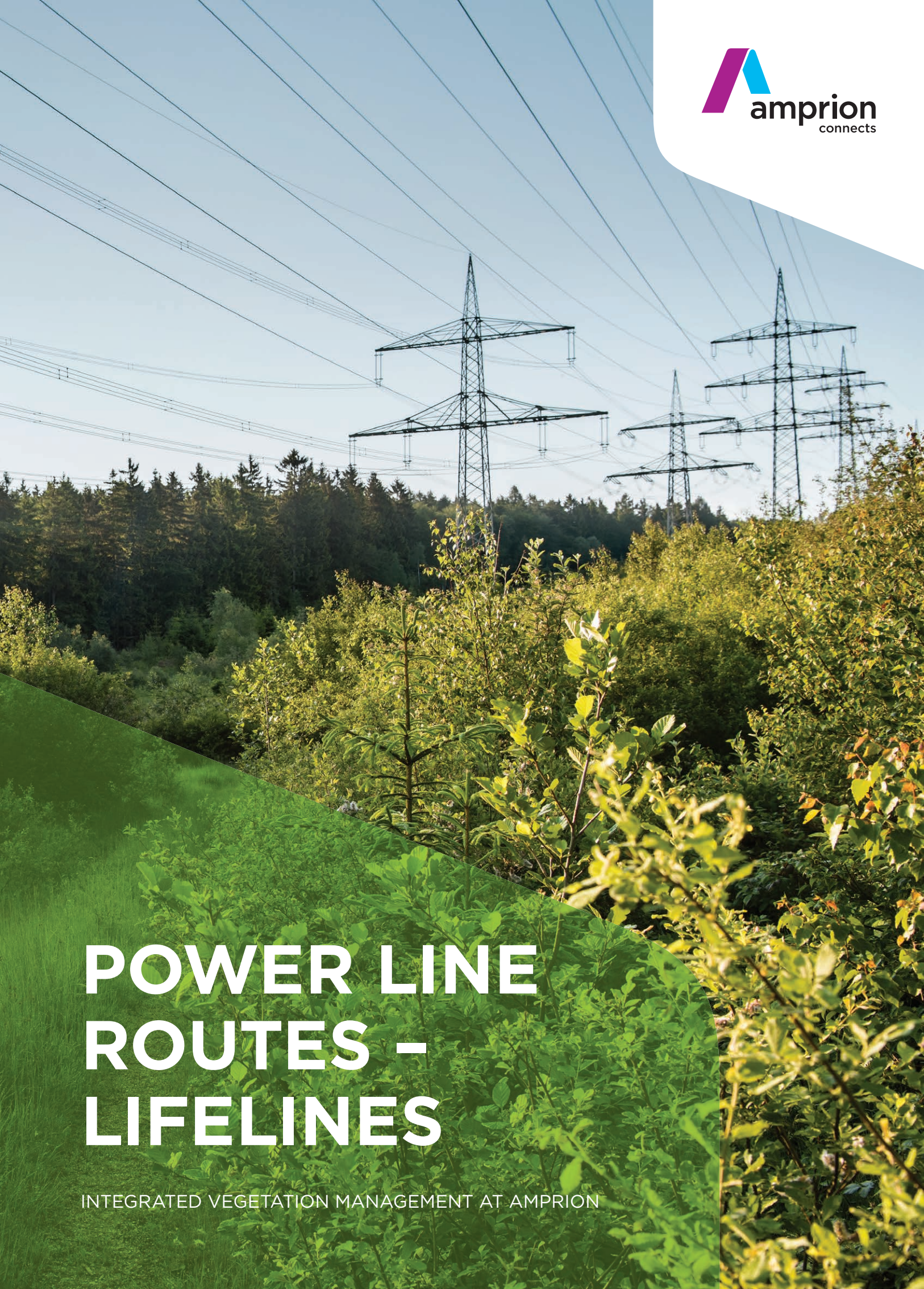


amprion
connects

POWER LINE ROUTES – LIFELINES

INTEGRATED VEGETATION MANAGEMENT AT AMPRION

CONTENTS

A BRIEF PROFILE OF AMPRION

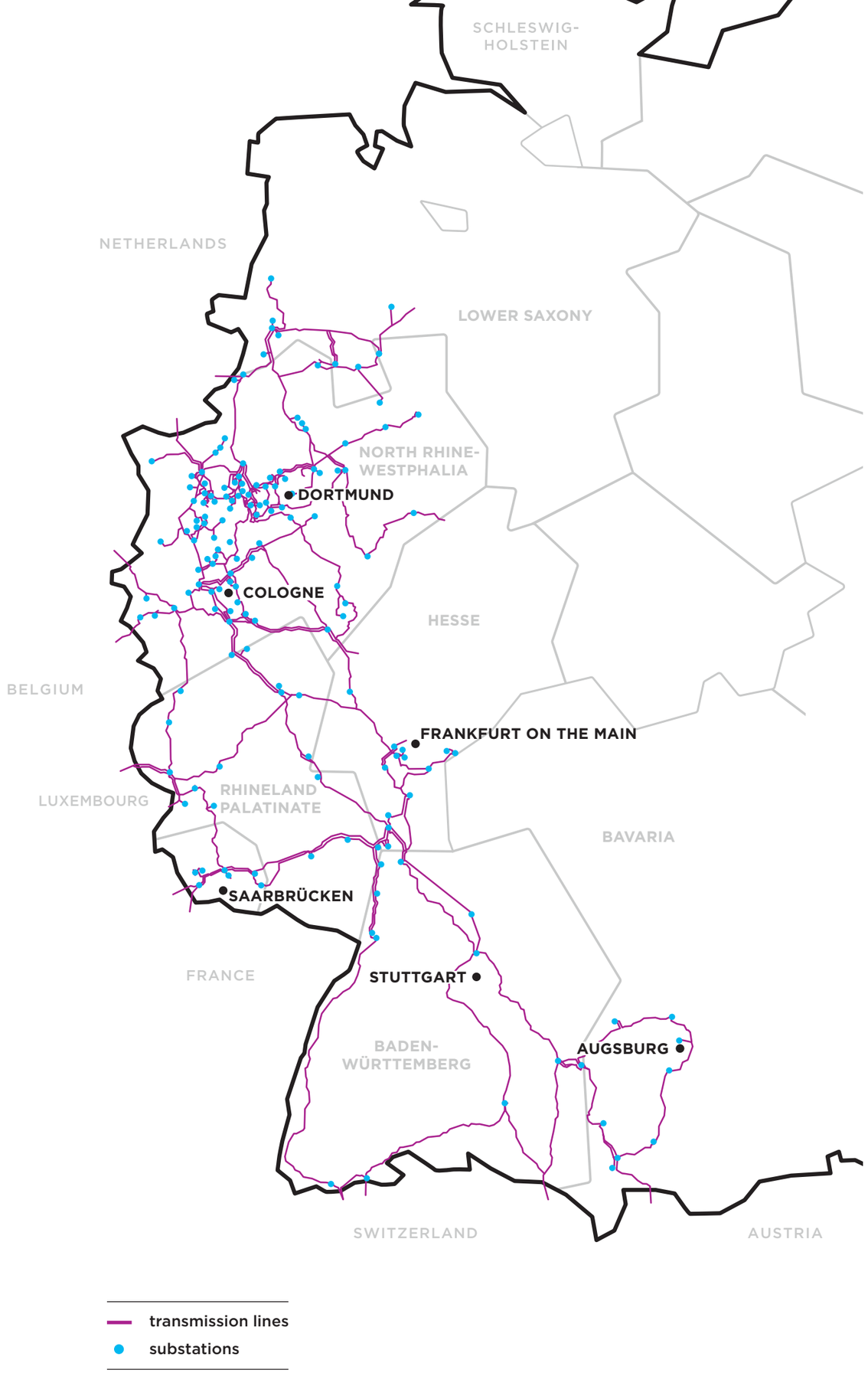
Amprion is **ONE OF FOUR TRANSMISSION SYSTEM OPERATORS** in Germany.

11,000 KILOMETRES
long is our transmission grid. It transports electricity all the way from the North Sea to the Alps.

29 MILLION PEOPLE
live in our grid area, where approximately one third of Germany's economic output is generated.

22.2 BILLION EUROS
We intend to invest over the next five years in the conversion and expansion of our network.

2,300 EMPLOYEES
contribute to keeping the lights on. They work in Dortmund and at more than 30 other locations in the network area.



Peter Milchert

Julia Hoeps

Dear Readers,

The energy transition in Germany and Europe is in full swing. Amprion is helping to shape this transformation by paving the way for a sustainable energy system. Amprion sees itself as a sustainable company. The protection of people and nature has a high priority for us. We attach great importance to carefully maintaining the areas adjacent to and below our power lines – the so-called protective strip. We already began developing corresponding concepts more than two decades ago – at that time under the term biotope management. Nowadays we use the term integrated vegetation management (IVM), which is commonly used by many stakeholders, including legislators and nature conservation organisations. The overarching goal – to maintain our protective strip in the most nature-friendly and ecological way possible, but also efficiently – has remained the same. We have continuously optimised our working methods over the years and intend to continue developing them going forward. By actively striving to protect nature and species, IVM is also a central component of Amprion's sustainability strategy. To achieve this, our experts in environmental planning and on-site in line operations work hand in hand. In this brochure, we present our approach in greater detail.

Yours sincerely,

Peter Milchert
Construction and maintenance planning
Operation of overhead lines

Julia Hoeps
Environmental planning and
nature conservation

THE WORK OF AMPRION
GRID EXPANSION FOR THE ENERGY TRANSITION

OUR POWER LINES ARE THE LIFELINES OF SOCIETY

The electricity grid is structured similarly to the road network: there are lines for long-distance traffic – the transmission grid – and lines for local traffic – the distribution grid. Four transmission system operators (TSOs) are responsible for the long-distance transmission of electricity in Germany. Amprion is one of them. 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 distribute electricity for 29 million people and thousands of companies, securing both quality of life and jobs. We keep the grid stable and secure so that the lights always stay on.

CHANGING ENERGY LANDSCAPE

Germany wants to be climate-neutral by 2045 and is relying on renewable forms of energy. However, in most cases, electricity from renewable sources is not generated where it is consumed. Wind energy, for example, comes mainly from the north. The centres of consumption, on the other hand, are in the west and south of Germany. To ensure that electricity from renewable energy sources is transmitted to where it is needed safely and reliably, we are pushing ahead with the expansion of the grid. We are thus fulfilling our legal mandate – and paving the way for a climate-neutral energy system.

RESPONSIBILITY FOR PEOPLE, NATURE AND THE ENVIRONMENT

Sustainability is an integral part of Amprion's strategy and is a major factor in all our business activities. We plan, build and operate our grid so that it has as little impact as possible on people, nature and the environment. This also includes the maintenance of our transmission lines – an area of around 9,000 hectares. Amprion was the first TSO to develop and implement appropriate concepts more than two decades ago. They ensure the safe operation of our transmission lines and at the same time support the flora and fauna. We consistently carry out the necessary mainte-nance measures with an ecological focus.

GRID EXPANSION FOR THE ENERGY TRANSITION

THE CLAIM – SUSTAINABILITY
HABITATS UNDER LINES

In order to operate our power grid safely and without interference, plants must not be allowed to grow too close to the conductor. Therefore, maintenance measures near the power lines are essential. However, the way this is done has changed fundamentally in recent decades. The large-scale removal of trees and shrubs – so-called clear-cutting – is no longer common along our power lines. Instead, we focus on the conservation and sustainable development of valuable habitats.

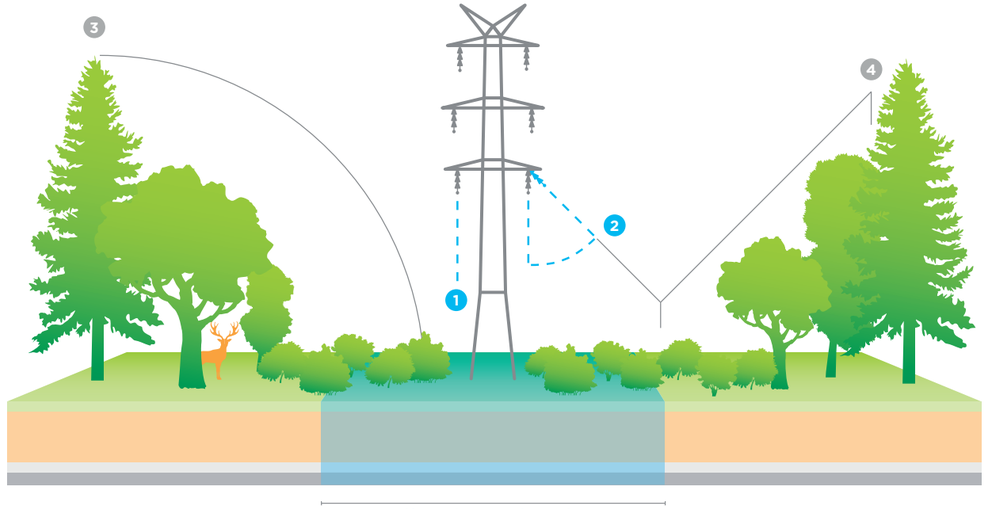
With our integrated vegetation management (IVM), we aim to minimise the impact on nature and the landscape and promote stable biotope structures in the area of our power lines. With our IVM plans, we ensure that the maintenance measures in the surrounding natural landscape are performed as carefully as possible and that the habitats of the wildlife found there are preserved and can develop properly.

TARGETED MAINTENANCE MEASURES

In our view, the maintenance of our power line routes and the protection of nature go hand in hand. We follow the principle of selectively and proactively cutting back trees and shrubs. The overriding goal of our maintenance work is to ensure the reliability of supply. Power outages, e.g. caused by fallen or overgrown trees, are controlled and eliminated by regularly pruning the vegetation near overhead lines. We remove fast-growing species of trees and shrubs and promote slow-growing varieties. In doing so, we also take spatial differences into account. At the edge of the protective strip and in the immediate vicinity of the electricity pylons, trees and shrubs can grow much higher than directly below the overhead lines, creating a smooth transition to the adjacent forest. If suitable woody plants are present, the stepped, stable and structurally rich forest edges provide diverse habitats for many species. With this approach, we ensure the operation of our overhead power lines on the one hand and preserve and nurture the existing vegetation on the other.

VEGETATION MADE TO MEASURE

The vegetation below the power line must not be allowed to grow too close to the conductors. It is also important to consider how much the conductor expands when it heats up – and the maximum amount of space it needs to settle. Near the pylon and at the edge of the protective strip, bushes and trees can grow higher than in the centre.



1 Sag of stationary conductor

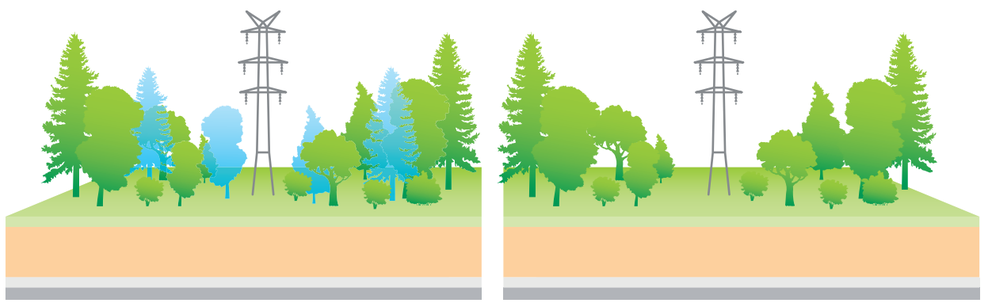
2 Space required for conductor movement

3 Fall curve of marginal tree when fully grown

4 Limiting the final height of growth through the promotion of forest edge structures

TODAY'S MAINTENANCE PRINCIPLE: MORE FREQUENT AND EXTENSIVE INTERVENTION

To create sufficient distance between the conductors and the vegetation, we intervene more frequently today by gently and proactively cutting back trees and shrubs.



Before maintenance

After maintenance

THE CONCEPT

WHAT INTEGRATED VEGETATION MANAGEMENT CAN ACHIEVE

Our integrated vegetation management (IVM) has both ecological and economic advantages. We maintain the routes of our power lines so that their operation is not disturbed, and natural areas can still develop properly in the long term. The concept includes maintenance measures designed to promote and encourage the growth of vegetation typical of the region. The IVM plans form the basis for line maintenance. They map the routes of the power lines and show the various types of biotope as well as maintenance targets. The planning for line maintenance is divided into maintenance units and carried out in close consultation with external experts such as biologists and representatives of nature conservation and forestry authorities. We also maintain individual dialogue with local associations and landowners. As it is important to us to keep a permanent eye on the development of local vegetation structures, we check the IVM plans at regular intervals and update the maintenance measures shown.

Through integrated vegetation management, we consider the specific local conditions under our lines – always with the aim of maintaining a harmonious landscape and stable vegetation structures. Maintenance according to Amprion's IVM concept is no more expensive than conventional measures. Our key guiding principle is to maintain more frequently, over smaller areas and more carefully instead of rarely, over large areas and intensively.

THE APPROACH:
FROM INVENTORY TO MAINTENANCE

In the first step, external environmental service providers record and assess the vegetation below the existing power lines. Together, we consider the ecological, technical and economic aspects relating to the maintenance measures. We coordinate the measures that are appropriate for the respective on-site situation with all relevant stakeholders such as landowners. This is the basis of our IVM planning, because transparency creates understanding. Maintaining a dialogue with all those involved enables us to explain the necessity of maintaining the area below the power lines.

STEP BY STEP

1

INVENTORY

When creating a new IVM plan, we first record the on-site vegetation and assign it to a biotope type. Common biotope types in our network area for IVM are, for example, meadow/pas-ture or mixed forest.

2

IVM PLANNING

The IVM plan contains information on vegetation and the type of maintenance measures required, such as "cutting back to the trunk" (p. 12). The measures are shown on the plan.

3

DIALOGUE

After assessing the routes and developing an IVM plan, we coordinate the necessary measures on the respective route with the relevant actors. Once finalised, the IVM plan is then presented and stored in our Geographical Information System, which is used to collect, manage and analyse data with the help of maps.

4

INSPECTION AND NEEDS ASSESSMENT

Based on the IVM plans, all route sections in the Amprion grid are inspected every year. Our line maintenance specialists digitally assess and record the maintenance requirements and consult with the land managers before implementing any measures.

5

IMPLEMENTING THE MEASURES

The agreed maintenance measures are implemented and subsequently checked exclusively by our route maintenance specialists and qualified, specialised companies on site.

INSIGHT INTO THE IVM PLAN

The IVM plan consists of two parts: a map and a text describing each area to be maintained. The plan shows the varying proportions, types and layers of vegetation that occur there (see graphic below). In addition, types of maintenance as well as objectives and special features are documented. Based on the detailed location information, the respective sections can be assigned to the responsible districts, cities and authorities.

Approx. 9,000

hectares is the area that we manage as part of our integrated vegetation management.

LINE MAINTENANCE ACCORDING TO PLAN

Amprion has mapped all areas under the power lines and divided them into vegetation types. This is important to preserve the diversity of flora and fauna.

Schematic representation of an IVM plan with maintenance units as examples

MAINTENANCE MEASURES

In accordance with the Nature Conservation Act, maintenance measures such as cutting back or removing woody plants may only take place between the beginning of October and the end of February each year. The strategy protects animals that use trees and shrubs between March and the end of September to rear their young. Birds can breed undisturbed and tree dwellers such as squirrels can raise their offspring. Insects also benefit, such as bees and butterflies, which find more nectar-rich flowers in spring and summer.

We use the following maintenance measures:

Individual removal
Trees that could potentially endanger the operation of the line or come dangerously close to the conductor are marked with a certain colour and removed in a targeted manner. The focus is on fast-growing species such as poplar, alder, willow, spruce and birch.

Thinning
Selective patch thinning is also aimed at keeping fast-growing tree species at a safe distance from the conductors. With this maintenance measure, we regulate the growth and composition of trees and shrubs. We selectively remove a larger number of trees so that our power lines can be operated without interference. The removal of the corresponding vegetation is divided into various maintenance intensity levels, which determines whether the growth is completely or partially removed.

Cutting down to the trunk
Deciduous trees such as oak, hornbeam and ash as well as hazel, elder or dogwood shrubs are cut off at a height of about 30 centimetres above the rootstock. The new shoots ("cane shoots") rejuvenate the forest so that coppice-like structures develop. Coppice forests are characterised by shrubby trees and bushes of varying heights, with light reaching the herb layer on the ground.

De-bushing
By removing emerging woody plants at regular intervals, we reduce what is known as scrub encroachment. This allows us to develop and maintain open areas where light-demanding species can grow without competition from other plants.

Mowing
The mowing of meadows serves to preserve existing plant species. Growing young shrubs are removed with the mowing. Regular mowing is necessary to develop meadows with as many species as possible and to maintain them in the long term.

PRESERVING DIVERSITY

EXAMPLES OF NATURE AND SPECIES CONSERVATION IN THE AMPRION GRID

REFUGE FOR THE GREAT NOTCH ANT

In Langen, Hesse, the rare great notched ant *(Formica exsecta)* has settled under one of Amprion's overhead power lines. The insect is on the Red List as "critically endangered" and specially protected under the Federal Nature Conservation Act and the Federal Species Protection Ordinance.

The seven-to-eight-millimetre large insects form huge colonies with several hundred thousand individuals. They hibernate from October to March and swarm out between June and August. The great notch ant likes to settle in open or slightly shaded areas such as forest edges or clearings. Amprion's overhead power line provides an ideal habitat for this species.

In October 2019, conservationists discovered nests of this rare species of forest ant. The nests look like a pile of lawn clippings and can easily be overlooked. Amprion immediately marked and protected the nests along the route so that they could not be damaged.

A short time later, the line maintenance specialists found more nests about 400 metres away from the first colony – proof that the great notch ant had expanded its settlement area along the line. The area under the Amprion overhead line is thus one of the few places in Hesse where the great notch ant can be found in large numbers.

Amprion is helping to preserve the habitat of the great notched ant on the line section by means of special maintenance measures. Mulching and mowing as part of line maintenance has created open areas that the great notched ant needs to be able to use the warmth of the sun. Amprion also takes care to remove trees only selectively or cuts the nests free by hand for line maintenance. The leaf and bark aphids that live on the various deciduous tree species provide the ants with an important source of food.

FLOWERING JEWEL – THE MEADOWS AT HIRTENBORN

Rare species of orchid in Hunsrück also benefit from our integrated vegetation management (IVM). The nature reserve "Wiesen am Hirtenborn" near the Middle Rhine Valley near Bacharach is an ecological gem located under an overhead power line. In May, numerous plant species typical of the region bloom here – including orchid species that are very rare in Rhineland-Palatinate, such as the broad-leaved orchid, the white orchid and the small orchid. The dry meadows on the mountain range west of the municipalities of Manubach, Oberdiebach and Oberheimbach are unique in the area and a popular destination for orchid lovers from all over Germany.

However, the annual splendour of blossoms at Hirtenborn is only possible because the flowers have taken advantage of the special site conditions under the overhead power line. The continuous maintenance of the power line maintains the nutrient-poor soil on which the rare species can develop optimally. If shrubs, trees and grasses were allowed to sprout uncontrollably, they would soon shade out and crowd out the orchids in the nature reserve. Therefore, we continuously monitor the plant growth on the overhead line route and maintain the area in accordance with the IVM. The associated plan is adapted to the needs of the plants that require protection down to the last detail.

Every three years, specialist companies mow and remove bushes from the meagre meadows on the route in consultation with our route maintenance specialists. The term "rough grassland" means grassland on nutrient-poor, dry sites, which has usually developed through extensive farming. Since the cultivation of rough pastures is no longer considered profitable and more nutrient-rich fertiliser is used in modern agriculture, the existence of these sensitive ecosystems is increasingly threatened.

The Hirtenborn nature reserve deliberately refrains from mulching the areas. Some of the green cuttings would otherwise remain on the ground and rot. As a kind of organic fertiliser, the nutrients would then return to the soil, which would harm the orchids. Amprion removes the green cuttings in favour of the lean soil preferred by the orchids and thus contributes significantly to the preservation of a valuable habitat that is home to a total of more than 150 plant species typical of the region.

FLIGHT PATHS FOR BATS

The nocturnal bats can detect power lines by echolocation and avoid them in flight. The integrated vegetation management on our power lines in the forest creates forest edge-like structures. They represent a kind of guard rail for various species of bat. Some species only discover their environment along such acoustic railings. Well-maintained power lines can thus sometimes become the flight path of nocturnal mammals.

With appropriate maintenance, the power lines can develop into important feeding habitats for some species of bat. Thanks to their partly sun-exposed and wind-protected location, the inner forest fringes usually harbour a variety of insects.

EXAMPLES OF NATURE AND SPECIES CONSERVATION IN THE AMPRION GRID

ANY QUESTIONS?

CONTACT

GET IN TOUCH WITH US

Peter Milchert
Construction and maintenance planning
Operation of overhead lines

E-mail: peter.milchert@amprion.net

Julia Hoeps
Environmental planning and
nature conservation

E-mail: julia.hoeps@amprion.net

Free information hotline
(only in Germany)
0800 5895 2474

FURTHER INFORMATION

INTEGRATED VEGETATION MANAGEMENT AT AMPRION

E-mail: naturschutz@amprion.net

IMPRINT

PUBLISHER

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

CONCEPTION AND DESIGN

3st kommunikation GmbH, Mainz

PHOTOS

Daniel Schumann (pages 1 and 14)
Johannes Döppler (pages 3 and 8)
Günther Bayerl (cover, pages 6, 13, 16–17)
iStock (pages 18–19)

PRINTING

Woeste Druck, Essen

Klimaneutral
Druckprodukt
ClimatePartner.com/19527-2309-1001

FSC
www.fsc.org
RECYCLED
Papier aus Recyclingmaterial
FSC® C006990

POWER LINE ROUTES – LIFELINES

Amprion is one of four transmission system operators in Germany. We plan, build and operate our network under the premises of economic and ecological sustainability, which also includes maintaining our existing overhead lines. With our Integrated Vegetation Management (IVM), we ensure that the overhead power lines in operation are maintained with due consideration to nature and the environment. With this approach, we preserve and promote flora and fauna and at the same time ensure that our overhead lines operate safely and reliably.

September 2023