BIODIVERSITY REPORT

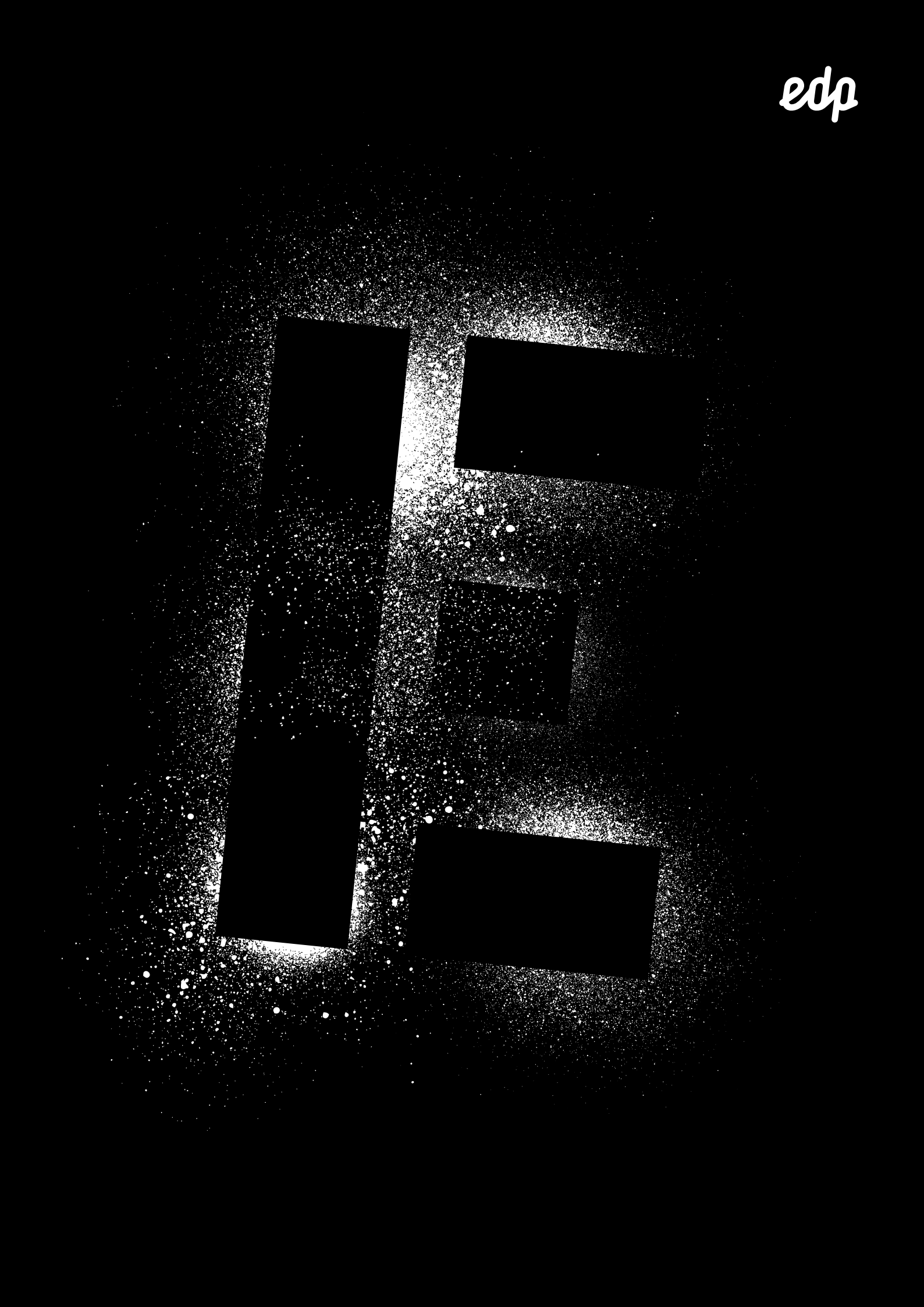
2015-19


Energy

Index


TOVEN
DWIND
IENTO


WIND
ENERGY



01

FRAMEWORK

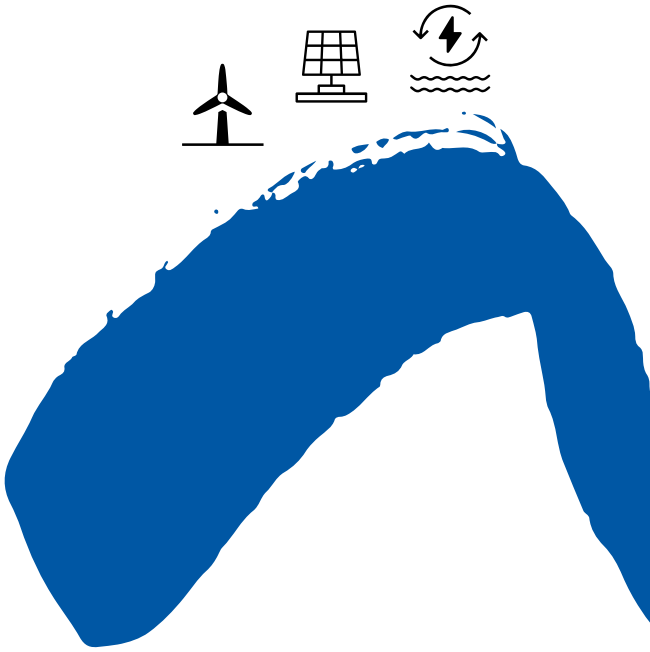
The term **biodiversity** describes the richness and variety of the natural world, in which it is not known for sure how many species there are. Different estimates point to the existence of numbers of species ranging from 2 million to 1 trillion (10^{12}), of which only 1.74 million have been identified and more than 80% are yet to be discovered. Today, species extinction rates are 1,000 to 10,000 times higher than usual, with one million species under threat[1]. Pollution, overuse of natural resources, urban, industrial and agricultural expansion, the spread of invasive alien species and climate change, are putting many species at risk of extinction, putting biodiversity loss and the collapse of ecosystems among the five biggest threats that humanity will face in the next decade[2,3].

Biodiversity is the result of 4.1 billion years of evolution and is essential for the survival of humanity. We depend on nature for the essential resources we use for economic activity and for our quality of life. Among other aspects, this includes food, building materials, source of heat, textile fibres and the molecules that form the basis of medicines. In addition to these goods, nature still provides us with other vital services such as air, water and soil filtration; regulation of the climate and pests and pollination, for example.

Biodiversity is under threat and the goal of halting its accelerated loss will depend on the active contribution of all sectors of society, including the private sector. The year 2020 was called the "super year for biodiversity" because it is where all the hopes to reinforce global commitments and goals for 2021-2030 fall due. This is indeed the decisive decade, the "decade of ecosystem recovery" as designated by the United Nations.

[1] https://ipbes.net/global-assessment
[2] https://futureearth.org/2020/02/07/we-have-launched-the-our-future-on-earth-2020-report/
[3] https://www.weforum.org/reports/the-global-risks-report-2020

Who We Are



EDP IS A MULTINATIONAL, VERTICALLY INTEGRATED UTILITY COMPANY

Throughout its 40 years of history, EDP has been building a relevant presence in the world energy scene, being present in 19 countries in 4 continents. EDP has around 11,700 employees and is present throughout the electricity value chain and in the gas commercialization activity.

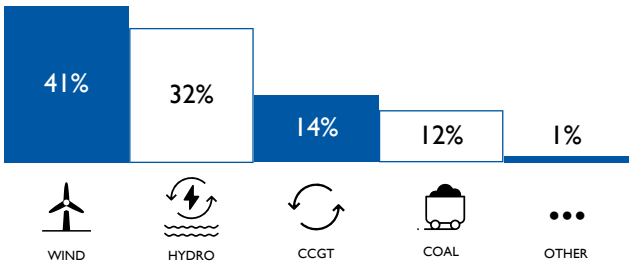
1. GENERATION

Generation is the first activity in the value chain of the electricity sector. Power plants transform the various energy sources into electricity. These energy sources may be of renewable origin (water, wind and sun) or non-renewable (coal, natural gas, nuclear and cogeneration).

2. TRANSMISSION

In the transmission the energy generated is delivered to the transport network, which is made of very high voltage lines and which then channels the energy to the distribution network. This is a new business segment being developed in brazil. In 2018 the first 113 km lot started operations.

27
GW OF INSTALLED CAPACITY

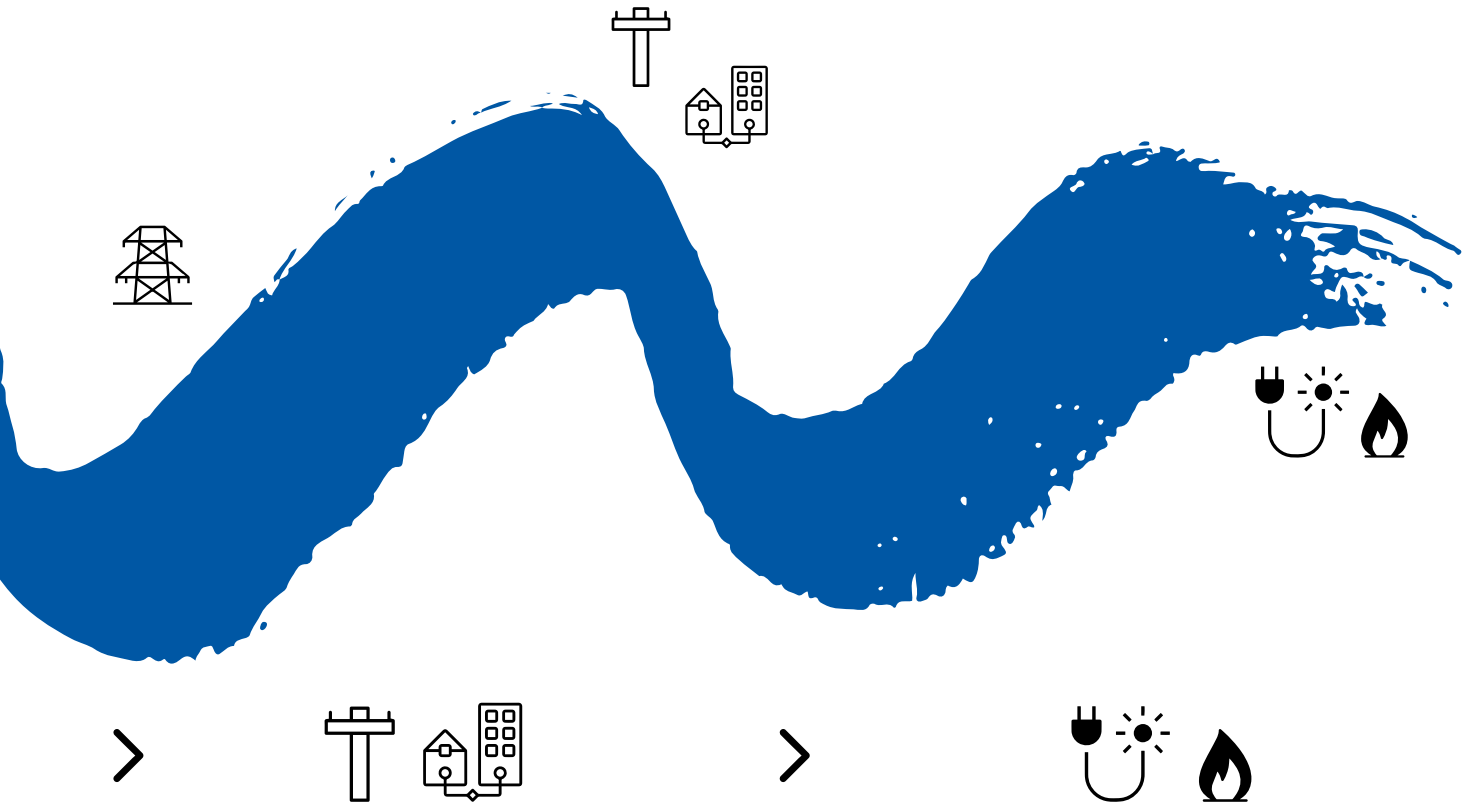


113
OF OPERATING NETWORK

1,328
OF TRANSMISSION NETWORK UNDER CONSTRUCTION

67
TWh OF NET ELECTRICITY GENERATION

66%
FROM RENEWABLE SOURCES



3. DISTRIBUTION

In the distribution activity the transported energy is channeled to the distribution grid. The distribution network allows the flow of energy to the supply points. Electricity distribution networks are composed of high, medium and low voltage lines and cables. Substations, processing stations and public lighting installations as well as the necessary connections to consumer installations and power stations are also an integral part of the distribution networks.

340,744
KM OF NETWORK

286,470
KM OF DISTRIBUTION OVERHEAD LINES

54,274
KM OF DISTRIBUTION UNDERGROUND LINES

80
TWh OF ELECTRICITY DISTRIBUTED

4. SUPPLY

In the supply activity distributed energy arrives at the supply point and is sold by the supplier. Throughout the electricity and gas value chain, supply is the closest activity to the customer and responsible for the relationship with final consumers.

9,827,505
ELECTRICITY CUSTOMERS

5,041,722
CUSTOMERS IN LIBERALIZED MARKET

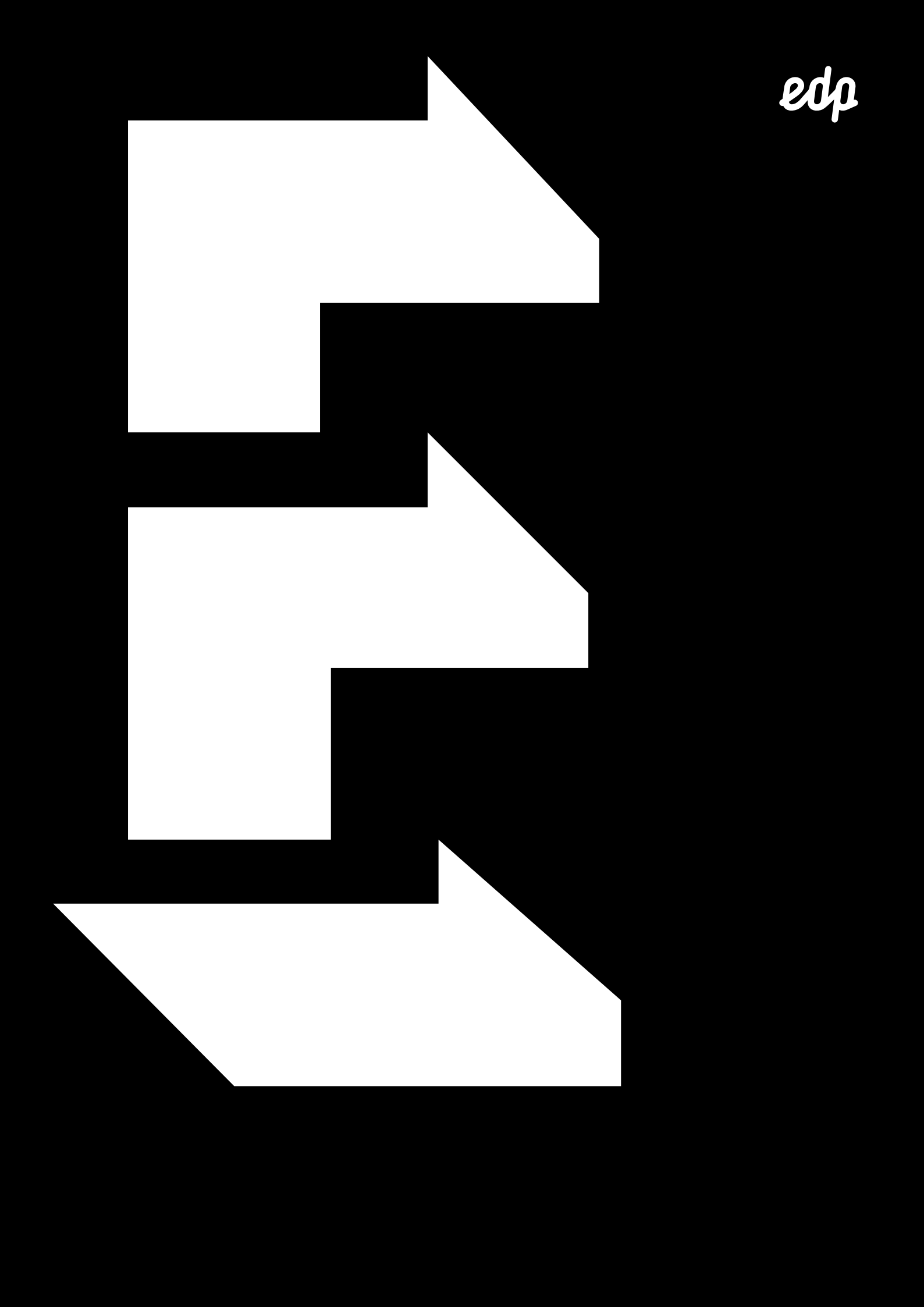
4,785,783
CUSTOMERS IN LAST RESORT

1,599,232
GAS CUSTOMERS

1,509,811
CUSTOMERS IN LIBERALIZED MARKET

89,421
CUSTOMERS IN LAST RESORT

SUSTAINABLE
ENERGY



02

COMMITMENT TO BIODIVERSITY

Proactive environmental management creates value and is the duty of a socially responsible company. EDP accepts its responsibility for the protection of biodiversity through its Environment Policy, but also through other specific commitments.

2.1 ENVIRONMENTAL POLICY

EDP considers the Environment to be a strategic management element, aiming to reduce the impacts of its activity through a set of commitments which ensure the implementation and maintenance of appropriate and effective environmental management systems, with the ultimate goal of Sustainable Development, namely:

- Protecting the Environment in its different components and integrating it into decision-making processes, considering a life cycle perspective, wherever possible;
- Mitigating the environmental impact, in all phases of the decision-making processes, giving priority to the mitigation hierarchy;
- Properly managing environmental risk, in particular the prevention of pollution and enabling an emergency response in the event of an accident and/or catastrophe;
- Promoting continuous improvement in processes, practices and environmental performance, stimulating R&D + Innovation within the framework of the established environmental goals;
- Complying with and respecting applicable environmental legislation, as well as other voluntary commitments;
- Integrating stakeholder expectations into decision making;

- Extending the management and improvement of environmental performance to the value chain;
- Communicating performance, within the framework of its ethical principles, in a regular and transparent manner, ensuring balance, understanding and accessibility by stakeholders;
- Training and awareness raising to improve individual and collective environmental performance.

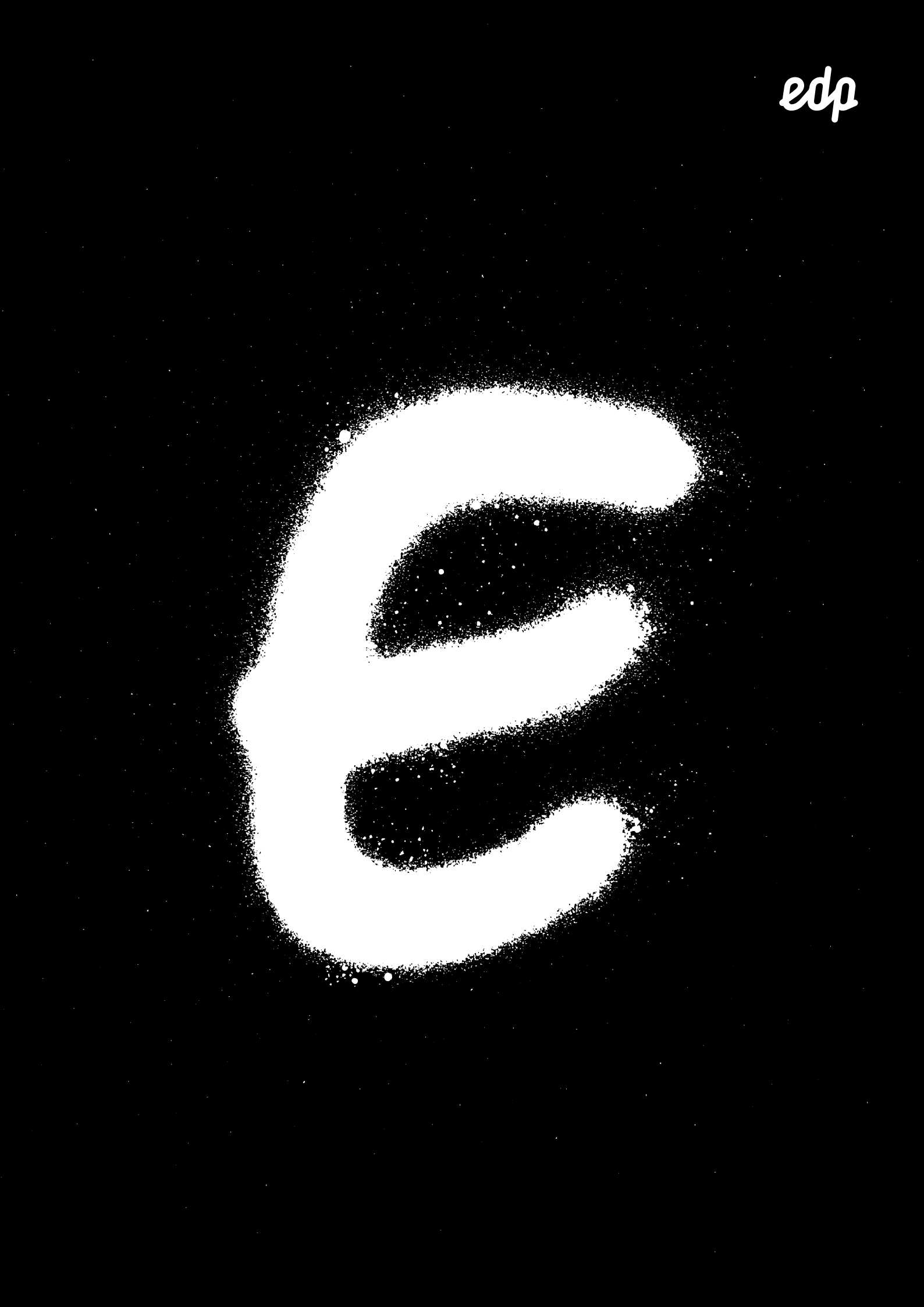
Based on the Group's strategic priorities, EDP also undertakes specific additional commitments, which include protection of biodiversity:

- Contributing to avoiding or reducing biodiversity loss, favouring dynamic, comprehensive, locally-owned management, long-term thinking and aiming for an overall positive balance.
- Contributing to the deepening of scientific knowledge on the different aspects of biodiversity, including through the establishment of partnerships.

2.2 OTHER COMMITMENTS

EDP has also committed to:

- "not building new production facilities in areas included in the UNESCO World Heritage List", ensuring that it continues to have no presence in these territories, and with a No Net Loss -NNL- biodiversity goal for all new projects with significant residual impacts, by 2030.
- in the EDP Group's Social Investment Policy, protecting natural heritage and biodiversity are strategic priorities in contributions to the community.
- actively contributing to the Sustainable Development Goals (SDGs) enshrined in the United Nation's 2030 agenda, in particular to SDG 15 - **Protecting Life on Land.**



03

OUR APPROACH

EDP works daily to learn about and understand the impacts of its activities on the loss of biodiversity. It assesses the risks and opportunities which enable it to act early and effectively in this area. It anticipates regulatory pressures and acts to respond to society's expectations in the search for solutions involving continuous improvement, which are considered in decision making. EDP's ambition is to achieve a positive global balance and, to that end, it is gradually ensuring that the **mitigation hierarchy** is always applied to projects involving the production, distribution and transmission of electricity, through giving priority to the earliest planning stages, before the impact occurs.

EDP takes an ecosystem focused approach in the process of mitigating impacts on biodiversity, such as integrated planning of soil, water, air and biological resources within a socio-ecological context. The approach is supported by participative, long-term and adaptive management processes, capable of dealing with the natural dynamics of ecosystems and uncertainties associated with their behaviour. In this way, EDP bases its action in the areas of scientific knowledge related to:

1. the structure, processes, functions and interactions between organisms and their environment;

2. the recognition of the human being as an integral part of many ecosystems;

3. the conservation of biodiversity as a key element, in guaranteeing the balance of ecosystems and the economic and social well-being of communities.

3.1. IMPACTS

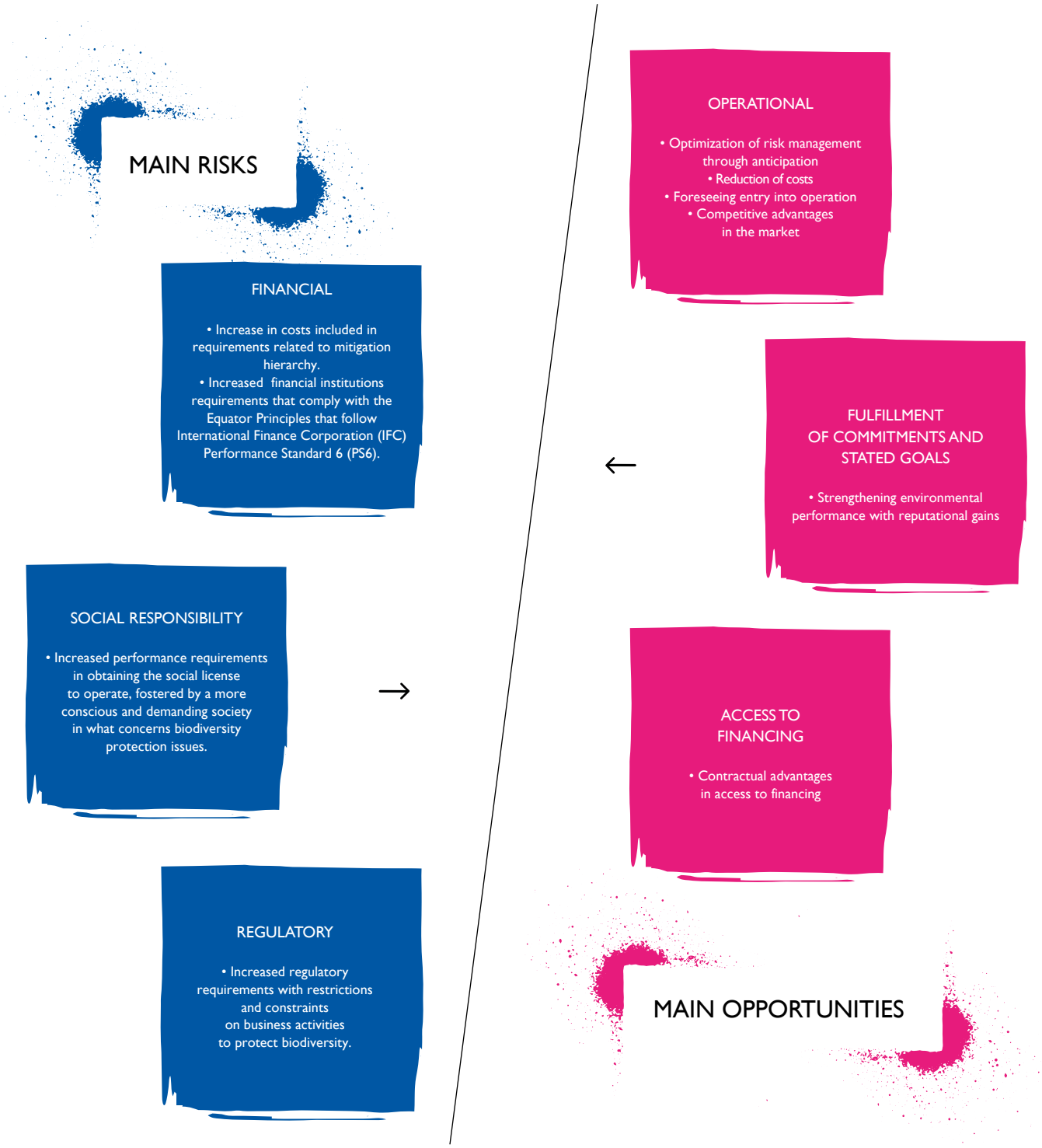
EDP assesses the potential effects on biodiversity of its main operational activities. This analysis ensures that they are covered by the environmental management systems implemented and makes it possible to systematize and optimize best management practices for mitigating impacts on biodiversity, across the Group.

	ACTIVITY	ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT	EFFECT ON BIODIVERSITY	WHAT WE DO
HYDROELECTRIC GENERATION	Presence of dam/weir	Upstream flooding and removal of water and sediment downstream	Alterations/disturbance of habitats, loss of river continuum	Disruption of habitats	Restoration and compensation for damage caused by the degradation, destruction, suppression and fragmentation of affected habitats
	Drained reservoir	Reduction of the mass of available water	Degradation of the chemical, biological and morphological characteristics of water courses		Ensure artificial spawning, recovery of water lines and fish ladders
	Handling dangerous products	Accidental/poor handling spillages	Soil pollution (by absorption) and water pollution (surface and subterranean)	Disturbance and destruction of species / Potential water quality reduction	Improvement of habitats in near and far proximity to projects
	Dam rupture	Sudden flooding fos downstream land	Fragmentation of habitats and potential reduction in water quality	Suppression of riparian galleries/ Disturbance and destruction of flora and potential drowning of fauna	
THERMAL GENERATION	Combustion	Emission of acidic gases, such as NO_x and SO_2	Acid rain	Degradation and disturbance of habitats and ecosystems	Minimize the impact of acidifying pollutants responsible for acid rain (NO_2 and SO_2)
	Generated in the value chain through the transport of row materials	Greenhouse gas emissions	Climate change	Global Biodiversity Loss	Use fuels with smaller sulfur concentrations and implement denitrification and desulfurization systems.
	Resulting from the extraction of row materials in the value chain	Consumption of row materials	Alterations/disturbance of habitats	Degradation and disturbance of habitats and ecosystems	
WIND GENERATION	Construction of accesses	Destruction of fauna and flora	Opening of new accesses that attract more people and cutting the ecological corridor	Loss of biodiversity	Monitor collisions of birds and bats and their cumulative effect on species.
	Wind energy generation	Existence of wind turbine	Cumulative impacts		Limit indiscriminate accesses that disturb sensitive species and habitats Mitigate environmental impacts in the different phases of wind projects: design, construction, operation and decommissioning of projects.

TRANSMISSION AND DISTRIBUTION 	Overhead and underground power lines	Power lines construction, particularly within and surroundings areas with legal nature protection status	Collision and electrocution of avifauna and other species of fauna	Ecosystems degradation and Loss of habitat and species	To avoid impact, we detour around more sensitive ecological areas.
	Opening and cleaning of the buffer strip	Discontinuity of fauna and flora	Alterations/disturbance of habitats		We promote the insulation of overhead lines to prevent electrocution.
	Opening of accesses		Fragmentation and potencial habitat reduction		We promote the insulation of overhead lines to prevent electrocution.
	Use of SF6 and CFC´s	Greenhouse gas emissions (SF6) and stratospheric ozone depletion (CFC´s)	Climate change	Global Biodiversity Loss	We ensure sustainable practices for the management of plant cover in the protection bands for the lines, reducing/cancelling negative impacts on the surrounding habitats.

3.2 RISKS AND OPPORTUNITIES

EDP promotes effective management of impacts on biodiversity, where the risk of regulatory and financial pressure and social responsibility is growing. Additionally, it recognizes the opportunity to optimize operating costs, access to financing and the benefits to its reputation, thereby increasing the effectiveness of mitigation measures and obtaining future competitive advantages, due to the experience acquired and put to use in the meantime.



3.3. MITIGATION HIERARCHY

The mitigation hierarchy is defined as a sequence of actions to: anticipate and **avoid** potential impacts; **minimize**, when it is not possible to avoid entirely; **restore**, when there are impacts; **compensate**, when residual impacts still remain. It is a gradual and cumulative action aimed at reducing the impact until there are no adverse effects on biodiversity, to at least reach the level of No Net Loss, but always aiming for overall gains (Net Gain). Following the mitigation hierarchy, EDP:

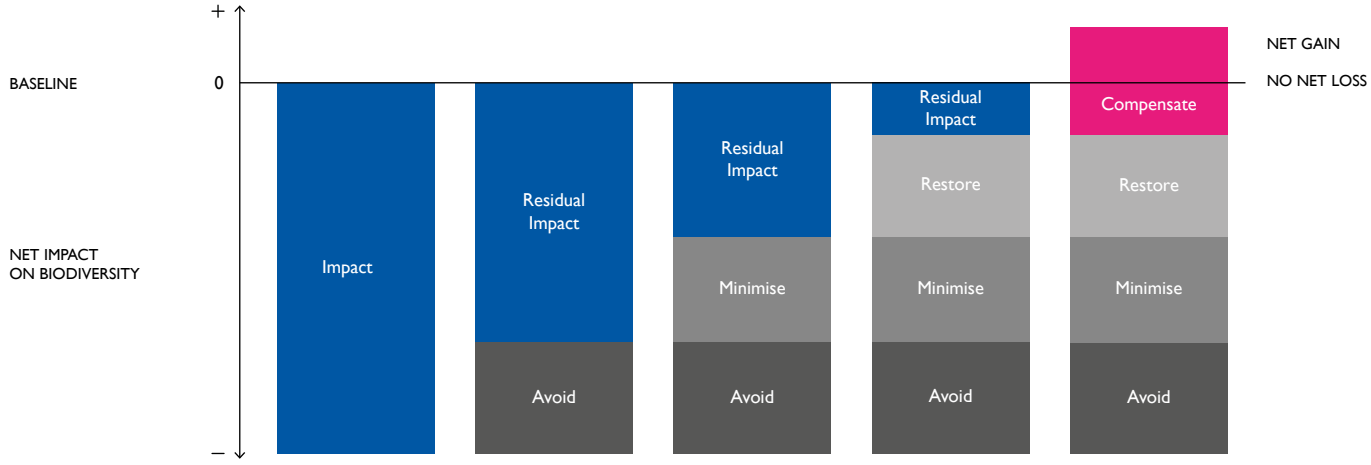
I. **Avoids**: situations are identified where it is possible to avoid impacts, already in the planning and project phase, through a careful selection of the place or period of time in which to establish the infrastructure elements.

II. **Minimizes**: after surveying the reference situation of the state of local biodiversity, measures are taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided.

III. **Restores/Renews**: after the construction phase, the affected ecosystems are restored and renewed, in particular returning the areas used as worksites, temporary accesses, etc., back to their natural status.

IV. **Compensates:** when the previous phases have not proven sufficient to annul the project's impact on local biodiversity, measures are taken to compensate for significant adverse residual impacts, in seeking net gains for biodiversity.

Avoiding and minimizing prevents and reduces impact, respectively, while restoring and compensating remedies the impact. An NNL or NG target is achieved with biodiversity **offsets**, to offset identified significant residual impacts. These result from actions designed to compensate for the significant residual impacts caused by the project and which have not been completely mitigated through the appropriate prevention, minimization and restoration actions.



MITIGATION HIERARCHY


W
A

WATER
ENERGY

04

EDP PANORAMA

EDP is a global energy company that incorporates a commitment to its customers, its people and the environment within its culture. A vertically integrated multinational *utility* with a business strategy that has been prioritising growth in renewable energies, in a biodiverse world.

EDP in Numbers

GLOBALLY

ENVIRONMENTAL EXPENSES

354,191
THOUSAND EUROS (INVESTMENT + EXPENSES)

EMPLOYEES

174
ASSIGNED TO ENVIRONMENTAL MANAGEMENT ISSUES

IN IMPORTANT BIODIVERSITY AREAS

6,000
OF FLOODED AREA BY RESERVOIRS (5% OF TOTAL FLOODED AREA)

97
OF ELECTRICITY TRANSMISSION NETWORK (7% OF TOTAL NETWORK)

17,228
KM OF ELECTRICITY DISTRIBUTION NETWORK (11% OF TOTAL NETWORK)

PORTUGAL

OPERATIONAL

5 852	Employees
5 833 961	Electricity and gas customers
11 159	Installed capacity (MW)
177 841	Overhead grid extension (Km)
48 981	Underground grid extension (Km)
304	Capacity secured onshore and offshore (MW)

BIODIVERSITY

Environmental Cost

34 247	Investments (EUR thousand)
133 983	Costs (EUR thousand)

In Important Biodiversity Areas

5 666	Area flooded by reservoirs (ha)
9 086	Overhead high and medium voltage lines (km)
991	Underground high and medium voltage lines (km)
19	Substations (n°)

SPAIN

OPERATIONAL

1 720	Employees
2069368	Electricity and gas customers
5 373	Installed capacity (MW)
15 729	Overhead grid extension (Km)
5 037	Underground grid extension (Km)
89	Capacity secured onshore and offshore (MW)

BIODIVERSITY

Environmental Cost

2 395	Investimento (mil€)
122 108	Gastos (mil€)

In Important Biodiversity Areas

330	Area flooded by reservoirs (ha)
998	Overhead high and medium voltage lines (km)
51	Underground high and medium voltage lines (km)
17	Substations (n°)

NOTE: THE FIGURES SHOWN CORRESPOND TO 2019
(*) WIND FARMS EVALUATED IN THE LAST 5 YEARS WITH
(**) IN OPERATION AND CONSTRUCTION

BRAZIL

OPERATIONAL

3 158	Employees
3 523 408	Electricity customers
2 787	Installed capacity (MW)
1 441	Overhead grid extension (km)**
92 899	Underground grid extension (Km)
598	Capacity secured onshore (MW)

BIODIVERSITY

Environmental Cost

34 052	Investments (EUR thousand)
7 137	Costs (EUR thousand)

In Important Biodiversity Areas

3	Area flooded by reservoirs (ha)
97	Overhead high voltage transmission lines (km)
6 095	Overhead high and medium voltage lines (km)
7	Underground high and medium voltage lines (km)
10	Substations (n°)

FRANCE+ ITALY

OPERATIONAL

121	Employees
324	Installed capacity (MW)
1 016	Net generation (GWh)
100	Capacity secured onshore (MW)
1 000	Capacity secured offshore (MW) (301 MW net for EDP)

BIODIVERSITY

Environmental Cost

955	Investments (EUR thousand)
940	Costs (EUR thousand)

In Important Biodiversity Areas

27.6	Wind farms within or/and around important biodiversity (ha)*

EUA + CANADA + MEXICO

OPERATIONAL

663	Employees
235 714	Installed capacity (MW)
811 696	Net generation (GWh)
2 096	Capacity secured onshore (MW)
804	Capacity secured offshore (MW) (402 MW net for EDP)

BIODIVERSITY

Environmental Cost

16 655	Investments (EUR thousand)
944	Costs (EUR thousand)

In Important Biodiversity Areas

5.5	Wind farms within or/and around important biodiversity (ha)*

POLAND + ROMANIA

OPERATIONAL

192	Employees
1 263	Installed capacity (MW)
3 333	Produção líquida (GWh)
475	Capacidade assegurada *onshore* (MW)
1 000	Capacidade assegurada *offshore* (MW) (301 MW líquidos para a EDP)

BIODIVERSITY

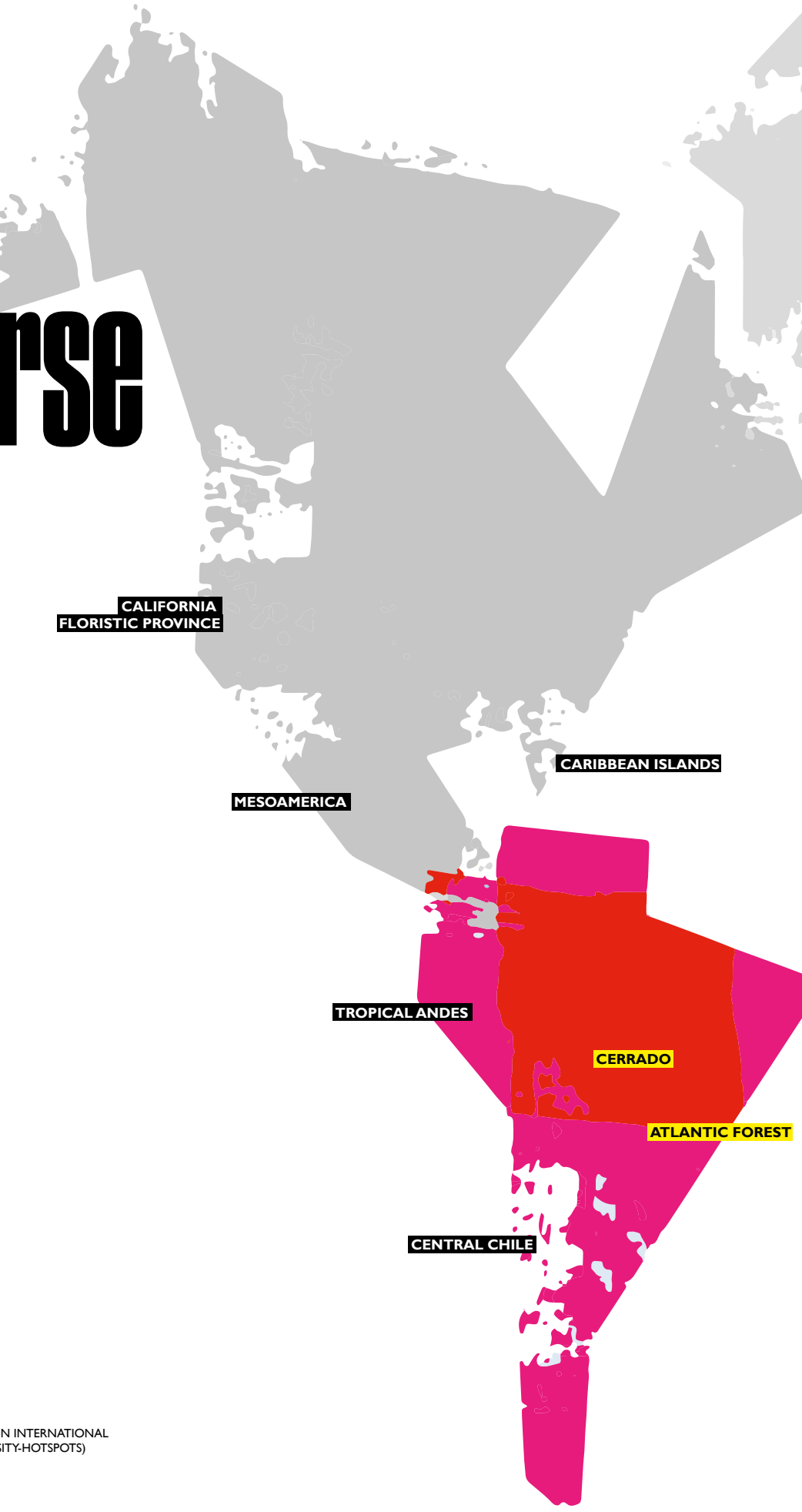
Environmental Cost

8	Investments (EUR thousand)
767	Costs (EUR thousand)

In Important Biodiversity Areas

58.1	Wind farms within or/and around important biodiversity (ha)*

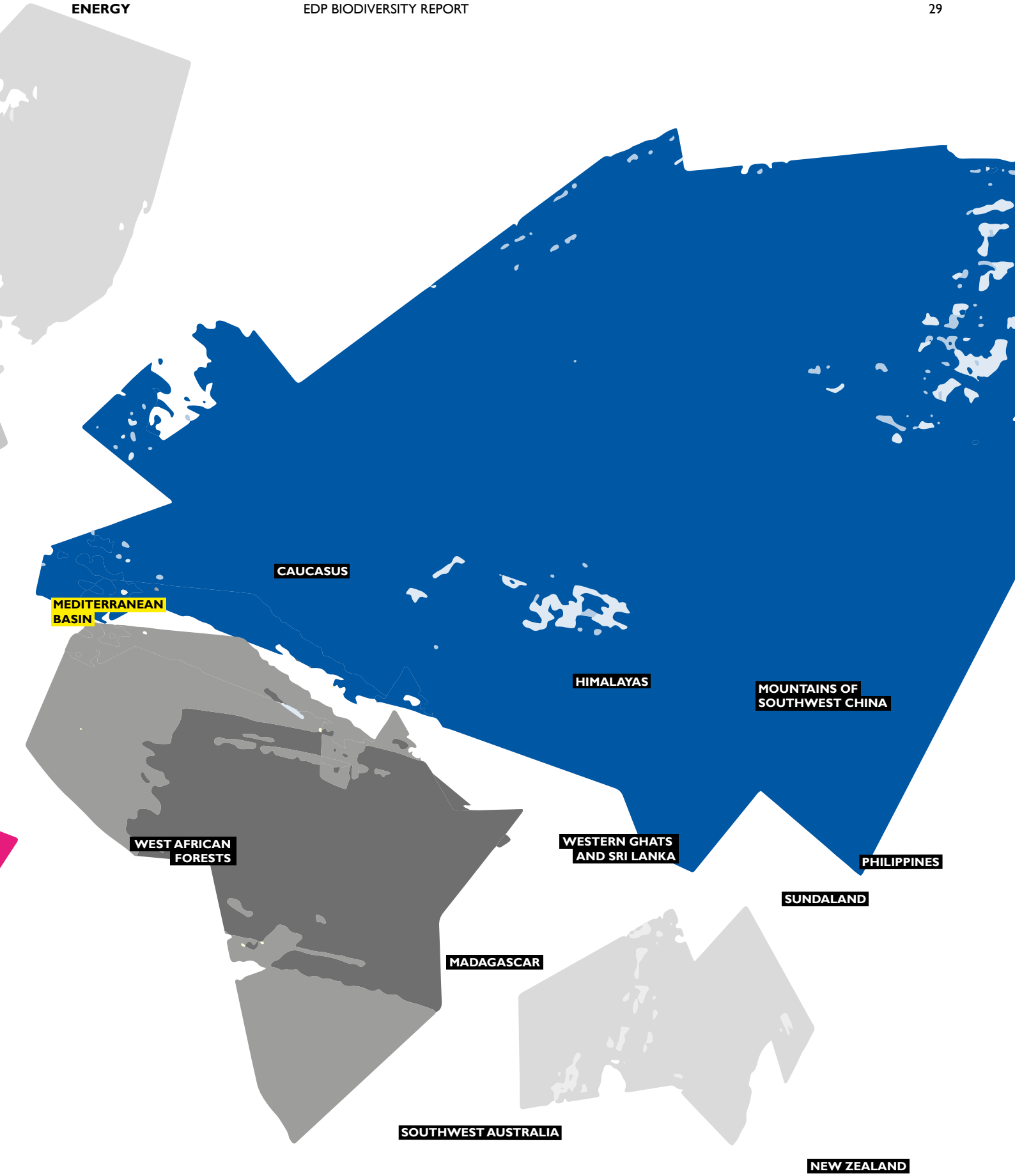
EDP in a Biodiverse World



BIODIVERSITY HOTSPOTS*
where EDP has activities

BIODIVERSITY HOTSPOTS*

*IN A TOTAL OF 36 HOTSPOTS IDENTIFIED BY CONSERVATION INTERNATIONAL (HTTPS://WWW.CONSERVATION.ORG/PRIORITIES/BIODIVERSITY-HOTSPOTS)


CAUCASUS
MEDITERRANEAN BASIN
HIMALAYAS
MOUNTAINS OF SOUTHWEST CHINA
WEST AFRICAN FORESTS
WESTERN GHATS AND SRI LANKA
PHILIPPINES
SUNDALAND
MADAGASCAR
SOUTHWEST AUSTRALIA
NEW ZEALAND

4.1. POTENTIALLY IMPACTED SPECIES

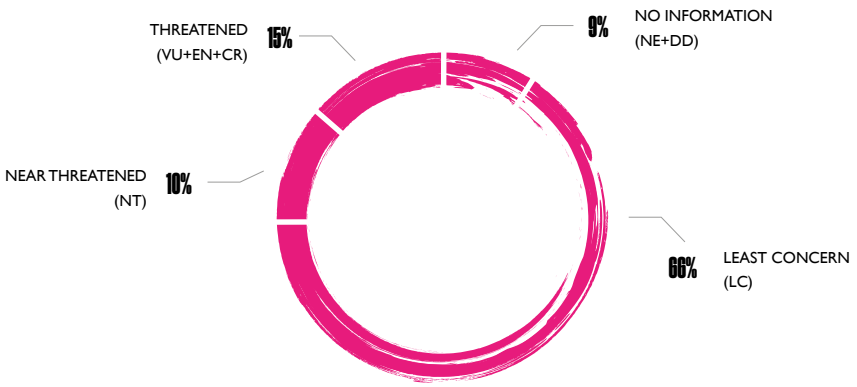
In 1964, the International Union for the Conservation of Nature and Natural Resources (IUCN) created what has become the largest catalogue for the conservation status of species of plants, animals, fungi and protozoans across the planet: the IUCN Red List of Threatened Species. The categories vary according to the level of risk of the species according to criteria that include: the rate of population decline (understood as the number of individuals per species), the size and distribution of the population, the area of geographical distribution and the degree of fragmentation.

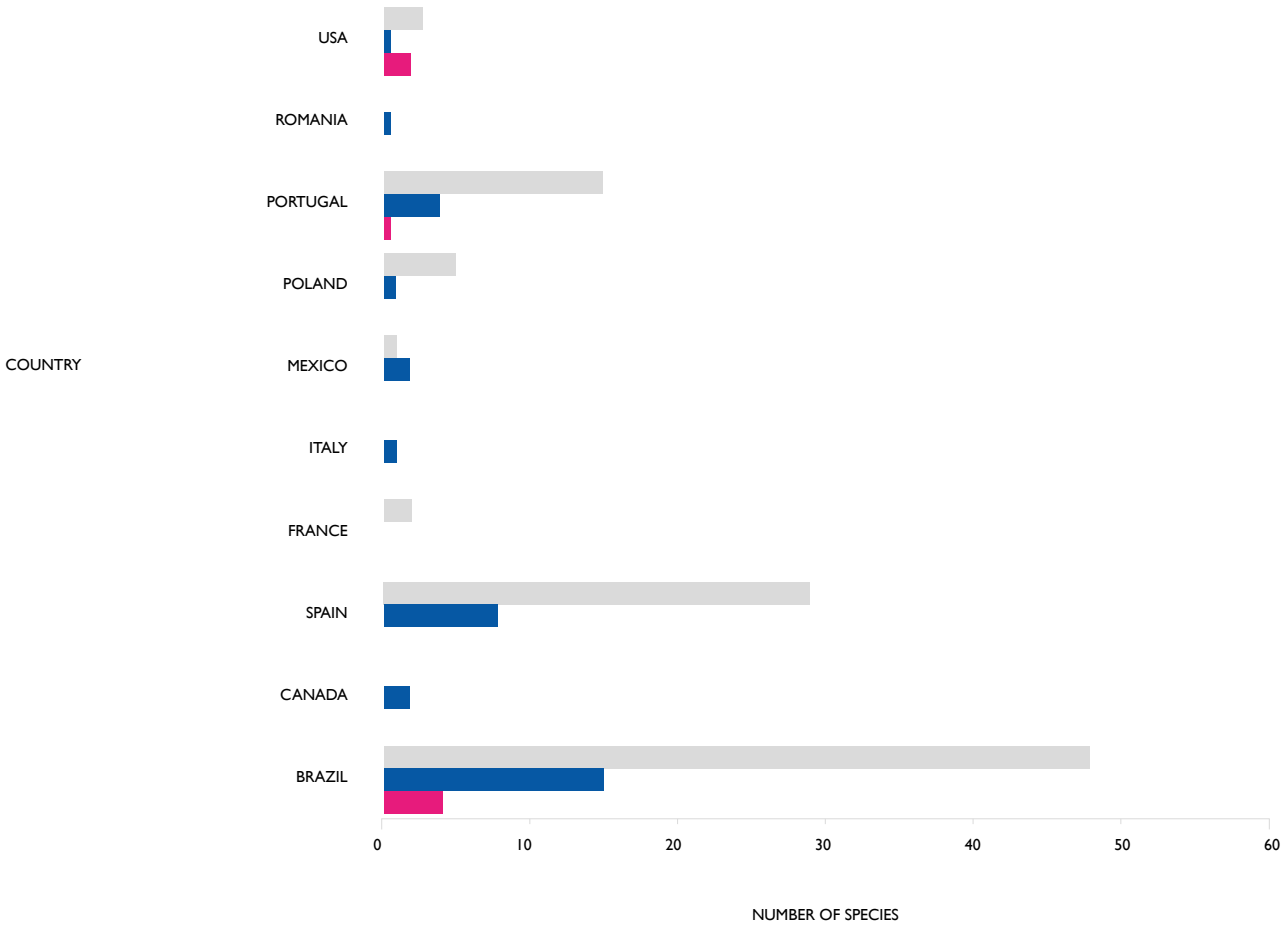
				THREATENED					
NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	REGIONALLY EXTINCT	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	RE	EW	EX

The list of species potentially impacted (LEPI) by EDP's activities is updated based on the species that are mentioned in the different studies developed within the scope of the different environmental impact assessments in the Group's electricity production, transmission and distribution projects. This list is updated on an annual basis, on 31 December of each year. (see https://www.edp.com/pt-pt/sustentabilidade/compromisso-com-a-sociedade-e-ambiente#proteger-o-ambiente)

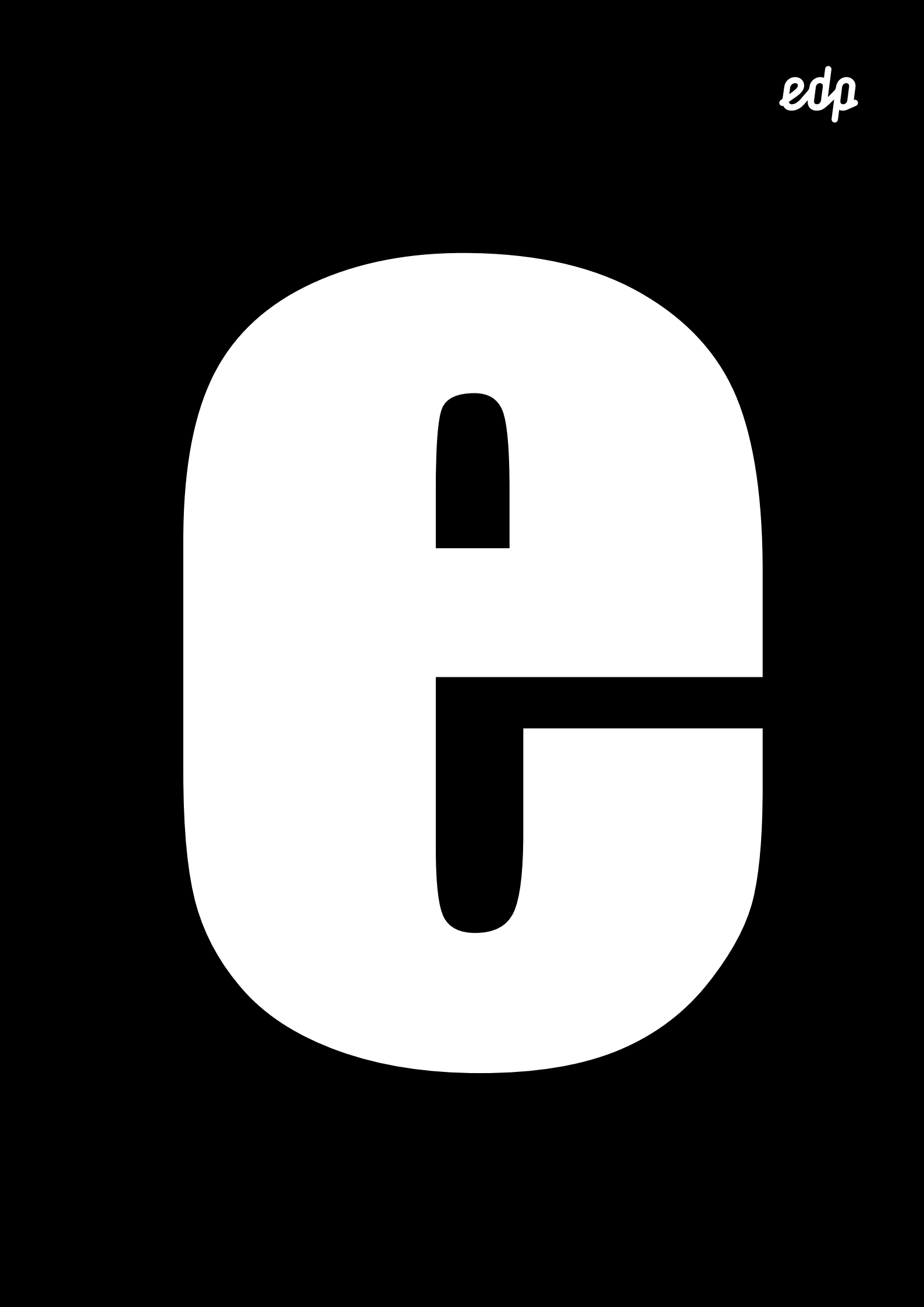
In 2019, LEPI contained 672 species of animals (87%) and plants (13%), the threat categories of which, according to the IUCN red list, vary between "least concern" (66%) and "critically endangered" (1%). The categories considered threatening (VU+EN+CR) represent 15%, distributed as follows: VU (10%), EN (4%) and CR (1%), out of a total of 99 species of animals (80%), mostly birds and mammals, respectively, and plants (20%), almost exclusively vascular plants.

This group of endangered species arises mainly from impact generated by wind and water projects and associated transmission lines, in the three regions of greatest consolidation and diversification in the value chain of EDP's activity, confined to globally recognized biodiversity hotspots: the Cerrado and the Atlantic Forest Region, in Brazil, and the Mediterranean Basin, in Spain and Portugal. In general, they are species impacted by the effects of habitat fragmentation, alteration and disturbance and the obstacles created in ecological corridors. However, these species are subject to mitigation measures aimed at avoiding, minimizing, restoring and offsetting the impact, with respective population monitoring programmes and conservation action which has been implemented. These measures essentially involve the installation of innovative devices for dissuading birds from wind turbines and transmission lines, for example, or through the restoration, improvement and protection of related priority habitats. (see the sample measures in the table on page 18)




USA
ROMANIA
PORTUGAL
POLAND
MEXICO
ITALY
FRANCE
SPAIN
CANADA
BRAZIL
COUNTRY
0
10
20
30
40
50
60
NUMBER OF SPECIES
IUCN RED LIST THREAT CATEGORIES
VU
EN
CR

HUMAN
ENERGY



05

WE ACT ON THE VALUE CHAIN

EDP's Corporate Environmental Management System (SIGAC), with the corporate management scope of the Group's policies, commitments and environmental performance, promotes a cycle of continuous improvement focused on better environmental performance throughout the value chain and throughout the project cycle.

The stories that follow are initiatives to mitigate the impact on biodiversity selected due to their innovative nature. Brief stories are told:

i. during the planning, design and construction, and operation and maintenance phase

ii. with employees and customers

iii. with the academy: EDP Chair in biodiversity II

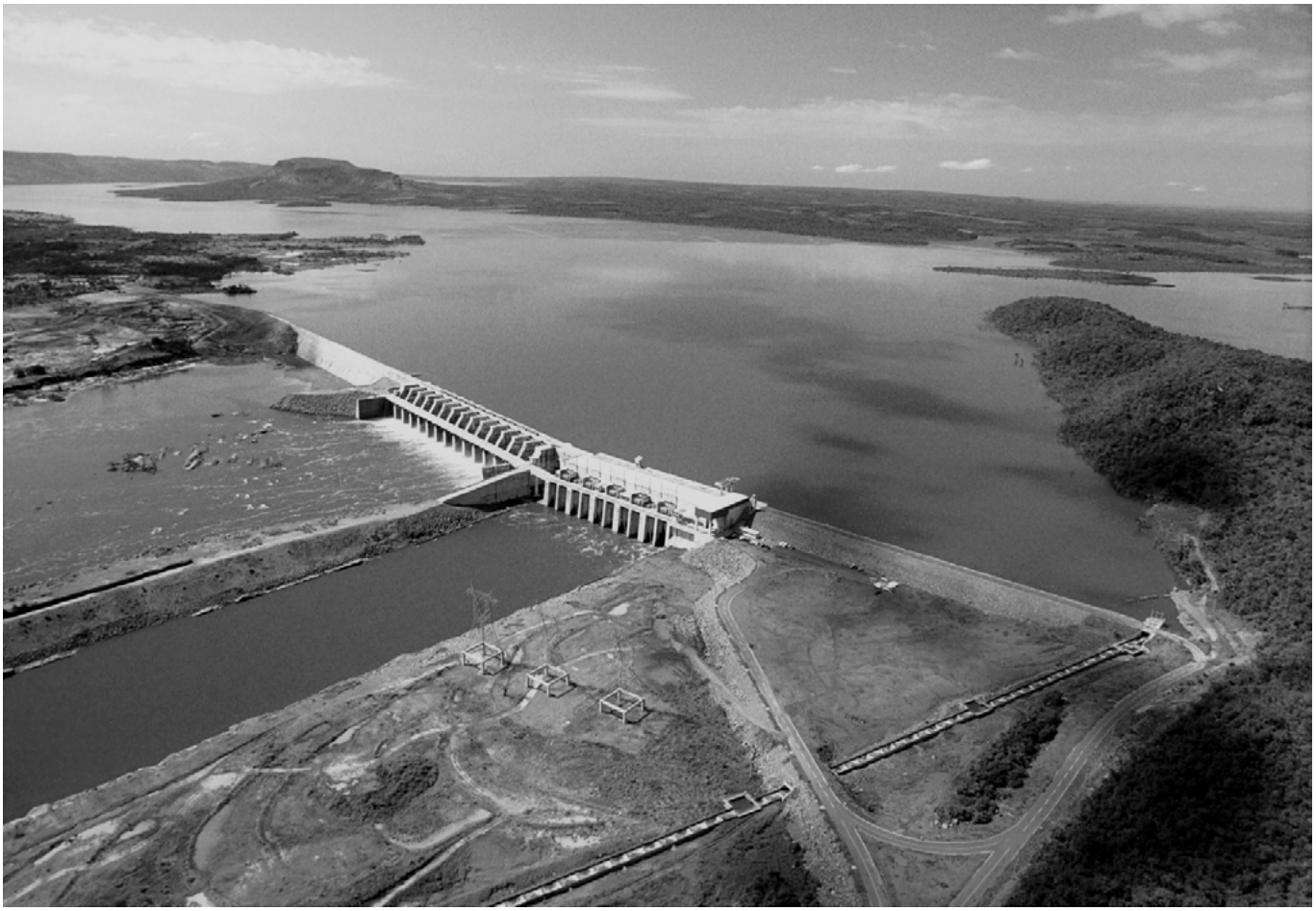
iv. with society

5.1. DURING PLANNING

The strategic approach supported by the mitigation hierarchy gives priority to the early phases which, in anticipation of and at the level of decision making, prevent the occurrence of potential impacts identified in the design phase. As a result, they provide an opportunity to manage the main biodiversity-related risks.

5.1.1. ENVIRONMENTAL VALUATION AND DEPENDENCIES AND IMPACTS ANALYSIS

EDP Brazil is developing an integrated methodology to measure and value the impacts and dependencies of ecosystem services related to its activities.



The tools for improving and analysing dependencies and business impacts are useful for defining priorities for action, improving environmental risk management, and identifying opportunities. In the context of mitigating the impact on biodiversity, these tools contribute to the first step of the mitigation hierarchy by facilitating early decision making to avoid potential impacts.

As such, EDP Brazil is developing an R&D project on biodiversity on "Environmental Improvement and Impact and Dependency Analysis for the Electric Sector", with the main objective of developing an integrated methodology to measure and improve the impacts and dependencies of ecosystem services related to their business activities.

The scope of the study covers electricity distribution activities in the state of Espírito Santo and São Paulo, thermal production in the thermoelectric plant of Pecém and hydroelectric production in the Luiz Eduardo Magalhães – Lajeado hydroelectric plant. The planned actions are divided into three modules to be implemented in 2019 and 2020:

- Module 1: Qualitative/quantitative analysis of risk and dependency of the ES;
- Module 2: Improvement of environmental externalities;
- Module 3: Dependency and operational risk assessment.

In 2019, actions were taken to identify the main stakeholders and the dynamics of use of ecosystem services by the business units.

In 2020, the study foresees the construction of a tool that will allow electricity companies to calculate their externalities, negative and positive, in order to strengthen the analysis of dependencies and impacts, and the related socio-environmental risks and benefits.

5.2. DURING DESIGN AND CONSTRUCTION

In the design phase, part of the potential impact can still be avoided and reduced, and, in the construction phase, the remediation involves minimization, restoration and compensation actions.

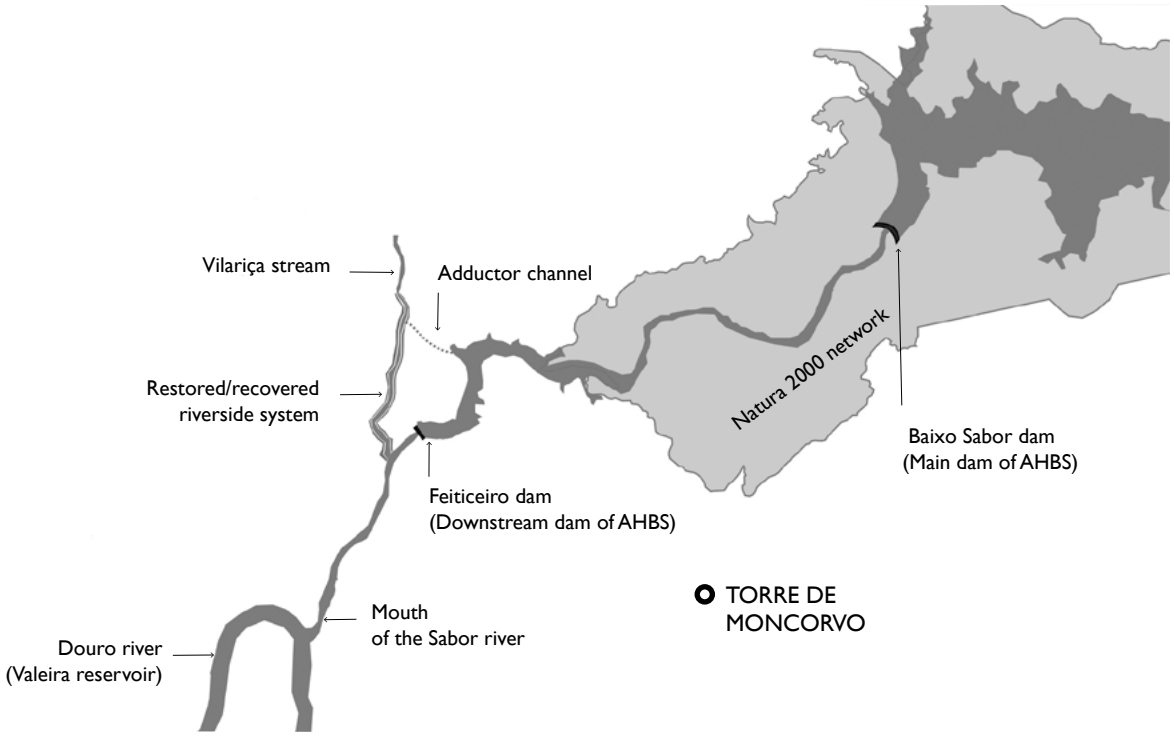
5.2.1. SUBSTITUTION HABITAT FOR THE FISH POPULATION

The barrier created by the construction of a dam on a riverbed prevents fish from moving along the waterline. Bypassing the river discontinuity remains one of the main challenges of hydroelectric projects.

Hydraulic infrastructures, such as weirs and dams, fragment water courses and make it impossible for migrations of different species of fish (ichthyofauna), preventing reproductive crossing between subpopulations, and consequently promoting a loss of genetic diversity.

The Baixo Sabor Hydroelectric Plant (AHBS) is no exception. It was built on the last section of the Sabor River near the mouth with the Douro River (in the Valeira reservoir), in the Trás-os-Montes and Alto Douro region, simultaneously within the Natura 2000 Network (RN2000) - Ecological Network for the European Union area and the Iberian Meseta Cross-border Biosphere Reserve.

AHBS only affects fish species that travel only in freshwater environments (freshwater migratory species), since species that migrate between the river and the sea (diadromous migratory species) are currently prevented from reaching the estuary, because of the waterfall from the Douro dams. The potentially affected species are the common barbel (*Barbus bocagei*) and the northern straight-mouth nase (*Pseudochondrostoma duriense*), studies of which have confirmed the occurrence of significant breeding migrations from the Valeira reservoir to gravel beds in the Sabor river.



These are native species which are relatively abundant and with a conservation status varying between "Little concern" and "Vulnerable" in Portugal, but both with some importance to the local economy. A compensation measure was established, with the aim of providing a replacement habitat for the final section of the Sabor River, which until then had been used as a spawning site by these two species which had, in the meantime, been hampered by the construction of the AHBS downstream dam (the feiticeiro dam). This measure was carried out between 2008-2015 and implemented on the Vilariça stream, which, in the vicinity of the AHBS, is the largest non-dammed tributary of the Valeira reservoir. The measure, known as the "Vilariça Compensation Habitat" involved the following actions:

- construction of a feeder channel between the downstream reservoir and the Vilariça stream, with the aim of increasing the volume of water during the breeding period and increasing the flow in the end phase. As such, this boosts the attraction of the Vilariça stream for breeding common barbels and northern straight-mouth nase;

- construction of 6 weirs (2 in stone and 4 in wood) in the last 5 km of the Vilariça stream, in order to create several transposable obstacles where the speed of the current is greater and therefore increases its attractiveness to specimens of these species.

- restoration/renewal of the entire riverside system of the Vilariça stream in a 5 km stretch, including actions to eradicate invasive species, such as *Arundo donax*, and the installation and/or densification of native species, such as *Alnus glutinosa*, *Fraxinus angustifolia* or *Salix sp*.

The results obtained since this was started have shown a significant recovery of the rehabilitated riverside system and the target species being attracted to the new spawning habitat. These results provide evidence of the effective success of this compensation measure.

5.2.2. USE OF DRONES TO AVOID DESTRUCTION OF HABITAT IN THE ATLANTIC FOREST

The use of unmanned vehicles to extend conductive cables in electricity distribution lines significantly reduces deforested area and brings forward the time of entry into operation

EDP Brazil faces significant challenges in mitigating the impacts on biodiversity caused by its electricity distribution activity, since there is a need to cross areas considered to have high biodiversity value The rainforest of the Atlantic Forest is a biome impacted by EDP's distribution activity in the state of São Paulo and Espírito Santo, at the level of the respective federal, state and municipal conservation units of the National System for Brazilian Conservation Units.

In 2018, during the construction of a 138 kV distribution Line in the municipality of Santa Maria de Jetibá (in the central mountainous region of Espírito Santo with the largest native forest coverage in this state), a pilot project for the use of "Unmanned Aerial Vehicles" (UAV) was developed - known as drones. This technology was used in placing the conductive cables thereby replacing the classic methods that require the clearing of large areas of forest.

The tests carried out showed significant operational cost benefit advantages and preservation of biodiversity, when compared with the classic methods. There were reductions in the suppression of native vegetation in the order of 85% and an optimization in the execution time of the work, with reductions in time around of 30%. Consequently, it was possible to bring forward the environmental licensing and entry into service of the distribution line.

In view of these excellent results that avoided the destruction of significant areas of priority habitats and that simplified the licensing process, the use of drones in the construction of medium and low voltage distribution lines has become a current practice at EDP Brazil.

5.2.3. IMPACT MANAGEMENT ON THE POPULATION OF THE IBERIAN WOLF BY THE WIND SECTOR

A multi-stakeholder approach to managing the impact on the Iberian wolf habitat generated by wind farms in Portugal.

The Iberian wolf (*Canis lupus signatus*) is a subspecies endemic in the Iberian Peninsula and the most threatened in Portugal, being classified as "In Danger", according to Portugal's red list of vertebrates. At the end of the 20th century, anthropogenic impact increased in the area of distribution of this species. The increasing construction of roads and energy infrastructures (wind and water energy), as well as frequent forest fires, also contributed to this threat. Since 2000, this species has been specifically mentioned in environmental impact assessment legislation.

In 2006, EDP Renováveis, together with other wind production companies operating in the Iberian wolf habitat region, financed the creation of the "Association for the Conservation of the Iberian Wolf Habitat"[4] (*Associação para a Conservação do Habitat do Lobo Ibérico* - ACHLI), to embrace the challenges of making wind production compatible and in balance with the habitat of this species. The objective of this collective effort is to protect the natural and cultural landscape characteristic of these habitats, through impact mitigation actions implemented for this purpose. All of these actions start from characterizing the current state of the wolf packs within the target areas and the socioeconomic context of the surrounding area, as the success and sustainability of the measures very much depend on the active involvement of the local communities.

The approach adopted by ACHLI is based on multi-stakeholder participation, which strongly argues for the involvement of local actors, such as municipalities, parish councils, owners, hunting zone management entities, and local NGOs, among others. In the mitigation

[4] https://www.loboiberico.org/

hierarchy, action is carried out at the level of minimization and compensation which, above all, involves conservation, awareness and monitoring actions, aimed at three main objectives: the promotion of the abundance of natural prey for Iberian wolves, reduction of human disturbance and the reduction of conflicts with the population.

Since 2006, ACHLI has actively participated in impact mitigation in the design and construction phase of 102 wind farms, 10 of which were undertaken by EDP Renováveis, and has carried out more than 218 actions, mostly on a voluntary basis. In 2010, the success of this widely shared model, led ACHLI to extend its territory of operation to other regions of the national territory where the wind sector operates and where there are conflicts with the population dynamics of the Iberian wolf.

Today, ACHLI is widely recognized as a model to follow in the challenges offered by mitigating the impact on this species in the wind sector. There is a clear recognition on the part of operators, national authorities, NGOs, and other partners, because the co-benefits and synergies generated allow conservation measures and actions to effectively serve this iconic species threatened with extinction in Portugal.

5.3. OPERATION AND MAINTENANCE

In this project phase, which is the longest, the mitigation hierarchy is always associated with the challenges of continuous improvement forming part of the respective environmental management systems. Many compensatory measures initiated in the construction phase, due to their long-term nature, are extended to this phase with actions involving maintenance, monitoring and reassessment of effectiveness.

5.3.1. REDUCING THE RISK OF FIRE IN PRIORITY HABITATS

The recovery of abandoned agricultural areas to prevent destruction of priority habitats by fire forms the focus of this initiative. The involvement of local partners in the protection of priority habitats threatened by fires has shown excellent results: data from 2019 shows a reduction in the burnt area of priority habitats of around 80%, when compared to the historical time series of the last 35 years.

The construction of the Baixo Sabor and Foz Tua Hydroelectric Plants, located in the Trás-os-Montes and Alto Douro region, in Portugal, flooded a total area of 3427 ha. One of the mitigation measures implemented to offset this impact was the Fire risk reduction programme (PRRI), which was able to protect about 6,560 ha in the surroundings of the Sabor River and 4,196 ha in Foz Tua.

We are talking about an area three times the area flooded by the two projects and which protects 1967 ha of priority habitats under European directive 92/43/EEC, in Baixo Sabor and 758 ha of micro-reserves, in Foz Tua. The biodiversity of this region of Portugal is very dependent on traditional extensive agroforestry activities. However, in recent years, these have been significantly abandoned, largely due to the rural exodus and the consequent aging of the local population. These are rural socio-economic dynamics which, in addition to creating a landscape mosaic favourable to biodiversity, also prevent that same biodiversity from being destroyed by fires. This is because the

discontinuities created in land use prevent fire from spreading and it is naturally extinguished. Currently, fire is one of the main threats to biodiversity in Portugal particularly in these inland regions.

The PRRI ensures surveillance to prevent the occurrence of forest fires, as well as maintaining the rural road network that guarantees access in firefighting situations. Another of the ongoing actions ensures fuel management in strategic areas to create a protection "ring" around the habitats to be protected. The biggest challenge of this initiative is to restore traditional abandoned land use to replace the lost landscape mosaic. In this specific case, we are referring to the restoration of olive groves, almond trees, and care of the native forest, as in the case of cork oak trees for the production of cork, to create such a protection "ring". The purpose is to take advantage of a discontinuity of land use, with less fuel and, therefore, reduce the spread of the fire, through preventing it from reaching the protected habitats.

The plan, which has been in operation since 2014, in Baixo Sabor, and 2016, in Foz Tua, involves local partnerships in the active management of the approximately 1600 ha that form the different protection rings, with more than 1100 plots of land owned by private owners involved. In total this benefits about 100 km² and 195 km of rural access. In 2019, the results showed a reduction in the burnt area of priority habitats in the order of 86% in Baixo Sabor and 80% in Foz Tua compared to the average of the last 35 years.

5.3.2. VALE DO TUA REGIONAL NATURAL PARK

Increasing the network of protected areas is one of the global strategic objectives for the UN "Biodiversity Decade" (2011-2020) to halt the accelerated loss of biodiversity and EDP has contributed to this.

In 2013, the Vale do Tua Regional Natural Park was created[5] (PNRVT) during the construction of the Foz Tua Hydroelectric Plant (AHFT), as a compensatory measure. It is the only "Regional Natural Park" in Portugal, as it is the only one proposed and managed by a local entity, in this case by the "Vale do Tua Regional Development Agency" (ADVT).

ADVT is made up of the 5 municipalities encompassed by the reservoir of this undertaking (Alijó, Carrazeda de Ansiães, Mirandela, Murça and Vila Flor) and also includes EDP Produção. The PNRVT covers about 25,000 ha around the AHFT reservoir and aims to allocate and manage part of the funds provided by the "Fund for Nature Conservation and Biodiversity" locally.[6] (Biodiversity Fund). This Fund, in turn, also appears as a compensatory measure aimed at mitigating the potential residual impacts generated by the project and results from an annual financial transfer by EDP.

Today, after seven years of implementation and consolidation, the PNRVT is widely recognized as a key partner in the socio-economic development of the territory of Foz Tua. This is the result of a strategy of proximity and recovery of endogenous resources, which include activities conserving nature, preserving the historical and cultural heritage, the planning and land-use management of the territory, and the encouragement of economic activities, environmental education and scientific research.

To date, some of the implemented actions which can be highlighted are: the publishing of nature guides; network of hiking trails; nature conservation actions, such as the installation of shelters for bats and those aimed at protecting micro-reserves; publishing pedagogical kits for primary and secondary school students; boosting the Down to Earth (see page 58) project for the 8th year of schooling; network of viewpoints; support infrastructures for observing nature; recreational activities; partnerships with local tour operators and entities, etc.

[5] http://parque.valetua.pt/

[6] THE ANNUAL AMOUNT TRANSFERRED BY EDP IS EQUIVALENT TO 3% OF THE AVERAGE ANNUAL NET VALUE OF ENERGY PRODUCTION FROM AHFT. SINCE JANUARY 2017, THE PNRVT HAS DIRECTLY MANAGED 75% OF THE VALUE OF THE FUND. THE REMAINING 25% IS UNDER THE MANAGEMENT OF THE ENVIRONMENTAL FUND, WHICH WAS CREATED IN 2016, TO WHICH THE PNRVT CAN ALSO APPLY THROUGH SPECIFIC PROJECTS.

5.3.3. AVIFAUNA PROTOCOL

For more than a decade and a half mitigating the impacts of electricity distribution networks on birdlife in Portugal.

The expansion of the electricity distribution network is highly dependent on urban planning - as the network of areas with a conservation status grows, the requirements to mitigate the impacts generated by this activity increase. The main impacts of EDP's distribution activity on biodiversity in the Iberian Peninsula result from the collision and electrocution of birds.

In Portugal, in managing the impact caused on birdlife by distribution lines, especially in areas with a nature conservation status, EDP has had a history of partnering with national environmental NGOs and the national authority, for more than a decade and a half. This multi-stakeholder partnership is implemented through the "Avifauna Protocol"[7], the governance of which is the responsibility of the Technical Commission for Monitoring Power Lines and Birds (CTALEA)[8] to which they all belong. The first protocol started in 2003 and in 2019 the eighth protocol was implemented.

Initially, protocols arose from the need to systematize internal procedures for planning, building and maintaining overhead power lines in protected areas, but this soon became a technical working group, scientifically capable of advising EDP Distribuição in the continuous improvement of mitigating its impact on birds. CTALEA monitors the implementation of mitigation actions and monitors the minimization measures implemented in the existing power lines, which are considered dangerous and carries out studies to identify critical lines.

[7] MAIN BIRD SPECIES STUDIED WITHIN THE SCOPE OF THIS: AQUILA FASCIATA (BONELLI'S EAGLE), AQUILA ADALBERTI (ADALBERT'S EAGLE), PANDION HALIAETUS (OSPREY), TETRAX TETRAX (LITTLE BUSTARD), CICONIA NIGRA (BLACK STORK), AEGYPIUS MONACHUS (BLACK VULTURE), OTIS TARDA (GREAT BUSTARD), AQUILA CHRYSAETOS (GOLDEN EAGLE), MILVUS MILVUS (RED KITE), BUBO BUBO (EURASIAN EAGLE OWL), GYPS FULVUS (GRIFFON VULTURE).
[8] CONSISTING OF EDP DISTRIBUIÇÃO; INSTITUTE FOR NATURE CONSERVATION AND FORESTS - ICNF (NATIONAL AUTHORITY); PORTUGUESE SOCIETY FOR THE STUDY OF BIRDS (SPEA); QUERCUS - NATIONAL ASSOCIATION FOR NATURE CONSERVATION AND THE LEAGUE FOR THE PROTECTION OF NATURE - LPN.

Over these 17 years of partnership, 680 km of overhead electricity distribution lines have been considered to be critical for avifauna within the National Classified Areas Network. A guide has also been developed with guidelines and measures to mitigate impacts on avifauna for new distribution lines which will inevitably be built in protected areas. Given the wide involvement of stakeholders in the construction of this guide, the national authority uses it in its licensing processes. The guidelines in this guide are essentially directed at the first two stages of the mitigation hierarchy (avoid and minimize), however, its application has also been shown in terms of compensatory measures aimed at mitigating the residual impacts generated by the construction of hydroelectric projects.

5.4. WITH EMPLOYEES

Thinking about corporate sustainability includes employee involvement, mobilization, and training. The employee is the vehicle and reflection of an organization's social responsibility.

5.4.1. ENVIRONMENTAL VOLUNTEERING

The EDP Group's volunteer programme has the mission of involving employees in activating the company's social responsibility, contributing to the development of the communities where we operate. Citizen science actions and reforestation of areas burnt by fires with major environmental and social consequences, are two examples of initiatives developed within the scope of environmental volunteering actions.

Environmental awareness is an important tool in environmental management, since it promotes the predisposition of citizens towards a change in attitudes and, in this particular situation, it is directed towards the sustainability of investment in nature protection.

Since 2011, EDP has mobilized employees, friends, and family to make a difference in the various social sectors where it operates. Currently, around 20% of EDP's employees participate in at least one volunteer activity per year. This corresponds to more than 38 thousand participants and 293 thousand hours of volunteering to impact around 1.4 million lives.

Environmental volunteering is one of the pillars of the EDP Group's Volunteer Programme, in line with our social investment policy - protecting natural heritage and biodiversity. Its objective is to make employees aware of the importance of biodiversity in the company's activities and social responsibility in general. It involves, above all, promoting and encouraging initiatives for involvement in nature protection actions. Two initiatives can be highlighted:

CITIZEN SCIENCE INITIATIVE: STORK WEEK

In June 2017, in Portugal, EDP Distribuição joined REN[9] in an activity to count white storks, where a total of 75 volunteers came together. The initiative resulted from a partnership between the EDP and REN (National Electricity Network) biodiversity chairs and was promoted by CIBIO-InBIO from the University of Porto. The objective was to collect scientific data, essential to building a model of the evolution of the species in Portugal. All of this was undertaken in order to study the advantages and disadvantages for storks of compatibility with the electricity transport and distribution infrastructures.

The participation of amateurs in research projects breaks down barriers and increases the scientific literacy of society, while promoting the approximation of science to reality. The white stork (*Ciconia ciconia*) is an iconic species that frequently uses human-made structures as a nesting site, including roofs of houses, chimneys, telephone poles, supports for power lines, etc.

REFORESTATION INITIATIVES:

In 2018, EDP Renováveis involved 50 employees in a joint reforestation initiative in Portugal and Spain, as a social response to a significant wave of fires that had haunted both Iberian countries in the previous year (2017). In Spain, the reforested areas were located in the Madrid and Oviedo area and in Portugal in the Porto area. In the same year, in Portugal, the Volunteer Programme involved employees from all over the national territory to help one of the areas most affected by the fires (the Oliveira do Hospital municipality). There were 190 volunteers involved in this activity and about 6000 native trees were planted.

[9] NATIONAL ELECTRICITY NETWORK

5.5. WITH THE CUSTOMERS

A company's greatest asset is its customers and the communication channels which are established are crucial for business continuity. Sensitizing our customers to environmental protection is an effective way to promote behavioural changes. Society is more aware and demands socially responsible behaviour from companies which includes high performance standards and sustainability.

5.5.1. NATURA 2000 EXPERIENCES

Raising awareness and training for a (re)appreciation of the territory and the resources offered by its ecosystems is a way of retaining human capital and contributing to halting a rural exodus which is promoting loss of diversity. Experiences in the Natura 2000 Network in Portugal aim to sensitize citizens to the importance of biodiversity in the socioeconomics of local communities.

In the territories belonging to the Natura 2000 Network (RN2000), mostly inland and rural, the biggest challenge is to reverse a "natural" trend of ecosystem degradation, caused by a sharp rural exodus. The loss of the younger members of the population has led to the abandonment of traditional agroforestry activities, on which the biodiversity characteristic of these places greatly depends. Much of this abandonment results mainly from a feeling of the lack of value of endogenous resources which, over generations, has been established in the local populations.

EDP manages a communication channel with its customers ("edp community") through the website www.comunidade.edp.pt[10]. The purpose of this electronic platform is to create and make available to its 3.8 million customers [11] a diversified network of commercial establishments (11 thousand[12]), which promote and make their products and services available there. This tool is an excellent vehicle for communicating with customers and, considering the significant percentage of the Portuguese population it manages to reach, it has become an exceptional tool for raising environmental awareness among citizens. EDP and LPN[13] (the League for the Protection of Nature) saw an opportunity through this platform to build the "Natura 2000 Experiences" initiative as a way to raise awareness of the importance of biodiversity.

At the national level, the initiative seeks to raise awareness among citizens in general and, at the local level, to train people and economic agents to (re)appreciate the products and services offered by the territory. It has been implemented in a quiz mode, where customers can participate by answering a questionnaire on the RN2000 website which is being promoted. Winners are offered the opportunity to discover and experience these places, benefiting from one of the 30 tourist vouchers available. The initiative has benefited from a partnership with the LPN, the oldest environmental NGO in Portugal, which here is taking an active role in the preparation of content and in local mediation. In particular, the focus of its work is on identifying and involving local stakeholders and helping in the construction of Tourist Packages: a weekend for two people in contact with the rural environment, on a journey through nature, and gastronomy, with an opportunity to get to know the local culture and ethnography, architecture, leisure and recreation.

The "Natura 2000 Experiences" initiative is aimed at the RN2000 on the Portuguese mainland, without any focus or emphasis on specific species and/or habitats. It is based on a journey through the different sites of this European ecological network, which features a different territory each publication. Between 2016 and 2019, the development and consolidation phase of the initiative took place at three different Natura 2020 locations, namely in Castro Verde, Douro International and the Southeast Coast. The results, demonstrated by the number of customers who participated and the degree of satisfaction of the winners of the nature experiences and the local tourism promoters, meant that the initiative proved to be an excellent business strategy seeking to maximize the social and environmental co-benefits of its activities.

[10] https://www.edp.pt/particulares/comunidade/
[11] 2019 DATA
[12] 2019 DATA
[13] https://www.lpn.pt/

5.6. WITH THE ACADEMY: EDP CHAIR IN BIODIVERSITY II

Knowledge is not absolute and, in terms of biodiversity, in addition to substantial gaps in knowledge, there is also a significant degree of uncertainty arising from the complex dynamics and response mechanisms of ecosystems. Given this, an adaptive management approach, as the best way to manage the uncertainties of the natural world, involves a continuous adjustment of actions based on the results studied and the knowledge generated. Here, the connection to the academy, as a centre for the production of knowledge and scientific know-how applied to problem solving and supporting decision making, is essential to the continuous improvement processes in companies.

EDP, together with the Foundation for Science and Technology (FCT), is co-financing the continuity of the EDP Invited Chair in Biodiversity for the 2018-2021 period, coordinated by CIBIO-InBIO, with the University of Porto, in a set of scientific research works dedicated to the management of impacts, conservation and monitoring of biodiversity. This research period is marked, above all, by the work involving the development and implementation of genomic tools (metabarcoding) for monitoring aquatic ecosystems. An emerging area of knowledge which makes use of DNA collected in the environment (environmental DNA or environmental genomics). Three research pillars are underway to improve the effectiveness of EDP's environmental investment:

5.6.1. ENVIRONMENTAL GENOMICS

The monitoring of the quality of water courses using eDNA techniques aims to develop new cost-efficient biological monitoring techniques, simultaneously generating significant information for solving problems in managing impacts on biodiversity and achieving No Net Loss or, preferably, Net Gain goals for biodiversity. In close coordination with the national authority, the actions take place in three areas of research:

i. **Early detection of zebra mussels in reservoirs**: with the aim of demonstrating the potential of environmental DNA for detecting and quantifying the relative abundance of zebra mussels (*Dreissena polymopha*) in reservoirs and, in addition, to compare the costs and efficiency of DNA-based methods with the methods currently used. This task was chosen due to the potential economic, as well as environmental, impacts associated with the expansion of the zebra mussel, an invasive species that can potentially pose very significant technical problems in the operation of hydroelectric projects.

ii. **Characterization of fish communities in reservoirs**: with the aim of developing and optimizing molecular methods to characterize the composition and relative abundance of fish species in reservoirs, as well as the temporal and spatial variation due to these parameters. The selection of this task stems from the need to find effective methods to monitor fish communities in

reservoirs, capable of meeting the requirements arising from the Water Framework Directive and, in addition, the need for the early detection of the presence of diadromous migratory fish in reservoirs and water courses, as part of national and international efforts to increase connectivity in strongly regulated water courses.

iii. **Monitoring of ecological quality of water courses**: With the aim of developing and optimizing ecological quality assessment methodologies based on molecular methods, primarily using macroinvertebrates as indicator organisms. The choice of this task resulted from the need to find more cost-efficient methods to monitor the ecological quality of lotic ecosystems in order to comply with regulatory requirements arising from the Water Framework Directive. This line of work aims to demonstrate that DNA-based methodologies allow results to be obtained at least as good as those obtained by conventional methods, and that these results are obtained more quickly, efficiently and at a lower cost per sample.

The activities of the new EDP Chair in Biodiversity started in December 2018 with an international meeting of experts[14], where the implementation of eDNA techniques for environmental water monitoring in Portugal was discussed. In 2019, work on testing the eDNA techniques for the early detection of zebra mussels in reservoirs, characterizing fish communities and monitoring the ecological quality of water courses (benthic macroinvertebrates) took place.

5.6.2. MITIGATION OF THE IMPACTS OF HYDROELECTRIC PRODUCTION

Research priority aimed at promoting adaptive management in mitigating the impact on biodiversity by hydroelectric production facilities. Research is primarily concerned with the continuity of the work initiated and developed in the previous Invited Chair period (2012-2017), around three lines of research:

i. **ecological effects and control of invasive aquatic species**: - with the aim of obtaining information on the impacts of these invasive species[15] identified in the communities on native species, focusing in particular on the trophic interactions of these species and on the possible existence of predation or competition for resources.

ii. **Assessment of environmental impacts and compensation:** in order to understand in more detail how hydroelectric projects affect terrestrial vertebrate fauna in the areas surrounding reservoirs and the effectiveness of compensation measures to mitigate these impacts.

iii. **Management and publication of biodiversity data:** With the aim of developing and optimizing management and publication models of biodiversity data collected by EDP in processes of assessing and monitoring environmental impacts through the international platform *Global Biodiversity Information Facility* (GBIF)[16].

The results of the works of the last area of research stand out, which, in turn, also contributes to the work related to the long term research site of Baixo Sabor (LTER Sabor Site[17]), initially established with funding from FCT and which has been supported by EDP *Produção*. This is a result of the partnership already established between EDP and the Portuguese hub of GBIF.

[14] https://cibio.up.pt/workshops--courses/details/workshop-on-molecular-approaches-envmetagen
[15] TWO GROUPS OF EXOTIC SPECIES, NAMELY FRESHWATER CRAYFISH (PROCAMBARUS CLARKII AND PACIFASTACUS LENIUSCULUS) AND FISH (ALBURNUS ALBURNUS, LEPOMIS GIBBOSUS, MICROPTERUS SALMOIDES, SANDER LUCIOPERCA, ETC.).
[16] https://www.gbif.org/publisher/e5150835-f502-424c-b470-24dd496b1b18
[17] https://www.lterportugal.net/sabor

5.6.2. SHARING OF SCIENTIFIC INFORMATION IN INTERNATIONAL DATABASES

In the context of the global decline in biodiversity, species occurrence and abundance data are essential tools for planning, implementing and monitoring conservation strategies and sustainable uses.

EDP, in the development of its production activity and through managing the mitigation of the impact on biodiversity, brings together millions of data points resulting from studies and monitoring. As part of the most recent hydroelectric projects built in Portugal, EDP has implemented a set of information collection and analysis instruments that are essential for the adaptive and long-term management approach which it intends to promote, in order to ensure that all mitigation efforts carried out translate into net gains for biodiversity.

In 2017, EDP started a process of sharing this knowledge with the world and officially became a publisher of information on biodiversity within an international database, the *Global Biodiversity Information Facility* (GBIF). Also in 2017, EDP published the first dataset information on reptiles and amphibians. In 2018, it shared 11 more datasets, on aquatic fauna, amphibians, and bats, and in 2019 contributed another 21 datasets on various environmental descriptors. At the end of 2019, EDP already had 33 publications, thus becoming the largest contributor to this international database in the utilities sector.

All this pioneering work developed by EDP, in conjunction with the GBIF Portuguese Branch and CIBIO, opened a new wave of sharing of scientific information by companies, which is important to fill gaps in scientific knowledge and, consequently, fundamental in ensuring the sustainability of the Planet (Aichi Biodiversity Targets)[18]. This entire EDP experience is serving as a reference in other countries, through the respective national GBIF branches, in terms of the involvement of private entities in general (for example: Spain, France, Norway, Colombia, etc.).

[18] https://www.cbd.int/sp/

5.6.3. MITIGATION OF IMPACTS OF THE ELECTRIC DISTRIBUTION NETWORK

Research priority focused on finding ways to manage electricity distribution networks environmentally, in coordination with the mitigation work already carried out or under development by the Technical and Scientific Committee for Monitoring Power Lines and Birds (CTALEA). This concerns a new research component that seeks to make an additional scientific contribution to the result of the work that has been developed by CTALEA, since 2003, within the scope of successive Avifauna Protocols. (see page 46). This work is organized into the following research areas:

i. **Organization of biological information:** this involves the collection and systematization of biodiversity data from EDP *Distribuição*, namely as part of the work developed in the protocols established with the organizations represented in CTALEA.

ii. **Evaluation of the effectiveness of mitigation measures in reducing bird mortality:** assessing in conjunction with CTALEA the need to analyse the data collected in previous studies using more sophisticated statistical modelling techniques, which are normally required for publication in international scientific journals.

iii. **Modelling the impacts of mitigation measures on population dynamics**: with the aim of developing population models for threatened species, in order to assess the effects of variations in mortality induced by power lines. The Bonelli's Eagle *(Aquila fasciata)* population in southern Portugal has been the species chosen for the study and development of demographic models, since it is one of the impacted species with the most available population monitoring and follow-up data.

In September 2019, the Chair joined the Serralves Foundation and CIBIO-InBIO/UP in holding an international conference to debate the post-2020 period, with the topic "How to deal with the dangerous decline of nature?". The debate was based on non-compliance with the Aichi Biodiversity Targets established for the Biodiversity Decade (2011-2020), according to the results of the recent Global Assessment Report on Biodiversity and Ecosystem Services, of May 2019, produced by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

5.7. WITH SOCIETY

A company's social responsibility is concerned with people and the environment and does not end with its patronage policy. It is a serious commitment to the values it defends, which are fundamental to strengthening the connection with society.

5.7.1. PROJECT TO REINTRODUCE THE OSPREY IN PORTUGAL

The osprey stopped nesting in Portugal for two decades. The disappearance of the last breeding specimens in 2002 had already led to the conclusion that the Portuguese osprey population would not recover naturally. After the beginning of the first phase of the project in 2011, in 2015, the first Portuguese nests became a reality.

The large reservoir of Alqueva served as the basis for the project for the reintroduction of the osprey in Portugal, carried out by the University of Porto's Biodiversity Research Centre (CIBIO), with the support of EDP. However, it was on the Vicentine Coast that a pioneering breeding couple settled, and two osprey hatchlings finally emerged from their shell in Portugal, for the first time in almost 20 years.

The recovery of the osprey was possible, but this had to occur through the involvement of a collection of individuals from donor populations in Sweden and Finland, where the species was not at risk of extinction, and its subsequent transfer and release to favourable locations, in this case to the Alqueva reservoir. With this, the aim was to ensure the creation of an initial reproductive nucleus, from which it would be possible to promote the progressive recolonization of the historical areas where this species was once found.

The first project phase (2011-2015) involved a set of steps that were repeated for 5 years:

i. collection of juveniles and the transfer of an average of 11 individuals per year (in July) from donor countries.

ii. placement of juveniles in suitable facilities, the hacking tower, built on the banks of the Alqueva reservoir, where they were fed without human contact until they completed their development (in July).

iii. release into their new environment, where they continued to be fed on platforms installed for that purpose (in August);

iv. migration south, across the Sahara, ending in West Africa - Senegal, Gambia, Guinea Bissau, Mali, or the Ivory Coast - (in September).

v. migration back to the home area (here simulated by the area of growing and liberation), after reaching adulthood in the third year of life.

At the end of this cycle, of the 56 transplaced osprey juveniles, only 46 reached the migration stage because 5 of them developed orthopaedic problems and were forwarded to refuge centres. Another 4 were lost due to predators.

The osprey is a philopatric species, which recognises the territory where it was born and raised as its "home". This was the assumption upon which the hacking technique was used for the juveniles to establish a strong connection to their new shelter habitat, where they grew up, and started to recognize as their homeland. All of this had a final objective, which was to hope that all the effort would make them return to Portugal and there they would start breeding and reproducing once again.

In 2015, the first results occurred. A couple settled in the Alqueva reservoir, next to the border with Spain and another, on the seacoast, in Arrifana, in the Southwest Alentejo and Vicentine Coast Natural Park, which generated the first two offspring. Proving the merit of the project, helped by the growth of the resident population in Spain, thanks to an identical reintroduction project, CIBIO and EDP advanced to the second phase (2016/18).

The second phase took place with the aim of gradually expanding out to the historical areas where the species was once found. Actions were taken mainly to improve the attractiveness of existing habitats for the pioneer population, with the installation of artificial platforms in reservoirs, lagoons, estuaries, in the Tagus, Guadiana, eastern Algarve, Vicentine Coast, Caia and Alqueva dams. The platforms served as a base for nests, at high and safe points, surrounded by waters rich in fish. This phase enabled the gradual increase of the resident populations of osprey.

At the end of the project there was news of a Portuguese-Spanish couple with offspring, in Alqueva, near to Spain, probably the same one that nested there in 2015, and of a lone male in the Vicentine Coast, whose partner died after reproducing in 2015, who was looking for a new partner. This is nature at work, where, for 8 years, CIBIO and EDP have strived to provide a stimulus so that all this could be possible.

5.7.2. DOWN TO EARTH PROJECT

Awareness initiative designed with local partners (schools, municipalities, environmental NGOs, and others), aimed at students in the 8th year of schooling, with the goal of bringing young citizens closer to local socio-economic activities. This project promotes a change in behaviour and attitudes around the importance of biodiversity for the well-being of communities and humanity in general.

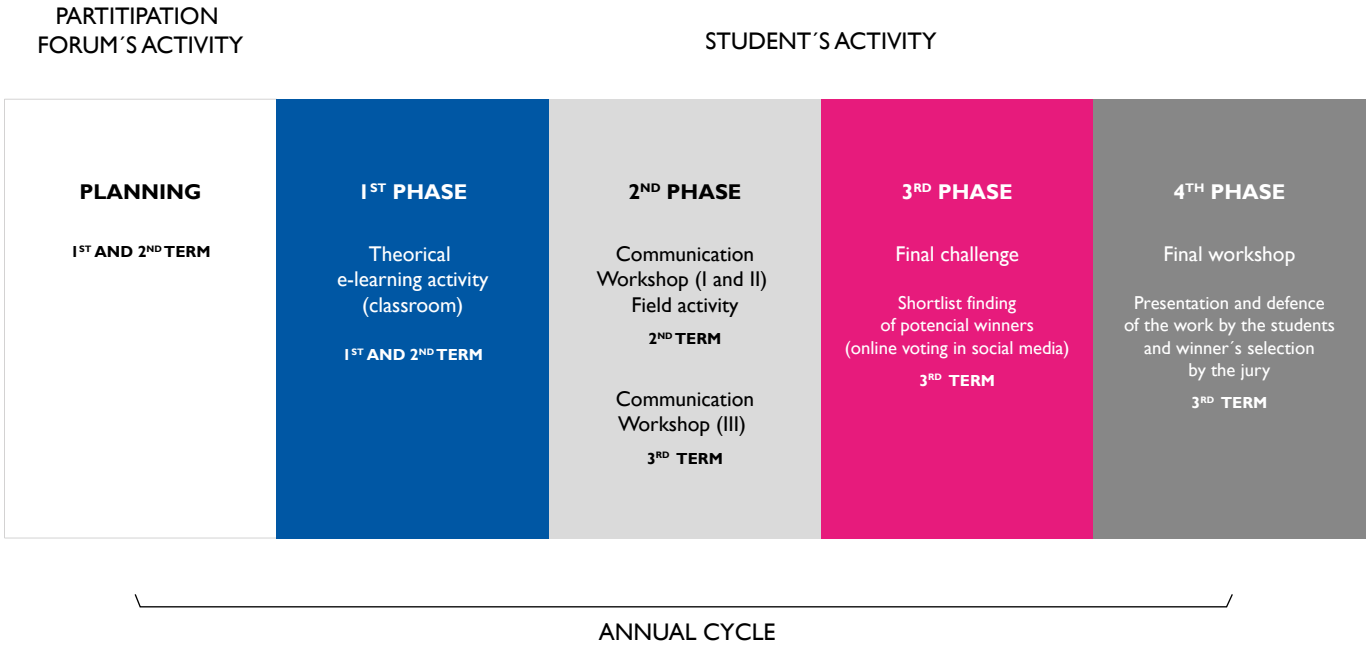
The Down to Earth project (JaT) project was born as an awareness-raising activity for compensatory measures for the Baixo Sabor Hydroelectric Plant (AHBS), but considered from the outset to be extended to the neighbouring territory of the Foz Tua Hydroelectric Plant (AHFT). These two territories of Trás-os-Montes, in a rural inland area of Portugal and with similar socio-ecological characteristics, share the growing devaluation of an impoverished territory due to an inability to stop young people from leaving for other regions. However, these populations share a unique and valuable natural capital that needs to be protected and recovered.

JaT considers itself to be the instrument capable of communicating with the community in an innovative way, capable of balancing human beings and human activity with nature conservation and biodiversity. It also aims to counteract a natural trend towards environmental degradation and loss of biodiversity in these territories, caused in large part by the rural exodus and the resulting abandonment of traditional agro-forestial-pastoral activities.

The project also sets itself apart due to its long-term crosscutting strategic alignment, which transforms it into a broader project for education in sustainability, as it seeks to train human resources as a method for retention of these individuals within the territory. It is through this involvement and active local leadership, and through the bottom-up approach built on the participation forum of the network of local partners involved, that success is achieved. This forum can be considered as the fulcrum for the success and ongoing improvement of the whole process.

Every school year, the project is repeated for all students of the 8th year of the nine municipalities[19] of these two territories, within a cycle of initiatives which enable them to experience e-learning activities, thematic workshops, field trips and the preparation of audiovisual works to submit in a competition, as described in the following image.

The project cycle is carried out in 4 phases and focuses on sustainable local development:



In the **first phase**, through e-learning[20], students explore the theoretical contents. Starting from dealing with concepts, the problem of loss and the importance of biodiversity to human beings on a global scale, it moves on to biodiversity and its local importance.

In the **second phase,** students go out to the countryside, in areas of their municipality. They participate in 6 workshops prepared by partners/local environmental NGOs which aim to awaken in the students the desire to learn about the biodiversity of their territory. Each student receives their "JaT Passport" which will be stamped in each of the workshops and which also serves as an incentive to visit points marked on the map of Trás-os-Montes to get to know their region better. Students also have access to a communication workshop where notions of storytelling and script construction are transmitted and where the various tools for building and editing video are discussed. The objective is to acquire skills and gain confidence for the next phase.

In the **third phase**, the challenge is to make a video which precisely shows the relationship between local biodiversity and human well-being. The works go through a first selection process at the school and then on an online platform[21] where anyone can vote for the work they find most interesting, with the 10 best works being selected for the next phase. Anyone who moves on to the next stage also has access to a final workshop, which helps to prepare the presentation of their work, with the aim of gaining skills in public communication.

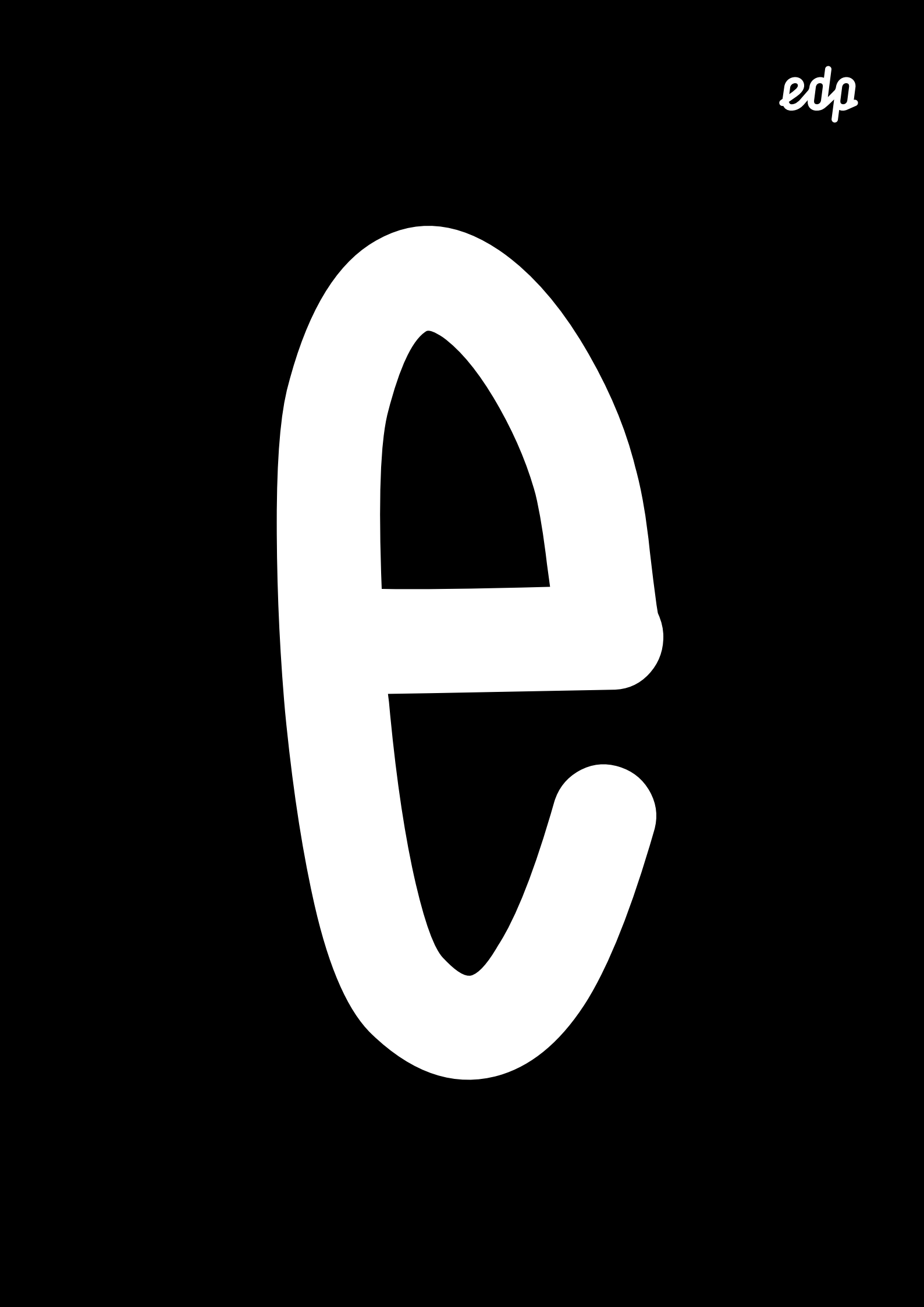
The **fourth and final phase** of the project takes place in the form of a Final Workshop. It is at this event that the 10 best works and their authors are put to the test. Each group of students shows their video and has the opportunity to defend it in front of the jury. There are several stakeholders, a special guest and performing arts at the event. In the end the 3 best works receive prizes.

[19] DISTRICT OF ALFÂNDEGA DA FÉ, MACEDO DE CAVALEIROS, MOGADOURO AND TORRE DE MONCORVO IN THE TERRITORY OF BAIXO SABOR AND ALIJÓ, CARRAZEDA DE ANSIÃES, MIRANDELA, MURÇA AND VILA FLOR ON THE FOZ TUA SIDE.
[20] ELEARNING TOOL: https://juntoaterra.pt/
[21] ONLINE VOTING TOOL: https://juntoaterra.pt/biodiversidade-no-sabor/ AND https://juntoaterra.pt/biodiversidade-no-tua/ FOR BAIXO SABOR AND FOZ TUA, RESPECTIVELY.

JAT RESULTS

So far (the 2019/2020 school year) 2029 students, 93 teachers, and 11 schools from 9 councils have been involved in this project. The Participatory Forums operating in each territory, in addition to the 9 municipalities and 11 schools, involve the participation of 9 Local environmental NGOs, the Vale do Tua Regional Natural Park, the Iberian Meseta Cross-border Biosphere Reserve, the Terras de Cavaleiros Geopark and the environmental brigade of the National Republican Guard (SEPNA-GNR).

At Sabor, the JaT initiative (JaT_Sabor), after three years coordinated by EDP, has started to be managed by the Association of Municipalities of Baixo Sabor, while in Foz Tua (JaT_Tua) the 2nd and penultimate edition have taken place under EDP's responsibility, but already with strong involvement from the Foz Tua Regional Natural Park, which will do the same when this is held for the fourth and future times.



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ACRONYMS

AHBS - Baixo Sabor Hydroelectric Plant

AHFT - Foz Tua Hydroelectric Plant

CBD - Convention on Biological Diversity

CFC's - Chlorofluorocarbons

CIBIO-INBIO – CIBIO, Biodiversity Research Centre and INBIO. Associated laboratory

CTALEA - Technical and Scientific Committee for Monitoring Power Lines and Birds

DNA - Deoxyribonucleic acid

FCUL - Faculty of Sciences, University of Lisbon

FEM - World Economic Forum

IAIA - International Association for Impact Assessment

IFC - International Finance Corporation

IPBES - Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

IUCN - International Union for Conservation of Nature

LEPI - List of potentially impacted species

LPN - League for the Protection of Nature

NG - Net Gain

NGO - Non-governmental organization

NNL - No Net Loss

ONGA - Non-governmental environmental organization

PNRVT - Vale do Tua Regional Natural Park

PRRI - Fire risk reduction programme

PS6 - Performance Standard 6 of the International Finance Corporation: Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012)

R&D - Research and Development

SBN - Solutions Based on Nature

SDG - Sustainable Development Goals

SF6 - Sulphur hexafluoride

SIC - Natura 2000 Network Sites of Community Importance

SPA - Special Protection Area of the Natura 2000 Network

UN - United Nations Organization or simply United Nations

UNESCO - United Nations Educational, Scientific and Cultural Organization


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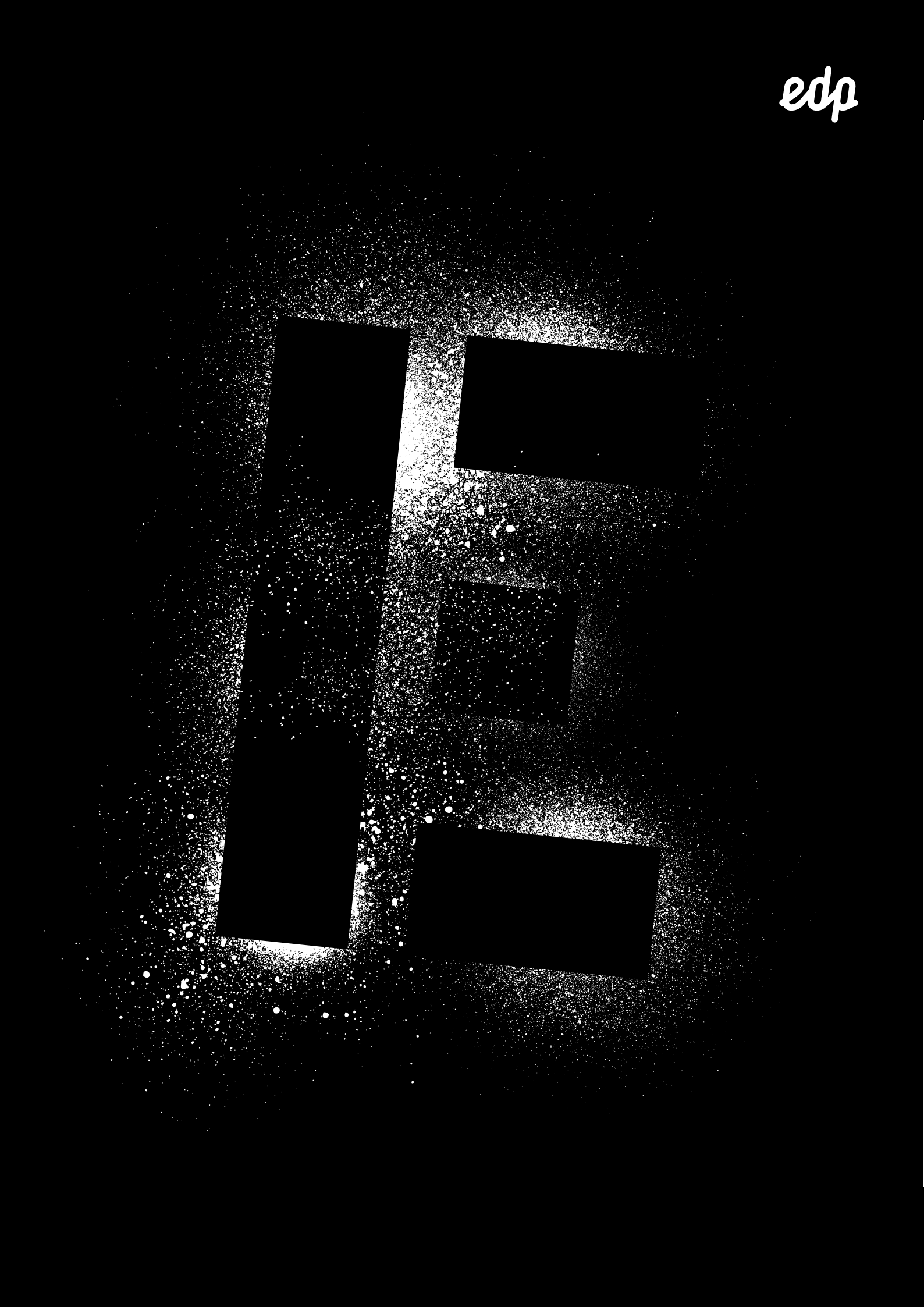


07

GLOSSARY

Adaptive management: assumes that technical and scientific knowledge is limited and dynamic, making regular adjustment necessary, resulting from the knowledge generated by the programmes monitoring its ecological effectiveness. Thus, a good diagnostic phase, characterising the state of conservation and identification of conservation targets and threats, is essential for the design of courses of actions and their implementation. Finally, integrated monitoring ensures that the assessment oversees the path to success, introducing the necessary ongoing improvement (Source: IAIA).

Biodiversity offset: these are measurable conservation results resulting from actions aimed at offsetting significant residual adverse impacts on biodiversity. These result from the implementation of the project, after the adoption of appropriate prevention, minimization and renewal or rehabilitation actions.

Biodiversity or **biological diversity:** this is the "variability between living organisms of all origins, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they form part; it encompasses diversity within each species, between species and ecosystems", according to the Convention on Biological Diversity (CBD).

Biosphere Reserves: this is a statute or label attributed by the UNESCO "Man and the Biosphere – MAB" Programme. https://en.unesco.org/biosphere/wnbr

Ecosystem services: these are the functions of ecosystems that are useful to human beings and which include:

i. Provisioning Services: goods or products obtained from ecosystems, such as food, fresh water, wood, fibres and genetic resources;

ii. Regulation Services: benefits obtained from the regulation and control which ecosystems have over natural processes, such as climate, diseases, erosion, water flows, pollination, as well as protection against natural risks;

iii. Cultural and Recreational Services: non-material benefits obtained from ecosystems, such as recreational, spiritual and aesthetic activities; and

iv. Support Services: natural processes, such as the nutrient cycle and primary production, which keep other services. (source: BCSD)

Ecosystem approach: the Convention on Biological Diversity (CBD) advocates an "ecosystem approach" because people and biodiversity depend on healthily functioning ecosystems, which must be assessed in an integrated manner and not constrained by artificial boundaries. This is an ecosystem-based, participatory, and long-term adaptive management approach to dealing with the dynamic nature of ecosystems, uncertainty and the often-unpredictable nature of their functioning, behaviour, and responses.

Ecosystem: this is a system of living organisms that interact with each other and with the physical environment where they are located, as a functional unit (examples: forests, pastures, rivers, coral reefs, agricultural land, urban parks, etc.) (source: BCSD)

Ex situ conservation: preservation strategy, recovery of plant and animal species, involving non-natural populations, such as plants grown in greenhouses and sowing and animals raised in captivity or aquariums, among others.

In situ conservation: strategies for the conservation of ecosystems, natural habitats, maintenance and recovery of viable populations of species in their natural surroundings.

Natura 2000 Network: the Natura 2000 Network is an ecological network for the European Union community resulting from the application of Directive 79/409/EEC, of 2 April 1979 (Avian Directive) - repealed by Directive 2009/147/EC, of 30 November - and Directive 92/43/EEC (Habitats Directive) which aims to ensure the long-term conservation of the most threatened species and habitats in Europe, contributing to stop the loss of biodiversity. This is the main instrument for nature conservation in the European Union (source: ICNF) https://natura2000.eea.europa.eu/#

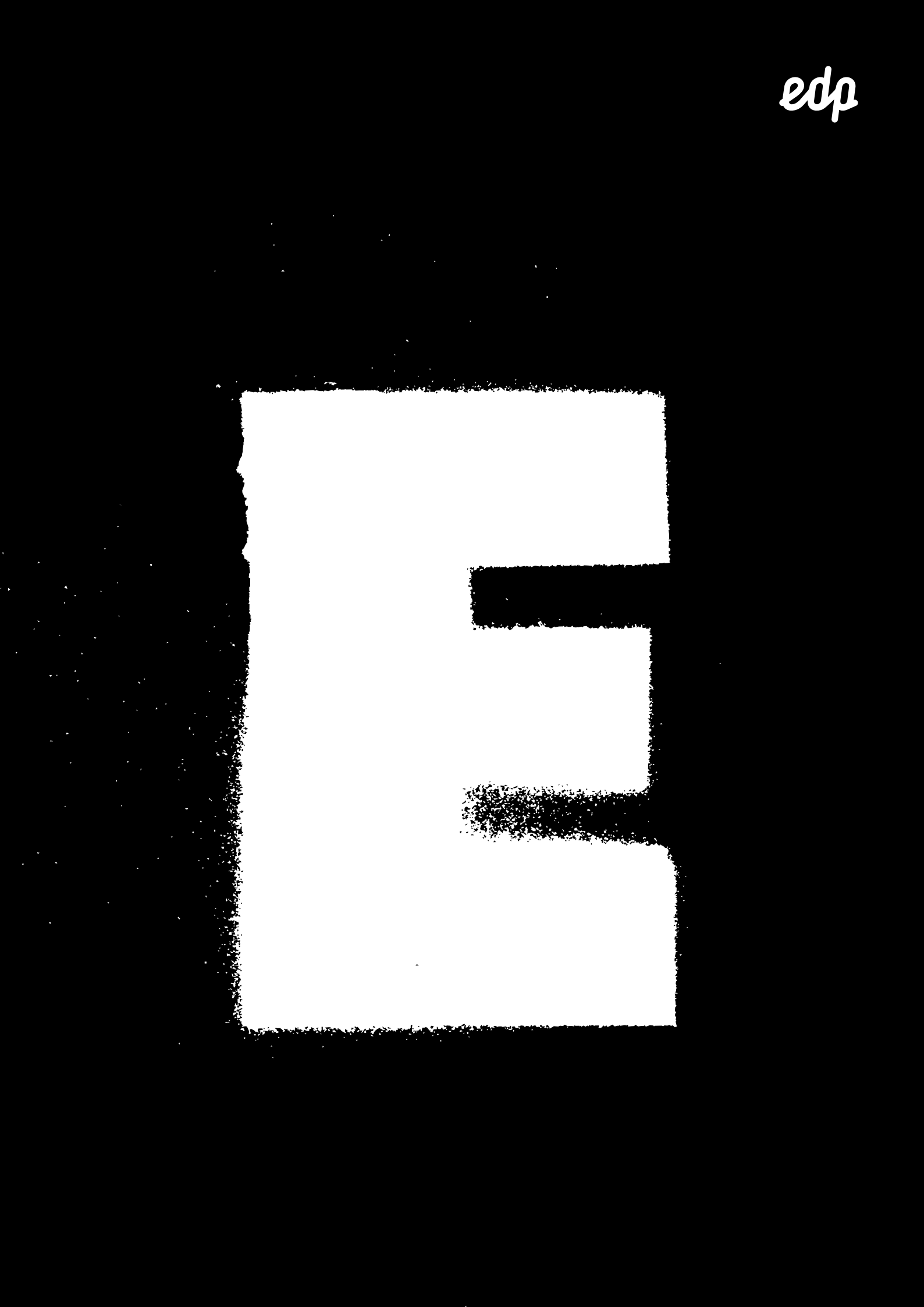
Natural Capital: this concerns aspects of the natural environment that provide socio-economic value through ecosystem services. (source: BCSD)

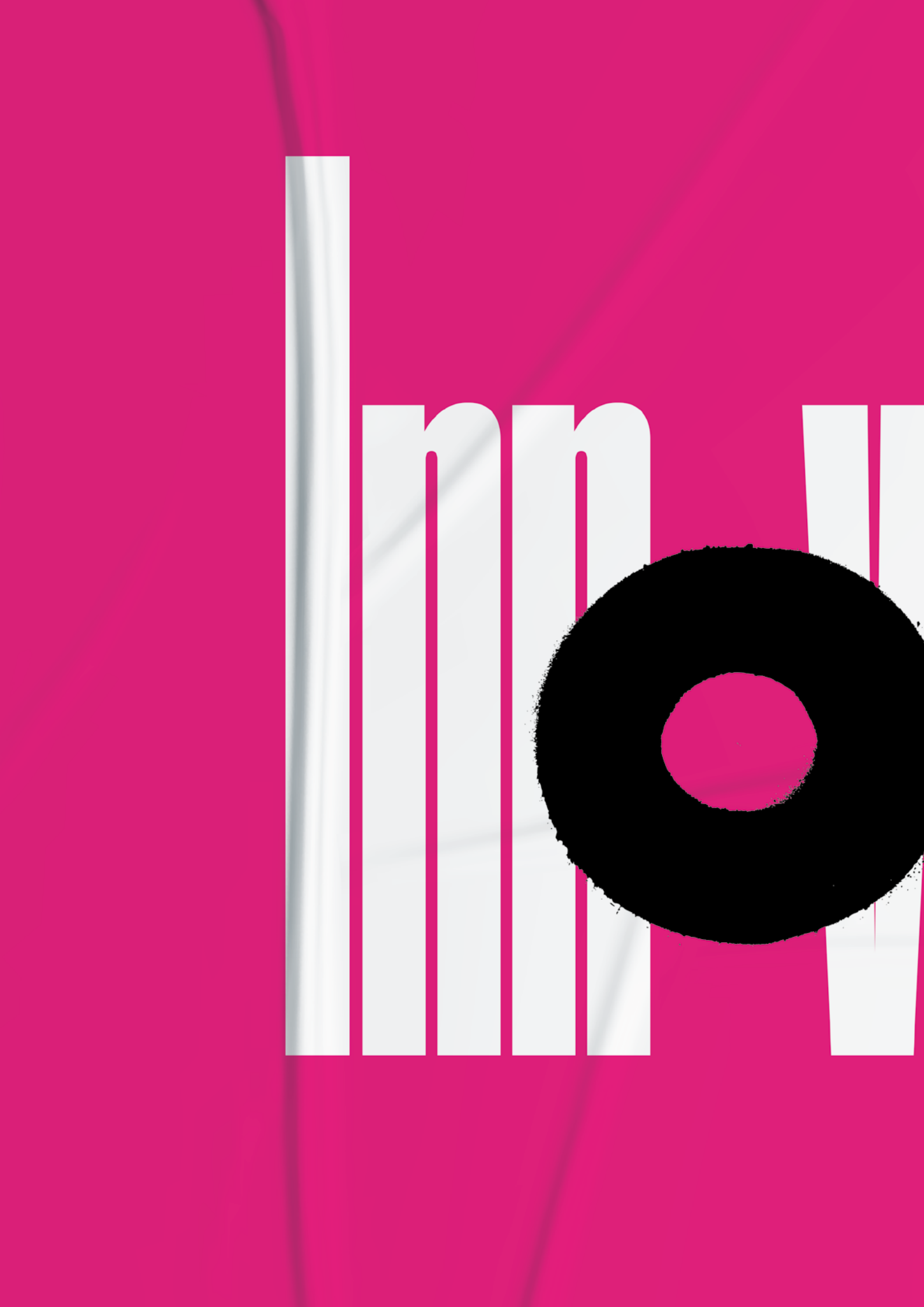
No Net Loss (NNL) and **Net Gain** (NG): NNL is defined as the point at which the project-related impacts on biodiversity are balanced by the measures taken by the mitigation hierarchy, that is, the point at which residual impacts are eliminated. When the compensation exceeds this point, the term used is net gain.

Philopatric species: in animal behaviour, philopatric is the designation for the tendency which exists in some species which migrate to return to specific places to feed or breed.

Reference state or **reference scenario:** a description of existing conditions that provides a starting point (for example, pre-project biodiversity status) with which comparisons can be made (for example, post-impact biodiversity status), thereby enabling the change/alteration to be quantified.

Social licence to operate: level of acceptance or approval granted in an ongoing manner, to the act.





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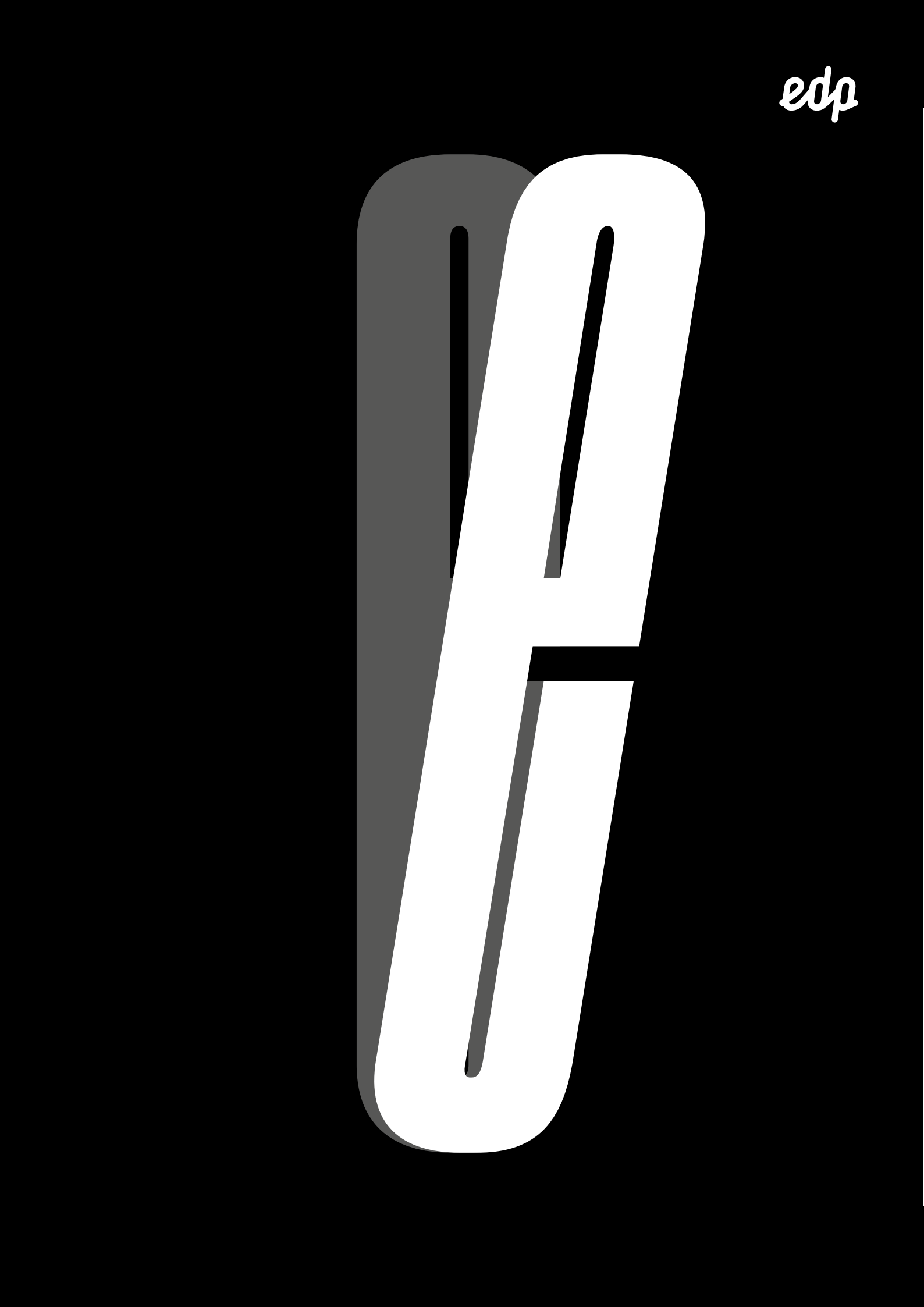


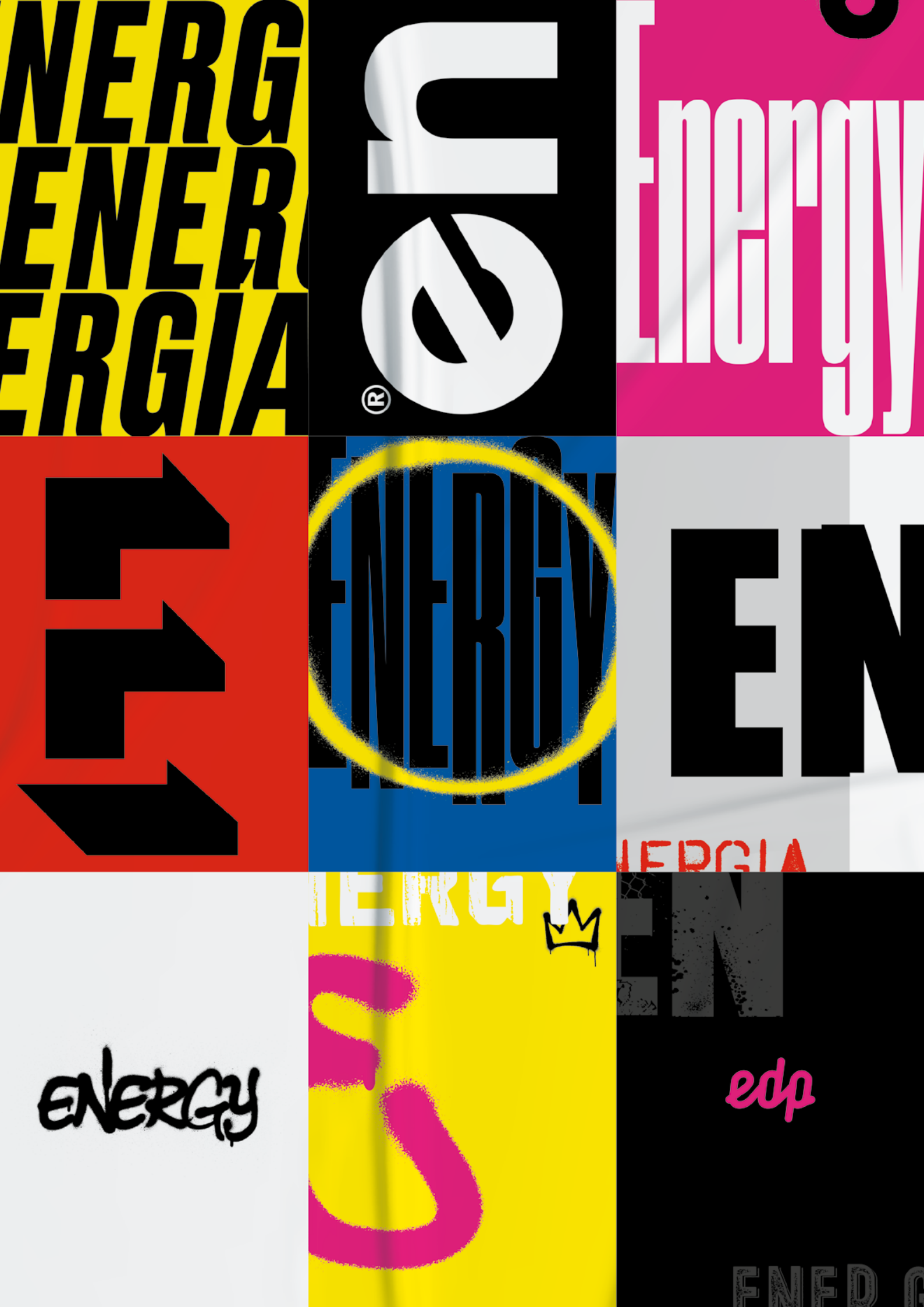
08

THIS REPORT

All technical and operational data characterizing the company as reported at 31 December 2019, having been verified by an external company, within the scope of the EDP 2019 Report and Accounts. The specific biodiversity information, particularly the initiatives reported, have been duly dated and report a period ranging from 1 January 2015 to 31 December 2019.

Additional information can be found at www.edp.com> compromisso com a sociedade e ambiente> proteger o ambiente> a biodiversidade é um bem essencial. In order to improve the transparency of the report, the glossary including the definition of the quantitative indicators and methods used, presented throughout the document, can be consulted online at www.edp.com

EDP thanks all its partners, in particular for supporting the creation of content and providing images used in this report.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