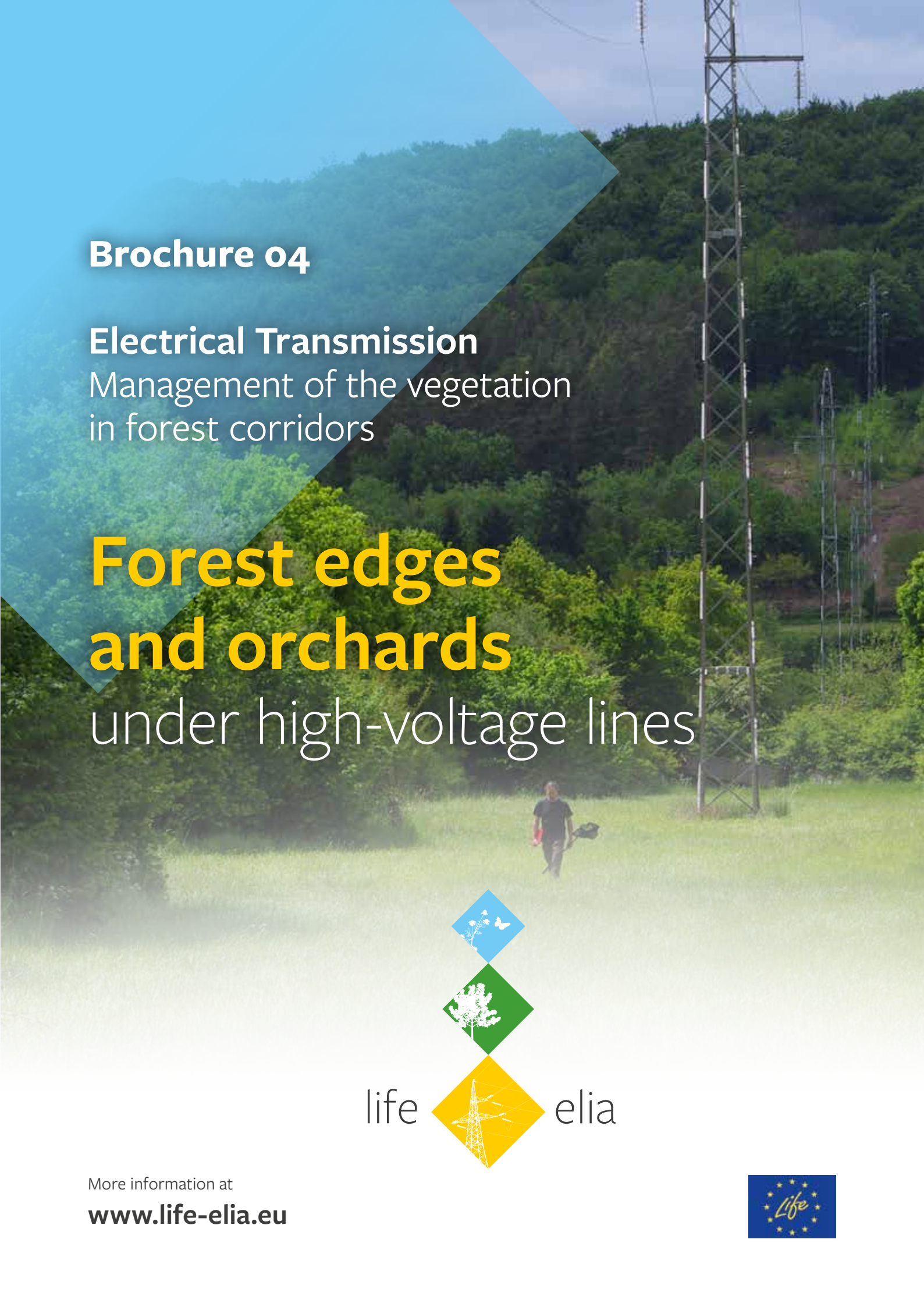

Brochure 04

Electrical Transmission
Management of the vegetation
in forest corridors

Forest edges and orchards under high-voltage lines

life elia

More information at
www.life-elia.eu

Summary

LIFE Elia
Development of electrical transmission network right-of-ways as active vectors favourable to biodiversity

CE Reference
LIFE10 NAT/BE/709

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Partners

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Wallonie

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1

Introduction

This brochure has been drafted by LIFE Elia-RTE's team. This 6.5 year project (2011-2017) is financed by the LIFE programme of the European Union, the Walloon Government, Elia and RTE, the latter two Transmission System Operators (TSOs) in Belgium and in France respectively.

The main objective of the project is the conversion of forest right-of-ways along the routes of high-voltage lines into ecological corridors in Belgium and in France. The restoration activities aim to establish innovative practices for managing the vegetation in these green corridors in the forest, and to raise awareness among various publics of the importance of biodiversity in these linear habitats.

2

Management of the vegetation under electrical lines

In forest areas in particular, management of vegetation is essential. The natural growth of seedlings and other new growth must be controlled at all times to guarantee that no current interruption will occur due to arcing from the line.

This precaution applies below the cables, but also on either side of them, to take account of swaying due to the wind, lengthening during the warmer months, and the risk of trees falling on the installations. Depending on the precautionary measures established by the TSO and the configurations of the terrain, this can result in a safety corridor over 50 m wide to be maintained.

Alternative solutions exist. They allow electrical safety to be ensured while taking account of biodiversity and involving local partners. This brochure details one of these in particular: restoration and planting of tiered forest edges and planting conservatory orchards.

3 Standard management by rotary cutting

Rotary slashing is most commonly used to maintain the corridors of the high-voltage network in the forest. This maintenance technique is carried out periodically using a sufficiently powerful tractor. This work is repeated every three years on average but the periodicity depends on the vitality of the local vegetation. This frequency of passage is set by the operator and allows work to be done quickly on trees of small circumference.

The result of the operation is ground cleared of vegetation and covered with wood chips. Inspection of the worksite is therefore easy and the provisions of the specifications are minimal.

3.1. The advantages of rotary cutting

This management practice has the following advantages:

- rotary cutting is well mastered, as it is familiar to the TSO patrollers, contractors and forest managers
- the procedure reassures the operator, for whom understanding the dynamics of vegetation is not the primary job. No trees = no electrical risk
- the opening up of the environment ensures a feeling of accessibility and easy visibility over the entire line (maintenance and intervention in the works)
- a clear demarcation of the "frontier" between the neighbouring forest and the electrical corridor maintained by the TSO.

3.2. The drawbacks of rotary cutting

Rotary cutting has the following drawbacks:

- the exposure of the soil results in:
  - germination of the seeds produced by nearby trees or by the seed bank stimulated by the exposure to light
  - a total disappearance of competition, a factor favouring so-called pioneer species of trees, which grow rapidly
- the root network of the cut trees will produce very vigorous sprouts
- the slight tilling of the soil and the shredded material generated by rotary cutting contribute to establishing ideal conditions for growth of the trees that the operator wishes however to limit.

These aspects are thus part of a sort of vicious cycle in which growth of the trees that pose a problem is in fact promoted by the method of management by rotary cutting.

There are also other disadvantages related to regular rotary cutting:

- destruction of the fauna and flora present in the parcel (although a maintenance period outside 1/4 to 31/7 reduces this impact)
- a negative visual impact
- compaction of the soil due to regular passage of heavy machinery
- multiplication and spread of certain invasive species (e.g. Japanese knotweed) by unintentional dissemination and transport of fragments
- regular enrichment of the soil due to the decomposition of the shredded material, which contributes to lack of variety in the flora
- considerable management costs

4 Forest edges

The two types of alternative management considered in this brochure aim to combine two major objectives: safety of the electrical network and biodiversity.

4.1. Definition

The forest edge is considered to be a transition zone between:

- a “closed” environment like forests of hardwood or coniferous,
- an “open” environment like meadows or crops.

These edges can thus be located on the periphery of wooded areas when the forest adjoins agricultural areas, for example, or in their midst when the forest is interrupted by a non-wooded area (clearing, trail, high-voltage line, etc.).

The edge is called “tiered” when it is composed of several strata of different heights.

4.2. The advantages of edges

The central idea in establishment of forest edges in the forest corridors of high-voltage lines lies in the fact that they very greatly reduce the possibility of growth of tree species that are problematic due to their height at maturity (beeches, birches, poplars, spruces, oaks, ashes, etc.). While rotary cutting offers them ideal germination conditions, edges deprive them of the light they need to grow.

When plant species that are known to be of low height at maturity are chosen, edges suppress problematic species while never constituting a danger to the safety of the network.

Planting edges is advantageous:

for forest management

The forest edge fulfils a number of functions within and at the edge of forested areas:

- when tiered, it plays the role of a shield for the dominant winds and attenuates their impact on the forest populations. Thus it ensures better stability of the forested areas and limits the risks of uprooted trees,
- if diversified, it provides an alternative to the production species that constitute the main population next to the lines,
- integrated and well-thought-out, it allows the use of valuable fruit-bearing species requiring light. It also allows forestry producing logs of small size and high quality,
- usable by the local population, it can produce firewood and so allow the municipalities to offer communal firewood to their residents,
- important at the level of forest legislation, certification of wood (PEFC) or Natura 2000, it fulfils the obligation, in a public forest in any event, to allow a cordon of shrubbery 10m wide to develop in the outer edge of the forested area, or to leave trees that are dead or of biological importance standing.

Antoine Bled, Production Department, National Forestry Office, France

Forest edges include remarkable ecological diversity. They are the buffer between open (meadow or agricultural) and forest environments, providing a progressive ecological and landscape transition. They are a genuine biotope of exchanges.

In this approach of constructive exchanges, the National Forestry Office in France has participated in planting edges to go from 'U-shaped' management of electrical corridors to 'V-shaped' management, promoting interactions between species.

We are convinced that this new management will give rise to an enrichment of flora beneficial to fauna, especially insects, birds and bats!

We will follow the developments of these edges carefully!

for biological diversity

Forest edges are areas especially favourable to forest biodiversity. At the meeting point between the forest and the open environment, they constitute a transition zone hosting species of both the forest and the open environment, and also offer a living environment to the species dependent on these edges.

They also play an important role in connectivity, allowing animal or plant populations to spread and so to expand their territories. Edges offer them an ideal progressive environment thanks to the diversity of conditions they create.

A varied choice of species adapted to the region gives the edges great diversity with regard to both flower and fruit production, and can increase the interest for bees. This diversity is favourable to numerous insects, birds and small mammals, which find food and sites for rest and reproduction there.

Likewise, these edges could have a role in the fight against certain invasive species by strongly suppressing their possibilities for development, due in particular to the density of the plants making up the edge.

Violaine Fichefet,
Natural and Agricultural Environmental Studies Department, Belgium

Located at the interface between the forest and open environments, edges are especially rich in biodiversity, especially when they are tiered and dynamic. The coexistence of edges and various types of open environments varying in space (size, shape, etc.) and in time within a managed forested area is an indisputable asset for biodiversity.

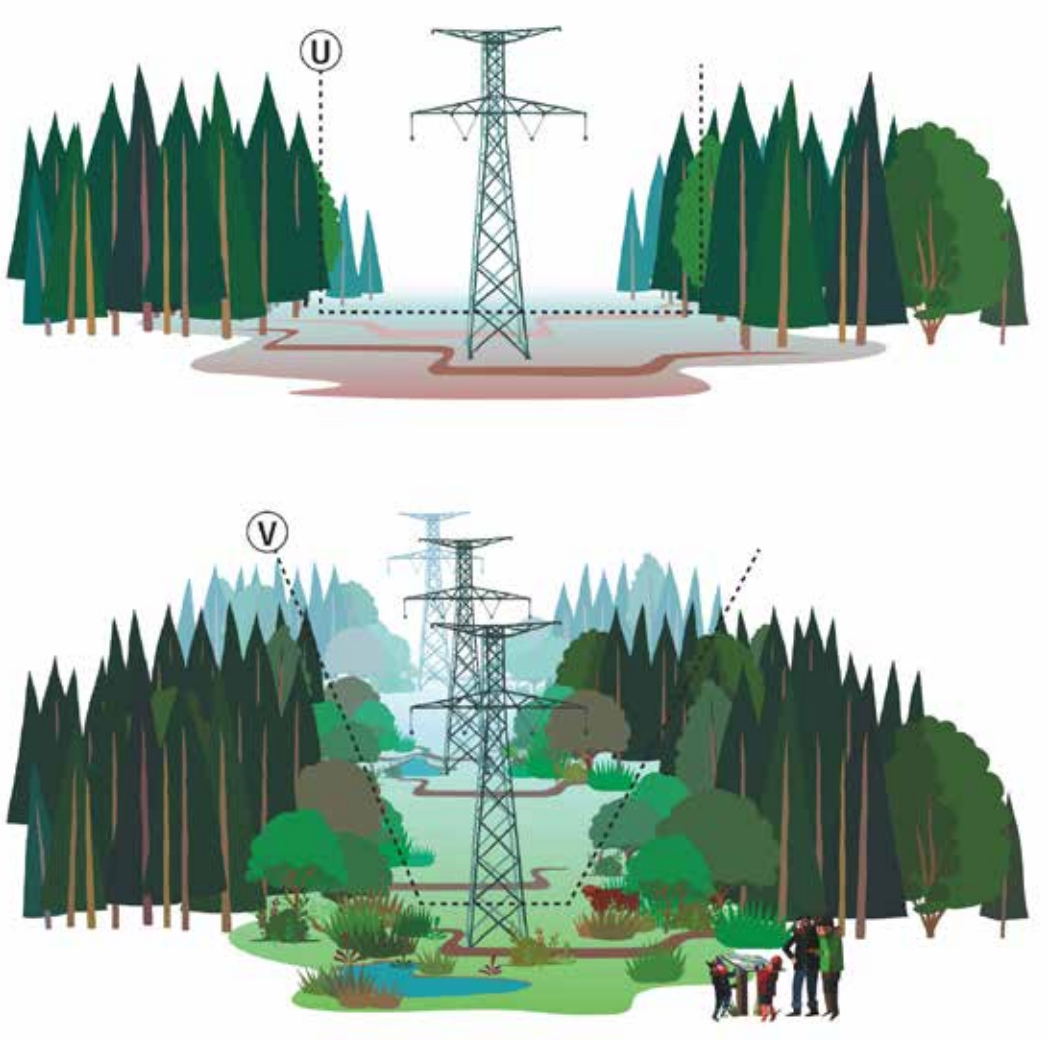
The open areas created in the forest by high-voltage lines amply fulfil this role and contribute to strengthening the habitat network. It is especially beneficial for butterflies, of which 50% of the species strictly dependent on the forest environment are threatened in Wallonia.

for small and large fauna that can be hunted

Hunters appreciate edges as they offer game a host environment and feeding environment. These two characteristics result from the presence of species attractive to the game that graze on them, of appealing fruits, grassy feeding grounds and resting places.

for integration of the high-voltage lines into the landscape

The forest right-of-way of the high-voltage network is often compared to a wound, a scar in the forested area. The establishment of forest edges allows the angular U-shaped structure to be attenuated and replaced with a softer shape in an open V. The diversity of the species and their variations in colour as well as the associated flowering enhance the landscape in these areas. In addition, the curves formed over time by the invaginations of the edge break up the abrupt lines and integrate these features into the forest landscape. They thus ensure better acceptance of these forest trenches by the general public.



For the forest manager, the TSO and a whole series of rural participants, establishment of a tiered edge thus presents real advantages.

4.3. Establishment of forest edges

4.3.1. The European forest context

As in many European countries, the Belgian forests (700,000 ha) are often single-species, mainly for economic reasons related to wood production.

The species most often encountered are the beech, spruce and oak. In this context, it is not always easy to find so-called "secondary" species. Of lesser size, their purpose is not pure production; they participate in the ecological balance of the natural forests.

Baudouin Baar, private forest owner in the Walloon Region

As a private forest owner of approximately 200 ha divided into three blocks, I am aware of the aspects of biodiversity in my forest management. Since 2009 I have met the requirements of PEFC Certification. Aside from the other activities conducted in collaboration with the LIFE Elia project, we have begun planting tiered forest edges. I believe they are an effective solution for increasing the potential for hosting biodiversity, improving the hunting quality (release - feeding) of the forested area, improving consideration of the landscape, and contributing to the stability of the populations on the edge of the electrical corridor, and these edges fulfil the commitment to PEFC Certification.

4.3.2. Restore or plant forest edges?

There are two techniques for establishing forest edges: restoration and planting.

If the presence and the diversity of bushy species on a site is sufficient, restoration of the edges will be preferred. This choice is motivated mainly by economic reasons, as restoration is less expensive for the Transmission System Operator, but also to promote local species already present and well-adapted to the site.

In the absence of these shrubbery species, preference will be given to planting edges.

4.3.3. Restoring edges

Restoration of edges, to be preferred whenever possible, is based on the presence of local, well-established species. The main objective is to promote these small or shrub-like species by removing the large species in order to provide a tiered structure for the edge, ensure its saturation and ensure electrical safety. This method has an essential feature: limitation of the number of procedures to manage the vegetation.

Before restoration (March 2012)

After restoration (April 2013)

Three possible situations

This technique can be applied at various stages of decision-making:

1. when ensuring the safety of a line by felling populations located at the edge of the corridor with an accompanying understory, mature trees will be cut while bushy species with a final height that will not present a hazard to the cables are kept. If the working conditions are too complex, shrubs can be cut down or cut back to facilitate felling or hauling. They will resume their growth when the work ends.
2. if a natural seedling stand of woody species is present, careful examination of the species will allow management to be oriented toward natural development of this vegetation to a sufficiently advanced stage for selection of seedlings. Otherwise, the management method used can be rotary cutting followed by planting. The choice of one method or the other is made by taking into account various parameters (density of shrub-like species, sizes of the species present, height of the line, requirements of the owner, etc.).
3. if a thicket is already present at a sufficiently advanced stage (the foliage being mainly located above the line of sight of the operator), it is then possible to penetrate into the vegetation. The edge is already largely established. This allows targeted felling of trees that can present a risk, current or future, to the electrical line. The trees will be felled well before they pose a risk of contact with the cables when they fall. They will be either left in place (for dead wood), or shaped and removed by a third party. If the felled stalks are too small to be used for firewood, it is then recommended that the branches be pulled to the ground so as not to leave stalks “hanging” in the vegetation, and that they be organised in heaps (offcuts) placed parallel to the line. This “tidying” of the cut stalks left in place will facilitate movement in future monitoring of the edge. Trees posing no risk to the line (or to nearby roadways), can be girdled, which will lead to the progressive death of the standing tree. This practice guarantees the presence of standing deadwood, highly favourable to biodiversity. As an additional non-negligible advantage, it is not necessary to handle heavy equipment and manage felled trees, as the tree remains standing and disintegrates little by little, without risk.

at ease in working

The major concern in restoration of an edge, as in maintaining it in the future, is the ability to penetrate into and circulate in a dense thicket. It can be necessary to lay out maintenance trails parallel or perpendicular to the line to allow easy access to the stalks to be felled. In addition, as the operator is surrounded by vegetation at the time of cutting, it is sometimes difficult for him to distinguish the specimens to be felled from those to be kept. The presence of another qualified worker outside the wooded area will allow him to be guided at a distance and can verify that all the trees to be felled have in fact been considered in the management carried out.

promoting biodiversity in restored edges

If the density of shrub-like species is sufficiently great but their diversity is low, it is possible to enrich the edge by planting new species and ensuring that they have sufficient light to allow them to develop. This is only possible in sufficiently lighted clearings or at the edge of an edge to be restored. It is for example possible to delimit the area to be mown (central strip of the corridor) from the edge area with a line of apple trees 5 m apart. Most often protected from game with a training support, these apple trees are distinctly visible from an early age and so provide demarcation of the areas while diversifying the mixture of shrubbery.

4.3.4. Planting edges

The “forest edges” action consists of planting naturally shrub-like species, of low height and advantageous for biodiversity (species with flowers, berries, etc.).

This activity is necessary where the nearby forests (often single-species) offer little understory or have shrub strata with little diversity, making spontaneous establishment of species by natural regeneration unlikely. In such cases, planting is then often unavoidable. Although costly, it guarantees that a good density and diversity of plants will be achieved.

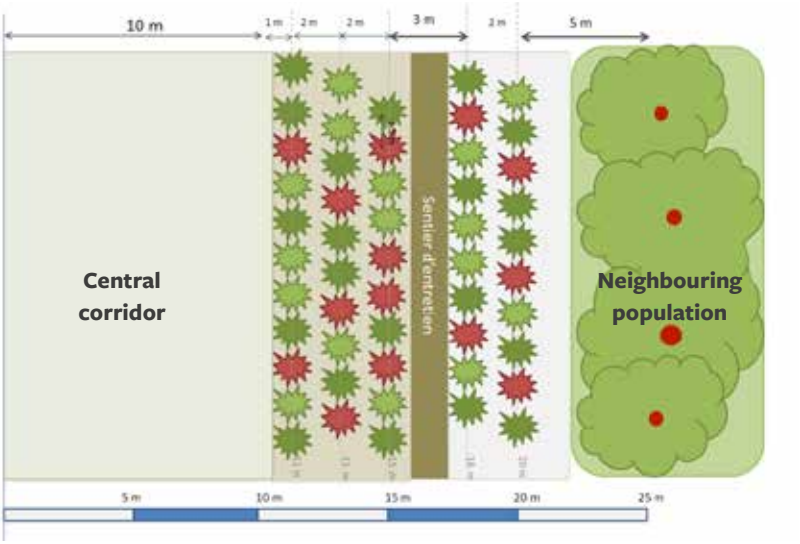
preparation of the ground

The experience of the LIFE project has shown that regrowth of planted edges is better when preparation of the ground precedes planting. This preparation consists of :

→ superficial rotary cutting of the ground over the entire surface to be planted (fully). The ideal is then to take advantage of last standard vegetation maintenance by rotary cutting to carry out planting,

→ loosening the soil only along the lines for planting over a width of approximately 70 cm and a depth of several tens of cm, which facilitates planting and rooting of the plants.

plantings parallel to the electrical line



The plants are arranged in lines parallel to the electrical line. The spacing between plants must be small enough so that the shrubs touch quickly due to their lateral growth and provide cover, thus preventing germination of natural seedlings of tall species. The diagram shows the planting method as it is applied in the LIFE project.

In order to leave an area free of planting to facilitate maintenance operations on the electrical works, the central part of the corridor is maintained and managed as an open environment. The width of this central space can be varied depending on the opportunities (cutting to be possibly contracted out) and the wishes of third parties (owners, hunters). When maintenance of this central space can be contracted, the grassy width will be greater. In the absence of a contract, the electrical operator sometimes requests that the central part remain grassy over a width at least equal to that between the outermost cables. In some cases, if the visibility of the cables is sufficient for inspection visits and they are high enough, the TSO can allow shrub-like vegetation even under the cables. In this situation, the shrubs then occupy the entire width of the corridor.

planting distances

To ensure rapid saturation of the edges, we have chosen to set the distances between plants at 1.5 m in the planting lines and to space these lines 2 m apart. A space of 3 m between two lines (line 3 and 4 starting from the central part of the corridor) is maintained free to allow future maintenance of the edge by facilitating access to the thicket for the management operator. The last planting line is located at least 5 m from the forest trees at the edge of the corridor to facilitate maintenance of the planting and allow use of the trees of the population, and to avoid plantings in an area that is too shaded.

the species chosen

In obtaining forest edges that fulfil the desired objectives (safety of the lines and biodiversity), the choice of plant species is primordial. Based on a review of the existing literature, we have chosen the species best adapted depending on:

- → their maximum height at maturity
- → their adaptation to the various types of soil encountered (acidic, chalky, hydromorphic, etc.)

Ten plant species thus form the basis for the composition of our edges. The proportion of the species in our planting mixtures may vary depending on the soil types (wet or not), the pressure from wild game, and the quantities available from the supplier. Species that are thorny or tolerate grazing rather well are favoured, while species with less coverage that allow more light to penetrate to the ground are in the minority. The table below lists the basic species and the proportions in the mixtures.

Common name	Latin name	%	Advantages	Max. height (m)	Three inner lines	Two outer lines
Single-seeded hawthorn	Crataegus monogyna	20	Good resistance to grazing thanks to its thorns	10	x	x
Common hazel	Corylus avellana	20	Good ground coverage, rapid growth, good resistance to grazing, no thorns	4	x	x
Alder buckthorn	Frangula alnus	10	Rapid coverage, ability to multiply by root suckers	5	x	x
Common dogwood	Cornus sanguinea	10	Rapid coverage, very low species	5	x	
Blackthorn	Prunus spinosa	10	Rapid coverage, resistance to grazing thanks to its thorns, ability to multiply by root suckers	4	x	
Eared willow	Salix aurita	10	Rapid coverage, adapted to wet soils, can propagate by cutting and natural layering	3	x	x
Rowan	Sorbus aucuparia	5	Tree of moderate height with flowers and fruits	10-20		x
Black elder	Sambucus nigra	5	Rapid coverage, shrub with flowers and fruits	10	x	
Red elderberry	Sambucus racemosa	5	Rapid coverage, shrub with flowers and fruits	4	x	
Guelder rose	Viburnum opulus	5	Rapid coverage, shrub with flowers and fruits	4	x	
European crab apple	Malus sylvestris	Depending on opportunity	Tree of moderate size with flowers and fruit. Produces small high-quality logs and is genetic reservoir of a species in decline.	6-10		x
European wild pear	Pyrus pyraster	Depending on opportunity	Tree of moderate size with flowers and fruit. Produces small high-quality logs and is genetic reservoir of a species in decline.	8-20		x

origin of the plants (indigenous/nurseries)

The choice of indigenous local species is an important criterion in promoting biodiversity. In addition to this aspect, the local genetic nature guarantees good adaptation to the conditions in which the plants will have to grow. Unfortunately, few traditional nurseries are able to provide plants of secondary species certified to be of local origin.

The LIFE team has therefore undertaken to develop these species itself by establishing its own process. This operation, time-consuming but ultimately economical, required the following steps:

- identification of the areas where the intended species were present, on the basis of field experience and with the support of partners (foresters, scientists, private owners, etc.),
- harvest of fruit from these identified trees, or cuttings for species for which this method of vegetative reproduction is suitable,
- extraction of the seeds by various procedures,
- bringing the seeds out of dormancy,
- sowing in open ground in a nursery and training the plants,
- extraction and progressive conditioning of the plants from the nursery depending on the worksites,
- planting in the forest corridors.

Planting indigenous secondary species in the forest edges can stimulate a complete economic process ranging from harvesting the seed to planting under the lines.

planting method

Before the worksite begins, the planting lines are set out by placing markers that indicate the alignment to be observed. Over time, this straight alignment can give way to a winding edge after the loss of some plants (game, plant fails to grow after planting, etc.).

When the plants have too large a root network, it is shortened before the bunches of plants are taken by the planters. Thus ensures better embedding in the soil when the plants are planted with an axe-hoe and guarantees better root development.

In addition to trimming the roots, the largest plants can also be pruned above ground. This consists of shortening the plant and limiting its number of branches so that it does not exhaust itself when growing in the spring. A balance is also maintained between the aboveground size and the size of the roots.

The mixtures depending on the planting lines are composed when the planting bags are loaded. The planter will be instructed not to load species that are tall at maturity into the bags taken for planting the first three lines, closest to the conductors (electrical cables). This will ensure a regular gradient in height between the central grassy area (the lowest heights) and the adjacent forest (the greatest heights).

protection of the plantings against game

One of the most important factors in failure of plantings is pressure from game. Deer, stags and does graze on the young plants and so find in the edges a source of food that is no longer available in the single-species forests of the forested areas on the edge of the electrical corridors.

In areas where pressure from game is high, some measures can be taken to guarantee the survival and growth of the plants:

Debarking damage to an elderberry plant

- **Choice of resistant species:** hawthorn, hazel tree, willow and alder buckthorn have proven to be the species most resistant to grazing by game
- **Fencing:** fences of Ursus® 2 m high mesh or wooden fence (untreated larch or Douglas fir) can be used to protect the planted area. The Ursus® fence has been widely preferred for many reasons (lower cost, better durability, etc.). Opening gates are installed to guarantee ease of access to the line for the TSO network monitoring patrols and for logging operations in the area. Note that installation of fences is not only costly, but also restrictive for forest users and line managers. If the emplacement is not well thought out and planned with all the users, tensions with local participants can arise.
- **Individual repellents:** two repellents have been tested for individual protection of the plants; placing sheep's wool, and spraying either gustatory or olfactory repellents, or a combination of both types: Certosan© or Trico© (the latter is not approved in every country). These are biological protectants against damage from grazing and debarking caused by game.

4.4. Regular management of forest edges

4.4.1. Maintenance of the plantings

The three years that follow planting are very important in guaranteeing its success. Stump sprouts or adventive species can compete with the plants in their access to light. In addition, in the first year some plants can suffer from a planting crisis. Stressed by handling (uprooting, transport, planting, search for water, etc.), they regrow slowly.

It can be necessary to carry out two main activities:

- infilling: if the overall regrowth of the planting is poor, replant plants in the empty areas,
- release: remove the plant species around the plants that hinder their proper growth (blackberry bushes, ferns, broom, etc.) This can be done with a billhook (for a blackberry bush or fern) or a brush cutter (blackberry bush, ferns, broom, etc.).

4.4.2. Long-term management of edges

An edge is "established" when the selected species have gained the upper hand over the competing vegetation. The edge must be sufficiently dense in shrub-like species so that seeds of large trees have little chance of germinating under the dense, shaded cover.

Standard long-term maintenance of an edge involves ideally selective cutting of species that can become problematic. This cutting is thus done preventively, well before the size of the specimens is of concern for the safety of the electrical line. Girdling (if the tree poses no safety problem) can be an advantageous alternative to selective cutting.

An original and effective management technique: girdling

This technique consists of removing, at shoulder height, a strip of bark from 10 to 20 cm wide. As circulation of the sap is no longer possible, the debarked tree dies little by little, but remains standing. The visual impact is therefore less significant. Encumbrance of the ground by felled wood and the phenomenon of stump sprouts are also avoided.

To guarantee good selective cutting, the operator must be able to recognise the species, even in the absence of foliage. This can be done by the forester from the public forest administration, the forest technician in a private forest, or even by a qualified technician within the TSO itself. If felling is subcontracted to a third party, the trees to be felled will be marked in advance either with a scribe or with a colour spray. If maintenance is carried out by qualified staff, selective fellings can be done at the same time as the identification of problematic species.

An alternative technique could be regular coppicing of the edge every 9-15 years, ideally by sections and not over the entire corridor. This would result in a regularly renewed thicket and would be favourable to biodiversity if the management activities are scheduled. This technique can only be implemented on a mature edge, however, and has the disadvantage of temporarily allowing seeds of large species to become established.

Damien Rouvroy, Natura 2000 attaché. Department of Nature and Forests, Belgium

The Department of Nature and Forests is responsible for the management of public forests in the Walloon Region. The edges at the edge of forested areas are an integral part of forest policy (economic, environmental and social) in Wallonia. The Forest Code adopted in 2008 stresses the importance of creating these edges, incidentally, as do the founding texts of Natura 2000 and the forest certification programmes.

Electrical corridors offer this possibility of creating significant lengths of edges which ultimately will be beneficial to the forest in numerous respects (reduction of the risk of uprooted trees, quality of the wood at the edge, hosting fauna, biodiversity, etc.).

4.4.3. Involvement of local partners

Depending on the local opportunities to identify and encourage them, rural participants may find it worthwhile to manage the edges established themselves.

While the risk of an electrical accident when trees are felled is carefully considered, the owner or manager (in a public forest) has the option to collect firewood in the edges. The selective cutting will of course target problematic species of trees.

In a private forest, the owner can maintain the edge himself or entrust this maintenance to someone else. These maintenance methods must be set in an agreement with the TSO. In the event of deficient management, the TSO remains responsible for electrical safety and will always retain the right to intervene or arrange intervention.

Likewise, in a public forest, the Forest Administration is requested to incorporate management of the edges into its forest management plan. With cutting scheduled every 6 to 12 years, it will suffice to mark several stalks and combine them with the lot of the adjacent population or possibly make them part of the firewood rights.

The central corridor, kept in grassland, can be maintained by a hunter wishing to maintain feeding grounds for fauna. In a public forest, this management by a hunter can be recorded in the specifications for leasing hunting rights.

5 Conservatory orchards

5.1. Definition

Crab apples

Secondary species not prized for their economic value, some fruit trees have become very scarce in our European forests. In Belgium, this is the case for the species of wild fruit trees: the European crab apple (*Malus sylvestris*), the wild pear (Pyrus pyraster), and the medlar (*Mespilus germanica*). The same applies to the common juniper (*Juniperus communis*).

In some regions, these species have virtually disappeared from the forest populations, the consequence of management too oriented toward production of wood alone. These small species have given way in many locations to production species like the beech or spruce in Belgium.

These orchards are called "conservatory", as they thus contribute to safeguarding these rare species by ensuring that their genetic heritage is preserved.

5.2. The advantages of conservatory orchards

As for forest edges, the key idea behind the establishment of conservatory orchards in forest corridors with high-voltage lines is that they very strongly reduce the possibility of growth of problematic tree species.

The establishment of conservatory orchards is of interest:

Alain Servais,
Manager of the Comptoir forestier, Public Service of Wallonia

Producing high-quality wood in a forest environment while taking biodiversity into account is a major objective of the activities of the Comptoir forestier [Forest Seed Bank] of Marche-en-Famenne. Besides the large forest species, the large-scale propagations of trees and shrubs of local origin like the wild pear and the crab apple are measures useful to this biodiversity. The plantings made in the framework of this LIFE project contribute to large-scale development of the crab apple conservatory orchards established at Philippeville. It's a fine example of partnership for the preservation of this diversity in genetic heritage in Wallonia.

for a genetic reservoir

These orchards will re-energise the populations of wild fruit trees, but also facilitate harvests of fruit (and thus of seeds) for future programmes of redeployment of the species conducted by those involved in forest protection (administrations, research centres, associations, public initiatives, etc.) or nursery owners.

for specialised production of wood

In the long term, if they are well looked after, the trunks of fruit trees can provide the wood industry with small high-quality logs sought after especially in cabinetmaking.

for increased biodiversity

The flowers and fruits of the species in these orchards will be especially attractive to pollinating insects, birds, small mammals, and large and small wild fauna.

for improving the hosting capacity of the forests

The production of fleshy fruits will not fail to attract large and small wild fauna. Boars and deer are very fond of them, which argues for establishment of these orchards in hunting grounds. Wild apples resist the cold longer and remain available a long time for the animals, which will benefit from their presence during long winters.

for a positive impact on the landscape

These orchards provide a special touch to the ambiance and the forest landscapes because of their form, their abundant blossoming, the fruit and the fauna they attract. They emphasise the corridors depending on the seasons and will play an important role as a focal point in the landscape.

5.3. Establishment of conservatory orchards

5.3.2. The forest context

Like the secondary species, the wild fruit species have a tendency to become considerably rarer. The last emplacements of some wild apple and pear trees are sometimes known only to the foresters in the field, but their presence in a forest is more and more rare.

5.3.3. Planting conservatory orchards

preparation of the soil

Conservatory orchards can be planted on both grassy areas and freshly rotary cut areas.

distances of plantings

The plants are planted 5 m apart both in a single line and between the planting lines. As a general rule, the orchards are planted at the same time on relatively small areas (20 ares). Wild pears, larger at maturity, are placed rather on the edges of the corridors, near the forest populations.

the species chosen and their origin

Juniper plant with training stake and Nortène® mesh

The species used are the crab apple (Malus sylvestris), the wild pear (Pyrus pyraster), and the medlar (Mespilus germanica). The apples and pears were harvested and propagated by the LIFE project, as explained in the context of the species that compose the edges. The common juniper (Juniperus communis) was provided by the scientific administration of the Walloon Region in the framework of a project for re-establishment of this species.

method of planting and individual protection

After possible trimming of the plant (pruning the roots and the branches), the young plants are planted using a hoe. Immediately afterward, a Nortène® mesh is placed around the plant, fastened to one or ideally two spruce stakes. This individual protection will prevent the plant being grazed, debarked or frayed by game. It maintains the plant and allows it to be better identified during maintenance operations on the surrounding vegetation. If planting without a protective cover can be considered, it is recommended that stakes be placed next to the plants to allow them to be located in the surrounding vegetation.

5.4. Regular management of conservatory orchards

5.4.1. Maintenance of the plantings and long-term management of orchards

The orchards do not require special maintenance. The trees must not be pruned as in a standard orchard. The individual protections must nevertheless be monitored (training stakes and protections always well-attached and straight).

The vegetation between the trunks of wild fruit trees can be mowed mechanically, in view of the spacing provided when they are planted.

6

Cost-benefit ratio

Management of edges, restored or installed, proves to be less costly than standard rotary cutting of vegetation. The results presented below are cited in more detail in brochure no. 2, “Cost-benefit analysis”, available on the site www.life-elia.eu/en/.

Standard management of the vegetation by rotary cutting costs 1,500 €/ha on average every three years. In areas with difficult access where manual felling is required, this amount comes to approximately 14,000 €/ha every five years.

Even considering the worst scenario (mowing of the central corridor by the TSO and no local partners to maintain the edges), the results show that the break-even point for this activity is reached after **three years** for restoration of an edge and after **nine years** for planting edges.

These results are illustrated below.

After 30 years, the activity shows a cumulative cost from 1.9 to 2.1 times less than that generated by standard management by rotary cutting in both cases, on large amounts. Taking into account a weighted average cost of capital (financing cost of the capital) of 5% that accounts for recosting and inflation, this activity remains 1.4 to 1.8 times less costly over 30 years.

The table below cites the results of the cost-benefit analysis:

	Comparison of the costs of the LIFE activities (planting and restoration of edge) with those of standard management		with a weighted average cost of capital of 5%
Activities	**Break-even point**	**Comparison after 30 years**	**Comparison after 30 years**
Planted forest edges	9 years	1.9 times less costly	1.4 times less costly
Restored forest edges	3 years	2.1 times less costly	1.8 times less costly

As it is not considered an activity to be conducted over large areas of a corridor, the conservatory orchards activity has not been incorporated into the cost-benefit analysis. It must be considered from time to time under the lines. The prices related to planting conservatory orchards involve the plant, the individual protection, the training stake, the workforce for planting and the placement of the individual protection, or a total of € 8.5 (excluding VAT) on average per plant.


Sorbus domestica

Areas of implementation of restoration of natural areas under high-voltage lines

In Belgium (Walloon Region):

- 155 km of electrical corridors

In France:

Seven sites distributed over the various bio-geographical regions

- Atlantic: Finistère, Seine-et-Marne
- Continental: Aube, Ardennes, Doubs
- Mediterranean: Drôme
- Alpine: Hautes Alpes

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