

BIRDS' PROTECTION AND ELECTRICITY TRANSMISSION LINES



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Why do we talk about this?

How do high-voltage electricity transmission lines relate to birds?

The most comprehensive research on bird mortality resulting from collisions with power lines has been performed in USA and Canada, where the number of bird deaths reach 50 million each year. In Europe, research on bird collisions to overhead power lines (other than distribution lines) started back in the late 1960s. Already then, frequent occurrences of such collisions were recorded, and the number of bird deaths in, for example, bogged-up areas of Netherlands was 700 cases per one kilometre annually, and the number of collisions exceeded a million. Over a million bird deaths per year were also recorded in France. In West Germany, over 500 killed white storks were recorded in the course of 40 years, which represents a significant proportion of the population of this species in the country. And this is statistics for only few European countries. Unfortunately, we did not have any research done on this issue in Lithuania until now. However, the relevance of the problem in our country was revealed by the situations in locations often visited by people and characterised by abundance of birds, for example, Nemunas River area in Kaunas. Our country is rather rich in such places where there is abundance of birds at certain times with power lines running above. Bird deaths resulting from short circuit requires a separate discussion.

On the other hand, many are surprised to see white storks, ravens hatching on high-voltage power lines, and in the nests of the latter often settle kestrels or other falcons. In foreign countries, one can even observe nests of ospreys on such supports, and they are considered extinct in our country. Therefore, the necessity arises not only to protect such nests, which often can disturb electricity supply, but also to adapt respectively the high-voltage electricity transmission line poles by installing artificial nests. It is a widely used practice in many European countries, however, it is quite new in Lithuania.

How this knowledge could benefit us and birds?

Knowing the scope of the problem and its relevance in protecting local and migrating birds, respective actions are planned for its solution. Naturally, the existing power lines are not equally dangerous to birds. Therefore, there is a clear need to identify the most dangerous sections of power lines, and plan appropriate measures to protect the birds. Also, it is necessary to identify the reasons for bird deaths in specific sections the elimination of which would result in reduced or zero negative effects. What is more, records of birds hatching on power lines raise questions related to ensuring their protection. Maybe it is even worth enticing certain species to hatch on electricity transmission supports? This is what we discuss in this brochure.

It is necessary to mention that knowledge on the dangers caused to birds by high-voltage power lines and possible ways to reduce them is exactly what allows to plan appropriate practical bird protection measures and their implementation.



Migrating flocks of birds using electricity poles and lines as a place to take a rest

Birds and overhead power lines

Lithuanian overhead electricity transmission network

In Lithuania, power lines are divided into high-voltage transmission network and distribution network. The main function of these networks is supplying electricity to users, and most of them are 0.4 and 10 kV voltage power lines. Distribution networks in the country are managed by the state enterprise AB ESO. These networks are made up of 121,698 km power lines with 78.7% of them being overhead, and 21.3% – electrical cables. Meanwhile, Lithuanian high-voltage electricity transmission network consists of 400 kV, 330 kV and 110 kV power lines, the majority of which run overhead (underground power lines constitute a relatively small part), and these lines are the cause of death of some birds. The high-voltage network is operated by the state enterprise AB LITGRID. The company is responsible for the management and development of this network. Currently it covers 7029 km of power lines and 236 transformer substations and distribution units. Each year, AB LITGRID prepares a plan for the development of Lithuanian electricity transmission network, carries out reconstruction of network facilities, and builds new high voltage overhead and cable power lines.

What concerns the scope and diversity of bird protection measures, currently they are mostly implemented in the network of high-voltage transmission lines.

Local and international legislation

In the Republic of Lithuania, installation of power lines is regulated by the Rules for the Installation of Electrical Lines and Wiring approved by the Minister of Energy. These Rules set out the technical parameters of how the overhead power lines must be installed, specifies the distances, materials, layout of wires, and also installation of power lines across forests and above water bodies. The Rules also specify the distances from overhead power lines to water bodies, trees, and green spaces. The Rules does not provide for any specific requirements or recommendations regarding conservation of biodiversity, which is ensured while drafting technical projects. When building new overhead power lines or reconstructing the currently existing power lines in Lithuania, an Environmental Impact Assessment (EIA) needs to be carried out. During this assessment, especially in recent years, significant attention is paid to the protection of birds in sensitive ornithological areas. For these areas, EIA provides various measures to reduce negative effects on birds, also measures to ensure better protection are planned.

International regulations also obligate the relevant countries to ensure bird protection in all the sectors, including the energy sector. The European Commission notes that decrease and even loss of biodiversity result in significant environmental, economic and social consequences on the European, as well as on the global level. This is due to strong ethical and moral arguments that support protection of biodiversity irrespective of its direct value to people. Moreover, ecosystems provide plenty of services that directly and indirectly contribute to human welfare by providing us with food, freshwater and clean air, recreational and medical services, reducing natural disasters, pests, various diseases and regulating the climate. Therefore, in 2011 European countries adopted an ambitious strategy aimed at suspending the loss of biodiversity and ecosystem functions in the EU before 2020.

The Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats, or otherwise called Berne Convention, ratified by Lithuania in 1994, has adopted 110 recommendations in 2004 on how to reduce negative impact of electricity transmission lines on birds. The countries of the contracting parties are recommended to take measures to avoid the risks of short circuits and collisions. In 2011, an agreement was reached on the Budapest Declaration on Bird Protection and Power Lines, in which the EU



White Stork

institutions and national governments are called on by 2020 to implement the action plans to eliminate the dangers birds encounter due to power lines.

In 2002, the United Nations Convention on Migratory Species, also known as the Bonn Convention, which was signed by Lithuania in 2001, has adopted the Resolution 7.4 on electrocution of migratory birds. In this Resolution, governments are encouraged to adopt appropriate legislation and implement practical measures to ensure safe installation of the new power lines eliminating the risk of bird deaths. In 2012, the Bonn Convention and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), to which Lithuania joined in 2014, has published a review on migratory bird collisions with power lines in the African and Eurasian region and presented guidelines on how to prevent or mitigate the impact of electricity networks on migratory birds in Africa and Eurasia. The issues of short circuits, collisions and change of habitats have been reviewed. AEWA Resolution 5.11 (2012 m.) on Power Lines and Migratory Waterbirds urges the countries to implement the recommendations presented in the special guidelines.

Why birds get electrocuted by overhead power lines and supporting poles?

All over the world, as well as Lithuania, bird deaths caused by overhead power lines are divided into two groups:

- Resulting from collisions with power line wires;
- Resulting from electrical discharge occurring during a short circuit (electrocution).

The risk of collision with electricity transmission lines varies among different species of birds. Usually it depends on the bird size, weight, character of flying, field of vision, time of the day and the special features of habitats near the power lines. In the past, it was thought that the size and weight of the body of birds were the critical factors as large birds are not very maneuverable on the flight and not able to avoid collisions with power lines if discovered only at a close distance. However, the latest research, including those carried out in Lithuania, have shown that the larger percentage of dead birds was recorded to smaller birds. It turned out that such collisions are more frequent at places with high bird concentrations or on the routes of intense migration (boot-

leneck sites). Especially it is true for clusters of birds when those in the middle fail to discover the obstacle on time. Foreign studies have shown that greater risk is also observed in more abundant breeding areas (especially near already formed colonies). In this case,



Collision of a Mute Swan with high-voltage electricity transmission wires in Kaunas



Electrocuted Whooper Swan after collision with power lines



Electrocuted Rough-legged Buzzard after collision with power lines

frequent flights between food sources and nesting sites increase the risk of collision.

Bird vision is another important factor affecting collisions with power lines. Unlike humans, birds have better lateral vision, therefore, they do not immediately see an obstacle in front of them. Predatory birds have good binocular vision, i.e. they are good at seeing distant objects and not that good at seeing object close to them; and for waterbirds, the view is lightly blurred when on land, and clear when under water. Therefore, it is difficult for birds to notice overhead power lines. Birds who fly to food sources early in the morning or late in the evening find it difficult to see in twilight. For example, geese, ducks, and swans fly in large flocks from their resting places to food sources when it is half-light and hardly notice power lines of small diameter. In addition, birds that migrate at night, such as waders, herons, coots, trushes, robins, etc. are more sensitive to collisions compared to day-time migrants.

One of the additional factors that can increase the risk of collisions with electricity transmission lines is disturbance of birds when they are flushed by some source of noise and try to escape it. For example, in winter, kayaks in Kaunas violently scare the mute swans who gather there to winter. They fail to form up for the flight, and cover each other's fields of vision, thus resulting in collisions with the power lines. A similar situation is observed when farmers try to whisk away flocks of migrant birds from their fields. In non-urbanized areas, birds are often scared off by predatory birds. Scared birds rise without clear vision of the power lines on their way, and collide with overhead wires.

Short circuit, especially in electricity distribution network, causes electrocution of birds irrespective of the season. Meanwhile, in high-voltage electricity transmission lines, such deaths are more frequently recorded during certain periods. This is determined by the fact that this problem is relevant only for our largest birds, such as white storks, large predatory birds, especially those that land to rest on the supports above the isolators holding the power lines. For example, during the pre-migratory period of white storks (when these birds gather in the fields), more disconnections of high-voltage lines resulting from

short circuit are recorded in various regions of Lithuania. Often, the causes for such disconnections are storks. Stork droppings fall on the isolators causing an electrical discharge, and often the death of the “culprit”. In Lithuania, this problem also relevant to large eagles.

What birds suffer the most?

Most often, birds that have relatively wider and longer wings or have relatively large bodies, are less manoeuvrable and slower in flight face higher risk of colliding with the overhead power lines. Therefore, herons, waterbirds and predatory birds are more likely to be found dead under the electric lines, given their relative abundance. On the other hand, larger birds are easier to notice, therefore their deaths are recorded more often compared to small birds. In Europe, there have been recorded collisions of loons, grebes, cormorants, cranes, terns and gulls, pigeons, and owls. Fast birds flying in flocks, e.g. sandpipers, are also susceptible to collisions. Therefore, night-migrating birds, such as woodcocks, herons, robins, and thrushes are also often affected.

In Lithuania, during the implementation of the EU LIFE+ funded project “Installation of the bird protection measures on the high voltage electricity transmission”, most frequently recorded were deaths of night-migrating passerines, densely populated sandpipers and large waterbirds. Some electrocuted predatory birds were also found under the electricity transmission lines. For example, 72 sections of high-voltage electricity transmission lines in various locations of North and Middle Lithuania were inspected during the period from October 2017 until April 2018. During this period 51 dead birds (18 species) were found under the power lines in the mentioned sections. Most frequent among them were Plovers (8) and Lapwings (7). These species gather in large flocks in fields during autumn. It was rather unusual to find 4 partridges, which are relatively low flying and rarely seen birds. All the birds were found during cold season of the year under the lines located near unploughed stubble.

Sometimes bird bodies are found only under certain high-voltage electricity transmission lines. For example, under a relatively short electricity transmission line section in Biržai area, as much as 16 dead birds were found: 6 European Golden Plovers, 2 Mallards, a Lapwing, Mute Swan, few thrushes and Robins. Apparently, there is a sort of bird corridor formed between the two large forest arrays. Since wire visibility improving measures have not been installed in this section, AB LITGRID will be advised to do that before the next bird migration season.

When defecating while perched on the poles of the power lines white storks cause short circuit, which most often result in the bird's death. In the regions of our country where large flocks of these birds gather during the pre-migration period, 50 storks were electrocuted each year until special protection measures were implemented. The good news is that the analysis of data for 2016 has revealed that only 12 disconnections were recorded in the sections of high-voltage electricity transmission overhead lines with only 2 cases recorded in sections where special protection measures were implemented during the period of the above-mentioned project. This shows there is a real potential to reduce the number of deaths resulting from short circuits. Beside White Storks, there were also some predatory birds – Golden Eagle, Common Buzzard – found electrocuted under the high-voltage lines.

Possible benefits of electricity transmission overhead lines for birds

Electricity transmission overhead lines and their supporting poles create conditions for building nests. Ravens often make nests on metal supports, and each year lay another layer on the top of the nest, which



Ravens often build their nests on metal structures of power line supports



Visibility of wires improved with the help of white coils

makes it heavier and bigger each year. Ravens often settle on the top or inside the metal support. Hatching starts very early and the brood leave the nest as early as in May. The empty nests are sometimes occupied by kestrels. They are listed on the Red Book of

Lithuania. These birds do not build nests themselves and rather use the existing “infrastructure”. Unfortunately, following the applicable rules of operating electrical lines such nests must be removed after the hatching period ends. Most probably, ravens will build new nests the next year, however, kestrels will be deprived of the suitable conditions for taking over the nests as a result of the above-mentioned actions. Therefore, in many foreign countries, operators servicing power lines often install alternative breeding places for protected species of birds, e.g. kestrels or other kinds of falcons. In those countries, no one is surprised seeing special semi-open nesting-boxes (see the drawing) installed on high-voltage electricity transmission line poles. In some countries, even Ospreys build nests on such supports, only in such cases they should be protected. In Lithuania, such cases have not yet been recorded, however there are some in the neighbouring Belarus.



White Stork nest built on a concrete support

In addition, different species of birds constantly use high-voltage electricity transmission lines or supporting poles for resting or as a perch for hunting. This is especially characteristic to predatory birds, also the so-called passerine birds, pigeons, starlings, and the already mentioned White Storks.

Reducing the negative effects of overhead powerlines on birds

What are the possibilities to minimize that negative effects?

In many countries, bird deaths resulting from collisions with high-voltage power lines is considered a serious threat resulting in significant bird losses in some areas. As we have determined earlier, the scale of this danger is different and depends on the bird species. To solve this problem, various means are being used, e. g. marking power lines, proper handling and usage of the surrounding environment, reducing the risk of disturbance and frightening of the birds, as well as installing aerial power lines under the ground.

One of the ways to reduce the number of collisions into the present wires of powerlines (when there is no possibility to change them with underground cables) is to improve their visibility. For this purpose, various means are used, e. g. marking the wires with special spirals or bird diverters.

Spirals are special plastic rods, which are put on the wire according to its diameter. Bird diverters is a revolving device with reflectors, which is firmly pressed on the cable with a special spiral.

In Lithuania, special measures are being implemented to reduce disconnections of high-voltage powerlines due to bird-caused electrical discharge. Those measures prevent birds (especially storks) from landing onto the support constructions above the insulator. For that purpose, the wishbone-type equipment which prevents birds from landing onto dangerous places is used, as well as soucer-type insulator protections, which are firmned onto their garland and perform a “roof function”, thus dispersing bird droppings and preventing short circuits.

The wires in the distribution networks, near the insulator are being covered by insulating material at a certain distance from the latter. However it is hardly accomplished in the case of high-voltage powerlines. It is also important to make the territories less attractive for birds, as well as reducing certain forms of agriculture which attracts migratory birds, e. g. ploughing or haying fields during certain periods of time, growing bird-attracting cultures under the powerlines or near them.

Therefore, during the storks' premigratory periods (July and August) field ploughing or haying, or



Bird flight diverter structure designed in such a way so as to reflect light while rotating



White spirals improves visibility of wires



The wishbone prevents birds from landing above the wires



The bird flight diverters improving visibility of high-voltage electricity transmission lines in Kaunas near hydroelectric power station

sowing bird enticing cultures is not recommended in such places.

What is the effectiveness of enhancing visibility of wires and reducing short circuits; and what external factors are important to achieve a favourable result?

One of the additional factors for the collisions of birds into the overhead powerlines is the disturbance of the birds, when birds are scared and fly rushing about. For example, in Kaunas, kayaking in winter makes falling into rank too complicated for unexpectedly frightened swans. They fly rushing about, consequently closing sight for each other, and collide into wires.

In non-urbanized territories birds often are frightened by predators, the predator mammals or White-tailed Eagles. Frightened swans, geese, and sandpipers do not see overhead electrical wires in front of them when starting off.

Enhancing the visibility of wires is widely applied also when setting up new powerlines, firstly in the territories where concentration of birds is really large and secondly, when the alternative places for the lines are not possible. Increasing visibility of wires reduced the number of bird collisions into the powerlines by 60–90 per cent. It is an excellent result, keeping in mind that fully positive effect is practically impossible without removing the cause.

However, saving lives for thousands of birds is possible. The same situation is observed with respect to means aimed at reducing bird deaths resulting from short circuit. As a result of implementation of the project in Lithuania, the number of deaths of white storks was reduced by 90 per cent. Creating the appropriate environment which is not bird-friendly or at least does not offer more attractive feeding conditions compared to other surrounding territories also reduces the number of bird deaths resulting from the collisions with the wires by 80–95 per cent.

Projecting new overhead transmission power lines is the most effective means

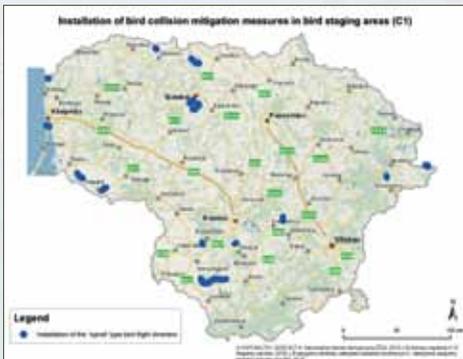
EC and international bird protection organisations, selection of suitable places for new power lines is considered as a priority and the most effective means of reducing the number of bird deaths caused by collisions with the power lines. Therefore, when projecting new transmission power lines qualified evaluation of their influence on biodiversity must be performed identifying the places with increased risk of bird collisions with wires. Such places include seasonal staging





Common Kestrel juvenile on electricity pylon with protective measures with Wishbone and Saucer type protection

places of waterfowl, waders and gulls; pre-migratory staging areas of storks, and regular feeding territories of predatory birds, as well as areas surrounding abundant colonies of birds. Roosting spots are of high collision risk because birds return there and fly for food in twilight, when the visibility of the transmission wires is the worst. When flying in flocks, they notice obstacles at the last moment when there is already no time to avoid collision. However, the most dangerous electrical transmission lines are the ones which cross the places where bird migration flows intermingle open fields inside big forests, river meadows, large water bodies, especially the Baltic Sea and the Curonian Lagoon. Extremely sensitive are bird wintering sites where abundant flocks of birds stay for longer periods of time. Such places in Lithuania are the Nemunas River down from Kaunas HE, and regional dumping sites with thousands of birds constantly staging there. Fishery farms with their ponds and the surrounding areas



are also areas with increased collision risk, because many birds stay there during migratory seasons, as well as in summer. Therefore, new transmission lines should not be planned in such places, as well as near big colonies of birds where birds would cross an increased risk zone when flying around for food. If it is unavoidable, it is better to put power lines along the risk zones rather than across them. In this way the risk of direct collision while flying is reduced. According to studies, locating overhead lines more than 500 meters away from the birds' concentration areas significantly reduces the chances of birds' collision with the wires. Thus every situation needs to be evaluated by qualified and experienced experts taking into account different species and surrounding peculiarities.

Artificial nests installed on the electricity transmission overhead line supports as a new opportunity to increase the number of rare birds.

There is no such practice used in the world to attract large birds to nest onto the supports of high-voltage overhead power lines is not used. However, in some cases when it does not cause disturbances to electrical transmission or maintenance of power lines, the nests of rare and endangered birds – white storks, ospreys or, in some cases, ravens are protected. Meanwhile, the practice of putting up artificial half-opened nesting boxes for different falcon species is widely applied all over the world. In Spain or Scandinavia, no one is surprised seeing special semi-open nesting-boxes (see the drawing) installed on high-voltage electricity transmission line poles; large part of their population breed in these nesting-boxes. In Hungary and other countries, the nests of similar type helped to improve the situation with the population of the saker falcon. The supports of power lines kept falcons safe from predatory mammals.

Up till now, from 150 to 300 pairs of common kestrels were constantly breeding in Lithuania. Ecological capacity of habitats in Lithuania would allow for much more. However, one of the factors limiting abundance and spread of the species was the lack of places suitable for breeding, or unsuccessful breeding caused by predators. Therefore, during the project, areas most suitable for kestrel breeding were chosen and 530 nesting-boxes were installed in those areas onto high-voltage overhead lines. The first nesting-boxes were occupied during the first year after they were put up. Later, the number of occupied nesting-boxes grew by 30 percent each year. In 2017, successful kestrel breeding was observed in 65 nesting boxes out of 400. As a result, the number of breeding kestrel pairs in Lithuania has grown by 20–40 percent. On the average, there were 5.2 of juveniles in one nesting-box. Ferro-



Common Kestrel juveniles in the nest box erected on electricity pylon



Citizens also installed several nest boxes in the city of Klaipeda



Common Kestrel nesting box dimensions should be 310 cm in height, 310 cm in width and 500 cm in length

concrete support constructions is a great place for bird breeding: these constructions are safe from predators, the nesting-boxes may be hanged near feeding places. The growth of the number of occupied nesting-boxes was noticed in those places which the previous year were occupied by at least one breeding pair. Possibly, youngsters return to surrounding areas of their home nests. Therefore, we may conclude that installation of the special nesting-boxes over high-voltage transmission lines was successful and made the population of the species to grow in our country.

The white stork protection initiative in Lithuanian electricity distribution networks.

Although this brochure is essentially aimed at addressing the problems of bird protection in high-voltage electricity transmission networks, successful bird protection initiatives in electricity distribution networks are also worth mentioning. One of them widely applied in Lithuania was installation of artificial nesting-sites (platforms) on low-voltage power line poles. This initiative was launched during implementation of the ES LIFE project “Conservation of White Storks (*Ciconia ciconia*) in Lithuania” by Lithuanian Ornithological Society and partners during 2009-2013. The platforms were installed in the previous nest-sites in order to protect Storks from short circuit and prevent disturbances of electricity transmission for consumers, which occurred in some previous years due to the birds or their nests. During the project, the public company AB LESTO, which was the electricity distributor in Lithuania at that time, installed 3260 of such platforms. This successful practice is worth to be continued even after the end of the project, however, we get information from people that new artificial platforms no longer are installed after taking down the old stork nests.

The role of society.

There are various ways for the society to participate in implementing bird conservation means in electricity transmission network. While setting up special means for birds’ protection electricity should be temporary disconnected, and special equipment must be used, therefore, the generic public cannot directly join such activity.





Pre-migration flocks of White Storks often suffer from high-voltage electricity transmission lines

However, environmental NGOs may initiate projects, including the issue of bird protection in relation to power grids. This may be illustrated by the both projects implemented by the Lithuanian Ornithological Society and the partners mentioned in this brochure. The projects were aimed at bird protection in relation to high-voltage power lines as well as in electricity distribution networks.

However the role of society remains very important for carrying out various monitoring programs. Currently, LOS and the responsible environmental institutions receive information from the citizens about duly maintained stork nests installed on electricity transmission poles as well as about the cases when such nests were taken down. Such information not only helps to find the offenders and prevent possible violations in the future. Therefore, the role of society in relation to this problem is of essential importance for conservation of white storks (especially because more than a half of the nests are installed on the power lines supports). The other important problem which needs a special support from the society is recording of the number of

electrocuted birds and identification the most sensitive areas. Rather fragmentary studies showed that sometimes even very short sections of power lines many be very dangerous and cause regular deaths of birds in certain seasons despite the neighbouring power lines do not cause any environmental issues. Identification of such places is of extreme importance. For this purpose, a special brochure has been issued by LOS, and distributed in schools.

Unfortunately, we still lack significant participation of the society.

More information about protection of birds near the high voltage electricity transmission lines can be found on the website <http://www.birds-electrogrid.lt/>.



18 billboards have been put up in different places in Lithuania near the installed protection measures during implementation of the project

What has been achieved with the project funded by the EU LIFE + program

The Lithuanian Ornithological Society (LOD), together with its partner LITGRID, has carried out a project funded by the EU LIFE + Program “Implementation of Bird Protection Measures in Lithuanian High-Voltage Power Transmission Grids” during 2014-2018. It has been aimed at achieving the following main goals:

- To improve the protection of migratory, wintering and certain breeding bird species by reducing the negative impacts of high voltage power lines on their populations;
- To support the breeding population of kestrels and other species of falcons with the help of special protective means.

To achieve these goals, the following main tasks have been implemented:

- The level of bird mortality in their concentration areas caused by collision of birds with wires was significantly reduced due to installation of special (high visibility) devices over high voltage power transmission grids;
- The number of white stork deaths caused by electrocution was significantly reduced by setting up special protection devices on high voltage power transmission grids;
- Breeding conditions for common kestrel (*Falco tinnunculus*) were improved with 530 nest-boxes installed on high-voltage power transmission poles in Lithuania.

For this purpose, four practical activities aimed at protection of birds have been implemented, the results of which are presented below:

- Installation of special measures to reduce the risk of bird collision with power lines in important bird staging places and in the places that are most dangerous for birds in this respect in Lithuania. These special measures have been implemented in the pre-selected sections of power lines (usually the thinner lightning conductor) amounting 80 km in length; they included 5993 spiral type and 2624 bird flight diverter type markers, which greatly increased the visibility of the wires. Such measures aimed at reducing the risk of bird collision with electricity transmission wires included all the most important bird staging places that are currently known to have high-voltage transmission lines crossing overhead.

• *Installation of bird protection devices (wishbone type devices and larger saucer type insulators) on high voltage transmission poles in Lithuania.* In total, 10,333 wishbone-type devices and 6,657 saucer-type type insulators were installed on several thousand supports from the start of the project. LOD has selected certain sections of a high-voltage power transmission network that crosses the living quarters of breeding storks, and accordingly, which can be considered as the most important ones, in order to electively protect the local population of white storks. The implementation of these measures has led to a significant reduction of the deaths of White Storks and other large bird species due to short-circuit.

• *Lifting nest-boxes for falcons.* During the project, 530 nest-boxes were installed on the high voltage transmission poles, and many of them were occupied during the project implementation (in 2017, 65 nest-boxes were occupied, which made up almost one fourth of the national population of the species). Most nest-boxes were occupied near larger cities - Klaipėda, Alytus, Kaunas and Vilnius.

The effectiveness of the project activities was evaluated through monitoring of the progress and effectiveness of the project activities.

A significant part of the project involved various public information activities: information stands installed at the project venues; a film on bird electrocution by power lines, an international seminar where participants shared their experience on implementation of bird protection measures in different countries on high-voltage lines; launching of the project website; publications on the project and the problem being addressed; spreading information by means of various media, etc.

Project partners

LITHUANIAN ORNITHOLOGICAL SOCIETY (LIETUVOS ORNITOLOGŲ DRAUGIJA – LOD) is a non-governmental organisation that unites the people of Lithuania who care about protection of the wildlife, who protect and observe birds and their environment, are concerned with environment conservation and ecological education of general public, as well as carry out their civil duty to participate in shaping the environment protection and biodiversity conservation policy.

Since 1994, LOD has been a representative in our country of Birdlife International, the global partnership of non-governmental conservation organisations working in more than 100 countries, with a special focus on protecting birds and their habitats.

We believe, that through our joint efforts, enthusiasm, knowledge and experience of the members of the Society, we will achieve more efficient protection of birds and the entire wildlife that surrounds us, and ensure it is actually implemented.

LOD is a non-governmental membership organisation incorporated in a form of an association. It is the largest conservation membership organisation in the country.

Every citizen can be a member of the Society by paying a membership fee.

The Society unites people of various interests: professional researchers, birdwatchers, naturalists, farmers, foresters, teachers, students, and other citizens who care for Lithuania's nature.

Join us, and become a member of LOD!

Whether you just start to discover your interest in our feathered friends and their fascinating world, you are welcome to join the like-minded people and give your voice for conservation of birds and their habitats. Everyone who loves birds and the wildlife, and cares for their future are welcome to join the LOD.

Together we can do more!

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AB Litgrid is the only electricity transmission system operator in Lithuania. The company is responsible for management and development of the Lithuanian electricity transmission network.

The main function of the operator is to maintain efficient and reliable operation of the Lithuanian electricity system, ensuring the integrity and interoperability of the electricity system of the country as well as management, operation and coordinated development of the transmission network and connecting lines with other electricity systems. Lithuanian electricity transmission network of 400–330–110 kV comprise of 236 transformer substations and distribution units and 7029 km of electricity transmission lines.

Users of high-voltage power transmission network are provided with electricity transmission service ensuring equivalent conditions for connecting to and using the transmission network. In addition, the company arranges connection of equipment of users, distributors, and producers to the transmission network, carries out and maintains electricity accounting of the transmission network.

AB Litgrid is responsible for reliable operation of the Lithuanian electricity system transmission network, connecting lines, and other electricity systems. The company also provides additional services required for safe, reliable and high-quality operation of the electricity system: engages in planning and coordination of electricity transmission network topology as well as prevention and elimination of malfunctions and failures.

Every year, AB Litgrid plans the development of the Lithuanian electricity transmission networks, and reconstruct network facilities: high voltage electricity transmission lines, transformer substations, and build new high-voltage overhead power lines and cable lines. Moreover, the company is also working to implement the country's strategic goal to reorient the electricity system towards synchronous operation with the electricity networks of continental Europe.

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