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ENERGY & NATURE | *Workshop Summary Report*

Trust in Transmission

Partnerships and policies for bird-friendly power lines

30 September & 1 October 2025
Bratislava, Slovakia

A learning excursion organised by Renewables Grid Initiative, in collaboration with Raptor Protection of Slovakia

Renewables Grid Initiative

Raptor Protection of Slovakia


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Introduction

As the energy transition unfolds amid intertwined climate, biodiversity, and energy crises, its success is strongly linked to effective mitigation of the impacts of the infrastructure on nature. For bird species, this requires addressing the risks of collisions and electrocution, on high- and medium-voltage power lines through strategic planning, targeted mitigation measures, trust-based collaborations among key stakeholders, and robust legislative frameworks.

In this context, the Renewables Grid Initiative (RGI), in collaboration with Raptor Protection of Slovakia (RPS), organised a learning excursion in Bratislava (Slovakia) on 30 September and 1 October 2025. The event explored Slovakia's regulatory approach, its practical implementation, and the long-standing collaboration model between grid operators and RPS. Protecting birds not only depends on the measures implemented, but is also about the processes and partnerships that enable them. Each country's regulatory, technical, and institutional context shapes the effectiveness of such efforts, and understanding these differences helps identify transferable lessons.

Bringing together over 40 participants from 13 European countries, including transmission and distribution system operators (TSOs and DSOs), environmental NGOs, technical experts, and public authorities, this event served as a catalyst for cross-border knowledge exchange and inspiration.

To facilitate this exchange, the event started with a half-day of workshop during which RGI presented successful initiatives such as SafeLines4Birds[1] and RISKY[2], and Slovak experts shared their success stories and lessons learned. The second day offered participants the opportunity to visit sites where best practices have been collaboratively implemented and to gain first-hand insights from Slovak experts. This document provides an overview of the activities and discussions carried out.

1 SafeLines4Birds is a LIFE project (2023-2028) aiming at reducing bird mortality along power lines in France, Spain and Belgium. 15 partners are involved in the project, across 5 countries.

2 RISKY is a digital platform that brings together open data and scientific knowledge on wildlife mortality caused by electrocutions and collisions at energy and transport infrastructures.

Day 1 – Workshop

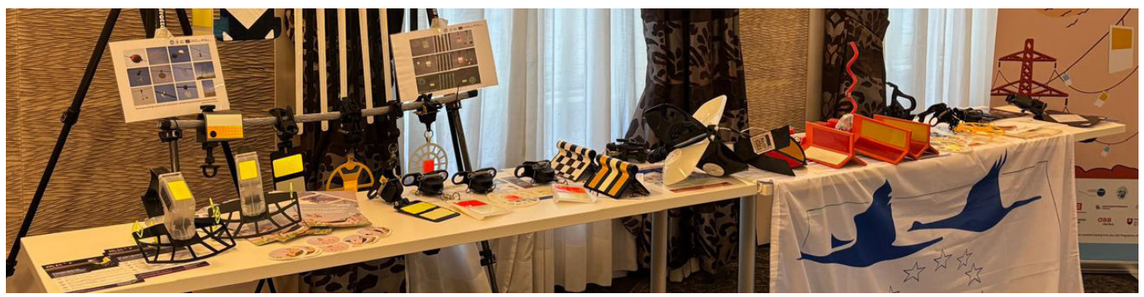
Key topics and outcome of discussions

1 Testing and evaluating bird-safe solutions

Studies demonstrate that targeted and well-designed mitigation measures can significantly reduce mortality of bird from collisions and electrocutions. To achieve optimal results, those solutions should be strategically implemented in areas with high bird activity, such as significant migration routes, to ensure maximum effectiveness. They should also be designed for long-term durability, using robust materials and construction methods that can withstand environmental conditions over time, thereby ensuring their continued effectiveness and minimising the need for frequent maintenance or replacement. Notably, when asked to prioritise between these two aspects, NGO representatives tended to value effectiveness more highly, whereas grid operators placed greater emphasis on durability.

Technological innovation plays a central role in improving the detection and prevention of bird mortality. For example, the use of infrared cameras or radar as sensor technologies can support the detection of mortality events; UV-lights as marking device or the utilisation of drones to install anti-collision devices more efficiently, can help reduce collision events. These tools can also provide continuous data for evaluation and adjustment.

Ecological monitoring once a solution is implemented, remains an essential counterpart to technical development. Complementary monitoring efforts, such as survey using cameras, are essential to evaluate the effectiveness of implemented measures, reinforcing the importance of ongoing, evidence-based validation. In projects such as SafeLines4Birds, innovative anti-collision devices, such as the Avian Collision Avoidance System (ACAS), are being tested along with their effectiveness thanks to daily carcasses searched, day and thermal video camera. Results will be published by the end of 2026.



Current practices across Europe show that collision and electrocution risks can be reduced significantly,[1, 2] when mitigation measures are strategically deployed, thoroughly tested, regularly reviewed and continuously adapted. The effectiveness of mitigation measures relies on a combination of carefully targeted design, the use of durable and field-tested devices, robust post-implementation monitoring, and adaptive management to maintain performance over time.

1 Verbelen, D., Bovens, W., Dwyer, J.F. & Swinnen, K. (2024). Wire marking reduces bird collisions with a transmission powerline in western Belgium

2 Tintó, A., Real, J. & Mañosa, S. (2010). Predicting and Correcting Electrocution of Birds in Mediterranean Areas. Journal of Wildlife Management

Day 1 – Workshop

Key topics and outcome of discussions

2 Standardised data and methodologies for bird risk assessment

Efforts to standardise how bird mortality is assessed and mapped represent a crucial step toward science-based decision-making at both regional and global scales. One key challenge lies in harmonising mortality data collection from countries with differing monitoring methods, and data accessibility. Without such standardisation, comparing results between regions becomes difficult, and the global prioritisation of effective mitigation measures is consequently hindered.

The RISKY project seeks to address this challenge. It provides a digital platform that integrates open data and scientific knowledge on wildlife mortality caused by electrocutions and collisions associated with energy and transport infrastructures. By offering advanced tools to analyse, predict, and visualise impacts on terrestrial vertebrate populations, RISKY supports more informed, transparent, and environmentally responsible decision-making.

Ultimately, collaboration across sectors and regions is essential to strengthen data quality, improve consistency in methodologies, and enhance the collective capacity to reduce bird mortality along power lines.

Standardised assessment of bird mortality risks is an important step in advancing evidence-based conservation. Platforms such as RISKY demonstrate how integrating diverse data sources can inform targeted mitigation solutions. Strengthening cross-sector and cross-border collaboration is key to building a unified framework for reducing wildlife mortality globally.

3 The Slovak experience – 20 years of strong cooperation

The Slovak experience demonstrates how long-term collaboration, robust legal framework, and adequate mitigation solutions can transform bird protection from a voluntary initiative into a national practice towards a common purpose and to achieve mutual benefits.

In 2003, a binding legal framework[1] established obligations and prohibitions regarding the protection of species, habitats, and landscapes, which provides the legal basis for enforcement by competent authorities today. In 2007, a second act[2] was adopted for preventing, mitigating, and remedying environmental harm caused by economic activities, including those related to energy infrastructure. In the context of the electricity grid, this legislation reinforces the responsibility of operators to prevent and address damage to protected species and habitats arising from collisions, electrocutions, or construction activities. It complements the 2003's act by ensuring that potential impacts are not only assessed during project planning but also monitored and, where necessary, remediated, thereby promoting stronger integration of biodiversity safeguards into grid development and maintenance. Finally, in 2020, a Precedent judgement of the Slovakian Supreme Court[3] confirmed that environmental protection takes precedence over commercial interests, further embedding biodiversity safeguards into the country's energy governance framework.

The LIFE Programme of the European Commission played a key role in strengthening collaboration between Slovakia grid operators and Raptor Protection of Slovakia.

1 **Act No. 543/2002 Coll. on Nature and Landscape Protection,** adoped on 25 June 2002, entered into force on 1 January 2003.

2 **Act No. 359/2007 Coll. on the Prevention and Remediation of Environmental Damage, adopted on 10 May 2007, entered into force on 1 July 2007**

3 Court Decision in Small Hydropower Case: The Public Interest Takes Precedent over Private Business, WWF Central and Easter Europe

Day 1 – Workshop

Key topics and outcome of discussions

3 The Slovak experience – 20 years of strong cooperation *(continued)*

The LIFE Energia project (2014-2019)[1] aimed to protect ten priority bird species affected by power lines in Slovakia. As part of the project, partners installed 8,755 diverters along 82 km of high-risk lines, reducing bird fatalities by collision by up to 94%. Nesting opportunities for Imperial Eagles and Saker Falcons were enhanced through 95 new nest boxes, eight of which were occupied by Saker Falcons that raised 18 juveniles. In total, 254 breeding attempts by five raptor species were recorded during the project.

Cooperation extended beyond national borders in 2020, with the LIFE Danube Free Sky project (2020-2026),[2] connecting grid operators and conservationists across the Danube river. Through this initiative, partners surveyed over 1,380 km of power lines to identify high-risk areas for birds and installed bird flight diverters on hundreds of km to prevent collisions. They also insulated hazardous poles to reduce electrocution and placed 370 nest boxes for species such as the Saker Falcon and European Roller. Around 10 ha of land were restored to improve habitats, and satellite tracking was used to monitor key bird species. The project also raised public awareness and promoted cooperation among stakeholders along the Danube region.

The Slovak example shows the value of cross sectorial cooperations, trust, and policy alignment. When clear legal obligations are combined with robust monitoring and collaborative relationships, systemic change becomes not only possible but sustainable for nature and grid infrastructure.

1 Raptor Protection of Slovakia was the coordinator of the project. Other beneficiaries were: VDS and ZSD (DSOs), University of Veterinary Medicine and Pharmacy in Košice and the State Nature Conservancy of Slovak Republic.

2 Raptor Protection of Slovakia is the coordinator of the project, along with 14 other project partners from 7 countries.

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Day 2 – Field visit
Summary and conclusions

On the second day of the learning excursion, Slovakian experts presented practical measures designed to integrate biodiversity into grid infrastructure operation and management. Participants visited a site beneath a section of 110 kV power lines to observe an Integrated Vegetation Management (IVM) initiative, where traditional clear-cutting has been replaced by selective vegetation management implemented by the DSO Západoslovenská distribučná. This approach, developed in cooperation with local hunters and supported by pond restoration, enhances biodiversity while maintaining network safety. The use of drone surveys by the grid operator enables precise annual monitoring, and early results show both reduced maintenance costs and improved habitat quality.

Another site visit allowed participants to observe anti-collision diverters implemented on a 22 kV lines (with FireFly or RIBE) and protective devices against electrocution to reflect on 9 years feedback and experiences with installed measures. We were joined by a Slovak ornithologist, who led a birdwatching tour along the Danube, and later by a drone company that works closely with RPS and Slovak grid operators to install bird flight diverters on power lines more efficiently.

Finally, we visited the nest boxes installed for the Saker Falcon on high-voltage pylons in collaboration with the Transmission System Operator, SEPS. Participants learned about the long-standing partnership between SEPS and Raptor Protection of Slovakia, which has focused on increasing breeding opportunities for this endangered species. Following decades of population decline caused by deforestation and hunting, Saker Falcons lost many natural nesting sites and began using areas near power lines for foraging. Through this cooperation, nesting boxes were installed on pylons to provide safe breeding sites, and today a significant portion of Slovakia's Saker Falcon population successfully nests on these structures thanks to these joint efforts.

These field activities allowed participants to witness first-hand how innovative technologies and collaborative approaches can mitigate environmental impacts and strengthen cooperation between grid operators and conservation experts. The discussions reinforced that the LIFE programme is essential for driving innovation, fostering cross-sector partnerships, and promoting data sharing across borders.

Conclusion

RGI's learning excursion in Slovakia demonstrated that integrating biodiversity into electricity grid planning and operation is achievable through trust-based collaboration, robust legislation, and adaptive management. The Slovak example showed how long-term cooperation between grid operators and conservationists can translate policy goals into lasting practices, which are essential to protection bird species and ensure the grid safety.

Across Europe, experience confirms that collision and electrocution risks can be greatly reduced when mitigation measures are well designed, tested, and regularly reviewed. Standardised monitoring and data-sharing platforms are essential for evidence-based decision-making and for strengthening cross-sector and cross-border cooperation.

The event also reaffirmed that EU initiatives like the LIFE Programme play a vital role in driving innovation, building partnerships, and ensuring that the energy transition advances hand in hand with nature conservation.

Contact

Manon Thiel
Manager – Energy and Nature
Renewables Grid Initiative

manon@renewables-grid.eu

Manfred-von-Richthofen-Strasse 4
12101 Berlin, Germany

Renewables Grid Initiative

renewables-grid.eu

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