

BIODIVERSITY REPORT



2011
2013



IBERDROLA



IBERDROLA

Biodiversity Report 2011/2013

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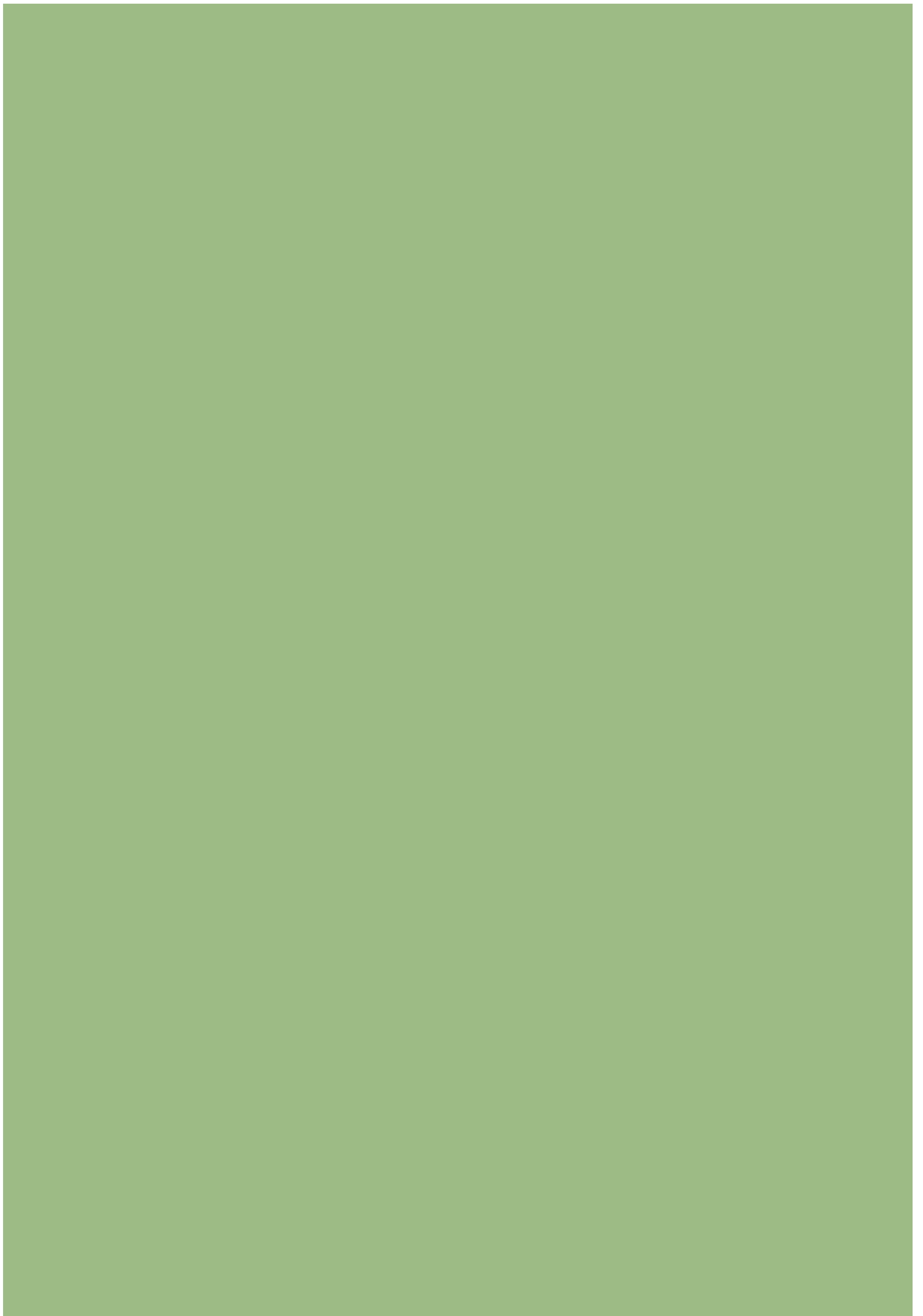


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1

Introduction



1.1. LETTER FROM THE CHAIRMAN

It is a source of great satisfaction for me to present a new edition of the IBERDROLA Biodiversity Report, which describes the management approach and the main activities and projects undertaken by the Company from 2011 to 2013 in this field.

IBERDROLA is aware that social and economic development is intimately linked with the use of natural resources, affecting not only their availability, but also the integrity of the ecosystems and the services they provide. Therefore, it is essential for this development to be sustainable and efficient to prevent or minimise its potentially negative impact.

The scientific community agrees in highlighting that there is currently a severe decline of natural capital and biodiversity worldwide, entailing serious environmental, economic and social consequences.

Despite the efforts made to detain this situation since the first Convention on Biological Diversity (Rio de Janeiro, Brazil, 1992) through to the eleventh Convention on Biological Diversity (Hyderabad, India, 2012), now is the time for all parties involved (States, governments, companies, etc.) to further intensify their actions to meet the goals established in the Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets.

Amongst other aspects, this plan –which must be adapted by the countries in their National Strategies and Action Plans– considers requiring companies to measure and report on their actions aimed at preserving and using biodiversity and ecosystem services sustainably. To fulfil this mandatory task, a change in mentality is essential and that companies consider the conservation of biodiversity as an investment or asset instead of a cost.

Iberdrola already has its own clear Biodiversity Policy, approved by its Board of Directors, through which it commits to taking into account the impact of its operations on biodiversity when planning, implementing and operating its energy infrastructures. This commitment also encompasses actions that contribute toward its conservation and awareness-raising on the importance of this matter.

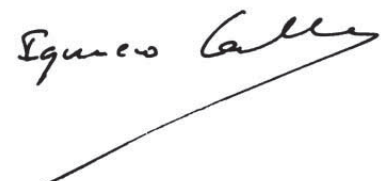
Our Company implements a great number of projects to make its activity compatible with the environment and to achieve its growth in the most sustainable way possible, many of which are included in this Report. In addition, Iberdrola promotes renewable energy sources and is committed to new technologies which are environmentally friendly, such as offshore wind power.

Moreover, the Group is firmly committed to the fight against climate change, which is directly related to the loss of biodiversity. In this regard, the Company has assumed the obligation to reduce the intensity of its emissions by 30 % by 2020 and to be carbon neutral by 2050.

In the coming years, and with the dedication and professionalism of its human resources, Iberdrola will continue to focus on sustainability, respecting the environment and promoting the social and economic development of those communities in which it operates to the fullest extent of its possibilities.

Ignacio S. Galán

Chairman of IBERDROLA



1.2. PRESENTATION

Governance Structure

IBERDROLA comprises a group of companies that in 2012 operated in 39 countries, most importantly: Spain, the United Kingdom, the United States, Mexico and Brazil. All these companies make up the group (the “**IBERDROLA Group**”) whose parent company, as defined by law, is Iberdrola, S.A. (the “**Corporation**” or the “**Company**”).

The corporate and governance structure of the IBERDROLA Group is an essential part of the corporate governance system of the Corporation, which is based on the separation of two areas of decision and responsibility.

On the one hand, the corporate Board of Directors, as the parent company of the Group, establishes the **policies, strategies and general management guidelines for the Group, supervises the implementation of these strategies and guidelines, and decides on matters of strategic relevance** at the Group level.

On the other hand, the chairman of the Board of Directors and chief executive officer, the general managing director and the rest of the executive team handle the organisation and coordination of the IBERDROLA Group and the dissemination and implementation of policies, strategies and management guidelines at the Group level. This strategic organisation and coordination is also made effective through the **subholding companies** which pool the stakes in each of the parent companies of the businesses with activities across the countries where the IBERDROLA Group operates and centralise the provision of common services to those companies, always in accordance with applicable legislation and, particularly, with regulations governing the separation of regulated activities. In turn, decentralised executive duties are handled by the **parent companies of the businesses** of the IBERDROLA Group for matters of ordinary management and effective oversight of each business subgroup, including ordinary control, through the respective boards of directors and management bodies.

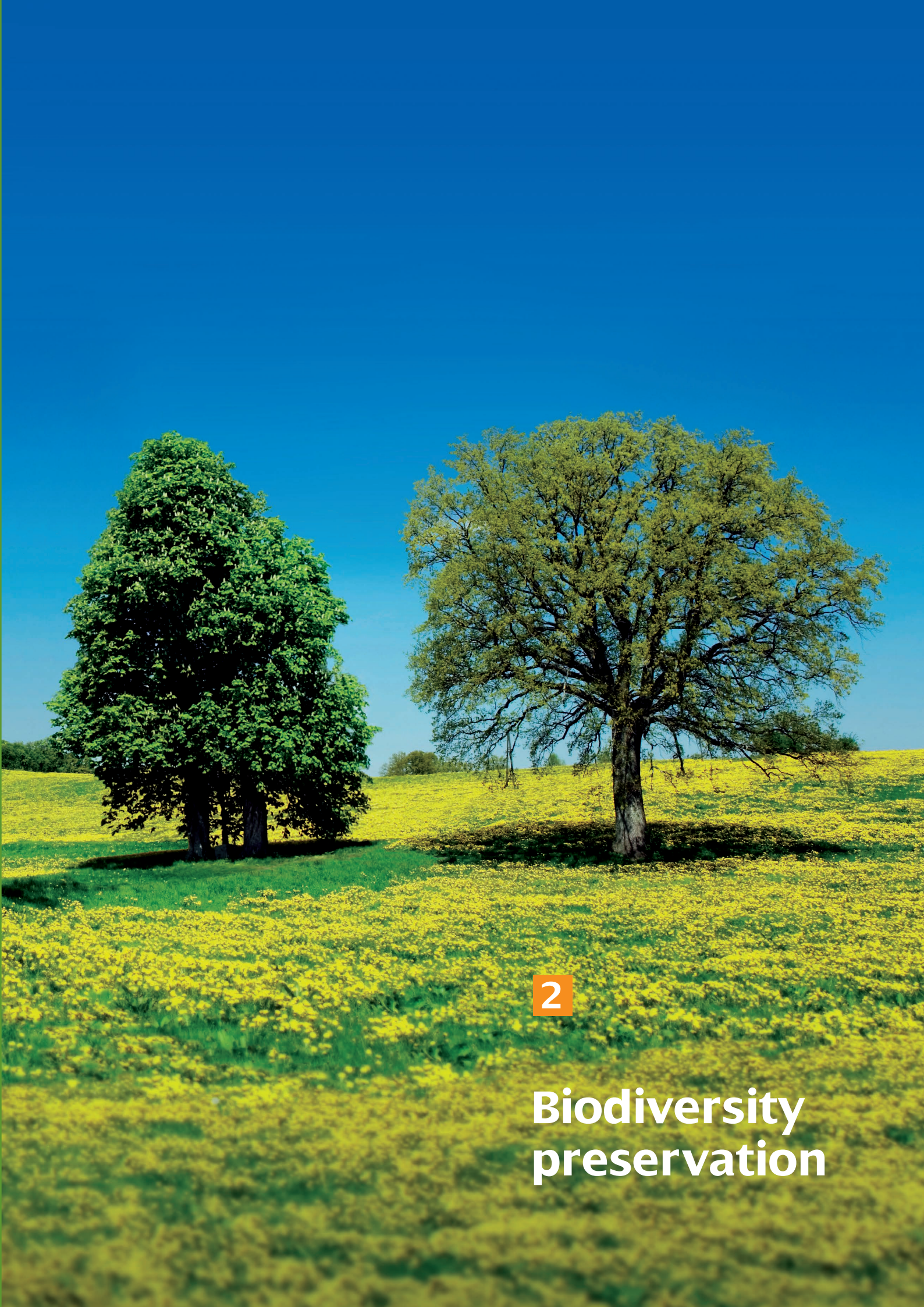
This corporate and governance structure of the IBERDROLA Group operates in conjunction with the Group's business model, under which it is organised into global business areas (“**Business Units**”) with a single corporation that provides them with various kinds of services (Single Corporation, Generation and Retail Business, Grids Business, Renewable Energy Business, Other Group Businesses).

This organisation entails the global integration of the businesses and aims to maximise operating efficiency through the exchange of best practices among the business units in the various companies of the Group.

Lastly, FUNDACIÓN IBERDROLA is a private cultural foundation founded by the Company which is separate from the corporate structure of the IBERDROLA Group. This non-profit foundation's mission is to carry out initiatives that effectively contribute to improving the quality of life of the people in the territories and countries where the Group operates, particularly in the areas of energy sustainability, art and culture, as well as solidarity and social action. The foundation is wholly independent to achieve its ends with full functions and autonomy. Fundación Iberdrola, notwithstanding its involvement with any other entities, coordinates and executes the Group's strategy of corporate social responsibility whenever coherent with the foundation's goals and as assigned by the Board of Directors, establishing, in particular, an appropriate framework for collaboration with the Company as its founding institution, with Grupo IBERDROLA and all other foundational entities linked to Grupo IBERDROLA for the coordination of activities of general interest and corporate social responsibility that the foundation has been commissioned to undertake.

Biodiversity Policy

The Company's Board of Directors, within its responsibility to design, assess and review on a permanent basis the Corporate Governance System of the Corporation, approves the Corporate policies that implement the principles set out in the corporate governance system and contain the guidelines governing the actions carried out by the Group, its directors, executives and employees. In this regard, the position of the IBERDROLA Group is defined in its approved Biodiversity Policy through which it pledges to integrate the impact on biodiversity when planning, implementing and operating its energy infrastructures, and to foster a corporate culture focused on raising society's awareness of the magnitude of this challenge and the potential actions that could contribute towards its conservation. It may be consulted at the end of this Report, in Annex 1.



2

Biodiversity preservation

2. BIODIVERSITY PRESERVATION

Over recent decades, human beings have introduced unprecedented changes in ecosystems to satisfy an ever-growing demand for food, water, raw materials and energy. This has resulted in a loss of biodiversity and the deterioration of ecosystems which is a source of increasing concern worldwide. According to the International Union for Conservation of Nature, the extinction rate of species over the last century has been one thousand times higher than its natural rate as a result of the increasing impact of human activity.

This loss of diversity is a negative indicator of the planet's loss of habitability, given that all living beings, including humans, depend on biodiversity and the natural resources it provides. In addition to the loss of nature's intrinsic value, an enormous amount of goods and services provided by the ecosystems are lost or deteriorated in a dimension that is strictly social or economic. Nature guarantees food safety, human health, air supply and potable water. Biodiversity contributes to local resources for subsistence and to economic development. However, despite its fundamental importance, biological diversity continues to be lost.

International action for preserving the variety of life on Earth is based on the **Convention on Biological Diversity (CBD)** signed by over 150 countries after the Earth Summit in Rio de Janeiro in 1992 .

The Convention acknowledges, for the first time, that the preservation of biological diversity is a common concern for humanity and is part of the development process. The Convention includes all ecosystems, species and genetic resources, defined as all biological material of animal, vegetable or microbial origin, of actual or potential value, containing inherited functional units. The CBD drove the elaboration and implementation of related national strategies and action plans for identifying, preserving and protecting existing biological diversity, as well as for improving it to the extent possible. Each country that signed the Convention assumed the obligation to draft a national strategy for the preservation and sustainable use of biological diversity.

Global leaders who participated in the Earth Summit in Johannesburg in 2002 assumed the commitment, within the framework of the Convention on Biological Diversity, to significantly reduce the biodiversity loss rate by 2010, designated by the United Nations as the International Year of Biodiversity.

In November 2009, the General Secretary of the United Nations, Ban Ki-Moon, declared that the achievement of this goal of detaining the loss of species set for 2010 had failed.

The global community, during **the Convention on Biological Diversity in Nagoya, Japan, approved the Strategic Plan for Biodiversity 2011-2020** with the goal of inspiring large-scale actions over the next decade by all countries and stakeholders to support biodiversity. Acknowledging the urgent need for action, the **General Assembly of the United Nations declared 2011-2020 as the UN Decade on Biodiversity.**

The Strategic Plan has been organised in **5 strategic objectives** and **20 ambitious and reachable targets**, known as the **Aichi Targets**. The Strategic Plan acts as a flexible framework for setting national and regional objectives and promotes a coherent and efficient implementation of the three objectives of the CBD.

The most recent Convention on Biological Diversity held at Hyderabad, India in 2012 focused on and reviewed the extent to which the countries had adapted the Strategic Plan into their National Strategies and Action Plans. The Plan's execution demands the active involvement of the corporate sector and requires companies to measure and report on their actions for preserving and using biodiversity as well as for sharing the benefits of biodiversity and ecosystems.

In the European Union, biodiversity is one of the key objectives of the sustainable development strategy and of the sixth environmental action programme. EU initiatives in this area are based on the provisions of the Birds Directive (2009) and the Habitats Directive (1992) (collectively the "nature protection directives"). Both Directives have been transposed into each country's legislation, including the United Kingdom and Spain, where our operations are significant.

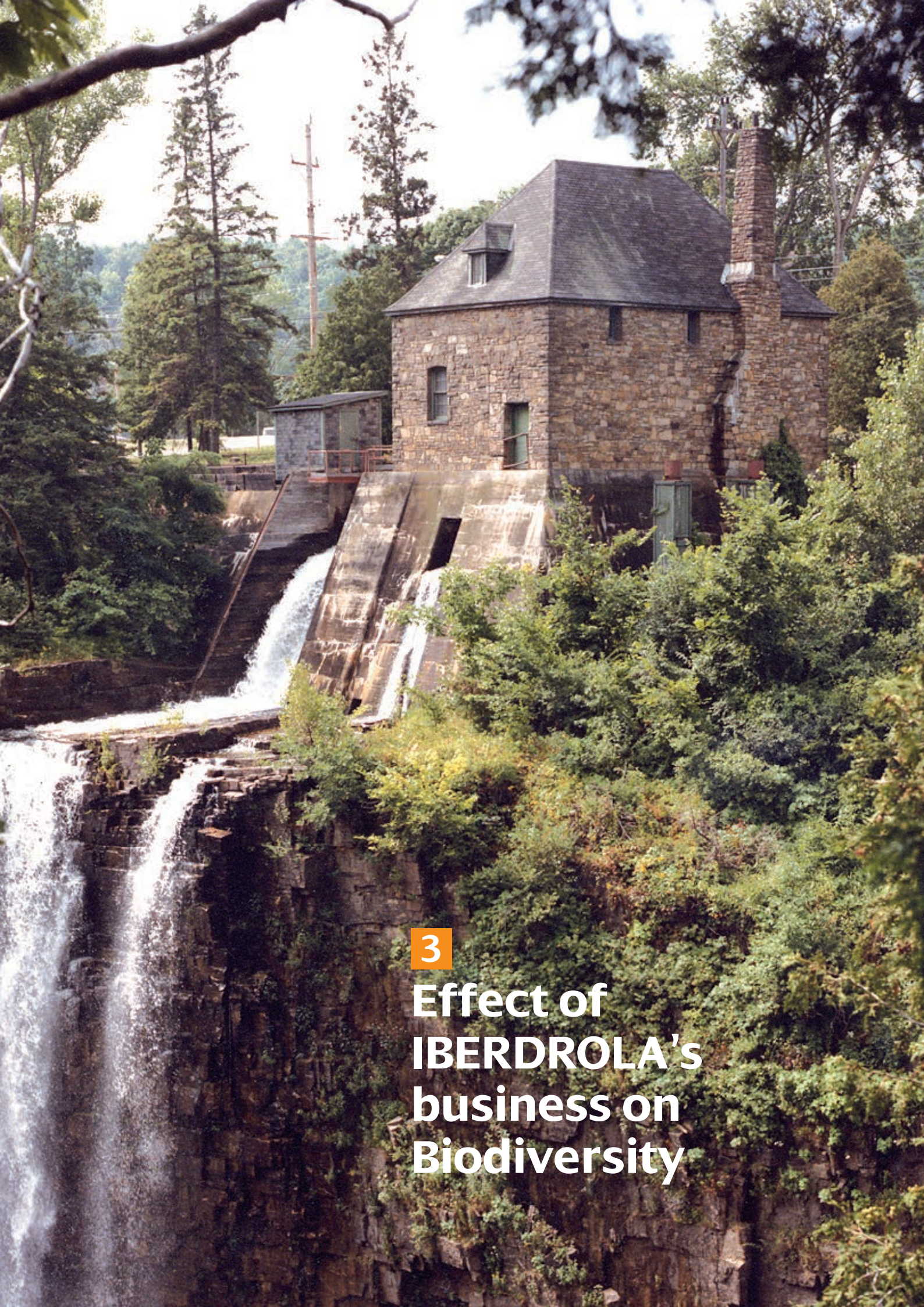
Community policy recognises that biodiversity is not uniformly distributed, and that some habitats and species are more threatened than others. Special attention is given to creating and protecting a major network of sites with high natural value: the Natura 2000 network programme.

In March 2010, the European Union's Environment Council reached an agreement on the objectives and ambitions for managing the loss of biodiversity throughout Europe, including the goal of detaining the loss of biodiversity and the deterioration of ecosystems in the EU in 2020 and for restoring it, whenever possible.

The IBERDROLA Group is aware of this problem and, consistent with its historic commitment to sustainable development, the defence and protection of the environment, considers that respect for biodiversity and ecosystems must assume a leading role within its corporate strategy. As a result, the Company has had its own **Biodiversity Policy** for years, through which it pledges to not only take into account the effects on the environment when planning, implementing and operating its energy infrastructures, but also to generate a social culture focused on raising awareness of this issue. This policy is applicable throughout all business units and regions in which the Company operates.

In addition, for IBERDROLA and the remaining companies, **the value of biodiversity and its sustainable management is a matter of enormous consequence that entails, or may entail, a wide range of economic benefits and opportunities,** a conclusion drawn by the **TEEB - "The Economics of Ecosystems and Biodiversity"**- Report. If companies efficiently manage the risks associated with biodiversity through their business management, they may benefit from a competitive advantage when accessing markets, capital and resources.





3

Effect of IBERDROLA's business on Biodiversity

3. EFFECT OF IBERDROLA'S BUSINESS ON BIODIVERSITY

The activity of some companies of the Group Iberdrola is transform specific natural resources (water, fossil fuels, wind, solar energy, etc.), into electric power that it distributes and sales across a wide geographical scope, wherefore the development of these activities produces interactions with a diversity of ecosystems, landscapes and species. These interactions occur during the construction of facilities due to different reasons - when introducing vehicles and machinery, while opening roads, when altering topsoil, by prolonging human presence, etc. These activities affect the behaviour of fauna and change the landscape, in general temporarily and reversibly. In addition, other types of alterations occur during operations, such as changes to natural courses of rivers, the barrier effect in hydroelectric sites that affect the ecosystems and habitats of certain species, resulting in species mortality from collisions and electrocution, and the disturbance of vegetation when maintaining power-line paths, displacing and changing the paths of birds and bats, etc.

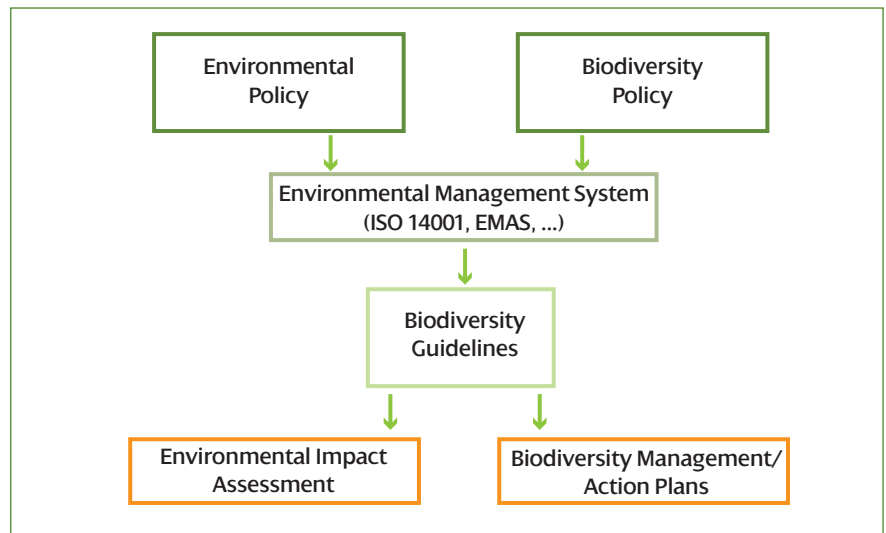
The background against which the companies of the Group operate likewise poses major challenges to biodiversity management, such as achieving a balanced portfolio of facilities so as to minimise the ecological footprint of its energy production, and making its businesses activity compatible with the preservation and respect of the biological wealth of countries with areas of high biodiversity. It is necessary to create projects for achieving a balanced coexistence, preserving and protecting natural heritage.

To face these challenges, the Group has adopted a range of management instruments:



Management tools:

- Biodiversity Policy
- Environmental Impact Assessments
- Management System
- Biodiversity Management/Action Plans



Generation and distribution facilities operate in compliance with the permits granted by each region's environmental regulatory authorities and are bound by restrictions and obligations that guarantee the protection of the local surroundings. Before starting their construction, an Environmental Impact Assessment of new infrastructure projects is completed, deploying analysis and impact prevention mechanisms that consider different alternatives and stipulate corrective measures. When there is one, the project is modified to the extent possible, available technical improvements and the necessary measures identified for minimising impact are adopted. When complete mitigation is not possible, compensatory measures are taken.

It is also worth mentioning that the control of environmental impact does not end once the facility has been built, rather it continues during the facility's operation and dismantling phases through the implementation of Environmental Management Systems. Environmental Management Systems certified according to a standard (ISO14001 or EMAS) are available for preventing and controlling environmental risks. In Spain and the United Kingdom, hydroelectric plant operations are adapted to the requirements of the Water Framework Directive, while thermal generation plant operations are bound to those of the Integrated Pollution Prevention and Control Directive.

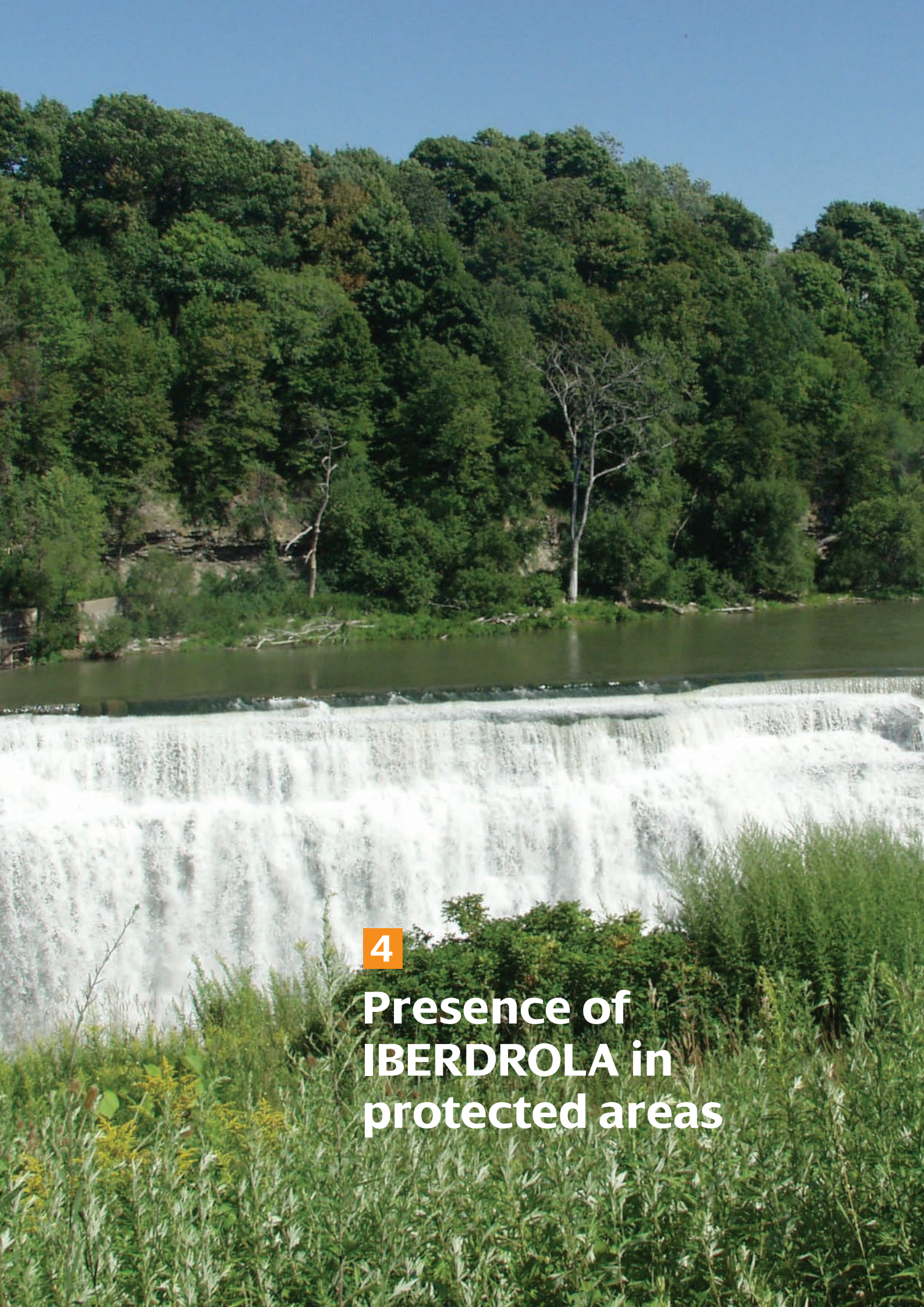
The effects of the Company's operations on biodiversity are described in the documents "Electricity Generation and Distribution: Their effect on the environment" and "Introduction to the Concept of Biodiversity Management within the Company", available through the website www.iberdrola.es > **Environment**.



Maranchón Wind Farm (Guadalajara)



Cortes Hydroelectric Plant - La Muela (Valencia)



4

**Presence of
IBERDROLA in
protected areas**



Alcántara Reservoir (Cáceres)

4. PESECE OF IBERDROLA IN PROTECTED AREAS

For managing biodiversity, it is necessary to know the protected areas or spaces of high biodiversity in which the Group carries out its business to adequately assess possible impact and, thereby, adopt measures for its mitigation or design projects for their recovery.

Installations owned by the Group that are considered as part of this indicator, given their high territorial occupation, are mainly reservoirs, power lines and wind farms.

- Reservoirs of the Group in protected areas represent 1.66 % of the total surface of these areas.
- The length of medium, high and very high voltage power lines crossing through protected areas is 14.50 % of their length.
- The Renewables Business is hardly significant, given that the presence of wind farms in protected areas is less than 0.1 %.

4.1 SPAIN

In the **Generation Business**, 68.1 % of the surface of the reservoirs is located within protected areas. This area represents 1.15 % of the total surface of Biosphere Reserves, National Parks, Ramsar Wetlands and Natural Parks.

Type of protected area	Space/Area Name (ha)	Autonomous Region	Reservoir	Surface of the reservoir in the natural area (ha)	Reservoir / Natural Space ratio (%)
	Monfragüe / 116,160	Extremadura	Torrejón -Tajo, Torrejón -Tietar, Alcántara	2.301	1,98%
	Sierras of Cazorla Segura y Las Villas / 214,300	Andalusia	La Vieja, Anchuricas	64	0,03%
Total Biosphere Reserves	330.460			2.365	0,72%
	Monfragüe / 18,396	Extremadura	Torrejón-Tajo, Torrejón-Tietar, Alcántara	1.135	
Total National Parks	18.396 (*)			1.135 (*)	(*)
	Colas del Embalse de Ullibarri / 397	Basque Country	Ullibarri	298	
Total RAMSAR Wetlands	397			298	75,00 %
	Sierras of Cazorla Segura y Las Villas / 209,920 (*)	Andalusia	La Vieja, Anchuricas	64(*)	(*)
	Montes Invernadeiro/ 5,722	Galicia	Las Portas	93	1,63%
	Arribes del Duero /106,105	Castile-León	Villalcampo, Castro, Aldeadávila and Saucelle	1.203	1,13%
	International Tagus /25.088	Extremadura	Cedillo	1.400	5,58%
Total Natural Parks	136.915			3.696	1,97%
Total Biosphere Reserve, National and Natural Parks and RAMSAR Wetlands	467.772			5.359	1,15%



Cortes Hydroelectric Plant - La Muela I and II (Valencia)

Type of protected area	Space/Area Name (ha)	Autonomous Region	Reservoir	Surface of the reservoir in the natural area (ha)	Reservoir / Natural Space ratio (%)
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(1) Excluding the natural spaces of the Monfragüe National Park and Natural Park of the Sierras de Cazorla, Segura y Las Villas given that the greater surface, declared Biosphere Reserve, is already included.

In addition, amongst the managed reservoirs there are 13,613 hectares in spaces of the Natura 2000 Network, including both Special Protection Areas (SPAs) for birds as well as Sites of Community Importance (SCIs).

Space type	Surface of the Natural Space (ha)	Surface of the reservoir in the natural area (ha)	Reservoir / Natural Space ratio (%)
Total Nature Network spaces	23.130.530	13.613	0,06%

The Cofrentes Nuclear Plant is located within the Natura 2000 Network. The protected areas are the LIC: Muela de Cortes and Croig and SPA: Sierra de Martés - Muela de Cortes.

In the **Network Business**, about 19 % of the extension of the very high voltage power lines (132 kV) and about 15.71 % of the medium and high-voltage lines are located within protected areas. In addition, 131 substations are found within Natura 2000 Network areas.

LINES AND SUBSTATIONS IN PROTECTED AREAS

	SUBSTATIONS	PRESENCE OF POWER LINES (km)	
		MEDIUM AND HIGH VOLTAGE	VERY HIGH VOLTAGE (132 KV)
Total No. in IBERDROLA	942	105.604	7.433
Protected AREAS (SPAs and SCIs)	131	16.589	1.412
Presence (%) in protected areas	13,91	15,71	19,00

In the **Renewables Business** the presence of facilities (mini-hydro plants and wind farms) in protected areas of the Natura 2000 Network is hardly significant as these are facilities that already existed before the national or regional declarations for protecting the spaces, mostly in the case of mini-hydraulic plants.

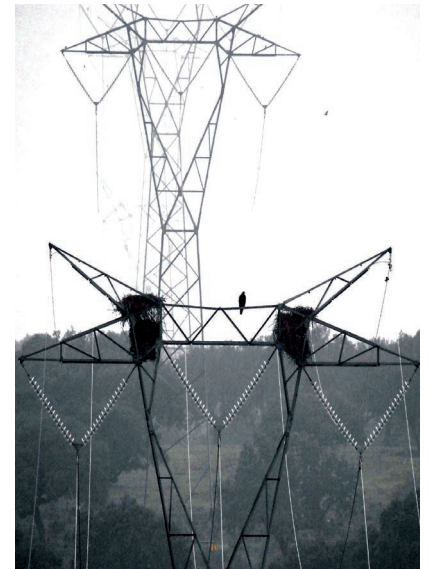
Wind farms, with an occupation of 139.14 ha, hardly affect the surface area of the Natura 2000 Network, representing a mere 0.0006 %. The surface area of these facilities in protected areas has not been expanded in recent years.

The following table displays the occupation of protected areas in Spain:

PRESENCE OF FACILITIES OF RENEWABLE SOURCES IN PROTECTED AREAS

TOTAL SURFACE AREA AUTONOMOUS REGIONS (ha)	SCIs		SPAs		TOTAL TOTAL IN NATURE NETWORK (ha)	% IN SPAs AND SCIs
	TOTAL TOTAL SCIs (ha)	% TERRITORY AUTONOMOUS REGIONS	TOTAL TOTAL SPAs (ha)	% TERRITORY AUTONOMOUS REGIONS		
50.622.291	12.742.867	23,17	10.387.663	19,99	139,14	0.0006

Information on protected spaces of the Natura 2000 Network issued by MAGRAMA (31/Dec/2013).



Monfragüe National Park (Cáceres)



El Teruelo Wind Farm



Beinn Tharsuinn Wind Farm (UK).

4.2 UNITED KINGDOM

SCOTTISHPOWER, has important areas on land for twelve production centres in Scotland and England, from the Ben Cruachan highlands to the Damhead marshlands. It is estimated that 41 % of the plots owned by Generation (3,264 hectares) are located in protected areas. This is mostly due to the size of the protected spaces of the Galloway hydroelectric complex, with a total of 11 protected sites, Loch Ken and Loch Doon, River Dee Marshes, the Laughenghie and Airie Hills, amongst others.

The protected areas include three designations of Ramsar wetlands, five Special Areas of Conservation (SAC), three Special Protection Areas (SPA) for birds and thirteen Sites of Special Scientific Interest (SSSI). In addition, a new site is being built near Avon, adjacent but not included within the Severn Estuary, a Site of Special Scientific Interest (SSSI) and also a designated Ramsar wetland.

The Lanark Hydroelectric Plant, located in the Falls of the Clyde Nature Reserve and next to New Lanark, is a designated Site of Special Scientific Interest (SSSI) as well as World Heritage Site.

The Cockenzie thermal plant was located on a Ramsar-designated site adjacent to the Firth of Forth Special Protection Area (SPA) for birds. Currently, the facility is being dismantled, given its closure in 2013. The Lindholme gas storage facility is located in Hatfield Moor, a SSSI. Likewise, the Cruachan hydroelectric plant is located next to the Coille Leitire Wood, which enjoys both SSSI and SAC status.

The occupation by power lines in protected areas covers an extension of 12.911 %, while that of substations represents 8.14 %.

ScottishPower Renewables operates three wind farms near the Natura 2000 Network, Clachan Flats (Glen Etive and Glen Fyne, SPA for the *Golden Eagle*), Arecleoch, (Glen App and Galloway Moors, SPA for the *Hen Harrier*) and the Carland Cross Wind Farm, adjacent to an area declared SAC and SSSI. In addition, another eleven wind farms in operation, (Arecleoch, Blacklaw, Beinn an Tuirc, Beinn Tharsuinn, Clachan Flats, Cruach Mhor, Mark Hill, Middleton, Whitelee and Whitelee Ext in Scotland, and Coal Clough in England) are partially located in blanket peat bogs, a habitat included in the “*UK Priority Biodiversity Action Plan*” and in Annex 1 of the Habitats Directive of the European Union. There are eight sites (Beinn Tharsuinn, Black Law, Cruach Mhor, Dun Law Ext, Greenknowes, Hagshaw Ext, Mark Hill and Wether Hill) in Scotland where native woodland has been planted, a habitat included in the “*UK Priority Biodiversity Action Plan*”. In addition, the Lynemouth Wind Farm in English is located in an area of high biodiversity, given that anatidae (swans and geese) spend their winter there.



Cockenzie Thermal Plant

4.3 UNITED STATES

At IBERDROLA USA, the extension of high voltage (115 kV or higher) power lines is of 5,832 kilometres, of which 6.89 % border with or cross through protected areas (402 km), designated as such by the federal government. For example, areas like the Champlain-Adirondack Biosphere Reserve, the Adirondack Nature Park and Forest Preserve, the Letchworth Nature Park, the Bigelow Preserve, the Kennebunk Plains Preserve, etc.

POWER LINES IN PROTECTED AREAS

COMPANY CODE	PRESENCE OF POWER LINES (km)	
	PRICE	IN PROTECTED AREAS
IBERDROLA USA	5.832	402,1

4.4 MEXICO

The Generation Business in Mexico has no facilities in protected areas, nor in areas of high biodiversity. It is worth mentioning that the activity of the Altamira III and IV Combined Cycle Plants is favouring the recovery of the ecosystem characteristic of the Garrapatas Estuary. The estuary was losing the salinity of its water because the entry of seawater was blocked, resulting in desalination. The discharge of the thermal plant into the estuary is permitting both its salinity and, therefore, the specific characteristics of this habitat and the species of fauna and flora adapted to it to be recovered.

4.5 BRAZIL

At Elektro, the presence of transmission lines is concentrated in the state of Sao Paulo. Of the 106 existing transmission lines, 13 are located in Environmental Protection Areas (EPA), declarations which became effective years after these power lines began operating, except for two. The total length of transmission lines in protected areas is 119.9 km, about 0.84 % of the 801.24 km of lines of 69 kV and 88 kV and about 18.4 % of the 614.74 km of lines of 138 kV.

Some of the affiliated companies of hydroelectric generation in Brazil, such as Rio PCH, PCH Goiandira, PCH Nova Aurora, Corumbá, Baguari, etc., have sites in protected areas that comprise a surface of 9,220 ha.

The subsidiary Celpa has the hydroelectric plant of Tubarao at the Fernando de Noronha Island Marine National Park, with a constructed surface of 1.03 ha. (3,493 m² and 6,807 m² of tree-covered area).

4.6 OTHER REGIONS

Rokas operates two wind farms in Greece located in protected areas of the Natura 2000 Network. Their presence is hardly significant as these are facilities that already existed before the national declaration of protected area. They represent 0.0004 % of the surface of the Natura 2000 Network.

In Hungary, the Kisigmánd Wind Farm has a weather station in the Duna-Ipoly National Park and the Ikervár Park is close to a Natura 2000 Network area.

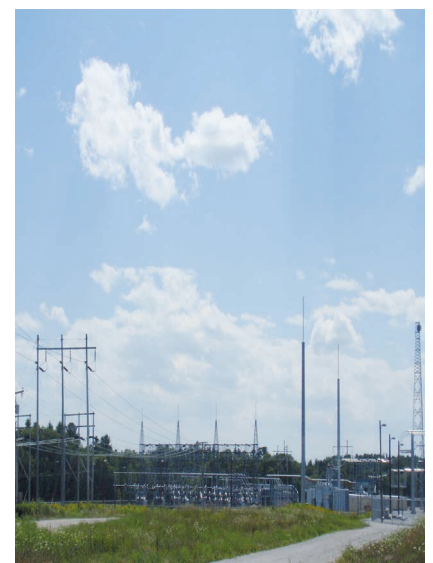
In Italy, the Alcántara Wind Farm is close to several Sites of Community Importance. Furthermore, the Rocca Ficuzza Wind Farm is close to a Site of Community Importance and a special protection area for birds.

Note:

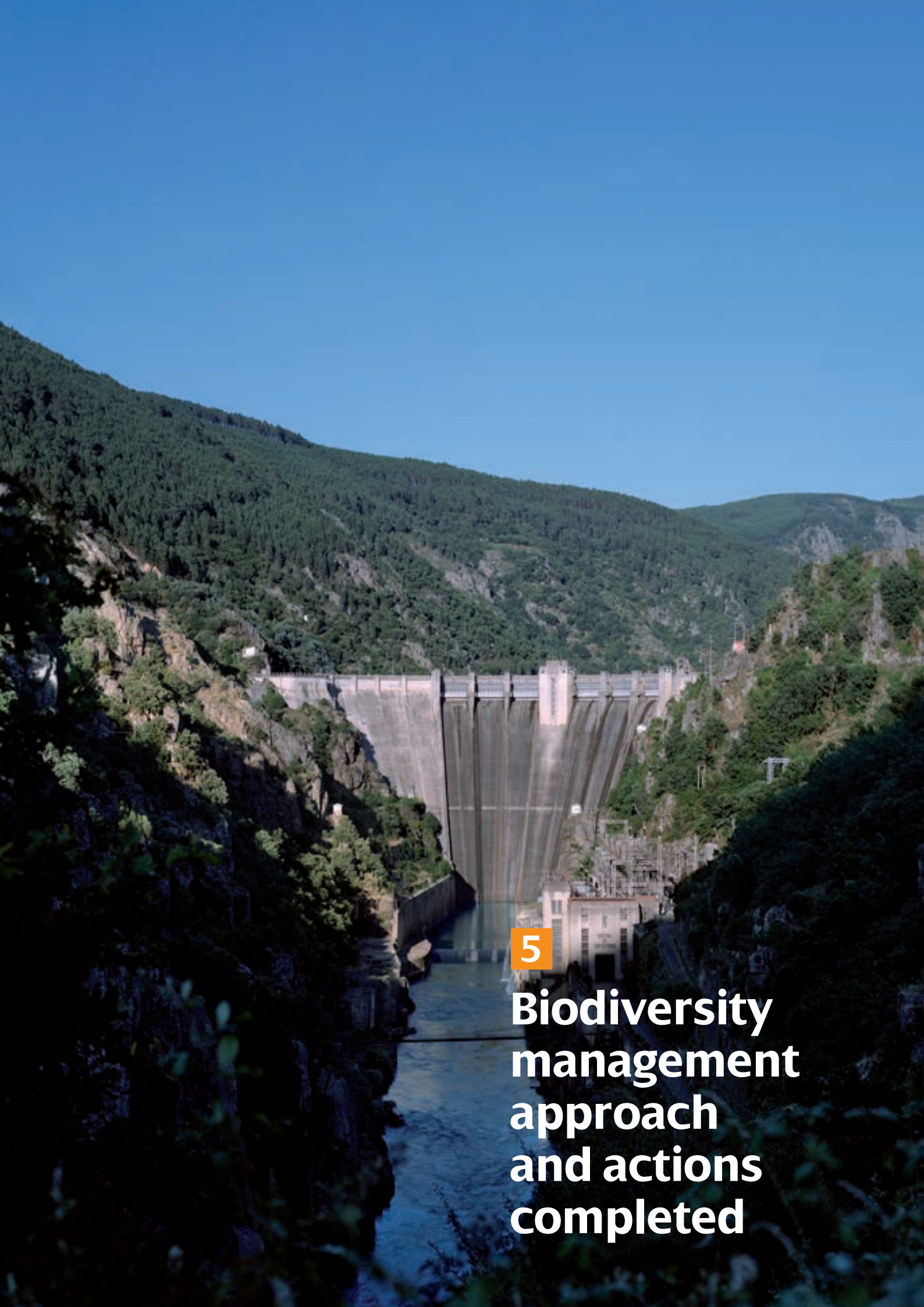
DESIGNATIONS OF THE MAIN PROTECTED AREAS:	
SPA	Special Protection Area for Birds, according to the EC Birds Directive.
SCI	Site of Community Importance, according to the EC Habitats Directive.
SAC	Special Area of Conservation, according to the EC Habitats Directive.
Ramsar	Wetlands of international importance, according to the Convention signed in Ramsar.
SSSI	Site of Special Scientific Interest (UK).
NSA	National Scenic Areas (UK).
NNR	National Nature Reserve (UK).



Dardanelos Hydroelectric Plant (Brazil).



Electrical substation in Maine (USA).



5

**Biodiversity
management
approach
and actions
completed**

5. BIODIVERSITY MANAGEMENT APPROACH AND ACTIONS COMPLETED.



The Biodiversity policy defines IBERDROLA's philosophy and commitment



Even before the regulations on Environmental Impact Assessments were published, Iberdrola Group has been applying advanced biodiversity-preservation criteria to electric infrastructure projects by carrying out our environmental studies before works begin. Company projects have paid great attention to the presence of priority habitats and of species at risk of extinction when disregarding or modifying a site. In addition, the Company has always paid special attention to the potential effect of power lines on birds, and has operated its generation facilities while considering possible effects on natural surroundings.

As a main indicator of sustainable development, biodiversity was already implicit in the first Environmental Policy subscribed to by IBERDROLA in 1992, was set out explicitly in the IBERDROLA Environmental policy approved in 2004 and continues its commitment in the current revision, approved by the corporate Board of Directors in January 2013.

An internal Biodiversity Working Group was designated in December 2006 - comprised of the Generation, Network, Renewables, Iberdrola Engineering, Fundación Iberdrola and Corporate Innovation, Environment and Quality Management Division - to draft the Biodiversity Management Plan (strategy, policies and actions) in Spain. This Working Group meets regularly to manage Biodiversity in Iberdrola Group in a coordinated way to reduce environmental risks of both new infrastructure projects as well as those of already existing ones in operation. Furthermore, in this field, whether by our own initiative or in partnership with other entities, its goal is to satisfy the demand for information.



Relocating stork nests from power lines in Extremadura

The management approach is similar in all Regions in which the Company operates, and even in some cases is more advanced, as occurs in the United Kingdom, where the culture associated with environmental conservation and protection is firmly rooted. In addition to minimising the impact of our activities on biodiversity, species and habitats are fostered by applying a positive conservation management and by performing research both at our sites and beyond.

A Biodiversity Policy was approved in 2007, defining the corporate philosophy and by which the company is committed to integrating biodiversity in its decision-making processes, in particular when designing and building new infrastructures and to include it in our environment management systems, training, collaboration and information.

In addition to this policy, the scope of application of which is the entire geographical ambit in which IBERDROLA operates, some subsidiaries, such as SCOTTISHPOWER or IBERDROLA Renewables USA, have their own policies.

It is worth pointing out that in 2013 IBERDROLA signed the Biodiversity Agreement in Spain which, promoted by Fundación Biodiversidad, dependent on the Ministry of Agriculture, Food and Environment, has the objective of materialising our commitment to environmental conservation and the sustainable use of biodiversity. Through this declaration, framed within the Business and Biodiversity Spanish Initiative (IEEB - Iniciativa Española Empresa y Biodiversidad), the Company assumes the obligation to continue to integrate biodiversity in its corporate policies, identify new business strategies that consider its conservation and continue to develop more efficient, sustainable and responsible conservation practices. Furthermore, IBERDROLA will continue to work, on the one hand, to disseminate its progress made in this area to evaluate already completed experiences and stimulate new initiatives and, on another hand, to collaborate and advise other groups wanting to invest in biodiversity conservation projects.

The biodiversity action lines of each Business and region are integrated in the Group's Environmental Management Model, which evaluates and mitigates the environmental impact of its operations in an integrated manner. This way, biodiversity is configured as a main aspect of the Group's environmental management. The most significant actions are detailed below.

5.1. SPAIN

5.1.1. Generation Business

Management focuses on several aspects as shown below for all existing generation facilities as well as for new projects.

Biodiversity conservation in new projects

- **IBERDROLA has available an inventory of areas which have undergone construction in the past and which hold great potential with regards to their recovery.** These areas correspond with plots built upon, abandoned buildings and infrastructures and depots from construction sites and abandoned buildings once in operation (warehouses, residences, etc.). In this regard, in 2010, Hydroelectric Generation launched a biodiversity improvement plan to correct the effects of the past



Power line with Wigeva crossheads preventing birds from perching and nesting.



Velilla del Río Carrión Power Station



San Esteban Hydroelectric Plant (Orense)



Almaraz Nuclear Plant (Cáceres)



Arcos de la Frontera Power Plant (Cádiz)

and recover the environment of the surroundings. During 2011/2013, the project has continued in different hydroelectric plants (Cedillo, Villarino I, Aldeadávila, Chandreja and Urrunaga).

- During 2012 the **restoration and recovery of the old quarry and dumpsite of the Muela I Hydroelectric Plant was completed**. A surface area of five hectares of land has been recovered, using the materials extracted during the construction works of the La Muela II Pump Facility. (Further information in section 6.1. Noteworthy projects).
- Numerous actions have been implemented in the **Environmental Surveillance Plan** of the hydroelectric plants **La Muela II and San Esteban II** for mitigating and compensating the impact generated, such as: restoring the vegetation and forests of affected areas; replanting with autochthonous plants; monitoring the loss of habitats and fauna before construction works begin, and of its progress during the construction phase; monitoring of birds of prey (*Bonelli's Eagle*). At the site of San Esteban II is worth mentioning the translocation of species of trees and fish; the revegetation of affected areas during the works (quarry, depots, unused elements); protecting the large and small horseshoe bat, both protected species, through monitoring.
- Over recent years, while executing the **project of the Alto Tâmega Hydroelectric Plant Complex in Portugal**, many studies have been completed for characterising the fauna, flora and habitats of the area, for drafting a complete and thorough environmental impact assessment on which to base the measures required for preventing, mitigating or compensating the possible impact on biodiversity that will result of the operation of these important facilities. (Further information in section 6.2. Noteworthy projects).
- We wish to highlight the execution and launch in recent years of the **TEVA Project for Reducing the Temperature of Thermal Discharge in Almaraz**, with an investment of over 38 million euros. The cooling system of the Almaraz Nuclear Plant is semi-open, basically cooled by the Arrocampo Reservoir, which acts as its cooling circuit. The goal is to improve and optimise the capacity for cooling the temperature of the water of the Arrocampo Reservoir, in any case guaranteeing that the temperature of the discharge into the Torrejón-Tajo Reservoir does not exceed 30 °C. This thereby complies with environmental legislation and has a positive repercussion on the surroundings, controlling the risk of eutrophication of the reservoirs, improving the ecologic equilibrium of the reservoir and contributing toward conserving the natural surroundings around the Plant. The area surrounding the Arrocampo reservoir and its shores are a Special Protection Area for birds (SPA).

Conservation of biodiversity during operations and maintenance

Many preventive measures are applied to minimise impact, such as:

- Different maintenance actions and the installation of new fencing, passes and exit devices for wildlife have been implemented for **protecting fauna**, at the different **channels of the hydroelectric plants**.
- **In the event of the risk of accidents due to oil spills in public waterways: Within the framework of the "Improvement Plan"** in hydroelectric generation, over forty actions have been carried out over the last two years at different plants to increase the capacity of barriers, instrument controls and containment and absorption elements that minimise the extent of the environmental impact.
- During the first semester of 2013, due to the works for expansion and maintenance of the **La Muela Hydroelectric Plant**, it has been necessary to partially drain the Cortes Reservoir and the upper tank of La Muela. Environmental surveillance and protection measures have been adopted to prevent possible environmental incidents. These, mainly, have consisted in a thorough monitoring of water quality, by monitoring different parameters (concentration of dissolved oxygen, temperature and pH, conductivity, etc.) and the surveillance of wildlife species present in both reservoirs.

The implemented measures have been successful and no environmental incidents of any kind have been detected.

- At the Company's coal-, diesel- and gas-fired **thermal generation plants**, environmental management focuses on minimising emissions and the risk of accidental spills into rivers, effluent temperature control, water use management and, in general, reducing the impact of the plants on the surrounding biodiversity. During 2011/2013, over one hundred actions have been carried out at thermal generation and cogeneration plants to improve control and monitoring of spills, emissions and immissions, and for preventing risks for the natural environment. For example, facilities have been expanded (basins, lamella settling tanks, etc.), new equipment (analysers, dosifiers, filters, etc.) has been purchased and vegetation has been planted to reduce visual impact.

Reducing environmental risks during operations and maintenance

- **Provision of the required ecological flow** for conservation of river stretches downstream of all dams. Including those for which this requirement is not mandatory for the use of the water resource.
- As part of the **Limnology Monitoring Plans** at the **reservoirs of the Tajo and Duero basin**. In 2011, the studies were completed at the Valdecañas and Azután reservoirs. Currently, the operation of the concerned plants takes place in light of the results obtained from this monitoring.
- **The following actions continue at the Cofrentes Nuclear Power Station and in the rest of the nuclear subsidiaries:**
 - The **Hydrobiology Programme** conducted by the Chemicals Department together with the Limnos company, carries out a study and follow-up of the environmental and biological conditions of the river and the reservoir.
 - The **Environmental Radiological Surveillance Programme** entails sample-taking and analysis of all exposure routes of living beings in the environs of the facility (soil, surface water, ground water, fish, game meat, etc). The results reveal a non-existent or negligible impact on the area's natural radiation level, with values similar to those obtained in the pre-operation programme before the station came on stream.

Participating in research, awareness-raising and training programmes with stakeholders

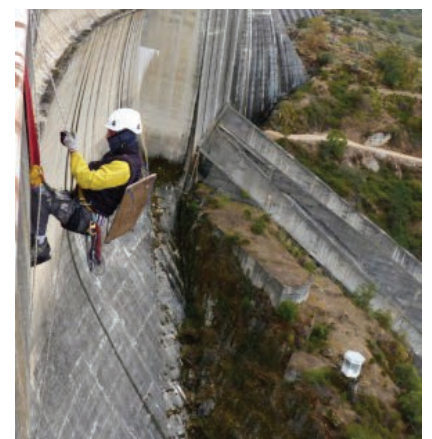
- The "**Ecological Study of the Villalcampo and Castro Dams**" carried out by the University of Salamanca was completed in 2011. The purpose of this study was to complete an inventory of the communities of phytoplankton, zooplankton, birds and fish at the Villalcampo and Castro Reservoirs, analysing the richness and abundance of species, to evaluate the impact of reservoirs on these.
- A nest box was installed in 2012 on the wall of the **Almendra Hydroelectric Plant** (Salamanca) so that a couple of **Peregrine Falcons** could build its nest there, away from any predators and breed their chicks, something that they could not do over recent years. This project has been completed with the collaboration of the Environment Council of the Municipality of Castile-León and with SEO-Salamanca.
- A project for characterising and monitoring amphibians and aquatic mammals was carried out during 2012/2013 in the surroundings of the **hydroelectric plants located in Arribes del Duero**. This project was completed in partnership with the Zoology Department of the University of Salamanca.
- In 2012, in partnership with the Iberdrola Corporate Environment Management Department and the Basque public company IHOBÉ, the **pilot project BIOVALORA** was executed, the goal of which was to obtain a method for the financial assessment



Castejón del Ebro Power Plant (Navarra)



Cofrentes Nuclear Plant (Valencia)



Nest box installed at the La Almendra HP



Western Marsh-harrier (*Circus aeruginosus*),
Cortes reservoir (Valencia)

of the ecosystem services offered by our hydroelectric plant facilities and their surroundings. It was developed on the basis of the Tera Hydroelectric System in Zamora, and obtained satisfactory results. The new method could represent a tool for supporting business-related decision-making including the environmental variable, as well as a guideline for compensatory measures and other measures aimed at offsetting environmental impact.

- Over the last two years, **we have collaborated with the Jucar River Hydrographic Confederation and the Environment Council of the Valencia Regional Government** to successfully conserve the **nesting** of a pair of **Western Marsh-harrier** (*Circus aeruginosus*) established in the area of the tail end of the Cortes Reservoir. The necessary measures have been taken during egg-laying and breeding of the chicks (between April-May to July-August) to make it compatible with the hydroelectric plant operations of the Cortes Hydroelectric Plant.
- The second phase of the **“Study and Monitoring of the zebra mussel in the Castejón Combined Cycle Plant (Navarra)”** project, carried out between 2008/2013, has been completed with very positive results. The conclusions and efficient measures obtained will be applied to larva control of the zebra mussel to prevent its binding and proliferation at electric power plant's cooling system.
- The project in collaboration with the University of Salamanca for **characterising the Ebro river's biodiversity** as it flows through the facilities of the **Castejón Combined Cycle Power Plant (Navarra)** and for preparing the inventory of the main species and censuses of both autochthonous and invasive biotic populations (fauna and flora) present on the banks of the Ebro River surrounding the Plant, has been completed. In October 2013, a similar project was launched at the Arcos de la Frontera Combined Cycle Power Plant (Cádiz).

5.1.2 Networks Business

The particular focus of biodiversity-management approach for distribution is centred on reducing incidents involving fauna and vegetation and protecting the natural environment, preventing dumping, fires, etc. To this end, Iberdrola Distribución Eléctrica has an Environmental Management System and an Inventory of Fauna, created on the basis of national and regional catalogues and of the International Union for Conservation of Nature Red List.

Power-line management and fauna

- Over **250 improvements have been made to operating facilities to reduce the risk of harming fauna**. Deterrent devices or nesting elements are installed for birdlife (sounds, electric fences, bird spikes, water, etc.), specimens are managed, nests are removed or modified in partnership with the Administration, nest boxes are installed, isolating devices are mounted (sheaths for conductors and bridges, extensions, etc.), crossheads are changed, pylons are corrected. Isolating elements are installed mainly for terrestrial fauna (staples, busbars, terminals, etc.). In 2012/2013, action was taken at 121 facilities to protect terrestrial fauna. Furthermore, power lines have been buried as a preventive measure. For example, 16 lines were buried in 2013. (See example in Section 6.3. Noteworthy projects).
- The **Madrid Plan (2010-2014) for the compaction of 16 substations and the burying of 125 km of associated overhead high-voltage power lines has continued**. Its environmental objective is to recover land, improve landscape, protect birdlife and prevent damage and forest fires. Over 50 % of the substations included in the Agreement have undergone compaction and are in service. A new underground network of high-voltage power lines has been built, and the corresponding overhead installations have been dismantled.
- The **pilot project for monitoring terrestrial fauna** has been completed at the Larraskitu (Bizkaia) substation. It consists of capturing animals from the substation's



Perches for birds to rest safely.

surroundings with cages and then freeing them again later in an alternate area, to keep them from suffering electrocution. The positive efficacy of this action has been verified with species such as cats and beech martens.

- Iberdrola Distribución Eléctrica has signed a **new agreement with the government of the Community of La Rioja** to apply corrective measures for reducing or eliminating the harmful effects of power lines known as “blackspots” along the power grid registering the highest rates of bird electrocution. Specifically, in 2013 action has been taken at 63 pylons of different power lines, adopting measures such as cable insulation, hanging of suspended chains or installing light posts to prevent the dominating loose bridges that are so dangerous for birds.



Beech Marten (*Martes foina*). Captured at the Larraskitu Substation (Vizcaya)



Protective elements installed for birdlife



Power line umbrella anti-perching and anti-collision deterrent devices.

Power-line management and vegetation

- A **vegetation management programme** is available for reducing the potential risk of fires in tree-covered areas. Trees are pruned annually and power line paths are cleared. For example, 255 works were completed in 2013.
- Numerous actions are implemented each year at facilities for reducing the potential risk of fire. Mainly, hot spots are deleted from lines and insulation is installed. For example, 605 actions were taken in 2013.
- **Fire risk maps:** The fire risk level mapping was completed and reviewed in 2012 for all medium-voltage pylons in the Autonomous Communities. The data obtained using the method created for calculation has been compared with the observed reality.
- A **pilot project is currently underway in the region of Alicante** for **reviewing and updating**, by application, the method for identifying the risk of fire in pylons and spans. The pylons with the greatest potential risk of fire have been identified and inspected in 2013. About 120 medium-voltage pylons have been selected, based on their specifications and the characteristics of their surroundings, establishing an improvement plan of corrections to be implemented in the future.
- The pilot project in Soria for the **“Integrated Management of Vegetation”**, aimed at optimising pruning and felling of trees, has been completed. The pruning and felling completed over the last 5-6 years in the area object of the study has been evaluated, and the risk of fire has been assessed. A geographical information system has been used for this purpose, verifying in the field the suitability of the works and drawing conclusions for their improvement.

Prevention of risks of spills at substations

- **Substation oil tank construction plan.** This Plan for minimising the environmental risk of spills has been underway since 2008. To date, 127 tanks have been built, and between 2011/2013 another 34 oil collection tanks have been built at substations. The sealing of some of the tanks has been inspected, applying the maintenance protocol and checking the substation spill prevention system. Furthermore, 31 tanks have also been built at training centres in 2013.
- The **temporary storage area construction plan** at substations has continued to be developed, to avoid contaminating the soil in the event of an accidental spill.

Research projects

The Ladder Snake Project

The first phase of the study of the behaviour of the ladder snake (*Rhinechis scalaris*) took place during 2011/2012, with the University of Salamanca. This species has a high electrocution rate in medium-voltage towers of the grid, causing electrical short circuits and situations of high risk of fire. During 2012/2013, a second monitoring phase has been completed, with radiometrics of the ladder snake and the Montpellier snake in Castellón (Valencia). This study has provided valuable data on the ethology of these species and of the optimum solution to prevent them from sliding up the electric pylons by using anti-climbing devices.

The DALIA Project

The **DALIA R&D&i Project**, the goal of which is to establish a series of technical and environmental criteria for integrating tree felling and pruning works with power line maintenance, has been completed. Results worth mentioning are the improvement of the efficiency of pruning campaigns and progress made in prevention and safety of personnel during pruning tasks. In general, vegetation management has been optimised.



Study on the Ladder Snake (*Rhinechis scalaris*) conducted in Salamanca and Castellón

Biodiversity conservation in new projects.

- During 2011/2013, the Networks Business, through Iberdrola Ingeniería y Construcción, has carried out **over 100 environment-related actions and studies** before and during the construction of substations and power lines. Preliminary studies focused on the impact on the Natura 2000 Network, flora and vegetation, nesting of birds of prey, integration and adaptation of landscapes, etc. Some examples are:
 - 132 kV I/O power line at TS Onteniente - Juan de Urrutia-Alcoy line. Study of nesting of birds of prey before building the power line. Species object of study include the harrier (*Accipiter gentilis*), sparrowhawk (*Accipiter nisus*) and hobby (*Falco subbuteo*).
 - Moratalla TS - Calasparra TS SC/CC 132 kV power line. Study of the effects on protected flora during power line construction, study of the effects on the Natura 2000 Network.
 - 66/20 kV Sigüenza Distribution Transformer Substation. Landscape and environmental integration and adaptation project.
 - Carril TS – Los Ateros TS 132 kV power line (Murcia). Flora and vegetation study. Tracking birdlife in the surroundings of the power line.
 - Enlargement project of the Navalagamella 66/20 kV Transformer Substation (Madrid). Study of the effects on the Natura 2000 Network.
- During construction, we restored and prepared the grounds, protected vegetation, birdlife, terrestrial fauna and landscape, monitored invasive species, implemented fire prevention, etc. Some examples include:
 - 220 kV I/O power line at the Montebello TS for the Jijona TS-El Cantalar TS/L. Tracking the nesting patterns of birds of prey.
 - 132/20 kV Arauzo Transformer Substation (Burgos). Protection of the juniper forest near the implementation area (SCI Sabinares del Arlanza) and restoration of the construction site surroundings. Total surface: 1.2 ha.
 - 66/20 kV Villalba Distribution Transformer Substation (Madrid). Protection of the forested area in the SCI Guadarrama River Basin.
 - Adapting the 132 kV Gatika-Lemoniz power line (Bizkaia). Control of vegetation and elimination of invasive exotic species of plants including pampas grass (*Cortaderia selloana*) and summer lilac (*Buddleja davidii*), amongst others.
 - Carril TS – Los Ateros TS 132 kV power line (Murcia). Training and installation of protective fencing and informational signs for protecting the spur-thighed tortoise (*Testudo graeca*), a threatened species. Prospecting nests in the areas surrounding worksites.
 - 220 kV power line, I/O at Plasencia TS on the Almaraz-Guijo-Gabriel and Galán power line (Cáceres). Installation of bird protection devices and nest boxes for European Rollers, Little Owls, etc.
- Likewise noteworthy is **the recovery of the use of mounted steed (mules)** as an alternative to mechanical means for reaching very isolated areas of difficult access for operation and maintenance work on power lines. This minimises the environmental impact of the work, prevents damage to the topsoil on hills and soil erosion, particularly on prominently uneven ground. Likewise, this contributes toward conserving a hybrid species currently in danger of extinction that in ancient times was used for many tasks.



Griffon vultures on a power line post in the San Pedro mountain range (Cáceres)



Model patented by IBERDROLA for reducing the risk of bird electrocution.



Cuenca Wind Farm.



Golden eagle (*Aquila chrysaetos*)



Valdeporres Wind Farm (Castilla-León)

5.1.3. Renewable Energies

The Renewables Business undertakes and drives Biodiversity policy commitments while integrating the analysis of the effects and actions for preserving biodiversity when planning and executing their activities. Biodiversity-related interventions are primarily undertaken during the wind farm development and subsequent operation and maintenance stages.

Biodiversity conservation in new projects

During the wind farm development stage, we carried out studies on birdlife and bats; environmental and vegetation restoration during construction and subsequent monitoring; installation of bird protection devices on evacuation lines. For example:

- In 2012, we completed the **revegetation and forestry treatments** in a surface of 167 ha near the seven wind farms in Cuenca (Pico Coballos, Carrascosa and Muela Cubillo), Soria (Bordecorex Norte, Tarayuela and Hontalbilla) and Guadalajara (Sierra Menera I). In Sierra Menera I, we reforested 24 hectares of land affected by extraction activities and conducted forestry treatments in the surrounding 27.9 hectares.
- **Birdlife study** for the **Elciego Wind Farm project** (Álava). July 2011 - June 2012
- Installation of **bird protection devices** on the Cabeza-Morena high-voltage line. Completed in 2013.
- Restoration of **slopes and landscapes** of the facilities in Bordecorex Norte, Tarayuela and Hontalbilla (Soria) were completed in 2013.

Conservation of biodiversity during operations and maintenance

During the development stage and within the Environmental Management System, we **studied and tracked terrestrial fauna, birdlife and bats, in addition to environmental and plant restoration at the sites where wind farms are located. We are also monitoring some of the high-voltage evacuation lines.** A few examples are given below:

- Regular monitoring of bird and bat accident and mortality has been conducted at various wind farms in Andalusia, Galicia, Castile-La Mancha, Castile-León, Catalonia, the Basque Country and Aragón.
- Tracking a golden eagle (*Aquila chrysaetos*) in the Badaia Wind Farm (Alava) with a GPS device to determine its routes and habits.
- The tanks at the Sabina facilities used for fire prevention were maintained as a measure required by the Environmental Impact Statement.
- Planting cereals on public utility hills for species that are prey for birds of prey (Albacete). Atalaya de la Solana Wind Farm.
- Monitoring and tracking of the black stork (*Ciconia nigra*) during the nesting and rearing periods at the Las Cabezas Wind Farm. These actions will continue over upcoming years.
- Yearly tracking and breeding studies on the Dupont's Lark (*Chersophilus duponti*) in the surroundings of the Radona I and II, Bullana, Ventosa del Ducado and Layna Wind Farms (Soria).
- Annual wildlife study at Regodeseves (Asturias)

- Study of the impact on bird of prey populations at several wind farms in the Cuenca province.
- Both at already operating wind farms as well as new wind farms inaugurated over the last three years have adopted **appropriate measures for preventing and reducing environmental risks**. For example, we have improved environmental management during emergencies resulting of fires at wind farms. During 2012/2013, we developed an environmental risk assessment method for Renewables. It will be implemented in 2014 at six wind farms with different environmental conditions.
- During 2013, **environmental awareness workshops for operation and maintenance personnel** were conducted by the contractors managing environmental monitoring. These workshops included theoretical and practical training (e.g., identification of local fauna species). They have already been held in some wind farms in Andalusia and are scheduled for other regions.



El Teruelo Wind Farm (Castilla-León)

The activities concluded at the mini-hydraulic plants in Spain are:

- Installation of fencing at the plants in Zumarresta and Leiza to prevent incidents with wildlife (deer).
- Environmental flow measurement and control at 21 mini-hydraulic plants.
- Inspection and conservation projects on existing fish ladders.
- Conclusion of the pilot project on continuous flow hydrocarbon spill control (2010/2012). This project is framed within the objective of minimising environmental impact resulting of the use of oil, grease and lubricants at hydroelectric plants.

Participating in research, awareness-raising and training programmes with stakeholders.

Lesser Kestrel Project

The study on the Lesser Kestrel (*Falco naumanni*) bird is especially worth mentioning. It began in the surroundings of the Sisante Wind Farm facilities (Cuenca) in August 2013 with the University of Salamanca. The goal of the project is to quantify the area's breeding and post-breeding populations as well as the potential roosting areas/groups of species. The purpose is to compare the rate/population size/sex/age of the Kestrel with the mortality observed for this species at the wind farm facilities; contrast this data with abiotic (rainfall, temperature and wind) and biotic (habitat, agricultural use, trophic resources) parameters and implement measures for mitigation based on this analysis.



Study on the Lesser Kestrel (*Falco naumanni*) conducted at the Sisante wind power facilities (Cuenca).



Bonelli's Eagle (*Aquila fasciata*)

Life+ ENGUERA Project

The three-year Life+ ENGUERA project (Biomass & Fire Prevention) underway with other partners in the Valencia region concluded in 2013. The main purpose of this study was to define new forest management criteria for obtaining biomass as a renewable energy source for palliating the effects of climate change; assess the effectiveness of these for preventing forest fires and analyse their impact on rural development as measured by the wealth employment generated by these measures.

Environmental partnership agreements

Of the partnership agreements signed with Spanish entities for preserving our natural heritage, the agreement signed with the Environment Agency of the Regional Government of Castile-León is worth highlighting. Several projects have been financed and completed between 2009 and 2011. The following projects continued in 2011:

- Development of a **Conservation Plan for the Bonelli's Eagle** (*Águila fasciata*) in Castile-León. Information is available in the project's website: www.aguilaperdicera.org/
- Monitoring **study of the Dupont's lark** (*Chersophilus duponti*) in the areas of influence of several wind farms in the Soria province.
- Construction of a building at the **Cañón del Río Lobos Park**.
- Improvement of the **accessibility at the Arribes del Duero Natural Park**.

See further information about the projects at www.patrimonionatural.org

Energy Classrooms

The Renewables Business runs five **energy education workshops** to foster the spirit of environmental conservation and protection amongst groups of associations and students throughout Spain. They are located in Castile-León and Castile-La Mancha. See further information in www.iberdrola.es.

5.1.4. Iberdrola Ingeniería y Construcción

IBERDROLA Ingeniería y Construcción also integrates biodiversity in new projects in Spain and abroad, approaching a variety of aspects.

Environmental Management System

In Spain, IBERDROLA Ingeniería y Construcción has an ISO 14001 certified Environmental Management System (EMS) in the areas of engineering and construction. During 2011, we acquired the certification of our subsidiaries IBERDROLA Engineering and Construction UK and IBERDROLA Engineering and Construction Networks, LTD, in the UK. In 2012, the implementation of the EMS began in the USA and in IBERDROLA Ingeniería de Explotación in Spain. These systems allow for optimising management and reducing environmental risks, particularly in relation with biodiversity, when designing and constructing facilities of all types.

Awareness-raising for own and subcontracted personnel

- We have been conducting **training sessions** and distributing **specific work documents** since 2011 for informing project personnel and raising their awareness on sensitive areas, species, etc.
- We have continued **signposting best environmental practices** at all international worksites with a view to raising environmental awareness and respect. Site-specific information is also signposted when pertinent. For example, alerting of the presence of protected species.
- Construction project contractors attend **awareness-raising and refresher seminars on fire prevention**. During the summer of 2013, these seminars were conducted in the areas of highest risk of fire, Castile-León, Valencia and Castellón.
- We are using **informative datasheets** (toolbox) in the United Kingdom for increasing environmental awareness-raising. They are included during presentations at the worksite, follow-up meetings, etc.

Applying habitat, wildlife and plant life protection measures

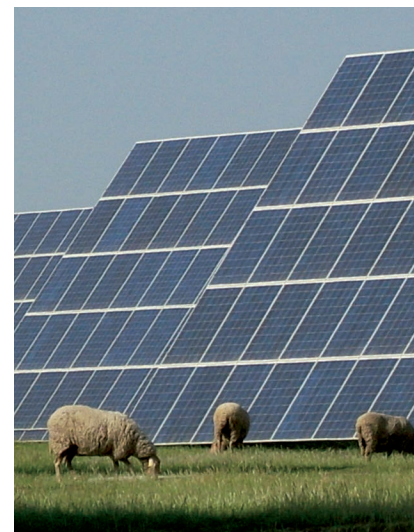
- A “**Best Environmental Practices Manual in Construction Work**” is available. This manual applies to all construction work and defines the basics for appropriate environmental management in construction and the best practices for reducing environmental impact and conserving biodiversity, amongst others. We have been using the manual “*Environmental Good Practice on Site - CIRIA Report C692*” in the United Kingdom since 2012.
- **Measures for protecting fauna and flora** have been established as contractual requirements for construction and assembly service contractors.
- During 2013, we used **treated peat to decontaminate soil with hydrocarbons**, generated when constructing the Koudiet Combined Cycle Plant (Algeria). Analyses reveal that the soil has been 99 % decontaminated and will be reused as fill at the same worksite.
- **Conservation grazing**: Land maintenance used sheep and goats as a priority criterion at operating photovoltaic plants, resorting to other measures whenever doing so proves impossible. In Spain, maintenance at Tayuela I and II photovoltaic plants is currently carried out with sheep.

Use of sustainable materials

- In recent years, our hydropower work has used wood from sustainably managed forests certified by the *Forest Stewardship Council and the Programme for the Endorsement of Forest Certification*. At the San Esteban and Muela II Plants, use of **sustainable wood** has surpassed 95 %. We are taking steps to obtain a similar percentage at that the San Pedro hydroelectric project begun in 2013.

Protection of endangered and protected species

- **San Esteban II Hydroelectric Plant (Spain)**: In the project implementation area, we detected two species of **protected bats**: the **Lesser horseshoe bat** (*Rhinolophus hipposideros*) and the **Greater horseshoe bat** (*Rhinolophus ferrumequinum*). To protect them, we continuously monitor the work area, a task intensified during the nesting and rearing periods (February through April).



Tayuela Photovoltaic Plant (Extremadura), sheep maintenance



Common pipistrelle (*Pipistrellus pipistrellus*)



Cantabrian Capercaillie conservation programme

- **Moffat Substation (Scotland):** During construction, we found nests of the **Common pipistrelle** (*Pipistrellus pipistrellus*) in a building scheduled to be demolished. Protective measures were implemented, such as installing nest boxes in the surrounding areas and the subsequent transfer of the bats, and training employees involved in the work as to actions related with the bats.
- Before constructing the **La Venta III Wind Farm (Mexico)**, we surveyed the local wildlife and **rescued and relocated threatened and protected species**. In total, we rescued 391 specimens from 20 different species, mainly reptiles.
- We have joined the **project for preserving the Iberian Ibex** (*Capra pyrenaica*), a vulnerable species of wild goat living in **the Muela de Cortes hunting reserve** near the La Muela Hydroelectric Plant.

5.1.5 Fundación IBERDROLA and corporate actions in Spain

During 2011-13, Fundación IBERDROLA¹ and the Corporate Innovation, Environment and Quality Management Division of the Corporation have driven and partnered with other organisations for training and awareness-raising activities in addition to various biodiversity conservation programmes. Among these projects we would highlight:

Cantabrian Capercaillie Conservation Programme

Since 2007, we have been working closely with the Spanish Ornithology Society and Fundación Biodiversidad, both run by the Spanish Ministry of the Environment, to recover and conserve the populations of the Cantabrian Capercaillie, starting with the "Sounds of the Forest" project and subsequently financing the LIFE+ "Urgent Action Programme for protecting the Cantabrian Capercaillie (*Tetrao urogallus cantabricus*) and its Habitat in the Cantabrian Mountains" project. Further information in the websites www.fundacioniberdrola.org and www.lifeurogallo.es.

"Bird Migration" Project

We are partnering with the Spanish Ornithology Society, SEO/BirdLife in this programme for describing and studying the migratory movements of numerous species over various years. Likewise, all the data collected will be available at no cost and in real time through the website: www.migraciondeaves.org. Thus, this project puts state-of-the-art technology at the service of the environment, obtains rigorous and verifiable information and, lastly, offers transparency of its data. See further information in section 6.4. Noteworthy projects.

Iberian Imperial Eagle and Black Stork Recovery and Conservation Programme

We have partnered with the programme of the authorities of Madrid for recovering and conserving the Iberian Imperial Eagle (*Aquila adalberti*) and Black Stork (*Ciconia nigra*). In particular, the Foundation's involvement has allowed the programme to tag three examples of the Iberian Imperial Eagle with GPS transmitters to monitor their movements and define critical areas for their conservation. Likewise, we have banded black stork chicks, conducted a census and defined the critical areas for this species.



Bonelli's eagle with GPS satellite connection

¹ Fundación Iberdrola: The Company, its Group and Fundación Iberdrola have developed an appropriate framework for collaboration between the Company and its Group, by which the Foundation coordinates and executes the Group's corporate social responsibility strategy insofar as it is consistent with its foundational purpose and as assigned by the Company's Board of Directors. The Foundation also coordinates the Group's general interest and corporate social responsibility activities in the countries in which it is present. Culture and biodiversity constitute one of the primary activity areas of Fundación Iberdrola.



Tagging a Black Stork chick in the Community of Madrid

Spanish Millennium Ecosystem Assessment

The Foundation participates in the "Spanish Millennium Ecosystem Assessment" carried out by FUAM, Fundación de la Universidad Autónoma de Madrid (Autonomous University of Madrid). In particular, we participated in the second stage, "Economic impact assessment of Spanish ecosystem services", for assessing 9 of the 21 ecosystems identified in Spain. The project will continue through 2014, for further information visit www.ecomilenio.es.

Aviary for Iberian Imperial Eagles

The Foundation has been working with Fundación Aquila since 2013 to install an aviary at its research, recovery and captive breeding facilities for threatened birds in Oropesa. This is a pioneering project in Spain, given that an aviary would enable flight practice and muscular development for Iberian Imperial Eagles in recovery or bred in captivity. Additionally, with the installation of an electric pylon equipped with electrical fencing, the eagles will learn how to avoid these structures as potential perching spots after their release. This system has been successfully tested on emblematic species such as the California Condor (*Gymnogyps californianus*) or the Philippine Eagle (*Pithecophaga jefferyi*).

Conservation of the Bonelli's Eagle

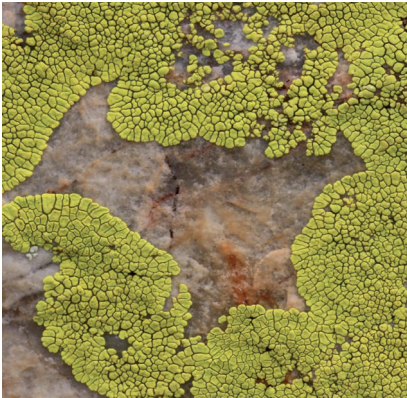
Within the framework agreement signed in 2013 between IBERDROLA and Fundación Patrimonio Natural, Fundación Iberdrola finances a project for conserving the Bonelli's eagle in Arribes del Duero, an area in which 14 of the 16 breeding pairs currently reside in Castile-León. The project will be implemented in the upcoming years.

Catalogue of Best Business Practices in Biodiversity Management

In coordination with the Club de Excelencia de Sostenibilidad (Excellence in Sustainability Club) and Fundación Biodiversidad, IBERDROLA has drafted the "Catalogue of Best Business Practices in Biodiversity Management", comprising a group of 40 practices implemented by large companies and SMEs operating in Spain with a view to conserving and improving fauna, flora, habitats and hydrologic resources. IBERDROLA chairman Ignacio Galán and the Spanish Minister of Agriculture, Food and the Environment, Miguel Arias Cañete, presented the catalogue at the corporate building in Madrid in July 2013. The Catalogue is available through the website of the Club de Excelencia en Sostenibilidad, www.club sostenibilidad.org.



Booted Eagle (*Hieraetus pennatus*)



Lichen (*Acospora hilaris*)

Monfragüe National Park Lichen Guide

In 2011, the book: “Monfragüe National Park Lichen Guide” resulting of research on lichens in this National Park, in which Fundación IBERDROLA partnered with the University-Society Foundation of the University of Extremadura, was published. Lichens are important bioindicators of many ecological processes and enable us to ascertain the conservation status of Mediterranean forest and scrubland ecosystems. Further information is available at the website:

www.fundacioniberdrola.org

Social-Environmental Actions

Various social-environmental actions were completed 2011 in which persons at risk of social exclusion participated. These projects included conserving the native flora along the Cartagena-La Unión Mining Mountain Range and volunteering to clean and recover river banks in La Rioja, Burgos and Cantabria.

“Sustainable Energy for the Future” Workshop

In November 2011, we organised and participated in the “Sustainable Energy for the Future” workshop at the IBERDROLA building in Madrid, together with the Global Nature Foundation. The workshop was framed within the European LIFE project, “Business & Biodiversity” and focused on biodiversity and the energy sector. Further information on this workshop is available at the website www.businessbiodiversity.eu

“Biodiversity in Castile-León: inventory, management and conservation” Exhibition

IBERDROLA has financed the “Biodiversity in Castile-León: inventory, management and conservation” exhibition, showcased during recent years at natural park lodges in various provinces of Castile-León. It was also on display in 2011 at the Casa de las Conchas in Salamanca as an event during the S3F fair.

First Regional Biodiversity Forum in Valencia

We participated at the First Regional Biodiversity Forum in Valencia in 2011, with the contract award in the tender for two actions: the planting of 300 riverbank trees in the Albufera Natural Park and the geolocator tagging of various specimens of the European pond terrapin (*Emys orbicularis*).

Environmental Volunteer Day in the Basque Country

The yearly Environmental Volunteer Day in the Basque Country continues with Fundación Lurguia (www.lurguia.org) and the Gorabide association for the disabled. It consists of reforestating, with native trees, an area originally covered by eucalyptus. “IBERDROLA Forest” began in 2008, and we have planted over 1,500 autochthonous trees of several species since then. Average thermal energy efficiency in thermal generation

Reforesting our own landsites

Since 2007, the Corporate Institutional Relations Division has been reforesting its own lands in the provinces of Salamanca (Olmedo de Camaces, Ledesma) and Zamora (Valdefinjas, Losacino) to recover the original forest surface. The total repopulated surface over these past seven years has reached 482.3 hectares and the species of planted trees have slowly grown, including Holm oaks, cork oaks, Portuguese oaks, Pyrenean oaks, etc. We have also undertaken maintenance, clearing and replacing plants during five years following planting. During 2011/2013, we have repopulated 177.6 hectares and undertaken maintenance that will continue in upcoming years.



European pond terrapin (*Emys orbicularis*)



Environmental Volunteer Day in the Basque Country. Reforesting.

5.2 UNITED KINGDOM

The focus on biodiversity management at the subsidiary SCOTTISHPOWER has evolved over many years and exceeds the regulatory requirements. We seek not only to minimise the effects of its activities on biodiversity but also to foster wildlife and habitats by applying positive conservation management and research at the sites and in their extensive natural surroundings.

SCOTTISHPOWER operates plants, power lines and substations of great size from the south of England to the highlands of Scotland, many of which contain a rich biodiversity of flora and fauna.

5.2.1. Generation Business

The management focus at the Generation Business comprises the following lines of action:

- * Implementing the *Biodiversity Action Plans* (BAPs) at all ScottishPower Generation's generation and gas storage facilities in the United Kingdom.
- * Contracting or sponsoring environmental protection professionals.
- * Developing biodiversity conservation strategies and policies in consultation with natural heritage authorities.
- * Working in conjunction with *Fisheries Boards*, particularly at our hydroelectric facilities, to protect and improve aquatic resources and integrate these in the biodiversity plans and projects of the local authorities.
- * Assisting in research on protected areas and species, funding NGO studies and linking them to the biodiversity plans and projects of local authorities.

Implementing and developing Biodiversity Action Plans

ScottishPower Generation operates ten Biodiversity Action Plans (BAPs) that cover nine generating sites in Scotland and England and gas storage facility at Hatfield Moor. The BAPs were all launched between 2004 and 2007 to entrench existing good practice and set out ecological enhancement objectives and a timescale for their implementation. Activities and goals include the following: providing natural and artificial refuges for various types of birds and bats, and encouraging the availability of food for them (by increasing the diversity of the flora, etc.); encouraging the preservation of habitats for the development of individual species of flora and fauna; improving the management of arboreal and woodland species; developing aquatic habitats; limiting the use of herbicides, and establishing good practices for their use; planning work activities so as to minimize the impact during the breeding season; raising employee awareness; and facilitating fish travel (by means of fish ladders, the installation of counters to track the specimens that use them, etc.).

Details about key species and biodiversity action plans at Generation sites are available in downloadable electronic documents on the www.scottishpowergeneration.com.

The main achievements of the BAPs during 2011/2013 are detailed below:



Cruachan Power Plant (Scotland)



Longannet Power Plant (Scotland).



Peregrine Falcon at the Shoreham CCGT

Birds of prey

A pair of peregrine falcons once again returned to nest at the Longannet coal-fired plant in 2011. The peregrine falcons continue residing at the Shoreham Combined Cycle Plant and Falls of Clyde, which is part of Lanark Hydros. In turn, barn owls continue nesting in the artificial nests constructed at the Damhead Creek Combined Cycle Plant.

Damhead Creek BAP: Introducing bees

One of the most recent activities of the biodiversity action plan at the Damhead Creek Combined Cycle Plant entailed introducing bees into the lands surrounding the plant. The decline in the UK's bee population has been well-documented in addition to the potential consequences for agriculture and survival of many native plant species if this trend does not stop. The lands adjacent to Damhead Creek are a perfect habitat for the bees given the existence of native plants. Bees play an essential role in this ecosystem, since they contribute to the pollination of the various species of plants in the area. We have introduced two beehives and a certain amount of bees that may inhabit the area.

The BAP encompasses a mitigation area of 32 hectares that include wetlands, coastline grazing areas and forested and shrubbery zones. In 2012, we recorded fifty species of birds while monitoring birdlife breeding. The studies have also revealed that the population of water voles is stable in the area and that there are healthy amounts of slow worms and common lizards in the mitigation area.

Damhead Creek 2- Conservation Grazing

In 2011, permission was granted to build a new gas turbine combined cycle system at Damhead Creek 2. It will occupy approximately 24 hectares of land outside the protected areas in the zone, which are mostly unmanaged grazing lands and parking areas. One part was used in the past for stocking ash residue from the Kingsnorth plant.

With a view to offsetting the loss of habitats, ponds will be created in addition to other environmental improvements at the eastern border of the construction site. Doing so will create an intermediate zone between the plant and the protected area in the Medway Estuary.

During 2012, to manage the natural growth of vegetation at an acceptable level, goats, sheep and horses were brought in to clean the vegetation zone. The use of conservation grazing instead of other more aggressive landscaping methods ensures that the animals inhabiting the land can adapt to the changes. After clearing the land, an exit-only fence will be installed so that animals can exit but not re-enter. (Further information in section 6.6. Noteworthy projects).

Biodiversity hotspots in Cruachan

At the Cruachan power station, we identified five areas considered to be "biodiversity hotspots outside protected areas". The biodiversity action plan at the Cruachan site has been revised to include measures that will improve the conditions of the selected areas. For instance, the development of a native wildflower prairie, where we have detected very interesting species such as the fascinating Vapoure butterfly caterpillar. This butterfly has only been spotted twice in Argyll.

In addition, three species of hoverflies were discovered in the summer of 2012 that had yet to be spotted on mainland Argyll. The *Xylota Tarda* is a significant discovery, since this species of *Xylota* has only been recorded 24 times since 2000 in the United Kingdom, particularly in Speyside. Rare species in Scotland include the *Criorhina Berberina*, similar to a buff-tailed bumblebee, and the *Scaeva Selenitica*, which resembles a wasp.



Beehive panels installed at the Damhead Creek Plant (United Kingdom)



Syrphidae in Cruachan

Nesting and wintering bird studies

Yearly nesting censuses have been conducted in Cruachan and Longannet /Valleyfield to define the birds nesting at these sites. Of the 50 recorded species, 31 have nested in Cruachan, 11 of which are listed as priorities in the *UK Biodiversity Action Plan (UK BAP)*: larks, tree pipits, dunnocks, song thrushes, ring ouzels, etc. We have confirmed the existence of common kestrels on facility premises.

Longannet and its ash pond recorded 87 species throughout 2012, of which 33 had been bred and 13 listed as priorities in the UK BAP: larks, song thrushes, common grasshopper warblers, sparrows, common linnets, common bullfinches, etc.

The censuses conducted on birds wintering at Galloway, Lanark Hydros and the Cockenzie power station have broadened our understanding of the species at our sites. In 2013, bird nesting studies were undertaken in addition to other wildlife studies, all for the first time at the six plants of Galloway Hydros and their four dams.

SP Generation, finalist for the sustainable development award of the RSPB Nature of Scotland Awards.

This award nomination represents a recognition of the efforts made at our plants through the biodiversity action plans.

The goal of our Biodiversity Action Plans (BAPs) is to protect and foster habitats and species in the areas surrounding our plants. To do so, we have established specific goals and action plans. Actions are coordinated with local wildlife protection groups. We have already conserved the populations of essential species throughout the country, e.g., the Peregrine Falcon, Eurasian Red Squirrel and the Great Crested Newt.

The awards ceremony was held on 1 March 2012 and, while we did not win first prize, **we are nevertheless proud of the company's achievement** and the recognition of the work undertaken to manage and protect nature surrounding our plants.

Contracting or co-sponsoring environmental protection professionals: wildlife rangers

SP Generation continues sponsoring or partially funding the functions of various wildlife rangers. Their duties include monitoring biodiversity, participating in the implementation of biodiversity projects and maintaining public relations.

We work with local authorities in support of the role of wildlife rangers at our ash ponds, Valleyfield Lagoons and Musselburgh Lagoons. Our hydroelectric plants also sponsor a wildlife rangers at the Scottish Wildlife Trust in Falls of Clyde, Lanark, and support the park warden at Loch Doon.

We work closely with Fisheries Boards

Eel recovery project in the Dee River

Galloway Hydros is backing the efforts to recover the European Eel in the Dee river, upstream from the Tongland plant. The European Eel has been classified as critically endangered on the Red List of Threatened Species according to the International Union for Conservation of Nature (IUCN) because of the steep drop in population by over 80 % over the last three generations. The project, conducted by the *Galloway Fisheries Trust*, and with the financial assistance of Galloway Hydros, strives to capture eels at the lower sections of the fish ladders to subsequently set them free. In 2011, two traps were installed upstream from the dam to simplify relocating the eels toward Loch Ken. In addition, a supervisory programme will assess the condition and potential increase in eel population, as well as its impact on the numbers of crabs over time. (Further information in section 6.5. Noteworthy projects).



Birds wintering at the sites



Park warden with a Common Barn Owl (*Tyto alba*)



Opening the Carsfad reservoir gates at the Galloway hydroelectric complex (UK)

Participation in projects on protected areas and endangered species

Recovery of the Caledonia pine forest, habitat for the Red Grouse

Over recent years, ScottishPower has provided support to the *Royal Society for the Protection of Birds* (RSPB) in a project for expanding and enhancing the native Caledonian pine forest at the Abernethy Reserve, specifically in an area spanning 96 hectares, repopulating holly, rowan, aspen, birch, blackberry and other native species normally found in these forests, thus contributing to the creation of a mosaic of different habitats and enriching the biodiversity in the area.

By the end of 2011, almost 7,000 trees had been planted in the Reserve, helping to create a much larger and more robust forest, better able to withstand the pressures of our changing climate and providing a significant stronghold for the endangered Capercaillie, Scottish sub-species (*Tetrao urugallus urugallus*), as well a home to a wide range of other animals and plants. Further information available at the RSPB website: www.rspb.org.uk.



Capercaillie - Photograph courtesy of Desmond Dugan (RSPB)

5.2.2. Network Business

ScottishPower Energy Networks applies its **biodiversity procedure** to major projects, including the construction of power lines and substations. This procedure includes projects from the initial planning and consulting stage to the development of **specific plans for protecting flora, fauna and the natural habitats** during the construction and operation stage.

Personnel and contractors are trained on the plans, which include, when necessary, the identification of species and procedures to follow for minimising impact on nature or habitats. Likewise, follow-up and control following the end of construction are an essential part of the procedure.

In recent years, we have held numerous public exhibitions of the plans to be developed, consultations with the community and environmental impact studies for 15 major grid projects, including the connection of the 132 kV overhead line at the Rhyl Flats Offshore Wind Farm; reinforcement of the 132 kV overhead line at Carrington-Lostock, east of Cheshire; the 132 kV transmission line, Beaulieu-Denny; etc. In December 2011, the latter project received the approval of the Scottish government for its plans to mitigate the visual and landscape impacts.

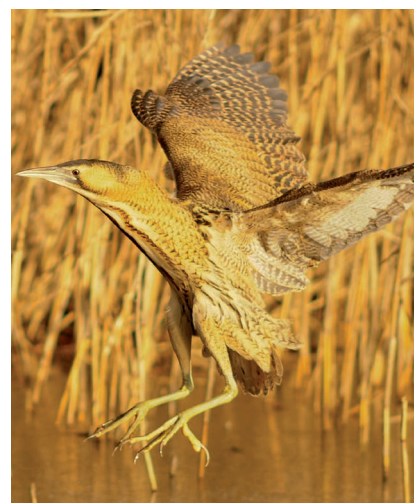
ScottishPower Energy Networks, in addition to the mitigation measures included in the **Environmental Management Plan**, introduces environmental improvements in some projects for the affected areas to produce a net benefit under the concept known as the **Habitat Enhancement Strategy**. This was done, for instance, for the Legacy – Oswestry 132 kV overhead line project in 2013.

These procedures, Environmental Impact Studies and further information regarding the environment and the development of new projects can be viewed at:

www.spenergynetworks.com/pages/environment.asp

www.spenergynetworks.com/pages/community_consultation.asp

In recent years, we have drawn up detailed guidebooks on species and specific problems concerning wildlife and habitat protection. They were published in 2013 through the update of the employee Health, Safety and Environment Manual.



Eurasian Bittern (*Botaurus stellaris*)



Dingy Skipper (*Erynnis tages*).



Wind farm and high-voltage lines

5.2.3. Renewable Energies

ScottishPower Renewables (SPR) has an Environmental Policy that includes the following principle:

Biodiversity, conservation and habitat management. Promote biodiversity conservation by encouraging and implementing positive conservation management and research throughout our Renewable Power Generating Sites and the wider environment.

In the United Kingdom and the Republic of Ireland, the Renewables Business has successfully implemented many of the goals for improved biodiversity management through facility-specific **Habitat Management Plans (HMPs)**. This enables SPR to offset or mitigate any habitat loss when constructing on a site and often to provide an additional enhancement. Doing so requires SPR to work closely with regulatory bodies, including the *Scottish Natural Heritage (SNH)*, *Royal Society for the Protection of Birds (RSPB)* and *Forestry Commission* with a view to ensuring that this management is aligned with national strategies and goals and follows best practices in conservation work.

ScottishPower Renewables manages or is currently constructing 18 wind farms with associated Habitat Management Plans (HMP) encompassing 8,885 hectares.

Within its environmental programme, **SPR** has continued implementing and monitoring a series of habitat compensation measures contained in the HMPs at various wind farm sites during 2011/2013. The main objective is to mitigate the negative effects of the wind farm by recovering native habitats and restoring the nesting and breeding conditions for species of birds, amphibians and reptiles. Specifically, these actions are being carried out at the following wind farms:



Black Law Wind Farm (Scotland)



Whitelee Wind Farm (Scotland)

WIND FARM	SOURCE	HABITAT	SPECIES OF INTEREST	COMPENSATED AREA (HA)
Beinn an Tuirc	Beinn an Tuirc HMP (2000)	Blanket peat bog	Golden Eagle	1.670
Beinn Tharsuinn	Beinn Tharsuinn LMP (March 2006)	Blanket peat bogs Heathlands	Merlin or Pigeon Hawk Black Grouse	140
Black Law	Black Law HMP (2004)	Blanket peat bogs Heathlands Native forest	Wading birds Merlin or Pigeon Hawk	1.440
Carland Cross	Carland Cross HMP (2013)	Dorset Heathlands	Bats Common Barn Owl Eurasian Golden Plover	3
Coal Clough	Coal Clough HMP (2013)	Blanket peat bog		10
Cruach Mhor	Cruach Mhor HMP (2004)	Blanket peat bogs Heathlands	Hen Harrier Short-Eared Owl Black Grouse	577
Dunlaw Ext	Dunlaw Ext. HEP (June 2006)	Heathlands	Black Grouse Merlin or Pigeon Hawk Wading birds	8,3
Greenknowes	Greenknowes BGMP	Heathlands Native forests	Black grouse	20
Hagshaw Hill Ext	Extension of Hagshaw Hill Wind Farm, BGMP. (June 2006)	Heathlands Native forests	Black Grouse Wading birds	12,2
Lynemouth	Lynemouth HMP (2012)		Swans Geese Common Barn Owl	134
Mark Hill	Mark Hill HMP (2010)	Blanket peat bogs Native forests	Water Vole, Reptiles Amphibians Otter	924
Middleton	Middleton HMP (2013)	Blanket peat bog		9
Wether Hill	Wether Hill HMP (2006)	Heathlands	Black grouse Peregrine Falcon	2
Whitelee	Whitelee HMP (2007)	Blanket peat bogs Heathlands	Wading birds Merlin or Pigeon Hawk Black Grouse <i>Pallavicinia lyellii</i> Red Grouse	2.547
Whitelee Ext	Whitelee Extension HMP (2013)	Blanket peat bog		8
Beinn an Tuirc 2 (under construction)	Beinn an Tuirc 2 HMP (2013)	Blanket peat bogs Heathlands	Hen harrier Black Grouse Golden Eagle	671
Black Law Ext. (consent granted)	Black Law Wind Farm Extension BGMP (2013)	Blanket peat bogs Native forest		410
Kilgallioch (consent granted)	Kilgallioch (2013)	Blanket peat bogs Tree planting		300
				8,885 ha.



Eurasian Curlew (*Numenius arquata*)



Water Vole (*Arvicola amphibius*)



Common Frog (*Rana temporaria*)



Red Grouse (*Lagopus lagopus scotica*)

The Habitat Management Plans are currently underway and each site has associated goals and objectives, which are established on the basis of the conditions and types of habitat. The number and type of objectives may vary, as new ones emerge while others are discontinued based on the effectiveness of the implemented measures.

HMPs evolve throughout the entire life of the wind farm and are viewed as an iterative process that will be updated as necessary on the basis of monitoring results.

The variety of solutions adopted at the sites depend on the goals of the Plans and the type of habitat. The work carried out will include measures such as recovering blanket peat bog, planting native tree species, eliminating invasive species, restoring conifer plantations to priority habitats and managing grazing, etc.; during which a comprehensive monitoring programme will be executed. Whenever required, we monitor bird species of interest and other special interest species such as riparian mammals (water voles, otters, etc.)



Wind Farm in Scotland

For the Whitelee, Beinn an Tuirc, Cruach Mhor and BlackLaw Wind Farms, a yearly report is presented to the competent habitat management bodies, the *Habitat Management Group* (HMG), whose members normally include representatives from local authorities, RSPB and SNH.

There is no formal reporting procedure for the remaining wind farms. However, local authorities and environmental organisations are regularly informed of the work undertaken and of any necessary recommendations. For example, further information on the main Whitelee extension HMP is available at the website www.whiteleewindfarm.co.uk.

Some of the main habitats and species that benefit from these Habitat Management Plans are:

Blanket peat bog

Peat bog restoration plays a major role in most HMPs, since their highly beneficial repercussions contribute to improving areas with numerous species of flora and fauna. **SPR** commits to recovering almost 8,000 hectares of blanket peat bog at our wind farms. We are working to recover damaged "peatland habitats" through a combination of conventional and innovative techniques. **SPR** has developed a new technique for restoring these forestry-damaged habitats by creating the conditions necessary for peatland development. This technique has been implemented during 2011/2012 at the Whitelee and Black Law Wind Farms with very satisfactory results. During 2013, we have been applying this technique throughout damaged peatlands for their recovery.



Drosera rotundifolia on peat bog

These results were presented in 2012 in the IUCN publication entitled "UK Peatland restoration: Demonstrating success" (www.iucn-uk-peatlandprogramme.org/resources/199) (Further information in section 6.7. Noteworthy projects).

Native forests - Planting trees

SPR currently manages 8 sites in which native trees have been planted as part of the HMP, covering 138 hectares. In 2012, we worked on creating a 14-hectare forest plantation with local species at the Beinn Tharsuinn Wind Farm, located in the Highlands near Alness. SPR is currently preparing to create 192 hectares of native woodlands at the Mark Hill Wind Farm in Ayrshire. This will become one of the largest native forests to be created in the United Kingdom. (Further information in section 6.8 Noteworthy projects).

Recovery of the Dorset Heathlands

The *Erica ciliaris* plant is rare worldwide, but located in the Dorset heathlands adjacent to the Carland Cross Wind Farm in Cornwall. This area has thus been designated as a Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). SPR has undertaken to recover 2.4 hectares of the Dorset heathlands, which will increase the size of this very important habitat and join it with the SAC. In addition, SPR is planting 1km of hedgerow which will provide a foraging area for certain bat species.

Black Grouse (*Tetrao tetrix*)

The protection of the black grouse is a matter of concern in the United Kingdom, and this species is included in Annex I to the European Union's Birds Directive. Habitat enhancement work has been carried out to benefit the Black Grouse in 9 of the SPR sites. This includes the creation of 138 hectares of native woodlands and small pools to provide shelter and a source of food. Similar work of this sort completed at the Cruach Mhor Wind Farm has proven to be very successful, since the population recorded in 2010 is the most abundant of the Cowal peninsula. In addition to actively managing the habitat to benefit the Black Grouse, SPR has provided funding to the RSPB to create a project office post over three years.

Wading birds

In recent years, the declining numbers of wading bird populations has become a matter of concern. By including wading birds in the habitat management plans designed for many sites, SPR has been able to identify the best way for managing the habitats to benefit these species. Black Law, Hagshaw and Whitelee Wind Farms have discovered that the Curlew (*Numenius arquata*) and the common snipe (*Gallinago gallinago*) account for the highest percentage of wading birds and are beginning to occupy felled plantation areas created to contribute to their recovery.

Golden eagle (*Aquila chrysaetos*)

The works undertaken within the framework of the HMP for the Beinn an Tuirc Wind Farm in Argyll aim to benefit the pair of golden eagles inhabiting the area. Management measure that have been implemented include the removal of commercial forestry to create heather moorland and grazing management, in addition to the implementation of a comprehensive monitoring programme. Since 2008, the pair of eagles have given birth to 5 chicks, making these the most productive couple in Argyll in recent years. In 2012, we tagged a chick born then to track its movements.



Heathland, United Kingdom



Golden eagle fledglings with radiotransmitters at Beinn an Tuirc



Common goose (*Anser anser*)

Hen Harrier (*Circus cyaneus*)

The Habitat Management Area created specifically in Cruach Mhor has proven to be highly valuable for providing alternative food sources to a pair of hen harriers. Monitoring before and after construction revealed that this species came to the area for feeding and even, in various years during operation, for breeding. Commercial forestry was felled to create a blanket bog and heather moorland mosaic, which would provide an additional foraging area for the hen harriers. (Further information in section 6.9. Noteworthy projects).

Wild swans (*Cygnus sp.*) and geese (*Anser sp.*)

During 2012, we established alternative feeding areas for wild swans and geese in the Lynemouth Wind Farm as a mitigation action in the wind farm area.

European water vole [*Arvicola amphibius (terrestris)*]

Water voles have been recorded at a number of SPR sites including Black Law, Whitelee and Mark Hill. We inspect the signs of activity of this species, such as tracks, excrements and eaten vegetation, etc., the presence or absence thereof at each site are recorded.

Water voles are afforded protection within the UK due to their declining populations, and SPR are undertaking monitoring to establish the presence of population on site.



Other noteworthy actions

“Green Week 2013”

As part of SPR's annually organised activities, this year's “Green Week 2013” focused on biodiversity to raise awareness and support the United Nations Decade on Biodiversity (2011-2020). The organised activities included a **photography contest** for employees; a **panel of biodiversity** experts brought together to discuss the main threats to biodiversity; a **quiz** and **informational resources** with interesting data based on local and global biodiversity challenges as well as on the “Year of Natural Scotland”.



Winning photograph at “Green Week 2013”



Electricity pylons, USA

5.3. THE UNITED STATES OF AMERICA

5.3.1 Networks Business

At IBERDROLA USA, an extensive good practice entails avoiding routing new overhead lines through high biodiversity areas, protected or otherwise. Further activities involving biodiversity have also been undertaken by these companies, some of which are detailed below.

Power-line and wildlife management.

Conservation of the Osprey

Through the enterprises constituting IBERDROLA USA, *New York State Electric & Gas (NYSEG)* and *Rochester Gas and Electric Corporation (RG&E)*, we work closely with the National Audubon Society and the New York State Department of Environmental Conservation (NYSDEC) to provide appropriate nesting sites to prevent birds from touching power lines. In particular, we build, install and maintain nest boxes for the Osprey (*Pandion haliaetus*).

These nest boxes are built from pressurised-treated wood and metal meshing that let water drain from the base of the nest. To keep ospreys away from power lines, maintenance teams install a 1.5 m piece of fibreglass above the posts as bases for the nest boxes. In 2012, a nesting box was installed on the eastern bank of Cayuga Lake near Ithaca in New York State. In 2013, RG&E employees transferred the nest of a pair of ospreys from a power line post near Lake Ontario.



Lake Ontario

The subsidiary *Central Maine Power Company (CMP)* is developing a procedure to minimise the impact on osprey nesting and breeding in distribution/transmission corridors. During 2013, we installed turkey decoys in problematic CMP service area spots to keep ospreys away from power posts so as to safeguard the birds' lives and the integrity of the system. The results have been satisfactory.

New England cottontail protection

We work with the New England Fish and Wildlife Service to identify and improve the habitat of the New England cottontail (*Sylvilagus transitionalis*), an endangered species of rabbit along distribution corridors.

Power-line management and vegetation.

IBERDROLA USA runs an extensive vegetation management programme comprising numerous vegetation controls to prevent them from touching power lines, thus precluding power supply interruption and potential fires. Each year, one-fifth of the power distribution lines are cleared using the natural clearing and trimming methods established by the *American National Standards Institute*, (ANSI) and the *Tree Care Industry Association* (TCIA). This programme entails a significant economic investment. For instance, RG&E invested \$7 million in 2013 alone. CMP likewise runs a similar vegetation management programme. In one five-year cycle, we have kept almost 38,000 km of distribution lines parallel to roadways free of vegetation.

Biodiversity conservation in new projects.

Compensated areas

At IBERDROLA USA, one line of action entails mitigating or compensating potential environmental damage caused when building new electrical facilities with other areas of similar or greater natural wealth. For instance, the following projects:

- The *Central Maine Power Company* is undertaking particularly prominent biodiversity management within the Canadian interconnection line project, *Maine power reliability program*. We have donated 14 lots of our land, totalling 1,943 hectares, to local authorities and conservation groups. From Kennebunk to West Forks, these hectares of property contain habitats for distinctive species (rare, threatened or endangered), wetlands, watercourses and temporary ponds, forests, etc. They will be protected in an effort to preserve and enhance the natural resources in the State of Maine. Further information at www.maine-power.com/environmentalsteward.htm.



Tree trimming in Maine (USA)



Compensated Areas in the *Maine Power Reliability Programme*



Saranac River-Bypass High Falls & Kents Falls

- Given the substation extension project, we have compensated the permanent and inevitable loss of 0.534 hectares of wetland under Federal jurisdiction through the acquisition of 1.603 hectares in credits at the *Cornerstone Mitigation Bank*. Further information at the website: www.ricccrg.com/wetlandbank.asp.

Restoration and habitat improvement work.

- We have concluded the work for **restoring the grounds on the Corning Valley transmission line** (115 kV) constructed by NYSEG during 2010/2011. This work was undertaken to create new plant cover by sowing and planting various plant species along the power line corridor.
- **Aquatic habitats:** the company is working with landowners in two rustic river basins. These activities include pretreating run-off water from impermeable sectors of the basin before it enters the river. The aim is to improve water quality and **enhance the aquatic and riverbank habitats**. Various erosion control measures are being employed such as removable matting for the passage of excavators. This reduces the biodiversity impacts of facilities sited on wetlands and bodies of water.

Participating in awareness-raising campaigns and training with stakeholders.

- In 2012, we held an environmental volunteer day at RG&E's hydroelectric plant no. 2 near the High Falls region. Students from the Henry Hudson school of the Rochester City School District participated with teachers, personnel, volunteering parents and RG&E employees. We planted trees, shrubs and flowers, and installed nest boxes for birds.

5.3.2. Renewable Energies

Iberdrola Renewables USA has established an **Avian and Bat Protection Policy** (ABPP) to comply with internal policies and meet the requirements of various government agencies and environmental regulations. The ABPP serves as a framework for managing compliance and commitments related with wildlife, and entails a series of best practices in management for environmentally sustainable operation to, thereby, prevent or minimise and reduce the risk for birds, bats and their habitats.

As a result of regulatory developments and the continuous improvement in environmental practices, the policy was revised in 2013.

The policy is reflected in the following main aspects:

- * **Wildlife:** Wildlife and their habitats are protected, managed or enhanced to prevent the possible impact of our operations (collisions, relocations, etc.). Wildlife includes mammals, birds, insects, amphibians and reptiles.
- * **Vegetation management:** Revegetation and/or mitigation is a regulatory requirement. Damaged vegetation is maintained or recovered to reduce erosion and provide habitats.
- * **Sensitive habitats:** Sensitive habitats are avoided and, during construction, marked off and identified.
- * **Power lines:** We manage bird electrocution risks by insulating live elements, revising bird-safe designs, etc.
- * **Nest management:** nests located on power posts, substations, wind farms are appropriately handled to protect against potential damage.



Blue Creek Wind Farm (USA)

Since 2008, to implement the policy we established an “**Avian and Bat Protection Plan**” (ABPP). This plan is being applied throughout all wind farms specifically on the basis of their particular characteristics. A *Project Specific ABPP* (PSABPP) is drawn up and developed through stages for each project. PSABPPs summarise the information on the species and habitats affected by the project, studies conducted during the various development stages, monitoring following construction, mitigation commitments and other site-specific variables. It is thus a useful tool for implementing the best practices in the development and operation of wind farms, thus minimising the impacts on birds, bats, other species and their habitats. 23 PSABPPs were developed for the year.



The Plan is aligned with and has even participated in the drafting of the new biodiversity directives and recommendations for wind power sites as published in 2012 by the *US Fish and Wildlife Service*.

The annual report, published in 2012 after being reviewed by US Fish and Wildlife Service technicians, details the modifications and progress in the ABPP during 2011/2012 .

Another main element that has been established is the **Compliance Management System** (CMS). This system comprises a set of tools for providing compliance guarantees for management and permits required by the administration in all stages of wind farm development, construction and operation. The CMS provides the framework for integrating and implementing the ABPP policy. It comprises three parts: permits and development, task and requirement monitoring, and incident management.

The following actions are worth mentioning as regards ABPP implementation:

Wildlife reporting and monitoring system

Technical validation by researchers of the Wildlife Monitoring and Reporting System (WMRS). This system is a part of the **Compliance Management System** and provides an initial and operational control reference for birds and bats dead or injured while commissioning or operating the wind farm, the observation of species and the management of species nesting on power lines and substations. During 2011/2013, we finished the base monitoring in various wind farms, an intensive tracking undertaken by technicians during the first year of operation. Subsequent operational monitoring is undertaken by internal personnel. In 2012/2013, wind farm technicians conducted mortality studies at many wind farms and the quality of their work has been validated by ecologists and zoologists.

Training and awareness-raising guides

During 2011/2013, we have drafted various training documents to meet the needs of personnel and encourage active participation. The subjects include: Accident classification protocol; Bat Identification and Reporting; Guide to the Whooping Crane; Guide to the California Condor; Guide to the Golden and Bald Eagles; Nest Management; Power Lines, etc.

Biodiversity conservation in new projects.

Restoration and conservation of habitats and specific species

Numerous wind farm-specific restoration and mitigation measures have been implemented as required before and after construction. We subsequently monitored them and, in some cases, continued their development. Some examples are:

- Hardscrabble Wind Farm: Wetland mitigation and restoration, and subsequent monitoring during ten years.





Blue Creek Wind Farm (USA)

- Elk River Wind Farm: Implementation of a grazing management plan that includes the rotational burning of pastures.
- Blue Creek Wind Farm: Wetland restoration and relocation of bivalves (molluscs). The restoration of trees at the shores of forest channels favouring the seasonal passage of cranes.
- Leaning Juniper II Wind Farm: Installation of nesting platforms.
- Horse Creek Wind Farm: Development of an incentives system for land owners for protecting birds nesting in the area.
- Klondike III/IIIa Wind Farm: Controls undertaken on an invasive species known as Cheat Grass (*Bromus tectorum*) with herbicides and favouring the growth of native species.

Compensation of habitats

Normal post-construction practice entails the mitigation of the habitat at wind farm sites with conservation passageways and other mechanisms to conserve the original habitats such as pastures, dehesa systems, forests, wetlands, etc., applying the associated best practices. We are currently maintaining and monitoring compensation areas at fifteen wind farms (Big Horn I/II WF, Casselman WF, Hardscrabble WF, Hay Canyon WF, Klondike III WF, Juniper Canyon WF, Leaning Juniper II A/B WF, Manzana WF, Montague WF, Pebble Springs WF, Shiloh WF, Star Point WF) with a total surface of 348 hectares.

Conservation of biodiversity during operations and maintenance

Monitoring species and habitats

We track specific species and their habitats after commissioning the various wind farms. For instance, at Learning Juniper IIA/B: Swainson's Hawk (*Buteo Swainsoni*) and Ferruginous Hawk (*Buteo regalis*), Elk River: monitoring the effects on the Greater Prairie Chicken (*Tympanuchus cupido*), which will continue for some years; South Chestnut: tracking the effects on the Southern Plains Woodrat and Green Salamander, etc.

Studies on specific species

We have conducted numerous significant wildlife studies supported by the ABPP and specific operating permits in some wind farms. They are primarily linked to the impact on and conservation of birds and bats. They have been conducted at the following wind farms: Locust Ridge I-II, Pebble Springs, Peñascal, Casselman, Stone Church, Barton Chapel, etc.

Regarding the relocation of species, studies have also been carried out at wind farms, for instance, at Dry Lake I/II: the Pronghorn Antelope (*Antilocapra americana*), and at Providence Heights: the American Golden Plover (*Pluvialis dominica*) and Smith's Longspur (*Calcarius pictus*). As to reptiles, we conducted a study during the Dunning Mt. project on the rattlesnake (*Crotalus horridus*) to determine its activity and usage of the area sited for the wind farm.



Big Horn Wind Farm (USA)



Indiana Bat (*Myotis sodalis*)

Participating in research, awareness-raising and training programmes with stakeholders.

Cooperation and project funding

During recent years, we have provided funding and technical assistance to a range of research and studies undertaken by groups of experts, among which the following are noteworthy:

- **Acoustic bat monitoring study at the Casselman Wind Farm** conducted under the guidance of the *Bats and Wind Energy Cooperative* and sponsorship of the *US Geological Survey*. The project, concluded in 2011, revealed the interaction of bats with wind turbines through an acoustic tool. The correlation between the activity recorded for the bats in the nacelles and the observed mortality rates was evaluated.
- Impact study on the Casselman Wind Farm (Pennsylvania) in collaboration with Bat Conservation International (BCI). The purpose was to examine the effect of wind power generator stoppage in light winds as a measure to prevent bat deaths and determine the reduction of electricity output during stoppage. Completed in 2011.
www.iberdrolarenewables.us/pdf/casselman-bats.



Casselman Wind Farm (USA).

- **Merlin Project**, underway at the Peñascal I/II Wind Farm (Texas). This project entails the use of the Merlin bird radar to monitor bird migration in low visibility conditions, when greater migratory activity occurs, thus enabling discretionary stoppage of turbines to reduce bird deaths and injuries.
- **Acoustic bat monitoring study at the Peñascal I/II Wind Farm** conducted under the guidance of the *Bats and Wind Energy Cooperative* and sponsorship of the *US Geological Survey*. We are examining the correlation between the activity recorded for bats in the nacelles and the observed deaths.
- Study focused on the **mortality of fledgling birds of prey** in relation to wind farm operation in collaboration with the *Oregon Dept. of Fish and Wildlife*, *Washington Dept. of Fish and Wildlife*, *Boise State University* and other associations. This study has concluded at the Leaning Juniper IIA/B Wind Farm (Oregon) and is currently underway at Pebble Springs.



Klondike Wind Farm (USA)



Golden Eagle (*Aquila chrysaetos*), USA

- We inspected various wind farms to develop a **safe high-voltage line design for birds** in collaboration with the *Avian Power Line Interaction Committee*. We are also developing a guide for managing nests on power lines.
- In partnership with the Oregon Eagle Foundation, we are **assessing golden eagle populations** in areas with wind power resources in Oregon. We are also assessing golden eagle populations in California and identifying opportunities to develop advanced conservation practices.
- Study focusing on the **potential impact of wind farm development and operation** on birds nesting in woodlands in eastern Texas, particularly the Black-capped Vireo (*Vireo atricapilla*) and Golden-cheeked Warbler (*Dendroica chrysoparia*). This study is underway at the Barton Chapel Wind Farm (Texas). The foregoing is being undertaken in partnership with the Environmental Bioindicators Foundation.
- Study for **improving bird monitoring in the pre-construction and operation stages of wind power projects in California** (Dillon, Manzano). This is under development in partnership with the *Bat Wind Energy Cooperative* and the *Pacific Southwest Research Station*.

Environmental awards

- In 2011, we established an **award recognising exceptional achievements in ABPP implementation**. The individual category of the award was conferred to a field technician at the Hardscrabble wind farm and the Peñascal site (Texas), as they demonstrated exceptional performance in executing the Wildlife Monitoring and Reporting System (WMRS).
- It should be noted that the *American Wind Energy Association* created the **Andrew Linehan Award for Environmental Excellence** in honour of our deceased colleague, Andy Linehan. This award recognises individuals in the wind power industry who work to establish and progress in the highest environmental standards for the wind power industry. In **2012**, the award was granted to **Stu Webster**, Director of Permitting and Environmental Affairs at IBERDROLA Renewables USA. (Further information in section 6.11. Noteworthy projects).

Further information at www.iberdrolarenewables.us.

5.3.3. IBERDROLA USA FOUNDATION

The Iberdrola USA Foundation has driven and partnered with other organisations for training and awareness-raising activities in addition to various biodiversity conservation programmes. Among these projects we would highlight:

Riverkeeper Project

We have become a sponsor for the Riverkeeper project. This project has been designed to safeguard the environmental, recreational and commercial integrity of the Hudson River and its tributaries, and ensure the quality of drinking water for nine million New Yorkers. Its mission focuses on the three global challenges the Hudson River communities face: recovery of the fluvial ecosystem and minimisation of fish mortality and water contamination; protection of New York's drinking water supply; and improved public access to the river.

Royal River Conservation Trust

We partner financially with the Royal River Conservation Trust, organisation that strives to preserve the natural, recreational, landscaping, agricultural and historical resources of the Royal River region in the State of Maine. Over the past decade, the Trust has preserved over 1,336 hectares of land in eight communities.



Riverkeeper Project, Hudson River

Protecting Canco Woods

In 2013, we signed an agreement with a coalition of organisations dedicated to conservation. The goal is to protect a 5-hectare lot in Portland known as Canco Woods, an urban forest of great importance for the community.

5.4. MEXICO

5.4.1. Generation Business

Noteworthy conservation projects

- The Altamira III & IV Combined Cycle Plant continues participating in the "**Hydrological rescue plan for the Garrapatas stream at the Industrial Port of Altamira**", which seeks to recover the saline environment of the lagoon and its biodiversity through the discharge of sea water from the cooling system in the Garrapatas lagoon.

Water in the lagoon was losing its salinity because the entry of seawater was blocked, resulting in the desalination of the ecosystem. The cooling water discharge enables the recovery of its salinity and, therefore, the specific characteristics of this habitat and the species of fauna and flora adapted thereto.

- We have maintained the **Altamira V Plant Reforestation Programme**, resulting in approximately 3 hectares reforested with species native to the area that provide a further ecological buffer zone. Within this area, we continue caring for the 23 specimens of *Zamia loddigessi*, a Palm species classified as at risk and protected by environmental authorities. They were transplanted to grow on plant premises.



Zamia loddigessi (Mexico)



Manglar (Mexico)



Mexican wildlife rescued before building the La Venta III Wind Farm (Mexico)

5.4.2. Renewable Energies

For the work in Mexico, IBERDROLA Ingeniería y Construcción has pledged to conserve biodiversity.

Biodiversity conservation in new projects

Rescue and relocation of species

During the construction stage of the **La Venta III Wind Farm (Oaxaca)**, we surveyed the local wildlife and carried out the rescue and relocation of 391 individual samples of 20 different species, primarily reptiles.

We have rescued threatened species such as the Boa constrictor, Pacific Coast parrot snake (*Leptophis diplotropis*), Banded cat-eyed snake (*Leptodeira annulata*), Beaded lizard (*Heloderma horridum*), Texas horned lizard (*Phrynosoma cornutum*), Jaguarundi (*Herpailurus yagouaroundi*), Mexican spiny-tailed iguana (*Ctenosaura pectinata*), Dunn's hognosed pitviper (*Porthidium dunnii*), Milksnake (*Lampropeltis triangulum*) and Checkered garter snake (*Tramnophis marcianus*). The protected species category comprises: Scorpion mud turtle (*Kinosternon scorpioides*), South American rattlesnake (*Crotalus durissus*), Yucatan white-lipped snake (*Symphimus leucostomus*), Common iguana (Iguana iguana), Pacific patchnose snake (*Salvadora lemnicata*), Cantil (*Agkistridon bilineatus*), Western Lyre Snake (*Trimorphodon bilineatus*) and three-loin serpents (*Sterautious salvini*). The project was a success as we attained 100 % survival and adaptation of the species to their new ecological niche.

Conservation of biodiversity during operations and maintenance

Monitoring of birds

After commissioning the wind farm in 2012, Iberdrola Renovables and the Ecology Institute are working in coordination to conduct bird monitoring studies comprising various actions such as point metering, flight pattern tracking, detecting carcasses and nocturnal acoustic monitoring. The purpose is to assess the community of regional and migratory birds for estimating their relative numbers, use of the habitat and possible impacts caused by wind farm operation.

In 2013, we conducted training and awareness-raising sessions for wind farm technicians and operators on biodiversity and birdlife in particular so that they can participate in monitoring birds.

5.5. BRAZIL

5.5.1. Generation Business

The following lines of action for hydroelectric plants are particularly noteworthy.

Biodiversity conservation in new projects

At partially held hydroelectric plants in Brazil, the normal practice is to undertake environmental restoration work around reservoirs in Permanent Preservation Areas (PPA) and degraded areas as a means of compensation. These plants are using the most appropriate reforestation techniques for each region in addition to local species.

The plants that have been put into operation during 2009/2012 have continued **their recovery or compensation programmes for Permanent Preservation Areas and degraded areas (quarries, landfills)** through reforestation as the main measure. In total, we have recovered approximately 1,197 ha and used 122,200 native seedlings. These actions were undertaken for the facilities at the small-scale hydroelectric plants



Neoenergia Hydroelectric Plants (Brazil)

(SSHHP) of Goiandira and Nova Aurora in Goiás; Pedra do Garrafao and Pirapetinga at the Rio I SSHHP; Bahia I SSHHP; Itapebi; Dardanelos and Corumbá.

It is worth mentioning that the **Itapebi plant recovered approximately 270 ha** through its programme for protecting its borders and recovering degraded areas. This surface includes the erstwhile mine, the PPAs and islands. In these areas, we are maintaining both maturing and advanced vegetation of these lots.



Itapebi Hydroelectric Plant (Brazil)

Conservation of biodiversity during operations and maintenance

Environmental programmes

All the hydroelectric facilities annually execute biodiversity conservation programmes, depending on the impacts caused by their operation: monitoring wildlife (ichthyofauna, amphibians, birds, mammals, insects, etc.); monitoring plantlife in reforested areas; controlling water quality; erosive process monitoring, etc. These actions have been established to meet the conditions for securing the operating licence.

Water quality control and management

At the partially owned hydroelectric plant in Termopernambuco, we carry out annual water quality control and management actions to prevent environmental risks.

Monitoring of fish

At the Baguari hydroelectric plant we are tagging fish since November 2012 to improve upon the studies conducted within the plant's area of influence. We estimate that 3,000 migratory fish, both native and exotic species, will be marked. The effectiveness of the existing fish ladder at the facilities can be validated. Further information at (<http://uhebaguari.com.br>).



Golden-headed lion tamarin (*Leontopithecus chrysomelas*)

Compensated areas

- During construction of the Itapebi hydroelectric plant in Brazil, we are **undertaking the compensation of two Conservation Units pertaining to the Integral Protection Group**. The purpose is to comprehensively preserve the natural resources and broad range of biodiversity existing around this plant's borders. The first is the UNA Biological Reserve (11,400 ha) in the State of Bahia. We have created a significant sample of the tropical rainforest ecosystem to conserve while protecting the Golden-headed lion tamarin (*Leontopithecus chrysomelas*), which currently faces extinction. The other is the Mata Escura Biological Reserve (51,046 ha) in the State of Minas Gerais.
- At the Baguari plant, we have executed environmental compensation of a surface of 70 ha on the Ibiturana Mountain.
- The Termopernambuco thermal plant works closely with the Environmental Protection Department and the Port of Suape for developing the conservation units at the Zumbie and Dos Lagunas forests.

Participation in research projects

The Termopernambuco thermal power plant runs an R&D+i programme, by which it collaborates in various research projects. The following environmental projects are particularly noteworthy:

- Project for **developing and implementing artificial reefs** near the plant to recover the habitat and fishing resources intended for local fishermen.
- An important project is the development of a biodegradable oil for the hydraulic systems in hydroelectric plants to prevent environmental damage caused by oil spilling into the water. Further information at www.termope.com.br.

5.5.2. Network Business

In the Renewables Business, the subsidiary Elektro and the partially-owned Neoenergia enterprises COELBA, COSERN and CELPE, adhere to the conditions established by environmental authorities for securing environmental licences to manage the impact on biodiversity. Work projects and activities are designed and executed in full observance of the established local and federal legislation and regulations, ensuring maintenance of the certification as per standard ISO 14001.

Biodiversity management includes different lines of action, such as:

Biodiversity conservation in new projects

Altering power line tracing and tower sizes

During the project design stage, tracings with the least impact are made and modified, if necessary. We also increase the size of towers to preclude vegetation interference.

Compensatory reforestation

A common activity at the subsidiary Elektro and the partially-owned Neoenergia distribution companies entails compensatory reforestation associated with the environmental licences for building power lines and substations. We reforest with native species in the areas determined by the authorities and with the same ecologic characteristics as the affected areas. Thus, for each native tree eliminated as a result of any building, at least 25 other native trees must be planted and cared for during 2 years.



Coelba Power Line (Brazil).

During 2010/2013, Elektro has planted approximately 250,000 seedlings of 90 different native species in three major reforestations. In 2012, the subsidiary Celpe has reforested 0.39 ha with 650 seedlings of different native species of the exclusive Brazilian habitat known as Caatinga, and maintains the reforestation of 15 ha of Atlantic woodlands in the Urubu mountain range.

Likewise, the subsidiary Celpe developed the forest replacement project in 2013 for the 69 kV Ouricuri/Trindade transmission line, by planting approximately 3,000 seedlings of 18 native species. Additionally, we maintain 1,000 plants while developing the Bom Nome/Salgueiro and Pontal Sul II/Pontal transmission line projects and the Pontal Norte substation. The subsidiary Cosern has replaced forest vegetation removed from the corridor of the 69 kV Natal/Lagoa Nova line and the flora monitoring projects for three additional power lines.

Protected power cables

We have continued installing protected power cables in sensitive areas. They prevent accidents (fires) by contact with the trees, reducing the need to prune them, and they also prevent direct contact of wild fauna with the energised grid, significantly reducing the number of fatal accidents. Doing so likewise improves the development and reliability of the power system. In areas near parks, plazas or in zones with an elevated density of ancient trees in populated regions as well as inland, the implementation of these networks has become a priority.

Fauna protection

To protect wildlife, rescue and relocation programmes are executed before building new electricity infrastructures. We then monitor the wildlife for a period of at least two years.

Development of isolated photovoltaic systems

An alternative to supplying power to isolated native communities, indigenous villages, etc. is the installation of isolated photovoltaic systems. Doing so avoids the environmental impact of extending the grid to those areas.



Shredded residue reutilised in the Arujá municipal nursery



Power line tree trimming

Power-line management and vegetation

- Similar to the other enterprises in the Elektro Group, we run a **vegetation management programme** comprising numerous vegetation controls to prevent them from touching power lines, thus precluding power supply interruption and potential fires. We regularly trim trees and their remains are sustainably managed as organic waste. They are shred and reused for organic compost, subsequently used as fertilizer in municipal nurseries located in the company's operating area. For instance, in the towns of Arujá and Ubatuba.
- One step that we take to reduce the risk of fire entails **enlarging the safety strip** on transmission lines located in cultivated areas.
- Since 2009, the company Celpe has been working on a **stubble burning control programme** in the towns around the Mata area in the State of Pernambuco. This programme has been designed to raise awareness among the inhabitants, facilities and sugar cane producers concerning uncontrolled stubble burning, which could damage power grids and cause interferences in the supply.
- It should be noted that the partially-owned enterprise Celpe contributes to the **preservation of the Marino de Fernando de Noronha National Park**, spanning 26 ha. It planted over 200 trees to integrate the Tubarão plant facilities into the local landscape, thus minimising the visual impact while promoting conservation of the archipelago's native species.

Power-line and wildlife management.

Elektro develops projects with the species that interact with their electrical facilities, endanger personnel and negatively affect the reliability of the system, including yet not restricted to:

Bees and wasps project

There are nearly 1,000 species of native bees and approximately 500 species of wasps in Brazil. The predominant bee species where Elektro operates is *Apis mellifera*. Bees and wasps nest in the facilities (pylons, substations, buildings, etc.), creating risks and complicating operation and maintenance work.



Honeybee (*Apis mellifera*) and hive at substation

The project has been conceived to provide personnel with accident prevention and nest removal techniques in compliance with environmental legislation. UNESP's Biosciences Institute in Rio Claro has partnered with us to do so. Actions currently underway are: Certification and acquisition of products (insecticides); Drawing up of Operating Instructions and Procedures for handling accident prevention; Qualifications for trained beekeepers throughout Elektro's entire concession area; Sustainable Management Training for Technicians and Electricians given by specialised Trainers.

Opossum Project

We have developed an experimental study on the habitats and morphology of the Opossum (*Didelphis sp.*) with a view to preventing them from gaining access to energised equipment at Elektro substations.

Opossums are wild mammals that adapt well to environments adapted by man. If they enter electrical facilities, they could damage energised equipment and provoke serious power disconnects, thus causing a wide range of issues and affecting client satisfaction. In this project, we tracked the behaviour of opossums of the genus *Didelphis* in an experimental area built at the Butantan Institute (São Paulo) to simulate an Elektro substation area. This project was undertaken following the substantial number of substation disconnect cases caused by an invasion of opossums affecting equipment. After applying the safeguards resulting of this project, Elektro had no new reports of disconnects caused by these mammals. While the invasion of electrical substations by animals is a relatively frequent event, this is the first time that a scientific experiment was conducted to solve or minimise the problem. (Further information in section 6.12. Noteworthy projects).

Participation in environmental projects, awareness-raising and training programmes with stakeholders.

Environmental programmes

Elektro has various environmental protection programmes at the communities in which it operates, developing associations with Park Management units, Ecology Stations, Experimental Reserves, among other types of Conservation Units and communities; seeking to recover and preserve the environment, as well as provide social-environmental education and local population development.



Opossum in the experimentation area



Green Sea Turtle (*Chelonia mydas*) included in the "Tamar Programme"



Programme (Meninos ecologicos) developed by Elektro

One particularly noteworthy project “**Meninos ecologicos**” seeks to raise the social-environmental awareness of youth aged 16-18 by producing seedlings in nurseries and through theoretical classes on various sustainability-related issues. The project was launched in 1998 and has since counted with the participation of 300 youth while producing over three million seedlings. A part thereof is donated to towns, NGOs and schools in Elektro’s concession area, and over 1,800,000 have been used for reforestation through “Environmental Recovery Commitment Agreements”.

Participation in threatened species-conservation projects.

The company Celpe backs Brazil’s Sea Turtle Conservation Programme, which seeks to protect sea turtles by generating economically sustainable alternatives. Further information at the website: <http://www.tamar.com.br/>

5.6. OTHER REGIONS

5.6.1. Greece

The subsidiary **Rokas Renewables** carries out mitigation and compensation measures before and after wind farm construction. The following actions are presented as an example:

Reforestation

- Maintenance actions have been followed up in reforestations completed in towns with wind farms, namely “Kalogiros”, “Makrirachi Extension” and “Patriarchis”, with a total of 11,530 plants covering an extension of 4.5 hectares. Seedlings in poor condition have been watered and replaced.
- Reforestation has been carried out to reduce the visual impact of the Arachnaio II Wind Farm in the Peloponnese region. A total of 2,940 plants have been planted along the paths and in areas where wind turbines are installed. The total surface extends to 1.82 ha.

Monitoring of birds

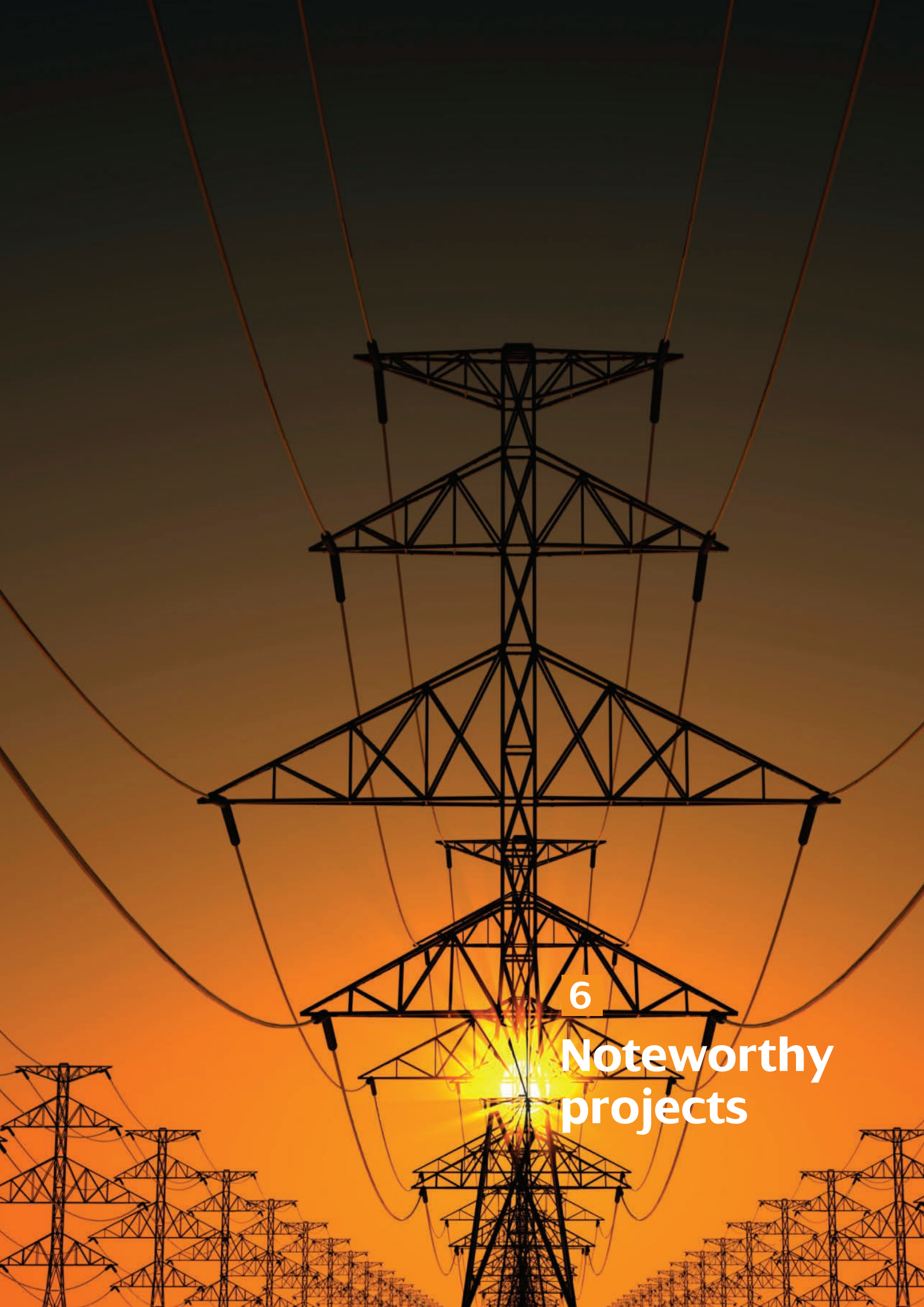
In 2012, we concluded the bird monitoring study conducted before the construction of 19 wind farms north of the Aegean Sea Islands (Lemnos, Lesbos and Chios - Aegean Sea Link Project). The wind farms are in Special Protection Areas (SPAs) for birds in the Natura 2000 Network. (Further information in section 6.13. Noteworthy projects).

Burying power lines

During 2012/13, we have buried approximately 30 km of medium-voltage overhead lines that link 6 wind farms in southern Evia (Antia AA, Antia AB Antia B; Makrirachi B, Skopies AB). This intervention has significantly reduced the risk of fire.



Thrace Wind Farm (Greece)



6

**Noteworthy
projects**

6. NOTEWORTHY PROJECTS

6.1. ENVIRONMENTAL PROJECT FOR RECOVERING THE MATERIALS DEPOT AT THE WORKSITE OF THE LA MUELA II HYDROELECTRIC PLANT

Iberdrola Generación has successfully completed a project for the recovery of the materials depot used for the construction of the La Muela II hydropower pumped-storage plant in the town of Cortes de Pallás. The restored and recovered land spans a surface of five hectares and is located on an old quarry in the town of Cortes de Pallás, which was used to build the Cortes-La Muela hydroelectric plant.



Recovery of the quarry at the Cortes-La Muela Hydroelectric Plant

The underground construction work at La Muela II included the excavation of interior galleries, vaults to house the reversible pump turbines and transformers, access shafts leading to the penstock and outlets for the generation cables running to the substation.

Within the framework of the relevant Environmental Impact Study, IBERDROLA proposed using the old quarry in Cortes, with an approximate surface area of five hectares, as a depot for excavation materials from the construction of the new plant.

Upon completion of the work, our Company implemented a project for restoring this depot, which consisted in filling, sealing and replanting the quarry, and is now performing maintenance work. This project has made it possible to recover an unused facility, adapting it to a surrounding area of great natural beauty.

Project stages

- * **Filling:** this stage lasted four years, from the start of excavation work in July 2007 to its completion in July last year. Nearly 320,000 cubic metres of waste generated during excavation and conditioning of the exploration drift, turbine and transformer caverns, penstock, interior access points and other works have been reused. To ensure that only suitable waste -earth and stones- reached the depot, a thorough waste selection procedure was carried out.

- * **Sealing:** this stage took place from July to August 2011. A layer of topsoil was used for sealing on the slopes and beddings. Previously, a drainage network was put in place to help remove the water and prevent the layer of soil -between 20 and 30 centimetres thick- from being washed away until it became firmly held by the vegetation. The topsoil was spread using a backhoe loader equipped with a bucket adapted for this purpose.



Planting tutors for recovering the forested area

- * **Revegetation:** revegetation of the area was completed in June 2012. The hydro-sowing system was used. This is one of the most efficient techniques for environmental restoration, facilitating sowing, fertilising and tucking. Hydro-sowing entails applying a homogeneous solution of water, seed, fertiliser and mulch on the ground using high flow rate sprinklers. Because mulch fibres retain up to 10 times their weight in water, the seeds remain protected and damp, germinating quickly and effectively. The mixture forms a topsoil on the ground while the mulch turns into humus, thus becoming an integral part of the soil. Another advantage of hydro-sowing is its versatility, as it facilitates sowing in difficult areas such as trenches, strong gradients or narrow strips. It is applied quickly and easily, perfectly covers the slopes and has minimum requirements in terms of soil, climate and maintenance. The seeds underwent a sterilisation process and strict quality control to ensure optimal germination and guarantee that they contained no invasive species or parasites.
- * **Planting:** revegetation of the forest area involved the use of a total of 2,750 plants with their corresponding protectors: plastic, biodegradable tubes to prevent damage caused by herbivores on the tender shoots of the plants. The species used for revegetation were selected based on the indigenous vegetation existing in the area and, particularly, some protected species. They were provided by the La Hunde nursery in Ayora.
- * **Maintenance:** finally, to ensure proper carrying out of the hydro-sowing and plantation work, a specific irrigation plan was prepared, which will continue until the roots take hold on the surface layer of the soil and the ground can absorb more water.

This is yet another example of IBERDROLA environmental restoration activities in the final stage of its various energy projects.



Cork Oak Grove

6.2. MANAGING BIODIVERSITY AT THE FUTURE TÂMÉGA HYDRO-ELECTRIC SCHEME

In upcoming years, Iberdrola Generación intends to build the Alto Tâmega hydroelectric complex in northern Portugal, one of the largest developed in Europe over the last 25 years with an installed power capacity of 1,135 MW. This major project comprises three hydroelectric stations (Gouvaes, Daivoes and Alto Tâmega) with their corresponding feed-in lines, substations and auxiliary facilities (accesses, quarry, landfills, work installation areas, etc.). The development and construction of these infrastructures requires thorough Environmental Impact Studies comprising the associated studies on fauna, flora, habitats, water tables, etc., to characterise the potential impact on biodiversity and thus enable us to mitigate or, where necessary, compensate, the damage.

The initial environmental studies for the Tâmega project were conducted throughout 2008, 2009 and the start of 2010 within the scope of the Environmental Impact Study (EIS) of the Tâmega Project hydroelectric facilities and its subsequent addenda. They primarily correspond with the fieldwork undertaken to characterise the affected area and its enclosure (initial condition or reference situation) after an initial characterisation based on records and documentation from the standpoint of existing flora and fauna.

For flora, we conducted plant habitat characterisation studies, with particular focus on priority habitats and identification studies on Rare, Endemic, Local, Protected and Threatened (RELPT) species of vegetation. For wildlife, we conducted studies to locate and identify the possible species present in the study area, primarily amphibians, reptiles, birds, bats, fish, river molluscs, mammals and invertebrates. In the priority habitat area, e.g., cork oak forest or riverbank habitats, we discovered the existence of RELPT flora such as *Veronica micrantha* and fauna species under protection such as the Pyrenean Desman (*Galemys pyrenaicus*), Eurasian Otter (*Lutra lutra*), a protected butterfly species (*Maculinea alcon*), some species of dragonflies, the endangered Freshwater Pearl Mussel (*Margaritifera margaritifera*) or the possibility that the affected areas were a passageway for the Iberian Wolf (*Canis lupus signatus*).



In addition, we conducted studies on water resources, specifically river surface water quality, studies to determine the environmental flow of future reservoirs or mathematical models to determine the evolution of the quality of stored water in future dams. We also conducted air and noise studies.

Further series of studies focused on detecting and identifying the potential socio-economic or cultural effects.

On the basis of all these studies, we developed programmes for monitoring flora and fauna, surface and underground water resources, air, noise and socio-economic resources; flora and fauna, socio-economic and cultural compensatory measures programmes; in addition to measures for minimising and repositioning the affected services to implement when building, filling and operating the reservoirs.

After securing the *Environmental Impact Statement* (EIS) in June 2010, the next step entailed drafting the *Assessment Report on the Execution Project's Environmental Compliance with the EIS* (also known as RECAPE) and its subsequent additions, for which a further series of studies were undertaken (during part of 2010 and 2011) to substantiate, explain or detail the results described in the EIS and to assess the suitability of the minimisation and compensation measures proposed in the EIS. Though not a comprehensive list, the main studies were:

- * **For ecological systems:** studies focused on verifying the presence of certain species (fish, moles, invertebrates, RELOPT vegetation, etc.) in a given area to determine the profile of the proposed monitoring programmes; specific studies (wolf dens, river molluscs, wildlife passage along the Tâmega river, nests of birds of prey); characterisation of the riverside habitats to determine whether the various sections of the river require conservation, restoration or reassessment (VALENER Programme); specific intervention projects for the Louredo and Avelames Rivers to determine their ecological condition and possible compensation measures; programme for containing, controlling and possibly eradicating invasive exotic species; studies on aquatic wildlife relocation mechanisms; compensation programmes for the SICs Alvão/Marão and Tâmega (pre-project stage); compensation measures for felling cork oaks.
- * **For water resources:** new studies (IFIM method) for checking or adjusting the environmental flow of dams; characterisation of the condition of water masses as per the Framework Water Directive; characterisation of contaminant sources, preferentially agricultural and farming sources; dam eutrophication control measures management programme; hydrogeological study and inventory.
- * **General:** water courses and habitats; dam deforestation project; study on the elimination of all possible contaminant sources in the dam flooding area; landscape recovery and integration project for all affected areas, etc.



Laurel (*Laurus nobilis*)



Veronica micrantha



Holm Oak (*Quercus ilex*)

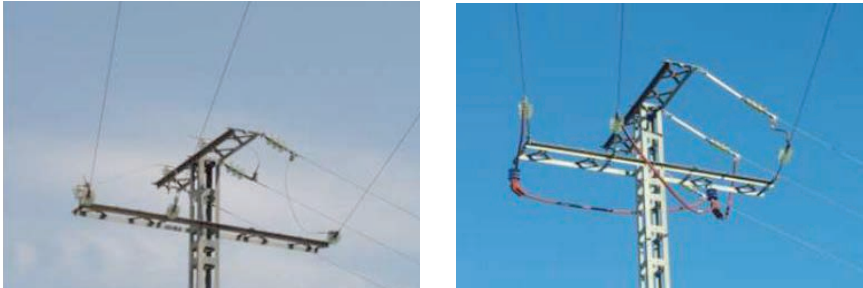
In addition to the aforementioned studies, we should include the environmental impact studies on the very high-voltage lines and the Gouvães quarry, which are similar but differ in areas of influence. Both were completed while drafting the Environmental Impact Study during 2010 and 2011.

Many of these studies have been completed and submitted to the Portuguese authorities, and have thus been approved or are undergoing assessment. Others will be completed and submitted "before filling" or as of "year zero" for monitoring the ecological systems, for profiling the exact locations for monitoring and the species, in addition to the execution projects for the ecological system compensatory measures. A budget of over €20 million has been allocated for monitoring and compensation measures that encompass the various aspects of fauna, flora and habitats as listed in the following table.

EXPECTED COMPENSATION MEASURES	
ENHANCED BIODIVERSITY IN PINE REGENERATION FOREST MASSES	Flora
ENHANCED WILDLIFE REFUGE CAPACITY IN DENSE SCRUBLAND AREAS	Flora
ENHANCED TROPHIC AVAILABILITY IN DENSE SCRUBLAND AND FORESTED AREAS	Flora
CONSERVATION OF MATURE STANDS OF NATIVE SPECIES	Flora
RECOVERY OF NATIVE TREES	Flora
CREATION OF A NURSERY FOR NATIVE SPECIES	Flora
CREATION OF A SEED BANK FOR VEGETATION SPECIES OF INTEREST	Flora
CONTROL OVER INVASIVE PLANT SPECIES	Flora
CONSERVATION OF THREATENED FLORA: RELOCATION OF POPULATIONS OF SINGULAR SPECIES	Flora
RESTORATION OF SPAWNING GROUNDS	Fauna
REPOPULATION OF THE COMMON TROUT	Fauna
CONSERVATION OF THREATENED WILDLIFE: RELOCATION OF POPULATIONS OF <i>Alcon Large Blue</i>	Fauna
CONSERVATION OF THREATENED WILDLIFE: RELOCATION OF POPULATIONS OF NYMPHS	Fauna
CONSERVATION OF THREATENED WILDLIFE: DESMANS	Fauna
CONSERVATION OF THREATENED WILDLIFE: IBERIAN WOLF	Fauna
CONSERVATION OF THREATENED WILDLIFE: OTTER	Fauna
CONSERVATION OF AQUATIC HABITATS: <i>Macromia splendens</i>	Fauna
CONSERVATION OF THREATENED WILDLIFE: HARRIERS	Fauna
CREATION OF MICROHABITATS FOR HERPETOFAUNA	Fauna
CREATION OF MICROHABITATS FOR THREATENED FOREST INVERTEBRATES	Fauna
CREATION OF HABITATS FOR THREATENED INSECTS (<i>Maculinea alcon</i>)	Fauna
ENHANCED LINEAR CONNECTIVITY IN AGROFORESTRY ZONES	Special
ENHANCED TRANSVERSE CONNECTIVITY FOR ADJACENT RIVERBANKS / FORESTS	Special
CREATION OF ECOLOGICAL CORRIDORS	Special
RECOVERY OF RIVERBANK FORESTS AND ENHANCED LONGITUDINAL CONNECTIVITY	Special
STABILISATION OF RIVERBANK SLOPES THROUGH BIOENGINEERING	Special
ENHANCED LONGITUDINAL RIVER CONNECTIVITY	Special
INSTALLATION OF NESTING PLATFORMS FOR BIRDS OF PREY	Special
MANAGING FOREST CONSERVATION FOR BIRDS OF PREY	Special
INSTALLATION OF PASSERINE NESTING BOXES	Special
INSTALLATION OF NESTING BOXES FOR NOCTURNAL BIRDS OF PREY	Special
INSTALLATION OF NESTING BOXES FOR BATS	Special
ADAPTING ANTHROPIC REFUGES FOR BATS	Special
PROTECTING BAT COLONIES IN CAVES AND GALLERIES	Special
REPOPULATING THE RED-LEGGED PARTRIDGE	Special
IMPROVING AQUATIC ECOSYSTEMS: CREATION OF PONDS; ADAPTING SLOW-MOVING WATERS	Special

6.3. IMPROVING THE COEXISTENCE BETWEEN OUR GRIDS AND BIRDS

During the power line design stage, we consider all the environmental factors and potential impacts that could arise on the basis of the path of the line and the natural areas that it crosses, avoiding possible environmental risks whenever possible.



Installation of extensions and bridge lining.

Likewise, a regular Distribution Business practice entails the correction of power lines that are already in service and have had a record of incidents with birdlife or an elevated likelihood of the same. In particular, the project describes the correction of pylons in the Alicante province during recent years.

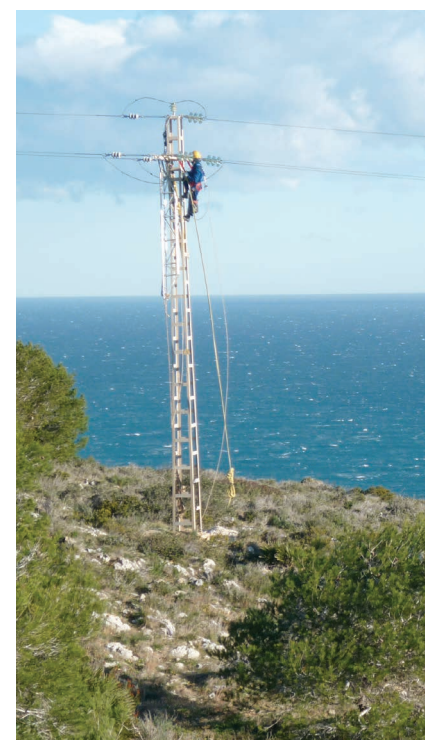
This project was designed to reduce the impact of overhead power lines on birdlife and, particularly, birds of prey, since they are especially vulnerable to electrocution due to their size. We believe that the main cause of the non-natural death of large birds is due to this issue, whether touching two cables (phase-phase contact) or, more frequently, between one of the phases and the metal crosshead (earth connection).

The Escalona mountain range is a protected space in the southern part of the Alicante province and classified as a Special Protection Area (SPA) for birds. This area is home to one of the densest and most stable populations of the Eagle Owl (*Bubo bubo*) in Europe, and is the habitat of other birds of prey such as the Common Buzzard (*Buteo buteo*), Short-toed Snake Eagle (*Circaetus gallicus*) and Northern Goshawk (*Accipiter gentilis*). Moreover, the Escalona mountain range is regularly visited by young Golden Eagles (*Aquila chrysaetos*) and Bonelli's Eagle (*Aquila fasciata*).

In 2011, the Council on Infrastructures, Land and the Environment signed an agreement with the Ministry of the Environment to allocate over €230,000 for correcting the overhead power lines posing a danger to birds. With the relationships and partnerships fostered with the Alicante Territorial Environmental Service, Iberdrola Distribución has become the primary beneficiary of these funds, and also takes steps to steer and coordinate the project at its own and third-party facilities. This Agreement covers the costs for all materials and labour employed to adapt the pylons.

Thus, the modification of 21 pylons began in 2011 and the activities spanned 2012. In light of the success in the Escalona mountain range, the project was extended to another special protection area, the Monte Coto mountain range in the heart of Alicante, until the total number of interventions at both sites included 132 pylons, 73 of which are owned by Iberdrola Distribución and 59 by individual proprietors.

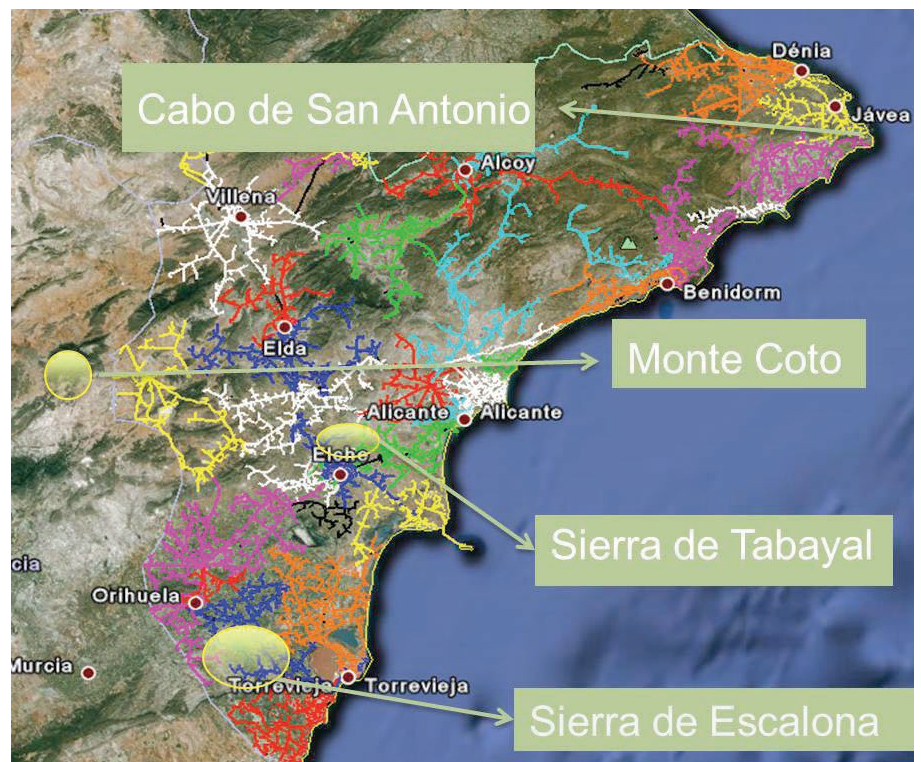
Each of the 132 pylons have been modified to minimise their impact through interventions for changing crossheads, replacing rigid isolators with suspended ones, insulating phases, installing extensions, modifying bridges or changing switchgears and protection devices.



Cape of San Antonio

The project has been an enormous success, eliminating reports of electrocutions, especially at individual installations where over 100 electrocutions were reported yearly towards the end of the 1990s. The bird of prey population throughout the Escalona mountain range has undergone a spectacular increase, with spottings of up to 75 pairs of eagle owls in the Escalona mountain range in 2013 and 160 in their environments (a far cry from the hardly 30 pairs surviving at the close of the 1990s). We have also detected an increase in other bird of prey populations and the enlargement of their territories to include other areas of the province.

The activities undertaken in partnership with the Alicante Territorial Environmental Service have not concluded with this project. Near the end of 2012, after spotting a pair of Ospreys (*Pandion haliaetus*) around the Cape of San Antonio at the northern coast of the Alicante province, a further subsidy was approved for correcting 11 pylons near the seashore. The Osprey is a Mediterranean cliff-nesting species that has been absent from the Alicante coasts for over 30 years.



6.4. FUNDACIÓN IBERDROLA SUPPORTS THE PROGRAMME: “BIRD MIGRATION (MIGRA)”

Fundación IBERDROLA has been working closely with the Spanish Ornithology Society, SEO/BirdLife, since 2011 on a new project to gain insight on the migratory movements of birds in Spain by applying state-of-the-art technologies. The purpose of the “Bird Migration” programme is to study the seasonal movements of species breeding and wintering in Spain, and conduct research on and disseminate information on possible changes in patterns.

To do so, SEO/BirdLife, with the support provided by the Foundation, has tagged numerous birds with satellite transmitters and geolocators. These new tagging systems improve traditional banding methods that provided biological data, but hardly any particulars concerning migratory movements. Furthermore, of the ten million bandings completed since the start of the last century, only three hundred thousand have been recovered. The MIGRA Programme tags enable us to locate the birds several times a day over a period of several years to know how long they remain exactly in their breeding and wintering areas, when they begin migrating, and their migration routes, speeds and altitudes. These methods also let us know how weather agents, the topography of the terrain, seas or deserts condition their movements and which points and habitats they use for resting during migration, all key factors that enable us to better work toward their conservation.

Thus, MIGRA enables us to ascertain, for the first time, unknown migratory routes and wintering areas of species about which we had scarce data, such as rollers, swallows and swifts.

Over the last decades, we see that many species have changed their migratory behaviour and part of some of their populations no longer flock to Africa, e.g., the white stork. Therefore, it is essential to determine the migratory behaviour of each species as soon as possible, since without this information the knowledge of past behaviour will be lost, basic data that could help us understand their biological evolution.

The use of tracking technology likewise enables us to follow the paths of tagged birds in real time from the project's website www.migraciondeaves.org. This application has become a key tool for reporting on the movements of migrating birds. This website currently has information on 204 specimens of 21 different species and over 317,000 locations. Its content of previously unpublished data is available to anyone (bird watchers, teachers and scientists) to contribute to the conservation of birds in our environment. The website not only reports on the movements of the birds tagged by the Project, but also represents a repository of data compiled through the research of other entities such as the Spanish Autonomous Communities of Extremadura, La Rioja, País Vasco, the universities of Alicante, Barcelona and Lund (Switzerland), and other entities such as the Catalonia Institute for Energy Research, Biodiversity Foundation, Doñana Biological Station and the Swiss Stork Foundation. These institutions have contributed to the project's website data on 88 specimens.

In recent years, with the partnership of Fundación IBERDROLA, we have tagged over 228 specimens with solar satellite-GPS transmitters: European Roller (*Coracias garrulus*), Booted Eagle (*Hieraetus pennatus*), European Honey Buzzard (*Pernis apvorus*), Black Vulture (*Aegypius monachus*), White Stork (*Ciconia ciconia*) and Red Kite (*Milvus milvus*); and with geolocators, the more numerous smaller specimens: Cory's Shearwater (*Calonectris diomedea*), Bulwer's Petrel (*Bulweria bulweri*), Great Reed Warbler (*Acrocephalus arundinaceus*), European Scops Owl (*Otus scops*), Common Swift (*Apus apus*), Common Nightingale (*Luscinia megarhynchos*), Barn Swallow (*Hirundo rustica*), among others.

Throughout 2012/13, we tagged various Roller specimens with the world's first GPS devices -each one weighing only five grams- in Madrid, Granada and Ciudad Real, with a view to ascertaining the migratory paths and wintering zones of this bird, whose population has declined 40 % in Spain in recent years. Thanks to the MIGRA programme, we have learned about their entire journey from Spain to the southern Africa.



European Roller (*Coracias garrulus*)



Booted Eagle (*Hieraetus pennatus*)



White Stork (*Ciconia ciconia*)



European Honey Buzzard (*Pernis apivorus*)

Furthermore, we have gleaned information on the booted eagle's life cycle after four GPS-tracked specimens returned to Spain in 2011. The incorporation of state-of-the-art technologies have enabled us to describe their routes along a journey of over 3,000 kilometres from their breeding areas to wintering sites in Mali, Mauritania, Niger, Nigeria, Sierra Leone and Guinea, as well as their return to rearing sites in Spain via the Sahara Desert and the Strait of Gibraltar. We currently have data on 15 booted eagles in 10 Spanish provinces on the Migra project website. The Victory Eagle's migratory route is especially interesting; we have followed it for the last three years to the same hilltop at the right bank of the Niger River.

Likewise, we have collected initial data from the migration itinerary of the great reed warbler and can now identify its primary rest areas in sub-Saharan Africa, where it migrates in the winter after breeding mostly in humid areas in Spain. Access to this information has been made possible after capturing tagged specimens and recovering their geolocators (each weighing under one gram), thus enabling us to estimate their position through mathematical formulae using the amount of light registered by a sensor.

Another particularly noteworthy example entails the first tagging of a European Honey Buzzard with a satellite-GPS transmitter in Extremadura, and baptised as "Picoto". Tracking this specimen has provided us with previously unavailable knowledge on this species' life and behaviour. With the data collected over two consecutive years, we have confirmed that it returns to the same sites for rearing in Extremadura and wintering in Liberia. To do so, it travels 4,000 kilometres in just two weeks. We thus see that the European Honey Buzzard (*Pernis apivorus*) remains loyal to its rearing and wintering sites.



Barn Swallow (*Hirundo rustica*) with geolocator

The recapture of two barn swallows in the spring of 2013, tagged in 2012 with small geolocators weighing less than 0.6 g each mounted on these birds' backs, is beginning to reveal the migratory routes, wintering areas and phenology of this small bird typical of Spanish towns. Every year, some 200 million barn swallows fly from Eurasia to Africa. During its migratory journey toward the wintering site in savannahs and tropical forests in western Africa, the bird travels 3,500 km, and each trip could last between 30 and 40 days.

Further information of interest involves a white stork marked in La Rioja and baptised as "Yerga". Online observation of Yerga has revealed the strategy followed by many birds for crossing the 14.4 kilometres that separate both continents at the narrowest part of the strait, between Oliveros (Spain) and Cires (Morocco). Similar to Yerga, the migration of hundreds of white storks and gliding birds of prey is affected by weather conditions when attempting to cross the Strait of Gibraltar. In this regard, when Yerga crossed over to Africa, over 1,800 white storks crossed the Strait with her.

In 2013, a Red Kite specimen was tagged with a GSM tracker to kick off World Migratory Bird Day in the centre of Spain on 9 May, in addition to the eight already tagged previously. While the Red Kite is unquestionably one of the most beautiful birds of prey in Spain and classified as "endangered", we nevertheless know very little of its migratory movements and behaviour throughout the year.

Similar to the specimens described above, we are now receiving highly valuable and previously unknown information on different European species, which will enable us to work better for their conservation.



Red Kite (*Milvus milvus*)

Further information at the Fundación Iberdrola website www.fundacioniberdrola.org and at the programme's website www.migraciondeaves.org.

6.5. DEE EEL RESTORATION PROJECT

European Eels (*Anguilla anguilla*) are now categorised as Critically Endangered in the IUCN Red List due to a sharp decline in the population of more than 80% in the past three generations. This has prompted much interest in the species over the last two years and immediate action to help focus efforts in conserving the species was addressed within the Solway Tweed River Basin District Eel Management Plan, which the Galloway Fisheries Trust (GFT) inputted heavily to and which was published last year.

Whilst the plan's main focus is to help increase silver eel escapement (the stage at which adult eels go to sea to spawn) by 40%, all remedial actions were considered at each of the freshwater life stages. One particular concern of the GFT was that eels were unable to negotiate Tongland fish pass; confirmed in their absence within any of the Dee electrofishing sites within the last 15 years and in July 2009, when we witnessed many thousands unable to negotiate past the two lowermost chambers of Tongland fish ladder.

To enable young eels to get past Tongland Dam un-aided, would require an extensive eel ladder to be built which would be substantial in length (to mirror the existing salmon and sea trout friendly fish pass of 200+ metres) and cost. With this option presently unavailable, capturing eels by means of trapping and then transporting them upstream of Tongland Dam has been seen as the most feasible option and this was trialled successfully in 2010.

In 2011, with the support from The Galloway Hydros, the GFT purchased, fitted and have been running two eel traps beneath the downstream entrance to Tongland fish pass (*Figure 1, Figure 2 and Figure 3*). These will run from May until October in 2011, with all eels caught being transported above the dam and replaced into small burns with good habitat within the lower river.

Here, they will disperse from and begin their lengthy stay in the Kirkcudbrightshire Dee (usually between 10 and 20 years). As part of Scotland-wide monitoring, random sampling of eel lengths will be taken each year. An example of this is shown in *Figure 4*.

Aside from the benefits to biodiversity that re-establishing a Dee eel population will play, eels are known to be voracious predators of young American Signal Crayfish which are well established in Loch Ken and its feeder burns. This restoration project is hoped to, in time, help deal with the river's crayfish problem.



Figure 1: Building an eel trap



Figure 2: Checking the eel traps



Figure 3: Trap 1 located beneath the fish pass



Figure 4: A random sample being measured in length

6.6. CONSERVATION GRAZING AT DAMHEAD CREEK

Damhead Creek has recently been the home of 47 goats, 116 sheep and 7 horses. What's a power station doing with all these animals? Conservation grazing.

Land adjacent to Damhead Creek is currently being developed in order to construct a brand new CCGT power station. Damhead Creek 2 is planned to begin construction in the next 3 years featuring a 1000MW output and possible integration with some of the original stations systems.



Grazing

This is a common challenge faced by the developers and, as an alternative to the use of mechanical means or control spraying, ScottishPower selected the Damhead site as a test location for conservation grazing.

As a well proven, approved conservation technique, that has previously been used by other leading wildlife groups and councils for similar purposes the trial proved a great success. The ground is now well maintained and the livestock, having done their job, are now ready for a new variety meal at a different location.

The land managed by conservation grazing is around 6.2 hectares in size. The sheep and horses were primarily used to clear the grass and the goats enjoyed the fibrous brambles. Water troughs were connected to the site water supply and a temporary scaffolding shelter was erected to shelter the animals in bad weather. In addition to successfully managing the land the livestock were made very welcome by staff due to their affectionate nature.

The horses and sheep were on loan from a local farmer showing close work with the local community. The goats were purchased by the station and will be gifted to the farmer for maintaining the health and welfare of the animals whilst on site. The local community support and willingness to provide animals for the trial was very much appreciated by the station project team.



6.7. UNITED KINGDOM PEATLAND RESTORATION

ScottishPower Renewables: Restoring afforested blanket bog

Introduction

ScottishPower Renewables (SPR) is the leading developer of windfarms in the UK with over 1000MW of installed capacity. As a responsible developer which acknowledges the sensitivities of development in upland locations SPR has made a commitment to peatland restoration covering an area greater than 8000ha, making SPR one of the largest single restorers of peatland in the UK. Although many of the sites are in the early stages of restoration, techniques are being pioneered with the aim of ensuring the best chance of success particularly in relation to afforested blanket bog which is particularly challenging to restore.

Recovery Methods

Experimental testing has been carried out at the Black Law and Whitelee windfarm sites where large expanses of blanket bog were historically drained and planted with commercial forestry. During windfarm construction the forestry was either harvested or mulched on areas of deep peat. A *Habitat Management Plan* (HMP) was developed for both sites with the core aim to restore these areas to blanket bog habitat.

Given the lack of similar projects at this scale relating to restoration of blanket bog from commercial plantations SPR have setup several trials to assess which techniques will provide the best conditions for blanket bog to recover. These trials involved traditional ditch blocking, ditch in-filling, brash/mulch manipulations, low intervention “cross tracking” where the ridge/furrow pattern was flattened and high intervention “ground smoothing” where the ridge/furrow pattern was mechanically re-graded.

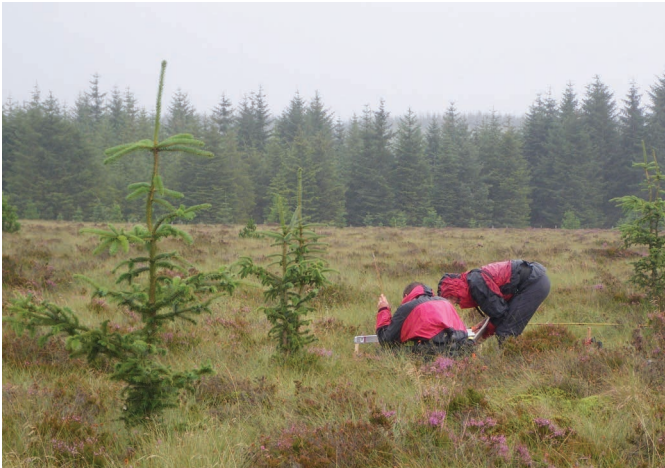


Excavator flattening plough/furrow features on drying bog surface and visible standing water 6 months later.

Monitoring of the trial restoration areas involves detailed measurements of erosion processes, hydrological response, water chemistry and the rate of vegetation growth. In areas where conifers are regenerating from seed their resilience to survive the above treatments is also being monitored.

Results, Learning and Innovation

Early results indicate that the methods used have been successful in raising water levels, with characteristic plants including sphagnum mosses starting to colonise the treated areas within 12 months. The ongoing monitoring will serve to inform which methods are most effective in different situations, and allow a programme for treatment to be devised in priority order. This work will be crucial for ensuring longterm success of the existing HMP's and inform future projects on the best techniques for landscape-scale restoration of blanket bog from commercial forestry.



Monitoring blanket bogs



Sphagnum magellanicum.

Region and Community

The monitoring results from the restoration trials are reported to a Habitat Management Group (HMG) which includes representatives from SNH, RSPB, FCS and various local authorities. This provides a forum for different stakeholder organisations to have input to the work, and also gain by shared learning in the activities and results which are achieved. It also allows us to engage with landowners who we work closely with to ensure practical issues are resolved and the objectives are realistic and deliverable without compromising existing land management practices.

Simon Christian, SPR UK Managing Director

"SPR's commitment to restoring over 8000ha of peatland on our windfarm sites makes us one of the largest restorer's of peatland in the UK. We very much welcome the aims of the IUCN peatland programme, which we feel are totally compatible with responsible wind farm development, and we look forward to working together with IUCN in the future."

* Article published by IUCN, original title: "*Delivering Results: UK Peatland Restoration. ScottishPower Renewables: Restoring afforested blanket bog*"

6.8. TREE PLANTING BY SCOTTISHPOWER RENEWABLES

Work has recently been completed on the creation of 14ha native woodland at Beinn Tharsuinn windfarm. The 29MW site located near Alness was first commissioned in 2006 and the creation of a woodland area was required under the Land management Plan for the site.

Prior to commencement of the planting work, a detailed plan was developed to ensure successful establishment of the trees. This involved looking at soil suitability for planting on; identifying suitable plants of a local provenance and determining the correct planting densities. Preparation of the site was crucial due to the seasonal window in which tree planting can be undertaken. The ground was cleared of excess vegetation and some areas were mounded to offer protection to trees in exposed areas. Upon completion of the preparation work, a mixture of trees including Scots Pine, Willow, Birch and Juniper were planted by hand.

Although it is the initial planting which puts the trees in the ground, it is the after care provided which ensures their successful establishment. Due to the high density of deer in the area, a deer fence was erected to keep the deer out and prevent the trees from being subject to browsing damage. In spring, fertiliser will be applied to the base of each tree to provide them with a nutrient boost in time for the growing season, further aiding their growth. The establishment of native woodland is a slow process, but careful planning and care helps ensure that the woodland will establish successfully.

ScottishPower Renewables (SPR) currently owns eight sites which have been planted with native woodland as part of their management or biodiversity plans, and this covers 138 hectares. Planting has been carried out at sites including Black Law, Cruach Mhor and Wether Hill. In addition to the planting of 5.3 hectares of woodland at Dun Law Ext, SPR funded a project run by the Tweed Forum in Dumfries, which undertook tree planting and pond creation as part of habitat enhancement and natural flood management.



Tree planted in the Beinn Tharsuinn Wind Farm



Reforestation at the Dunlaw Wind Farm

Further to this, SPR are currently in the process of preparing a plan for the creation of 192 hectares native woodland at Mark Hill windfarm in Ayrshire. This will be one of the largest woodland creation plans of its kind in the UK, and is an extremely ambitious project. It is expected that over 215, 000 individual trees will be required to plant up the area, which will again be protected by a deer fence expected to reach almost 18 km in length.

There are many benefits of planting native woodland areas. It improves air quality, acts as carbon storage, stabilise soils and provide a valuable habitat for a wide range of wildlife. This includes species such as Black Grouse, which are present on many of SPRs sites, including Cruach Mhor, which in 2011 had the largest Black Grouse population in Cowal. In addition, the planting of these high ecological value habitats will help to contribute towards reaching Government woodland cover targets.



Cruach Mhor Wind Farm (Scotland)

6.9. HABITAT MANAGEMENT: CRUACH MHOR CASE STUDY

Background

Cruach Mhor windfarm is situated on the Cowal peninsula in Argyll and has been operated by SPR since its first commissioning in 2004. The site has a Habitat Management Plan (HMP) covering 610ha, which covers both the 387ha windfarm area and the specially created 223ha Habitat Enhancement Area (HEA). During the planning process, Black Grouse and Hen Harrier were identified as sensitive species due to their current status within the Scottish countryside and the wider UK.

In order to comply with the conditions of planning consent designed to mitigate against any potential negative impacts the windfarm may cause, and to additionally provide a greater ecological benefit, SPR undertook a comprehensive management programme to enhance the area. Ornithological monitoring was carried out to investigate the response of the Hen Harrier to the windfarm and HEA, and to monitor changes in the Black Grouse population.

Habitat Restoration

The HEA lies adjacent to the windfarm, and around 380ha of commercial forestry was cleared from the whole site as part of construction to create a bog/heathland mosaic which would provide an alternative feeding area for Hen Harrier and Black Grouse. The area was further enhanced for Black Grouse through the creation of pools and the planting of 16.48ha of native woodland. Monitoring has shown that the area has revegetated well post felling, with good heather establishment across the site in addition to rewetted areas of bog. These habitats support plant communities that provide a direct food source for Black Grouse as well as providing good conditions for field voles and small birds which are the main prey items for Hen Harrier.

Black Grouse

Black Grouse (*Tetrao tetrix*) are a species of conservation concern in the UK as their population has seen a dramatic decline from an estimate of 25,000 males in 1970, to only 5,000 in 2005. This is largely due to a decline in suitable habitat. The population of Black Grouse at Cruach Mhor have been particularly successful and SPR were delighted to learn that the 2011 Black Grouse survey found the population at Cruach Mhor to be the largest on the Cowal peninsula. Here the population has increased from 2 lekking males in 2005 to 10 in 2011, whilst elsewhere in the region numbers are in chronic decline.

Hen Harrier

The Hen Harrier (*Circus cyaneus*) is another species of national importance due to heavy persecution which has left around only 620 breeding pairs left in the UK. Monitoring of flight behaviour was analysed in 2005 and used to predict the core Hen Harrier range.

Figure 1 shows Hen Harrier flight activity pre-construction which is centred on one core area. The red/yellow colours illustrate the inner ranges where most flight time is spent, while the green/blue colours indicate the outer ranges.

Figure 2 shows activity post-construction focused on the same area in addition to a second core area within the previously unused HEA.



Black Grouse (*Tetrao tetrix*)



Hen Harrier (*Circus cyaneus*)

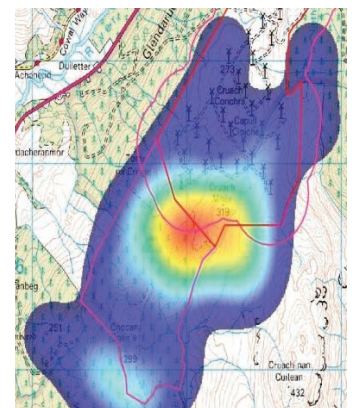


Figure 1

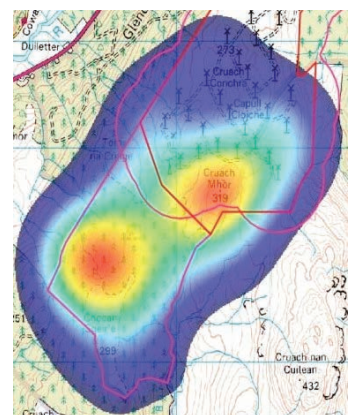


Figure 2

The results show that there has been an increased usage of the HEA, while consistent flight activity within the windfarm throughout both the pre- and post- construction periods indicates that the Hen Harrier have not been displaced by the windfarm. The nesting locations have also remained unaffected by the windfarm development with nest sites being selected in the same areas as before the windfarm was constructed.

Lessons learned

The windfarm and HEA areas at Cruach Mhor have shown a positive response to the management measures implemented by SPR, with both Black Grouse and Hen Harrier frequently use them. Cruach Mhor is a prime example of how when careful mitigation and management is applied to a windfarm development, the site does not only provide a benefit through the provision of renewable energy, but also for the conservation services it can provide.



Recovering the habitat at the Cruach Mhor Wind Farm

6.10. CONSERVATION OF THE OSPREY AT IBERDROLA USA

At Iberdrola USA, New York State Electric and Gas (NYSEG), Rochester Gas and Electric Corporation (RG&E) and Central Maine Power Company (CMP) work in cooperation with public authorities and environmental protection organisations to comply with bird protection legislation in each state, whether endangered or not, and likewise to prevent bird accidents with electrical facilities (collisions, electrocutions) that could affect the reliability and quality of the power grid.



Osprey (*Pandion haliaetus*)

One of the most common birds with which we work is the Osprey or sea hawk (*Pandion haliaetus*), a bird that feeds on fish. These birds usually stand between 50 and 60 cm high with a wingspan of between 1.2 and 1.8 m. Ospreys have brown bodies, though their heads and central areas are predominantly grey, while their wings and the circle around their eyes are black. They live in various habitats and nest near bodies of water for feeding. Osprey nests are mainly built from branches and clay and can be as large as 0.4 m², weighing up to one tonne. Between 1950 and the 1970s, these birds began to disappear as a consequence of the use of pesticides that poisoned and weakened their egg shells. After DDT was banned in 1972, their numbers began to recover. However, ospreys continue on the list of endangered or threatened species in some States in the US. Given that their nesting areas have disappeared as a result of urban development, platforms for nests have become an essential factor for recovering ospreys.

Ospreys nest instinctively in elevated areas near water sources, and electricity posts, in particular, are a source of attraction. The proximity to live electrical equipment could risk the integrity of the system and the lives of these birds. A best practice of the subsidiary companies of IBERDROLA USA is the construction, installation and maintenance of nesting boxes away from power lines or the transfer of the nests created by these sea hawks on electrical posts to nearby spots away from any danger.

For instance, we installed a nesting box in 2012 on an NYSEG electrical post behind the Cargill salt rock plant on the eastern edge of Lake Cayuga near Ithaca in the State of New York. On this occasion, we intervened because the nest of a pair of ospreys wintering in a warmer climate had caught fire and was partially destroyed. After the event, the electricity construction and maintenance supervisor at the NYSEG office in Auburn built and installed a nesting box. A permit was granted by the New York State Department of Environmental Conservation for this. When the ospreys returned to their wintering site, they built a new nest in the installed box.



Nest built for ospreys at Lake Cayuga



Transferring an osprey nest

NYSEG's power line maintenance teams have built, installed and maintained nesting boxes in eight different spots around Auburn. These nesting boxes are built from pressurise-treated wood and metal meshing that let water drain from the base of the nest. Maintenance teams keep ospreys safely away from power lines by installing a 1.5 m fibreglass piece above the posts as a base for the nesting boxes. In May 2013, RG&E employees transferred the nest of a pair of ospreys from a post on North Huron Road, near Lake Ontario. The post supported four transformers and a 4 kV three-phase service line. There were problems related with low-voltage at this point caused by parts of the nest that continuously fell upon the transformers.

The RG&E power line maintenance team for the Lakeshore Region mounted a new post next to the existing one. A round base of a cable reel was secured above the post. The team then transferred the nest with harnesses and anchored it to the base of the reel. The team also installed a safeguard above the crossbeams of the post at which the old nest was located so that the ospreys would not rebuild their nest there. A few days later, the ospreys returned to their nest at the new spot and now live safely in their old nest, though currently on a more modern and higher post with no live voltage.

The subsidiary CMP has a procedure for minimising the impact on osprey nesting and breeding in distribution/transmission corridors. During 2013, we installed turkey decoys in problematic CMP service area spots to keep ospreys away from power posts so as to safeguard the birds' lives and the integrity of the system. The results of this initiative have been satisfactory.



Osprey rescued at the Newcastle substation (Maine)

In 2012, a white-headed osprey was rescued in the Newcastle substation in the State of Maine. The osprey was injured and unable to fly. Our hypothesis is that it was injured after colliding with a power line cable while hunting a rodent. This type of incident was resolved in compliance with the protocol established, by calling the State of Maine's wildlife refuge centre and department of fishing. Once captured, the bird was brought to the recovery centre for examination and treatment of its wounds.

6.11. IBERDROLA RENEWABLES' STU WEBSTER EARNS THE ANDREW LINEHAN AWARD FOR ENVIRONMENTAL EXCELLENCE

Iberdrola Renewables' Stu Webster Earns Environmental Excellence Award

National Advocacy Group Recognizes Webster's Contribution to Wildlife Protection
PORTLAND, Ore. – The American Wind Energy Association today honored Iberdrola Renewables' Stu Webster, director of permitting and environmental affairs, with the Andrew Linehan Award for Environmental Excellence. Webster received the award at the national advocacy group's fall conference in Chandler, Ariz.

"This award is truly a professional and personal honor," said Webster. "I'm extremely proud of not only my Iberdrola Renewables team but also countless others in this industry who work tirelessly to reduce wind's impact on wildlife. It is critically important that we demonstrate to the world that wind is truly the greenest energy source available and I'm pleased we are making great strides in that direction."

Webster has led Iberdrola Renewables' wildlife protection efforts since mid-2010, including full implementation of the company's fleet-wide, one-of-a-kind Avian and Bat Protection Policy in 2010; completion of a three-year radar monitoring study of migratory bird and bat use at the Peñascal wind facility in Texas; and continuation of a nine-year study of increasing the presence of prairie chickens at the operating Elk River wind facility in Kansas. Webster has overseen numerous public and private research initiatives on raptor populations.

He has also worked to improve techniques of monitoring for bats and birds – and, in collaboration with Bat Conservation International, has refined cut-in speed curtailment techniques.

Webster's initial career as an air quality scientist led him to wind energy, an industry that held great promise to address air and water quality challenges facing the energy sector – including its alarming impact on the earth's climate. His first wind energy position was permitting director for Clipper Windpower Development.

As vice president of the American Wind Wildlife Institute – a partnership of wind industry and environmental non-governmental organizations whose mission is to effectively address the interactions of wind energy development on wildlife and habitats – Webster led such initiatives as development of the Landscape Assessment Tool (LAT) and advocating for the creation of an accessible database of wind industry wildlife studies. The Research Information System (RIS) is currently under development by AWWI. He has served on AWWI's board of directors since 2010..

AWEA established the *Award for Environmental Excellence* in honor of Iberdrola Renewables' Andrew Linehan in 2010, after Linehan succumbed to a long battle with cancer. The award recognizes individuals in the wind industry "who contribute to the responsible siting and permitting of individual projects, who tackle wildlife issues proactively and who work to establish and advance, as Andy did, the highest environmental standards for the industry."

"This is a very proud and poignant day for us," said Martin Mugica, president and CEO of Iberdrola Renewables. "Stu Webster has done a phenomenal job of continuing Andy Linehan's legacy and we're very happy to see this award come full circle. Stu continues to raise the bar on environmental stewardship at Iberdrola Renewables and across the wind industry."



Stu Webster receiving the environmental excellence award



Merlin Radar. Peñascal Wind Farm (USA).



Indiana Bat (*Myotis sodalis*)

Iberdrola Renewables LLC has a long history of responsible development, particularly when it comes to safeguarding the natural environment. The company works closely with state and federal agencies, and environmental groups, to site wind farms responsibly – and regularly participates in studies seeking to reduce wind power’s impact on wildlife and other aspects of the environment. In 2008, Iberdrola Renewables adopted the U.S. wind industry’s first voluntary Avian and Bat Protection Policy, which was approved by the U.S. Fish and Wildlife Service..

“Stu Webster’s work has been very important to an industry committed to improving the health of our planet,” said Denise Bode, AWEA CEO. “We’ve worked alongside Stu for many years through his leadership positions on AWEA committees and involvement in important industry research, and we are pleased to honor his efforts.”

More information in the video:

- Stu Webster Career Background: <http://iberdrolarenewables.us/video/video-stu-career.html>
- Stu Webster on Avian and Bat Protection:: <http://iberdrolarenewables.us/video/video-stu-avian.html>

Additional Web Resources:

- Wildlife: <http://www.iberdrolarenewables.us/b2c-wildlife.html>
- Avian & Bat Protection: <http://www.iberdrolarenewables.us/b2c-avian.html>

6.12. RESEARCH ON THE CLIMBING HABITS AND MORPHOLOGY OF THE *DIDELPHIS SP.* TO PREVENT IT FROM ACCESSING ENERGISED EQUIPMENT AT ELEKTRO SUBSTATIONS

Summary

Opossums are wild mammals that adapt well to environments adapted by man, which could thus have its drawbacks for humans. If they enter electrical facilities, they could damage energised equipment and provoke serious power disconnects, thus causing a wide range of issues and affecting client satisfaction. In this project, we tracked the behaviour of opossums of the genus *Didelphis* in an experimental area built at the Butantan Institute (São Paulo) to simulate an Elektro substation area. Given the substantial number of substation disconnect incidents caused by an invasion of opossums affecting equipment, the Safety and Environmental Division at Elektro proposed this intervention. While the invasion of electrical substations by animals is a relatively frequent event, this is the first time that a scientific experiment was conducted to solve or minimise the problem.



White-eared Opossum (*Didelphis albiventris*)



Big-eared Opossum (*Didelphis aurita*)

I- Introduction

Marsupials are distinguished by their characteristic pouch, which is a bag of skin in which the females rear their young. In America, the most common species pertaining to the genus *Didelphis* is popularly known as an Opossum. Their appearance is that of large rats, with a hairless tail used as a fifth limb for grasping. Their front paws have sharp nails while the first finger on their rear paws are opposable. Their padded palms enable gripping. Opossums are climbing nocturnal animals. They are extremely prolific and can give birth to two offspring yearly. These wild mammals can easily adapt to environments modified by man. As omnivores, opossums can eat virtually anything. They normally build their nests in house attics.

II- Method

An experimental area was built at the Butantan Institute, and the gantry used at Elektro substations was installed in the centre. We collected specimens of *D. aurita* and *D. albiventris* in the State of São Paulo following authorisation from the environmental protection agency and transferred them to the laboratory. The specimens were vaccinated, weighed and measured. For the morphometric examination, we measured the lengths of the front and rear legs, tail, head, thorax and entire body. After their acclimatisation to the area, we tracked the animals, filming them individually with cameras between 18:00 and 6:00.



Experimental Area



Opossum in the experimental area

We used fibreglass half-moons strategically positioned on the gantry as barriers. Enclosing the two beams in an «I» and the muffle assembly, we installed galvanised plates to form a box closed at the top (dimensions: 0.30 x 0.30 x 0.50 m). We considered the body size of the animals for the dimensions of the box.

We also built a wire-mesh fence in the corner of the experimental area. As a physical barrier, we welded a 0.40 m galvanised plate to the top part of the wire-mesh at an angle of 45° and 1.5 m from the ground. To simulate substation invasions by crossing the fencing, we placed the opossums inside the fencing and stimulated them to move across it.

We returned the animals after the experiments to the spot where they were captured (coordinates were previously determined by GPS).

III-Results and Discussion

The animals used for the experiments were intense and excellent climbers and scrambled up and down the gantry many times, along all the structures, seemingly at random and using their rear paws with the first opposable finger and the hairless tail as a fifth member for grasping. The percentage of time that they remained on the gantry clearly demonstrated their climbing behaviour (between 79% and 93% of their active time). We observed that the young opossums were also capable of climbing the gantry in the same way as the adults. Therefore, they are potentially capable of causing disconnects. Modifications of the gantry do not interfere with the opossums' climbing activity. They climbed the structures regardless of whether there was a food stimulus, i.e., with or without food on the beams.

Tracking demonstrated that the half-moons proved to be 84 % effective in preventing climbing, whenever their edges were mounted on the vertical gantry at least at 20 cm and on the «X» structure at 30 cm from the surfaces that could provide support for the rear paws (considering the full length of the animal, with both front and rear legs extended, which for the animals studied in this case reached 40 cm). When mounted at closer distances, the opossums were capable of crossing them.



Practical application of galvanised plate boxes

The galvanised plate boxes, moulded on the basis of the morphometric studies, proved to be 100 % effective.

The use of the galvanised plate at the top of the fence, folded at an angle of 45°, was 100 % effective because the opossums were unable to cross the barrier. Additionally, when using this type of physical barrier, it should be borne in mind that the animals have shown a preference for remaining on the wire-mesh fencing. This indicates that the presence of fences at substations could be considered an attraction for opossums.

Opossums are very persistent, intelligent and learn quickly. Tracking reveals that opossums learn to adopt better climbing postures after their initial contact with the gantry, and that they often fall. However, after the second or third day of their acclimatisation, there were visible improvements in their climbing behaviour, as they began to climb the gantry easily and without falling.

The practical application of the devices developed in this project proved to be highly effective and significantly reduced substation disconnects caused by opossum invasions.



Opossums in the experimental area

6.13. BIRD MONITORING STUDY IN 19 WIND FARMS IN AEGEAN LINK PROJECT

The “Aegean Link” project is an investment project of the Rokas Group which aims to the electrical interconnection of three islands (Lesvos, Chios and Limnos) of the North Aegean Sea to mainland, in Greece. The project has a total capacity of 706 MW, distributed among 28 wind farms located in semi – mountainous and hilly regions of those three islands. The region is counting with special biodiversity values: nineteen (19) out of twenty eight (28) planned W/Fs are located in Special Protection Areas (SPA) for birds of the Natura 2000 Network.



Streptopelia turtur and *Gallinula chloropus*, North of Lemnos

During the period 2008 -2011, special bird inspection was conducted, in order to estimate the population, diversity and the conservation status of the avifauna and assess the presence, nesting and wintering behaviour of avian species that use these bio-geographic regions. Those investigations provided a deep knowledge framework related to the biotopes and their birds community of each island.



Burhinus oedicephalus, Southeast of Lemnos

The research started with a preliminary Ecological Base study to identify, in total, the ecological characteristics of the islands. In this period, the presence of avian population and their habitats were also studied as part of a cohesive ecosystem.

Then, a complete assessment of biotic and abiotic environmental parameters of the area was carried out by ornithologists and specialized scientists. Each wind farm was elaborately inspected relatively to its local species and special characteristics. Those studies included research and monitoring in situ (field-working), according to European and international bird monitoring standards and methods, combined with information of bibliographical references, previous scientific survey and reports..



Site supervision: Aipos mountain on Chios

Finally, the information were cumulatively and synergistically analysed to estimate how birds and their habitats can be influenced by wind turbines, taking into account the sensibilities and conservation status for species, individually. The conclusions have been integrated in the Environmental Impact Assessment study for Aegean Link project.

In terms of good practices for environmentally friendly solutions, the final study proposed a series of mitigation measurements, in order to achieve the harmonic coexistence of wind energy and local natural elements.



7

Annexes

7. ANNEXES

Annexe 1 The Iberdrola Group's Biodiversity Policy

The Board of Directors of IBERDROLA, S.A. (the "**Company**") is aware that social development is intimately linked with the use of natural resources, affecting their availability as well as the natural systems and the services they provide, which sometimes results in a reduction of biological diversity. The scientific community agrees that we are currently witnessing an accelerated loss of this natural capital and biodiversity, which are essential for human survival as a species, our welfare and for sustainable development.

Preserving biodiversity is also an issue of increasing importance for some of the key stakeholders of the company, such as non-government organisations (NGOs), governmental entities and socially responsible investment groups.

The Company and the subsidiaries of the Group, whose parent entity, as established by law, is the Company (hereinafter referred to as the "**Group**"), are aware of the importance and pledge to consider the effects on biodiversity when planning, building and operating its energy infrastructures and to foster a corporate culture focused on raising society's awareness of the magnitude of this challenge and the potential actions that could contribute towards its conservation.

This commitment is assumed and promoted through this *Biodiversity Policy* so that the various organisational levels of the Company and other Group companies can gradually integrate the study of biodiversity effects and conservation actions when planning and implementing their actions. In addition, all Group employees will contribute in their day-to-day work towards attaining the targets set in this regard.

With a view to putting these commitments into practice, the Group will be guided by the following basic action principles, which will be applied gradually to all our operations and business:

1. **Integrate** the conservation of biological diversity into the Group's strategy, including its consideration in decision-making on the execution of infrastructure projects.
2. **Promote** in-house training of Group personnel on biodiversity-related matters.
3. **Apply** a preventive approach to minimise the impact of new infrastructures on biodiversity, bearing in mind their full life cycle, including the construction, operation and dismantling stages, and drawing up environmental guidelines for each type of infrastructure project undertaken by the Group.
4. **Incorporate** this preventive approach into the environmental and social impact assessments for new projects, especially in sensitive, biologically diverse or protected natural areas.
5. **Integrate** biodiversity into the Group's environmental management systems (EMSs), defining targets, indicators and criteria for controlling, monitoring and auditing within the framework of these systems.

6. **Participate** in research, conservation, education and awareness-raising projects, working in partnership with public authorities, NGOs, local communities and other stakeholders during these projects' development.
7. **Report** on the Group's biodiversity-related actions, on its facilities in protected areas and on research, conservation, education and awareness-raising initiatives.

This *Biodiversity Policy* was initially approved by the Board of Directors on 18 December 2007 and most recently modified on 13 December 2011.



Publisher: IBERDROLA
Graphic design: IBERDROLA
Photography: IBERDROLA
Printing: xxxxxx
Legal publication number: BI xxxxxxxx
Copyright: IBERDROLA



Printed on ecological recycled paper



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