roamers are often at increased risk of electrocution.

A dedicated risk assessment for the electrocution problem in the UK is not known to us, nor recommendations and conclusions, what needs to be done. We assume that this basic work was not yet performed in the UK. This should be the first step to be done.

A.14 Denmark

Not yet interviewed.

A.15 Norway

The large number of electrocuted White-tailed Eagles (*Haliaeetus albicilla*) reported from Norway has shed a negative light on the power pole constructions used in Norway. Photo-graphs of the power poles in use showed cross-arms with pin-type insulators and too close spacing of the conductors. Quite obviously, these losses are quietly accepted.

A particular threat appear to be the new power lines to the locations of wind turbines. Often they cut through habitats previously free of medium-voltage power lines.

LARSEN & STENRUD (1987) (ref. [A.15-1]) reported about an attempt to re-introduce Eagle Owls in the Southeast of Norway. This program failed due to the extraordinary high number of losses by electrocution. This could be proven, because all birds were telemetered.

The publications of K. Bevanger (e.g. BEVANGER (1994) (ref. [A.15-2])) in Norwegian and in English journals have not yet produced deep awareness for the electrocution problem in Norway.

White-tailed Eagles and Eagle Owls are not the only species at risk to electrocution in Norway.

In-depth interviews with NOT-BirdLife Norway are planned and will be reported in the next issue of this report.

A.16 Sweden

The Swedish Government Report is exceptionally comprehensive and useful. It illustrates the difficulties to make substantial progress in bird safety on the medium-voltage power lines.

The following information is drawn from the Government Report:

- The Swedish Ornithological Society (SOT- BirdLife Sweden) started awareness campaigns in the 1980's, and complains, that agreements were easier to reach in the 1980's, than today.
- There is no legislation, nor are there agreed technical standards or “good practices” for bird safety on medium-voltage power poles.
- Dangerous power poles with upright insulators (in literature, they are called “killer poles”) are still commonly in use – also on new power lines!

- For the concession to build new power lines, Environmental Impact Assessments are mandatory. Case-by-case decisions are made, to which extent the power poles must be made bird safe.
- There is hardly any awareness, that Recommendation No. 110 (2004) exists, and that it could be very helpful. Hopefully, the 2009 follow-up of Recommendation No. 110 (2004) has now triggered awareness for this international agreement.
- It quite obvious, that there has been no trans-national exchange of information and experience with countries advanced in bird-safety.
- Neither the ban of the most dangerous types of power poles, as stipulate in Recommendation No. 110 (2004), nor the development and introduction of bird-friendly power pole constructions seem to be on the agenda.
- Species at risk of electrocution comprise in particular the Eagle Owl (*Bubo bubo*), White-tailed Eagle (*Haliaeetus albicilla*), Golden Eagle (*Aquila chrysaetos*), and Ural Owl (*Strix uralensis*).

Fortunately, Sweden is a very bird-minded nation. This gives hope, that the situation will be improved and that Sweden will soon join the league of countries, which are advanced in bird-safety.

A.17 Finland

Not yet interviewed.

A.18 Poland

In Poland, the electricity industry is still state-owned, but there are tendencies to privatise.

Bird safety on power lines is not yet really on the agenda of bird protection in Poland - but there are a few regional activities. Up to now, priority was set on providing safe nesting platforms in a nation-wide campaign for the huge White Stork population in Poland (approx. 40,000 breeding pairs in 2009). Approximately 60 % (regionally even 80 %) of the White Storks breed on power poles. The huge effort for the census and for safe nesting platforms needed strong public awareness and public support, as well as very good cooperation with the electricity suppliers.

It is a recognised fact, that safe nesting sites are the first and most important step to increase the breeding success of the White Stork. The annual stork losses on power lines are estimated to approximately 600 casualties (approx. 85 % of these are due to electrocution) (R. GUZIAK, private communication). These losses are absorbed by the better breeding success on safe nesting platforms.

The following outlines are quoted from SCHNEIDER-JACOBY (2008) (see ref. [3.2-1]) and translated into English:

(a) Importance of Poland for bird protection

Poland is of essential importance for bird protection in Central Europe. A sizable number of species of large birds, in particular the White Stork (*Ciconia alba*), depend as overall populations on the large breeding populations in Poland.

Aside from the White Stork, large populations of birds of prey exist, like those of the White-tailed Eagle (*Haliaeetus albicilla*) and Lesser Spotted Eagle (*Aquila pomarina*). The vast lowlands in Poland are important staging areas during migration towards Western Europe and towards South-Western Europe.

According to HEATH & EVANS (2002), Poland is a country of essential importance for the following endangered and protected species, which are at risk of electrocution: Black Stork (950 breeding pairs), White Stork (30,500 breeding pairs in 2002), Honey Buzzard (1,000 breeding pairs), Black Kite (500 breeding pairs), Red Kite (400 breeding pairs), White-tailed Eagle (440 breeding pairs), Lesser Spotted Eagle (1,600 breeding pairs), Spotted Eagle (15 breeding pairs).

(b) Survey of power pole configurations

A survey trip undertaken in 2001 revealed that practically all power poles are of the category “very dangerous design”. Particularly worrying was the fact, that on new power lines and on power lines under construction only these very dangerous pylon configurations were found. Determined steps must be taken, in order to avoid further risk to Polish bird life.

Probably because of many bird-induced short-circuit events and outages, a large number of switch towers are integrated into the power lines. Because these switch towers are highly dangerous, they even increase the risk of electrocution.

The good cooperation between bird protection organisations and the electricity suppliers is concentrated almost exclusively on installing safe stork nesting platforms on low-tension pylons.

Despite the known losses on power lines, there are no apparent activities to reduce the economic loss and the bird losses on the power lines.

The nature conservation organisations in Poland are quite strong and professional. In several important publications, the problem of electrocution and the high mortality due to electrocution are addressed, and pictures of dangerous pylons with electrocuted White Storks are presented.

PTOP, a Polish NGO, is preparing a project for bird safety on power lines in the extremely important fluvial lowlands of the Narev and Biebrza Rivers.

(c) Concluding evaluation

Because of its essential importance for the protection of large birds in Central Europe, the situation in Poland must be seen with concern. Aside from the existing, very dangerous pylon configurations, all new power lines use without exception the same very dangerous pylon configurations – a very worrying situation.

The broad public support and the professionalism of the nature conservation and bird protection organisations in Poland are an excellent pre-requisite to initiate bird safety projects and programs. Financial support to these organisations is important, because they can provide competent experts needed for collaboration with the electricity suppliers.

The Polish ECOFUND offers the possibility to develop bird safety standards, similar to the German Catalogue of Mitigation Methods (1991).

-- end of quote --

It appears that Poland has not yet responded to the CMS resolution 7.4 (2002), nor to Recommendation No. 110 (2004) by adequate planning and action.

A.19 Baltic States

Not yet interviewed.

A.20 Greece

In Greece, there is only one large electricity company (DEH), who also operates the medium-tension power grid.

The vast majority of the medium-tension power poles are wooden poles - either with wooden cross-arms or with steel cross-arms. On these cross-arms, pin-type (upright) insulators are commonly in use, but also strain-type (horizontal) insulators. The cross-arms are not grounded. Jumper wires are in most cases routed below the cross-arms. Also switching armatures are mostly attached below the cross-arms. It is the overall impression, that unnecessary electrocution risk to birds is avoided and that the medium-tension power lines are in well-kept condition.

The main risk on wooden power poles with pin-type insulators are phase-to-phase short-circuits. If the distance between energised wires is too narrow, this risk increases significantly. With a single insulating hood over the central insulator plus some length of wire, this risk can be reliably avoided. This probate solution has never been seen in Greece, although it would eliminate electrocution risk.

On the standard wooden poles in Greece, the pin-type insulators are not equally spaced, because the carrying pole occupies the centre of the cross-arm. Therefore, one side is wider spaced, which is good for perching birds, but the other side is closer spaced, which is dangerous for large perching birds. How perching birds use the asymmetric cross-arms of these power poles has not yet been investigated and documented.

The very few concrete pylons with steel cross-arms, which were seen up to now, are all highly dangerous. Obviously, bird safety has not been understood for this yet uncommon type of pylon.

The awareness for the need of bird safety on medium-tension power poles does not yet exist. Also, there does not seem to be any research on the electrocution problem in Greece. In other words, it will be necessary to start from scratch with basic field surveys, awareness campaigns, etc.

Almost all electrocution incidents on wooden poles, as they are used in Greece, are phase-to-phase short-circuits events, which can be quite dramatic with strong arcing. In such accidents, the feathers of the birds can become ignited and the falling birds can cause wild fires. Taking into consideration, that bird safety automatically means less outages and less risk of wild fires, the lack of research is not understood.

In the Important Bird Areas (IBA) in Greece, hardly any power lines have been made bird safe against electrocution. The only measures reported so far are air cables. In these cables, the three phases are insulated and bundled. They are thicker and better visible. Bird losses due to collision are avoided, as well as losses due to electrocution.

A.21 Balkan States

In HAAS & SCHUERENBERG (2008), M. SCHNEIDER-JACOBY (ref. [A.21-1] and [A.21-3]) analysed and described the situation of bird safety in some of the states of Ex-Yugoslavia. The relevant sections are translated into English and repeated below.

A.21.1 Slovenia

(a) Importance for bird protection

Although a small country, Slovenia is of great importance for bird migration. Situated between the Alps and the Adriatic, a number of protected and endangered species use this migration corridor. The power lines in the fluvial lowlands of the Drava River were surveyed, because these lowlands are of key importance for the breeding population of the White Stork.

(b) Survey of power pole configurations

Most of the pylons surveyed were “highly dangerous” – however, a non-negligible part of the power poles in Slovenia is only “moderately dangerous”. The latter are old wooden pylons, but also new pylons with suspended insulators.

The Slovenian power company has realised, that bird-induced outages cause significant economic loss. Therefore remedies were investigated, that allow to reduce the bird-induced short-circuits. By increasing the height of the upright insulators, the number of short-circuits was reduced by 98 %.

This measure only benefits species up to the size of a crow, but not storks and other large birds, which need to be protected.

Fortunately, new pylons are of safer design. New standard (series) poles with suspended insulators are a significant improvement in bird safety. End poles and mast / transformer stations are still of dangerous configuration and require further improvement.

DOPPS-BirdLife Slovenia, EURONATUR and the Karl-Kaus-Foundation collaborated in a public awareness campaign, and published a brochure on bird safety, which was distributed to 3000 multipliers and to the staff of the power company.

(c) Concluding evaluation

Slovenia is a positive example, because the Slovenian power company had recognised, that bird losses and bird-induced outages go together. The increased height of the upright insulators is only a first step. Of main importance is the change-over to safer pylon configurations on new power lines.

Slovenia is a good example that public awareness campaigns and transfer of information lead to rewarding progress in bird safety.

A.21.2 Croatia

(a) Importance for bird protection

The lowlands of Croatia are rich in large birds. In particular, White-tailed Eagle, Lesser Spotted Eagle, White Stork and Black Stork are to be mentioned. Other rare species are found in the Karst and on the islands in the Adriatic, e.g. Short-toed Eagle and Griffon Vulture.

During fall migration, Croatia is of major importance.

In all Important Bird Areas (IBA), a large number of rare and endangered species of large birds are at risk of electrocution on dangerous pylons, such as White Stork, Griffon Vulture, White-tailed Eagle and Saker Falcon.

(b) Survey of power pole configurations

Practically all pylons in Croatia are highly dangerous. In the past, power poles of moderately dangerous construction had been in use: wooden poles and some steel poles with suspended insulators. Most had been replaced some times after World War II, because much of the power transmission infrastructure had been destroyed.

On the island of Cres, in the Karst (Zrmaja, Gacka), and in the flood plain of the Sava River old power lines were replaced to a large extent. It is very alarming, that the new power lines use pylons, which are more (i.e. highly) dangerous, compared to the old ones. Over long distances, the new highly dangerous power lines cut through the open landscape and through all important habitats – such as flood plains, Karst and islands (*).

Only at two locations in the flood plain of the Sava River, insulating hoods were found on power poles. They became dislodged in the meantime and have lost their function for bird safety.

In 1994 /95, a new power line was fitted with insulating hoods during construction. This example shows, that the state-owned power company HEP was well-aware, that its pylons with upright insulators are extremely dangerous to large birds.

Insulating hoods were used on steel pylons near Guce. They were not stable enough, and a number of them hang tattered on the conducting wires.

With respect to bird safety, there is little awareness and little readiness to comply with the needs of bird protection. Only in the Vulture Information Centre in Beli / Island of Cres, this menace to the Griffon Vulture population was openly addressed. Typical for Croatia, exactly in this part of the Island of Cres new power lines with extremely dangerous steel pylons were built. In July 2002, EURONATUR reminded HEP of its given promise and informed various institutions.

It is at least good news, that wooden poles reappear in different regions (e.g. Cres, flood plain of the Sava River). Nevertheless, there is urgent need to retrofit many hundreds of kilometres of relatively new power lines.

(* After intervention by EURONATUR, the state-owned power company HEP promised to the World Bank in 1994, that it will construct only bird-friendly power lines according to international standards (USA, Germany, South Africa). These promises were not held.

(c) Concluding evaluation

The situation of bird safety in Croatia is alarming. Despite promises given by the state-owned power company HEP, only highly dangerous pylon configurations were built until 2002, when this survey was carried out, and often replaced moderately dangerous wooden poles.

The negative impact on the fauna of large birds is judged to be high.

In the Important Bird Areas (Cres, Lowlands of the Drava River, Kopacki Rit, floodplains of the Sava River, Karst) immediate and large-scale mitigation measures need to be taken.

Legislation:

In 2005, Article 88 of the Nature Protection Act was introduced

Furthermore, a Strategy and Action Plan for the Preservation of Biological and Landscape Diversity of the Republic of Croatia (OG 143/08) was elaborated and contains sections relevant to power lines.

Technical Standards:

HEP ODS, who operate the electricity distribution in Croatia were requested to review new pylon configurations and technical components of medium-voltage power lines.

There are papers identifying technical solutions, which include the solutions presented in the CMS-brochure (HAAS and NIPKOW (2002) (ref. [1-4]).

A.21.3 Bosnia

(a) Importance for bird protection

The importance of the wide Karst Poljes (plains) has not yet been adequately recognised. In Bosnia, only three Important Bird Areas (IBA) are described, and only 0.5 % of Bosnia are protected areas (IUCN 2004). Migrating birds of prey, as well as several rare breeding species, use the wide grasslands. For Livanjsko Polje, EURONATUR has gathered data to prove its ecological importance.

All of these semi-natural areas are still unprotected and have not yet been recognised as IBA. Overall much needs to be done for nature conservation in Bosnia (IUCN 2004).

(b) Survey of power pole configurations

During travels since 2002, it was found that practically everywhere new and highly dangerous power lines were being constructed. Standard pylons are of pre-stressed concrete with upright insulators, and junction pylons of extremely dangerous configuration are commonly used on all new power lines.

In two locations, the logo of USAID, who coordinates the re-building of the power transmission infrastructure in Bosnia, was found (Popovo Polje and Livanjsko Polje) !

(c) Concluding evaluation

It is alarming, how consequently the re-building program in Bosnia replaces the relatively bird-safe wooden power poles by highly-dangerous concrete pylons. These pylons are the only perching sites in the vast grass- and bush-lands. A high risk for rare birds of prey must be assumed.

EURONATUR made several attempts to convince USAID, that bird safety must be respected – so far without success. The dangerous pylons will cause bird losses for many decades to come.

The frequency of wood fires in the back-country near Dubrovnik has increased. This could be an indication that the new power lines not only threaten birds, but also the public and the environment.

If it not arson, the large fires in Livanjsko Polje in early 2007 may have been caused by an electrocuted bird.

A.21.4 Montenegro

(a) Importance for bird protection

Montenegro is an important zone for the European flyways of bird migration. Here, the Central European flyway crosses the Adriatic towards North Africa. Another sizable part of migrating birds follows the East Coast of the Adriatic to the South.

Lake Skutari with the Bojana-Buna delta belongs to the most important wetlands in Europe with waterfowl exceeding 300,000 birds (SCHNEIDER-JACOBY et al (2006) (ref. [A.21-3])).

(b) Survey of power pole configurations

Since 2002, EURONATUR works for the protection of important staging and breeding areas in Montenegro. All new power lines in this country use highly dangerous pylons of pre-stressed concrete and with upright insulators. One of these highly dangerous power lines cuts across the longshore Velika Plaza between the Adriatic and the salt works Solana Ulcinj. This area is highly important for birds of prey.

(c) Concluding evaluation

Within the EURONATUR monitoring program, 25 species of birds of prey and 6 species of owls were found in the Bojana-buna delta. The migrating birds of prey include Honey Buzzard, Lesser Kestrel, Black Kite, and Marsh Harrier. Wintering Spotted Eagles, and in all seasons Lanner Falcons and Peregrines can be found.

The new power lines are a high risk for migrating and breeding birds.

A.21.5 Serbia

The Government Report mentions several activities in the planning stage. Further information to be obtained for the next issue of this report.

Efforts concentrated on providing safe nesting platforms for White Storks and for the endangered Saker Falcon. The latter were a cross-border cooperation with MME-BirdLife Hungary.

A.22 Bulgaria

In the past, BSPB-BirdLife Bulgaria had joined forces with the utilities to mount safe nesting platforms for pole-nesting White Storks.

Within the frame of a LIFE-project, BSPB intends to have all dangerous power poles insulated within the territories of the Eastern Imperial Eagle.

At the time being, BSPB complains that bird-safety on medium-tension power lines has only low priority, and that they have to start again from scratch after the electric industry was privatised.

An in-depth interview is planned.

A.23 Rumania

Not yet interviewed.

A.24 Iceland

In a short travel report, HAAS, GAUGGEL, SCHNEIDER (2008) (ref. [A.24-1]) describe the power lines seen in Iceland – good technical solutions, as well as not desirable constructions. These authors recommend, that Iceland should assess the electrocution risk of the different medium-tension power pole configurations, as a precautionary measure, in order to avoid that dangerous constructions can become more common.

The bird segment at risk from electrocution is relatively small, but comprises species such as the White-Tailed Eagle, Gyrfalcon and Merlin, but also large waders, like Whimbrels and Curlews, large

gulls, and possibly the Snowy Owls could be at risk. The list of bird species which suffer electrocution losses, would be a small, but desirable scientific contribution.

A.25 Ukraine

In 2008, BirdLife news (ref. [1-1]) reported that Ukraine has “implemented remedial actions with their power companies” in response to Recommendation No. 110 (2004).

This could not yet be verified by interviews and will be followed up in the next issue of this report.

A.26 Kazakhstan

LASCH & LENK (2008) (ref. [A.26-1]) reported about a survey and monitoring program carried out in 2006 along power lines in the area of the Tengiz Lake system, a Ramsar wetland in Central Kazakhstan. The recorded electrocution losses of 1.5 – 8.6 birds / km / month on different power lines were extremely high and illustrate the urgency of improving bird safety in Kazakhstan.

Conservative estimates arrive at approximately 70,000 km of medium-tension power lines with approx. 700,000 dangerous pylons (MOSEIKIN (2003) (ref. [A.26-3])). This is a huge legacy from Sowjet times. Modernisation and improved bird safety were already planned. They were not implemented, because of the huge political changes when the Sowjet Union broke up. The old and highly dangerous power lines are still in use, and on new power lines, the same highly dangerous pylon constructions are re-used (MOSEIKIN (2003)).

The fact, that the huge power grid in Kazakhstan is operated and maintained mostly by regional power companies, complicates the start-up of mitigation programs. A strategy, how to start-up a large-scale mitigation program in this huge country, needs yet to be found and most likely requires massive external support and know-how transfer.

The fast deterioration of the Steppe Eagle (*Aquila nipalensis*) population, which has been caused by electrocution and by changes in agricultural usage, is illustrated by two reports:

- KARYAKIN (2005) (ref. [A.26-2]) found 15 electrocuted Steppe Eagles under 43 km of power lines in the Aral Sea region
- MEYBURG (2005) (ref. [A.26-4]) reported the large decline of the migrating Steppe Eagles over Eilat / Israel:
 - minus 40 % over the last 30 years
 - over the same period, the proportion of juvenile Steppe Eagles declined from 30 % to mere 1.4 % - an alarming finding.

Awareness campaigns and attempts to install bird safety equipment on demonstration lines were in negotiations. In the next issue of this report, this will be followed up.