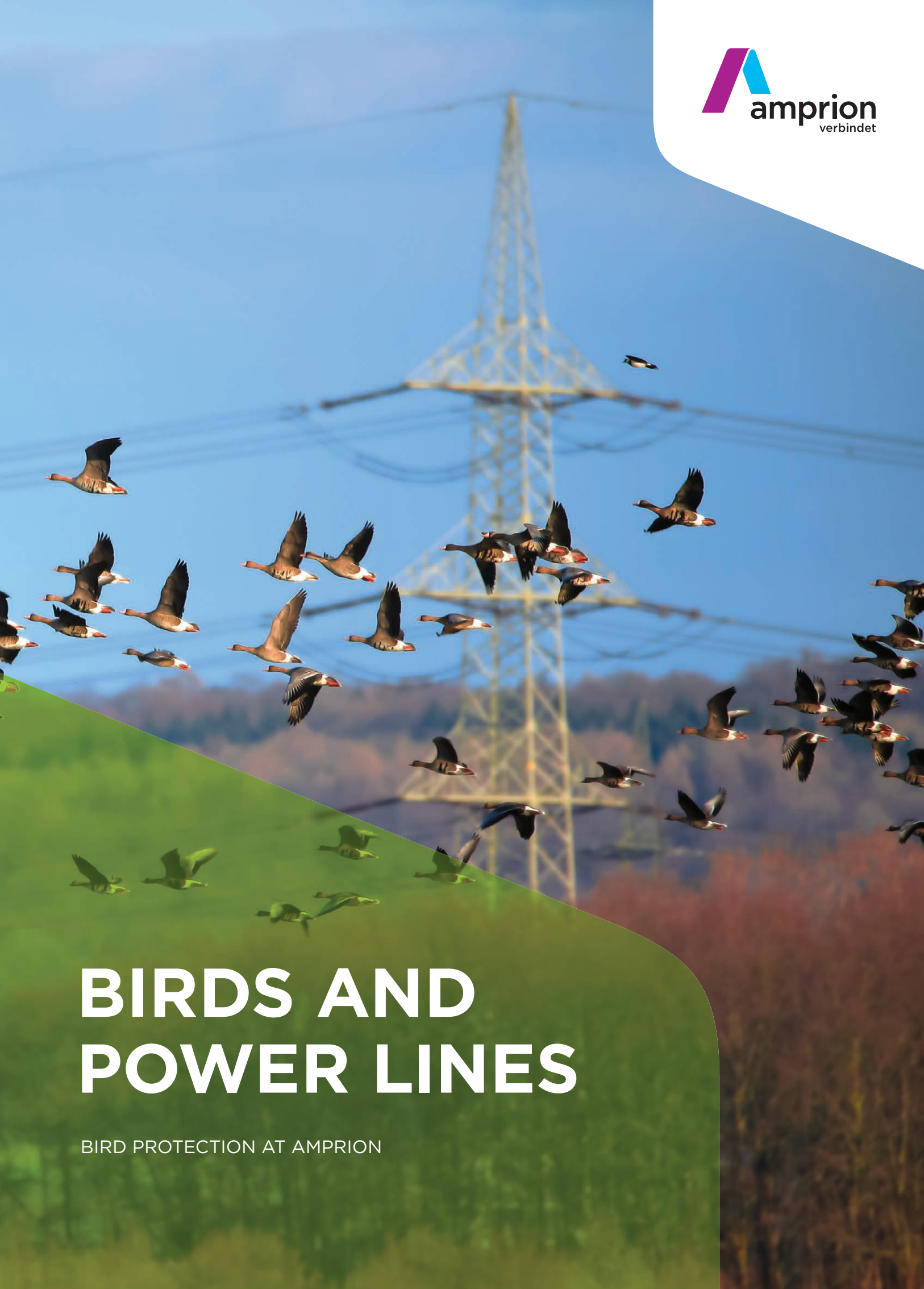


amprion
verbindet

BIRDS AND POWER LINES

BIRD PROTECTION AT AMPRION

A BRIEF PROFILE OF AMPRION

Amprion is **ONE OF FOUR TRANSMISSION SYSTEM OPERATORS** in Germany.

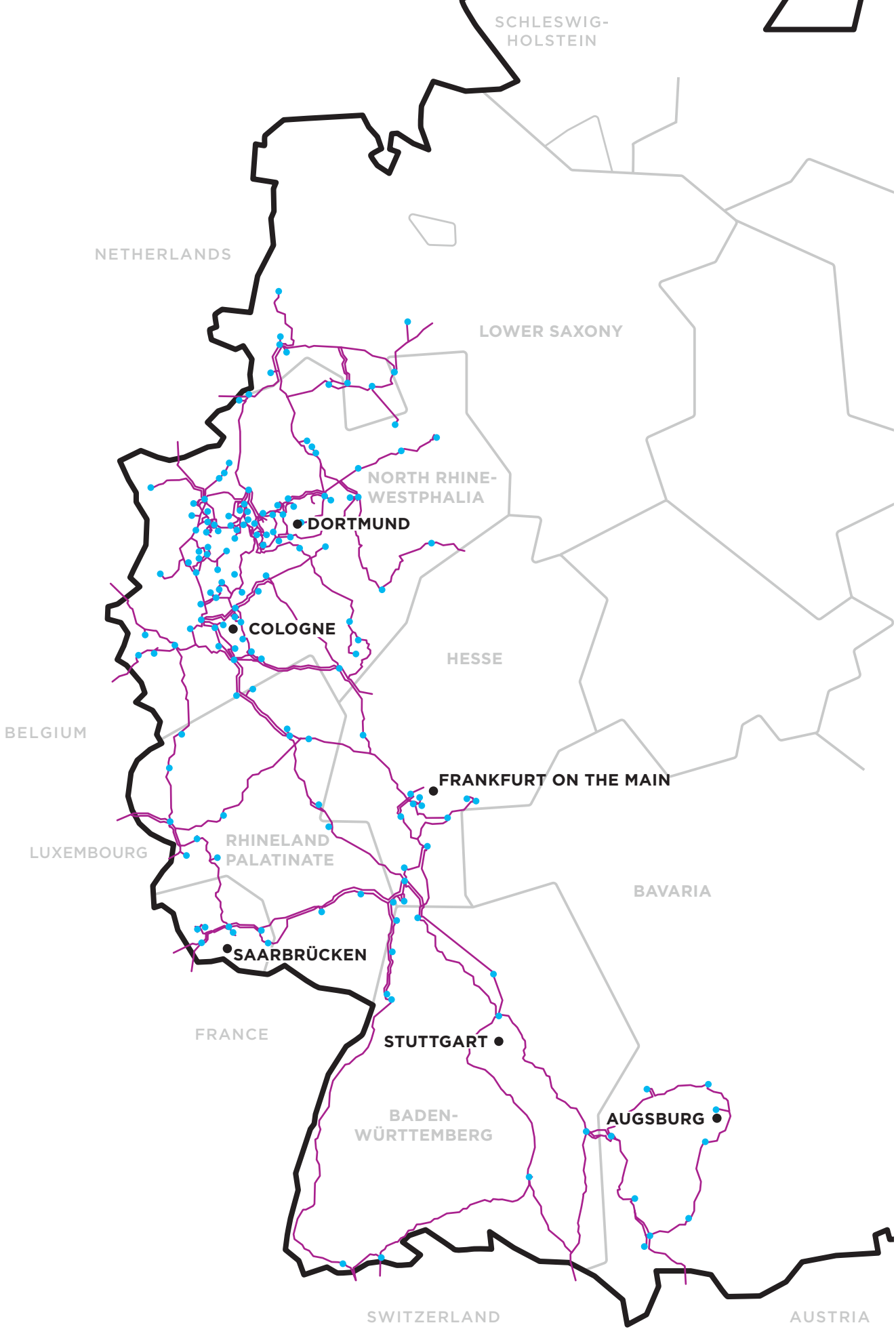
Our power lines are the lifelines of society. They transmit electricity all the way from the North Sea to the Alps.

We ensure a stable and reliable electricity supply for **29 MILLION PEOPLE** in our grid area.

By 2030, **80 PER CENT** of the electricity is to come from renewable sources. To achieve this feat, the transmission grid needs to be expanded.

By 2026, the company will have invested around **12 BILLION EUROS** in the conversion of the energy system.

We plan, build and operate our grid on the premise of economic and and ecological sustainability. Our transmission line routes are the habitat of numerous animal and plant species. For this reason, Amprion is involved in many aspects of nature conservation and environmental protection and, for the past 25 years, has been particularly involved in bird protection on extra-high-voltage overhead lines.


SCHLESWIG-
HOLSTEIN
NETHERLANDS
LOWER SAXONY
NORTH RHINE-
WESTPHALIA
DORTMUND
COLOGNE
HESSE
BELGIUM
FRANKFURT ON THE MAIN
LUXEMBOURG
RHINELAND
PALATINATE
BAVARIA
SAARBRÜCKEN
FRANCE
STUTTGART
BADEN-
WÜRTTEMBERG
AUGSBURG
SWITZERLAND
AUSTRIA
transmission lines
substations

CONTENTS

Christin Osadnik

Stefanie Holm

DEAR READERS,

The protection of birds is a key topic of concern for Amprion. Our recognised commitment in this area has developed over 25 years. Our dedication is characterised by close cooperation with the fields of science and nature conservation. The beginning of our engagement was marked by research projects carried out in cooperation with bird protection observatories, universities and associations in which we investigated the risks of our overhead power lines for birds. This led to measures that are now an integral part of our overhead line management strategy. To ensure effective bird protection, Amprion also works with nature conservation associations as important professional partners. We will continue to work with experts on various measures and projects in the future. As we actively protect nature and species on our overhead lines, bird protection is also a central component of Amprion's sustainability strategy. In this brochure, we present our approach in more detail.

Yours sincerely,

Christin Osadnik
Environmental planning and
nature conservation

Stefanie Holm
Environmental planning and
nature conservation

THE WORK OF AMPRION
GRID EXPANSION FOR THE ENERGY TRANSITION

The electricity grid is structured similarly to the road network: there are routes for long-distance traffic – the transmission grid – and routes for local traffic – the distribution grid. Four transmission system operators are responsible for the "long-distance transport" of electricity in Germany. One of them is Amprion. Our transmission grid extends over 11,000 kilometres in an area stretching from the North Sea to the Alps. Our power lines are the lifelines of society. They transmit electricity for millions of people and thousands of companies, securing both quality of life and jobs. We keep the grid stable and secure so that the lights always shine.

CHANGING ENERGY LANDSCAPE

Germany wants to limit the impact of climate change and is relying on renewable energy to do so. Electricity from renewable sources is generated in the North Sea region, while the main consumption is concentrated in the west and south of Germany. Therefore, more and more electricity needs to flow through the grid. Amprion is paving the way for the energy transition and driving forward the expansion of the grid, thus fulfilling its legal mandate.

RESPONSIBILITY FOR NATURE AND THE ENVIRONMENT

We plan, build and operate our grid under the premise of economic and ecological sustainability, which also includes preserving the diversity of existing habitats for plants and animals. We have been committed to designing a bird-friendly grid for more than 25 years.

HOW BIRDS USE OVERHEAD POWER LINES
ELECTRICITY PYLONS AS A HABITAT

The German transmission grid consists largely of overhead power lines. They run for long distances through fields, meadows and forests and cross the habitats of many different animals – including numerous bird species. However, how they affect birds depends on a variety of factors. These include the location and shape of the overhead line, but also the flight, hunting and breeding behaviour of the species present. While overhead power lines can be an obstacle for some bird species, other birds use the pylons as breeding sites and benefit from them.

WHY BIRDS SIT ON ELECTRICITY PYLONS

The picture is familiar: especially after the breeding season and during autumn migration, flocks of birds sit directly on the electricity pylons. Besides swallows, starlings and thrushes, it is mainly pigeons and corvids. Some birds of prey use the pylons as lookouts in order to spot prey on the ground. Most common among them are kestrels and buzzards.

ELECTRICITY PYLONS AS A BREEDING GROUND

In addition, birds have varying requirements for their breeding sites – some species breed on the ground, while others nest in lofty heights. However, in some regions of Germany, there is a lack of suitable breeding sites such as trees or rocks. In this case, ravens and birds of prey in particular breed on electricity pylons. In many cases, birds even prefer the high-voltage pylons – even if other breeding options are in the immediate vicinity and offer optimal conditions. For this reason, grid operators install species-specific nesting aids on their electricity pylons in certain areas (see also page 14).

The advantage of electricity pylons is that due to their height, they offer safety from some nesting enemies. Due to their solid construction, they also provide a stable support for the nest. A true "power pole specialist" is the osprey in its northeast German breeding area. White storks, ravens, rooks and magpies also use the steel nesting sites. Sometimes there is even a subsequent use of the nests, as the Eurasian hobby, common kestrel and peregrine falcon, which do not build their own nests, like to raise their offspring in abandoned crows' nests on electricity pylons.

THE CLAIM: SUSTAINABILITY
CONSIDERATION FOR PEOPLE, WILDLIFE AND THE ENVIRONMENT

Amprion sees itself as a sustainable company. The protection of people and nature has a high priority for us. That is why one thing is important to us in all our projects: the construction and subsequent operation of the transmission grid should have as little impact as possible on people, wildlife and the environment. In this respect, we always comply with legislatory requirements at state, federal and European Union level at all times and often go beyond them.

GRID EXPANSION IN HARMONY WITH NATURE

Grid expansion is indispensable for the success of the energy transition. It is the only way to achieve the ambitious climate goals of the European Union and Germany. However, this requires interventions in nature. In order to conserve resources and thus people and the environment, Amprion is doing its best to optimise the existing grids. The grid will only be expanded when this is no longer possible. If new line corridors become necessary, nature conservation will play an important role – alongside economic efficiency, the interests of the population and technical concerns, which are also taken into account by legislators.

FROM THE BEGINNING OF THE PLANNING

When planning and expanding our extra-high-voltage grid, we always check and take into account the location of a planned overhead line in the surrounding area and the assets that may be affected. These include not only people but also wildlife, plants, water and soil. Considering the various objects requiring protection is contained in the approval documents that we submit to the respective competent authority. We try to avoid areas where we cannot sufficiently minimise disturbances to birdlife at an early stage in the planning when building new overhead power lines. In areas where we cannot exclude the possibility of disturbance to birds, we use protective measures (see page 10).

PLANNING SPECIES PROTECTION CORRECTLY
THE LEGAL FRAMEWORK

Amprion aims to avoid or minimise potential environmental impacts with the help of professionally based measures. To this end, Amprion strictly adheres to the applicable legal requirements, in particular the Federal Nature Conservation Act, when planning and constructing grid expansion projects.

ENVIRONMENTAL STUDIES ON THE PROTECTION OF WILDLIFE AND PLANTS

In order to protect endangered wildlife and plants, the Federal Nature Conservation Act stipulates bans on disturbing, killing and damaging reproduction and resting places. In Germany, for example, this includes all native bird species in Europe. The regulations also apply comprehensively outside protected areas, i.e. wherever the species in question are to be found. During the planning and approval of power lines, we usually commission detailed environmental studies. These aim to examine the impact of the project on the various protected assets to enable them to be taken into account when selecting variants. These studies are carried out by environmental experts. If, for example, they determine a risk for a certain species of animal or plant, measures must be taken to preserve and protect it.

Governmental agencies are also involved during the approval process. The licensing authorities examine the results of the environmental studies and the planned protective measures. If the public-law notice of approval contains nature conservation requirements, Amprion is obliged to comply with these when constructing and operating a transmission line. These requirements ensure the protection of wildlife and plants.

COMPENSATORY MEASURES: GIVING SOMETHING BACK TO NATURE

The construction of new power lines also has an impact on the natural environment and the landscape. As a first step, we always try to keep these impairments as low as possible or avoid them altogether by implementing so-called avoidance and minimisation measures. If an impairment cannot be avoided, legislation prescribes compensatory measures. Based on our environmental studies, we determine how many compensatory areas are required for a project.

We agree in detail on which measures are appropriate with environmental experts, local authorities, landowners and the relevant licensing authority. Depending on the region and the animal or plant species affected there, a variety of measures may be suitable. Among other things, we plant orchards on former intensively used fields, integrate species-rich flower strips and so-called lark windows in farmland, and are involved in the renaturation of peatlands – measures from which many bird species benefit.

NATURA 2000 – NETWORK OF PROTECTED AREAS IN EUROPE

The European Union has also set itself the goal of preserving biological diversity. This is to ensure the survival of animal and plant species and their habitats in the long term. The most important legal instruments in this respect are the European Birds Directive and the Habitats Directive. These directives form the basis for the European network of Natura 2000 sites – an interconnected network of ecological protected areas.

Amprion plans power lines so that their construction and subsequent operation do not have any significant negative impact on the conservation objectives of the protected areas. Only then is the planning compatible with international guidelines and their implementation in the Federal Nature Conservation Act.

BIRD PROTECTION AT AMPRION
MEASURES TO CREATE A BIRD-FRIENDLY GRID

Amprion has set itself the task of improving bird protection in the extra-high-voltage grid. In doing so, we have made a lot of progress and always remain in dialogue: for example, Amprion initiated a symposium on the topic of "Birds and overhead lines", at which speakers from various institutions and environmental service providers shared their knowledge and experience.

BACKGROUND: OVERHEAD POWER LINES AS AERIAL OBSTACLES

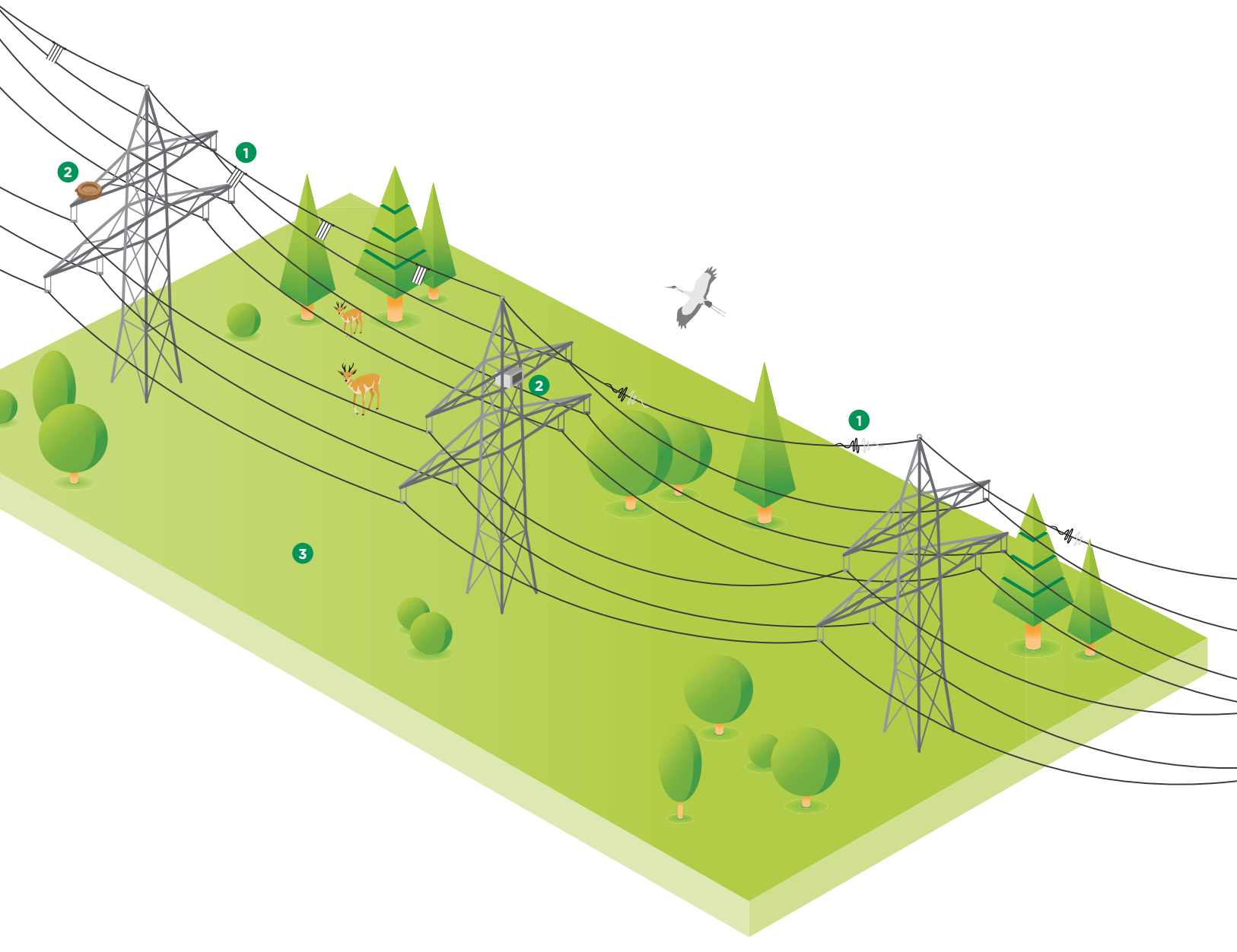
While some bird species benefit from overhead power lines, they can also become a hazard for others – because some birds may possibly collide with the wires of the overhead power line during flight. How high the risk is depends, among other things, on the bird species, its body size and agility, and its eyesight. On the other hand, influences such as the weather and the structure of the surroundings can also play a role. Strong winds, for example, make it difficult for birds to manoeuvre, while heavy rain, fog or sunshine can impair their vision and make it difficult to recognise the overhead line.

For this reason, ornithologists have systematically investigated our grid area to identify the sections of power lines that pose an increased risk of collision. To do this, the experts determined the so-called avifaunal risk potential. It describes the probability of bird collision risk depending on the area and the bird species that live there. We then equipped all relevant sections of the Amprion grid with bird protection markers.

The configuration of the overhead line also plays an important role, as the current-carrying conductors are suspended in bundles of two or four wires.

These bundles are better recognised by birds than single wires. Additional features such as bundle spacers further enhance this effect. However, the ground wire running above the top of the pylons, which serves to protect against lightning strikes, is less visible to birds than the bundled conductors. Amprion is therefore placing bird protection markers on the ground wire in relevant areas.

The risk of birds suffering an electrical accident in the high-voltage grid is very low. Electrocution on conductors is only possible if there is an electrical voltage between two parts of the body. On high-voltage and extra-high-voltage lines, the distance between the conductors of different phases is so large that it cannot be bridged even by large birds. All pylons at Amprion are erected in such a way that birds are protected from electrocution.



1 **Bird protection:** Reduce the collision risk for birds by installing bird protection markers on the ground wires.

2 **Pylons as breeding sites:** If required, securing the nests or installation of species-typical nesting aids.

3 **Integrated Vegetation Management:** Through targeted maintenance measures, interventions in nature and landscape are minimised, valuable areas are preserved and at the same time reliability of supply is guaranteed.

SEEING THE WORLD WITH DIFFERENT EYES

Birds do not see the world the way we humans do – and not all bird species have the same vision either. Owls, for example, have excellent night vision, but their vision is less focused on sharpness than on light yield. Peregrine falcons, on the other hand, as day hunters, can spot and track small objects such as prey birds over distances of more than a kilometre. Many species have an additional colour receptor for violet light in the ultraviolet (UV) range. Kestrels, for example, can recognise from the air whether mice are on the move because their urine glows in the UV range. Starlings, on the other hand, can see the ripeness of fruit through their special colour vision. The ability to see spatially is also different in birds than in humans, and in many species it is limited.

Due to their anatomy, some bird species have an increased risk of colliding with overhead power lines. The decisive factor – apart from manoeuvrability – is the configuration of their field of vision. Birds whose eyes are located on the side of the head and whose forward vision is severely restricted are particularly affected. Other species, for example, do not direct their gaze straight ahead in flight but to the ground when searching for prey. In both cases, the birds may not perceive the overhead power lines as an obstacle in the air early enough. Agile flyers can then sometimes avoid the obstacle in time, but bird species with lesser flying skills do not always manage to do so.

The black and white bird protection markers are mounted on the ground wire with the help of a helicopter. The poorly visible wire is thus better recognisable for birds.

MARKERS FOR BETTER VISIBILITY

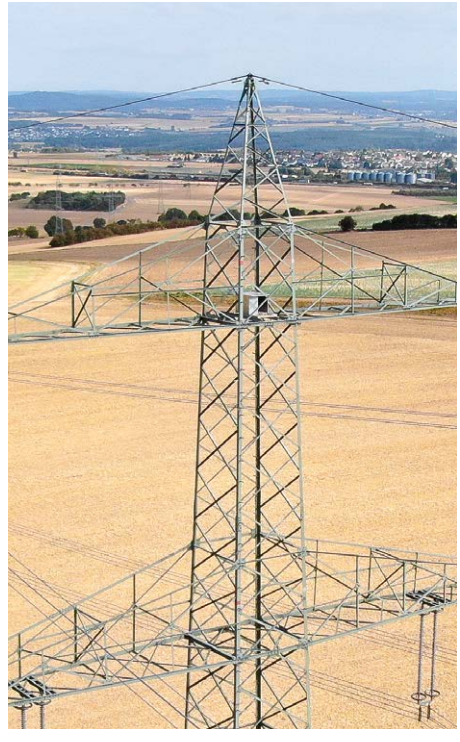
Various types of bird protection markers have been successfully used for several decades. The aim is to make power lines more visible to approaching birds. This is done by attaching bird protection markers to the ground wire which is less visible. So-called bird protection flags or spiral markers are used. Both types of markers have a high-contrast black and white colouring, as this is easily visible to birds even in bad weather. Before-and-after comparisons in different regions of Germany show that this reduces the risk of collision – depending on the bird species and marker type – by 60 to 90 per cent.

NEST MANAGEMENT AT AMPRION

For some bird species, electricity pylons are particularly suitable as nesting sites. In many cases, nesting on the pylons is not critical for the operation of the overhead line. If, for example, necessary maintenance work or construction measures have to be carried out that cannot be postponed to a time outside the breeding period, experts check whether the birds are disturbed by the construction work. If this is the case, various measures can be taken to protect the birds and their nests. Even if birds build their nests in unsuitable locations on the electricity pylon, these must be relocated to protect the animals and ensure safe line operation. For this purpose, a so-called "nest management concept" was developed with the participation of experts and environmental associations. This concept includes various coordinated procedures for the protection of birds during construction measures and for the operation of the transmission line, as well as the development of nesting aids that can be attached directly to the pylons.

NESTING AIDS ON OVERHEAD POWER LINES

As part of our commitment to bird protection, we equip certain sections of power lines with nesting aids and enable the common kestrel, peregrine falcon and Eurasian hobby, among others, to breed on overhead line pylons or in the immediate vicinity. We often install nesting aids where birds of prey have already used an old nest for breeding. Sometimes the nests used by the birds are "dilapidated" or placed in unfavourable locations – for example, because they can lead to problems with power transmission or can be an obstacle during upcoming construction work. In such cases, we move the eyrie to a nesting basket, which we attach to the pylon at the same height but in a more suitable location. For the common kestrel and peregrine falcon, a nesting box made of stainless steel was developed in cooperation with ornithologists and technicians. This is very durable despite its exposed position on the electricity pylons. The new nesting box is precisely adapted to the needs of the two bird species and our experience shows that our artificially created nesting aids are being readily accepted.



The new nesting aids for various falcon species can be mounted securely on the overhead line pylons and have a high longevity at the same time.

PRESERVING BIODIVERSITY
SPECIES PROTECTION IN THE AMPRION NETWORK

BREEDING SITES FOR FALCONS

For birds of prey such as the Eurasian hobby, common kestrel and peregrine falcon, electricity pylons are ideal breeding sites, as they offer the animals a very good view of the land-scape. A bird protection measure was therefore carried out in Siegen in March 2017: Amprion equipped seven pylons east of the city with new nesting boxes for peregrine falcons. The old nesting aids had been removed during work on the overhead line there. Since wind and weather had visibly damaged them, new boxes were purchased. Amprion attached most of the nesting aids, which weigh around 30 kilograms, to the pylons on which the boxes had previously been located.

After consultation with ornithologists, the fitters were given precise instructions on what to look out for when installing the boxes so that as many of them as possible would be accepted by the target species. The nesting boxes are optimally installed when chicks leaving the nest can first train their muscles on the steel struts before they make their first real attempts to fly. The peregrine falcon was thought to be almost extinct in Germany, but the population has since recovered thanks to a well-thought-out range of nesting sites and intensive monitoring of breeding pairs.

Since 2019, nesting boxes for kestrels and peregrine falcons have been developed especially for electricity pylons. Both models already have a kind of balcony integrated, including a perch. Three of these new nesting boxes for the kestrel were already installed in the Betzdorf area in Rhineland-Palatinate in spring 2022. The idea to install these kestrel nesting boxes on Amprion's overhead power lines came from dedicated local conservationists. The pylons suitable for installation were then determined in joint consultation.

Electricity pylons are suitable nesting sites for various species of birds of prey. Especially for kestrels (below) and peregrine falcons (above), nesting aids have already been installed at various places in the Amprion grid.

HEATH LANDSCAPE NEAR MÖRFELDEN-WALLDORF – A ROUTE BECOMES A BIRD SANCTUARY

In 1965, an approximately 190-metre-wide strip of forest was cleared over an area of around 100 hectares nearby the Hessian town of Mörfelden-Walldorf. Thus, in the immediate vicinity of Frankfurt Airport, space was created for a route with three parallel overhead lines. However, after 20 years, the rapid growth of pine trees and other woody plants in this area endangered the safe operation of the power lines. As a result, the lines were initially managed according to hunting aspects and with varying degrees of intensity. In 1991, a concept for integrated vegetation management was developed. Since then, the maintenance measures have been consistently geared to the needs of the typical regional flora and fauna. With great success: through the targeted care of the heath landscape, the populations of rare bird species there have developed so positively that the overhead line route was integrated into the bird sanctuary "Mönchbruch and forests near Mörfelden-Walldorf and Groß-Gerau".

Such an upgrading according to the standards of a Natura 2000 protected area only happens very rarely – and confirms the effectiveness of our integrated vegetation management. Although it borders on two motorways and Frankfurt's major airport, the bird sanctuary is now one of the five best breeding areas for the woodlark and the wryneck in Hesse. For the European stonechat, which mainly breeds in the heathland under the overhead line, it is even the best breeding area in Hesse.

PORTAL "BIRDFOUND & POWER LINES"

With the "Birdfound & Power Lines" portal, the Renewables Grid Initiative (RGI) and the Naturschutzbund Deutschland (NABU – German BirdLife Partner) launched a project in 2017 together with transmission and distribution system operators to improve bird protection in the power grid. As an association of nature conservation organisations and grid operators – including Amprion – the RGI is committed to the transparent and environmentally conscious development of the grid.

Birds can be reported on the internet via a special reporting platform. The aim is to systematically collect data on the approach of birds to power lines throughout Germany for the first time and to have it analysed by ornithologists. The focus is on bird collisions with overhead power lines, but information on bird sightings in the distribution grid, for example on medium-voltage pylons that pose a risk of electrocution, is also collected. The data will help nature conservationists and grid operators to better understand the risks to the lives of different bird species, to improve existing protection measures and to use them as effectively as possible in the future in the course of grid expansion.

The red kite's main centre of distribution is in Germany, where more than half of the world's population breed.

LIFE EUROKITE already has data from around 2000 red kites that have been transmitted. The birds are fitted with GPS loggers in their nests when they are still young.

LIFE EUROKITE – MORE PROTECTION FOR BIRDS OF PREY IN EUROPE

In 2019, the "Mitteleuropäische Gesellschaft zur Erhaltung der Greifvögel" (MEGEG) launched LIFE EUROKITE, a Europewide conservation project for birds of prey that is financially supported by Amprion. The EU LIFE project analyses the use of space and habitat, for example breeding areas, resting and roosting places as well as the flight routes of various species of birds of prey. The focus is on the red kite, which is also the eponym for the project. Although the red kite is no longer classified as endangered in Europe, subpopulations have suffered a severe decline. More than 40 per cent of the world's red kite population is resident in Germany.

One aim of the project is to identify the causes of deaths in birds of prey and to reduce mortality caused by human activities. The most common causes of death include poisoning and illegal hunting, which are to be curbed through publicity and prosecution. But power lines can also be a problem for the birds. Therefore, a working group named "Power lines" has been established. With the help of the data collected in the project, the experts want to identify problematic power lines throughout Europe, make them safer and thus further reduce the risks for the birds.

From 2020 to 2024, 615 red kites and 80 other birds of prey (white-tailed eagle, imperial eagle and black kite) in about 40 project areas in twelve countries are to be equipped with GPS transmitters so that their activities can be permanently tracked. Through data exchange with partners and collaborators of the project, data from more than 2,000 transmittered red kites are currently already available. This means that the largest possible area in the entire European range can be covered. The collected data provide valuable information on the behaviour of the raptor species, from which targeted protection measures for the birds can be derived.

GLOSSARY

Habitats Directive
Council Directive 92/43/EEC or the Fauna-Flora-Habitat Directive (Habitats Directive) is a European Union directive that serves to protect nature. With the Habitats Directive, the European Union created the framework for the national legislation of the member states for the protection of habitats and wild animals and plants as early as 1992. An essential component is the creation of a Europe-wide, interconnected network of protected areas, the so-called Natura 2000 network. These areas are designated to protect endangered species and habitats. In addition to these so-called FFH areas, the protected areas in accordance with the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council) are also part of the Natura 2000 network.

European Birds Directive
Directive 2009/147/EC of the European Parliament and of the Council aims to conserve wild bird species and their habitats. With this directive, the European Union has set the framework for national legislation to protect all species of birds living in the wild on the territory of the member states of the European Union. This includes the creation of bird protection areas as an essential measure, which together with the FFH areas form the so-called Natura 2000 network.

Protected goods
For the so-called protected goods, an environmental impact assessment (in accordance with the Environmental Impact Assessment Act, or UVPG for short) determines whether there are direct or indirect effects on them because of a planned project, such as the construction of an overhead power line. These protected goods include humans and in particular human health, wildlife, plants, biological diversity, climate and air, landscape, soil and land, water, cultural heritage and other material goods as well as their interrelationships with one another.

Avoidance and minimisation measures
The Federal Nature Conservation Act stipulates that impairments to nature and the landscape must be avoided (impact regulation). In order to prevent avoidable impairments during the planning and implementation of projects, various protective measures, the so-called avoidance and minimisation measures, can be used. These include, for example, the installation of bird protection markers to avoid bird collisions.

Impact regulation
The impact regulation is used for nature conservation, especially in the landscape outside of protected areas. German legislation stipulates that the condition of nature and the landscape must not be allowed to deteriorate. However, if this nevertheless happens due to certain unavoidable interventions such as construction projects, these interventions must be offset (compensated) by certain measures.

Ground wire
The ground wire or lightning protection wire is usually routed over the tops of the pylons and thus hangs above the current-carrying conductors. It serves to protect the overhead line from lightning strikes.

ANY QUESTIONS?
CONTACT

GET IN TOUCH WITH US

Amprion GmbH
Robert-Schuman-Straße 7
44263 Dortmund, Germany

Free information hotline
(only in Germany)
0800 5895 2474

CONTACTS

Christin Osadnik
Environmental planning
and nature conservation
E-mail: christin.osadnik@amprion.net

Stefanie Holm
Environmental planning
and nature conservation
E-mail: stefanie.holm@amprion.net

INFORMATION CENTRE

ENVIRONMENTAL PLANNING AND NATURE CONSERVATION

E-mail: naturschutz@amprion.net

Amprion GmbH
www.amprion.net

IMPRINT

PUBLISHER

Amprion GmbH
Robert-Schuman-Straße 7
44263 Dortmund, Germany

DESIGN

3st kommunikation GmbH, Mainz

PHOTOS

Amprion (pages 14 top, 15 and 18)
EUROKITE (page 21)
Daniel Holte (cover)
iStock (pages 16–17)
Richard Katzinger (page 20 top)
Dominik Pietsch (pages 12–13)
Mark Rolph (page 20 bottom)
Daniel Schumann (pages 1, 3, 4, 7, 22–23)
SPIE SAG GmbH (page 14 bottom)
Manfred Stöber – Fotolia (page 19)

PRINTING

Woeste Druck, Essen, Germany

September 2023