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Environmental commitment

Connected
to the protection
of the natural
environment



RED
ELÉCTRICA
DE ESPAÑA



About this document

This document is a summary of Red Eléctrica's environmental performance and commitment during 2016.

In order to make its environmental commitment known, Red Eléctrica drafts an annual Corporate Responsibility Report as a means to disseminate the Company's performance and results regarding corporate responsibility in economic, social and environmental aspects.

Moreover, every year, Red Eléctrica publishes an annual Environmental Statement in which the Company discloses information regarding its environmental performance, and the ongoing improvement of its actions and activities related to the environment, in accordance with the requirements of the Community Eco-Management and Audit Scheme (EMAS).

This publication contains a summary of the main environmental aspects included in both the aforementioned documents.



More in-depth information

that may be of interest to you



+ INFO
Corporate Responsibility Report 2016



+ INFO
EMAS Environmental Statement 2016

MEMBER OF
Dow Jones Sustainability Indices
In Collaboration with RobecoSAM



Our environmental commitment

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Integration of facilities into the environment

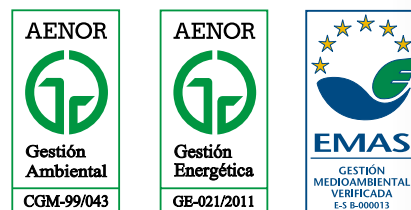
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Biodiversity

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Our environmental commitment

Respect for the natural environment, biodiversity conservation and commitment to the fight against climate change have always been the cornerstones of our environmental commitment.

Integration into the environment

We make our facilities compatible with the environment and this is done through dialogue with stakeholders and the implementation of preventive and corrective measures to minimise potential impacts on the environment.

- Environmental assessment of all projects. **Hábitat Project** (2015-2020).



Environmental management

Red Eléctrica undertakes all its activities following strict environmental criteria in accordance with the principles adopted in its Environmental Policy.

- ISO 14001 Certification and EMAS Register.
- 87% fulfilment of the 2016 environmental programme.



ENVIRONMENTAL EXPENDITURE 2016

€ **23** million

Climate change

Red Eléctrica contributes to the fight against climate change by providing solutions in the execution of its business activities, and through its commitment to the efficient use of energy.

- 40.8% of demand covered using renewable energy.
- 1,907 tonnes of CO₂ avoided in 2016.



Biodiversity

Biodiversity conservation has always been an essential principle of the Company's corporate strategy.

- 3,040 Km of electricity lines marked with bird-saving devices (3% more than in 2015).
- 1,8 million euros of investment in the 'Red Eléctrica Forest' initiative (2009-2016).



+ INFO

in the 'Environmental section' of the corporate website.

Key Environmental Performance Indicators

	2014	2015	2016
Km of line in Red Natura / Km of total lines (%)	15.1	15.0	15.0
Km of line marked bird-saving devices	2,776	2,950	3,040
Direct emissions (t CO ₂ equivalent) [1]	83,125	33,662	31,500
Indirect emissions (t CO ₂ equivalent)	771,774	808,347	738,038
Non-hazardous waste (t) [2]	2,111	1,857	1,522
Hazardous waste (t)	2,375	1,184	2,036
Environmental expenditure (M€)	22.4	22.7	22.6
Fulfilment of the environmental programme (%)	78	84	87

[1] As of 2015, the calculation of SF6 emissions is based on the registry of actual data regarding leaks. Previously the calculation was done by applying theoretical emission factors to the installed gas. [2] Metal waste not included as an adjustment is being made in the process of collecting and recording the information. This explains the difference of the data for 2014 and 2015 with those published in previous years. Waste vegetation is not included either because it cannot be quantified, most of it is incorporated into the land or given to landowners, as the most appropriate form of waste management.

Recognitions 2016

Inclusion in the **CDP Leadership Index** (A list). The Company has been recognised as part of the group of leaders, for its efforts and actions to combat climate change.

- Maximum score in the **Dow Jones Sustainability Index 2016**, in the criteria of 'Climate Strategy' and 'Biodiversity'.

Sustainable Development Award. The Ministry of Water, Agriculture and Environment of the region of Murcia presents this award

to companies whose projects and initiatives contribute to the sustainability of the environment. Red Eléctrica was recognised for including the Sierra del Molino mountain range in Calasparra in the 'Red Eléctrica Forest' initiative, and by doing so, contributing to the creation of a carbon sink of 18 hectares through the planting of 22,000 trees and shrubs.

- Red Eléctrica received the 'Commendable practices' distinction awarded by the **Renewables Grid Initiative** for the project 'Real-Time Automatic Management of the El Hierro Hydro-wind Power Station' in the candidacy for 'Good Practice of the Year' 2016.

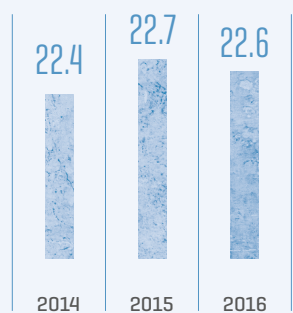
Environmental management



Red Eléctrica undertakes all its activities following strict environmental criteria in accordance with the principles adopted in its Environmental Policy.

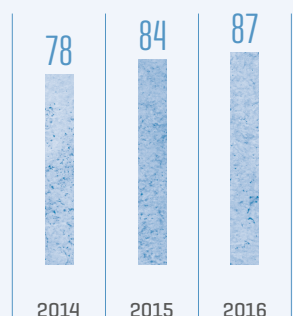
Environmental expenditure

ME



Evolution of the fulfilment of the environmental programme

%



The main environmental impacts of Red Eléctrica are those derived from the presence of facilities nationwide, therefore the Company works hard to make them compatible with the environment, considering their entire life cycle and paying particular attention to biodiversity conservation. In addition, Red Eléctrica is committed to a sustainable energy model and maintains

a specific commitment regarding the fight against climate change.

Environmental management system

In order to continuously improve its environmental performance and processes, Red Eléctrica has an environmental management system certified in accordance with ISO 14001 and which has been registered, since 2001, under the Community Eco-management and Audit Scheme (EMAS). Similarly, an environmental programme is defined annually that sets out the various objectives arising from the strategies of the Company and those actions necessary for its fulfilment.

Environmental policy

This sets out the principles of environmental protection, which includes is the commitment associated with the prevention of pollution.

Integration of facilities into the environment



Red Eléctrica works with the public administration and other stakeholder groups on the definition of the siting of substations and the routes the electricity lines will follow, so as to minimise their impact on the natural environment.

The principal measure for reducing and even avoiding the undesired impacts of Red Eléctrica's facilities on the environment, and in the local communities, is the selection of their location. For this reason, the Company conducts a detailed study of the territory, and works in coordination with the public administration and key stakeholders on the definition of the siting of substations and the routes the electricity lines will follow.

In addition, Red Eléctrica establishes the appropriate preventive

and corrective measures to be applied when carrying out construction or maintenance work, in order to reduce, as far as possible, the potential impacts these activities may have on the territory. Environmental monitoring programmes are established and put into action in order to guarantee the implementation and effectiveness of the measures defined.

Among the preventive and corrective measures applied, of note are the ones designed to protect habitats and species (measures to protect biodiversity) and those aimed at reducing potential impacts on the socioeconomic environment.



In 2016

among the preventive measures implemented, noteworthy was the use of a helicopter for the hoisting of 14 towers of the 132 kV Ciutadella-Mercadall line and for the stringing of the 400 kV Boimente-Pesoz line.



Main measures regarding landscape integration

Restoration of areas affected by works.

Creation of vegetation screens and gardened areas in substations.

Blending substation buildings into the landscape.



Minimising impacts on the socio-economic environment

The presence of electricity infrastructure in no case represents a significant disruption in the way of life of the communities affected. In the case of substations, these produce a total and irreversible occupation of land.

However, in the case of electricity lines, land use is limited to the feet of the towers and the newly created accesses to the infrastructure. The land surface with overhead electricity lines is subject to a right of way easement during the useful life of the infrastructure. Livestock and agricultural activities are compatible with the lines, allowing all kinds of agricultural crops to be grown under them and the free movement of the machinery necessary for its management.

On the other hand, the social aspects are integrated into the environmental impact assessment carried out in the design phase of the facilities and the main conditioning factors to consider are: the use of land not compatible with the facilities; areas of high agricultural yields and agroforestry plantations, and landscape, touristic and cultural resources.



Blending facilities into the landscape

One of the principal challenges regarding the integration of electricity transmission infrastructure into the environment is the ability to blend them into the landscape. In order to progress in this line of work, in recent years, Red Eléctrica has been promoting different projects for the assessment of the visual impact of facilities:

- **Methodology** for the analysis and integration of the landscape into the environmental impact studies for electricity lines.
- **Landscape assessment system** for existing facilities.
- **Methodology** for visibility analysis of electricity lines [3D mapping to assess the visual impact of existing or projected lines].



Protection of archaeological and ethnological heritage

In 2014, work began on the 'ARQUEORED' project, which aims to provide digital mapping of catalogued heritage for its consultation prior to the planning of works. In this way, potential impacts can be avoided and the necessary measures, where appropriate, can be provided in advance. The information for all the autonomous communities is currently available.

On the other hand, before carrying out any earthworks, an archaeological survey is conducted whose intensity and scope are based on the likelihood of material of interest being present in the area. According to



Main actions in 2016

Archaeological assessment of the Iberian archaeological site 'Cañada de la Lengua' Almansa [Albacete].

Protective measures for Spanish Civil War trenches in Cabezo del Cerro, Cuevas de Almodén [Teruel].

the results, the need for the continued presence of an archaeologist during the works is determined.

Electric and magnetic fields

Thanks to the criteria applied in the design of facilities, the levels of electric and magnetic fields (EMFs) stay below those recommended by the Council of the European Union.

In order to verify compliance with the recommendation, Red Eléctrica has a tool that uses specific line parameters to accurately calculate the maximum EMF levels that said facilities can generate. When the values of the parameters necessary for the calculation are not available, it is necessary to take in situ measurements. At present, it can be considered that Red Eléctrica has evaluated and validated compliance with the regulations for 100% of its facilities.



Archaeological supervision

In 2016, archaeological supervision took place during the construction of 5 new substations and 19 works carried out on new and existing lines, with the permanent presence of an archaeologist at 95% of the lines and 80% of the substations.



+ INFO

in the 'Environmental section' of the corporate website.



Biodiversity

The commitment of Red Eléctrica to biodiversity has always been a key principle of its environmental policy and specifically it becomes evident in its biodiversity strategy and in a specific action plan that covers all the activities of the Company.



HÁBITAT PROJECT 2015-2020

OBJECTIVE: MONITORING OF THE INTERACTION

of electricity lines and natural habitats of community interest

Biodiversity challenges

- Work on new approaches to biodiversity management.

Incorporation of concepts of net impact and mitigation hierarchy.

- Make facilities compatible with birdlife.

Marking plan for sensitive areas identified thanks to the project of 'Birds and Power Lines: mapping of bird flight paths'. Monitoring the interaction between lines and birds: assessing the effectiveness of different models of bird-saving devices.

- Make facilities compatible with forested areas.

Signing of agreements for the prevention of forest fires.

- Make facilities compatible with habitats of high ecological value.

HÁBITAT Project (2015-2020).

- Collaborate with Autonomous Communities and other stakeholders on biodiversity matters.

- Promote Red Eléctrica's stance on biodiversity matters.

Electricity grids and biodiversity

The interaction of electricity facilities and infrastructure with biodiversity is mainly associated with their presence in the territory, the impacts associated with works for their construction and maintenance, the

impact on birdlife due to collisions and also to the risk of fire.

In this regard, avoiding areas rich in biodiversity is a priority criterion taken into account in the grid planning phase as well as in the definition of each project. However, considering that 25% of the area of Spain has some form of environmental protection, it is inevitable that in some cases infrastructure crosses, or is located in protected areas or areas with species of interest.

On these occasions, Red Eléctrica implements all preventive and corrective measures required to minimise the possible impacts on habitats and species. These measures are complemented with environmental improvement actions aimed at enhancing biodiversity.

Protection of habitats and species

In works for the construction of lines or the modification of facilities, the main impacts to be avoided are the alteration of the habitat of certain species of fauna and flora, and also the impact on vegetation due to the opening up of safety corridors,

necessary to prevent fires in the operation of the electricity line.

Minimising the risk of bird collisions

The main impact on birdlife by Red Eléctrica's infrastructure is the risk of birds colliding with grounding cables that protect the lines from electrical discharges during storms. The most



Specific measures for the protection of habitats and species 2016

Use of a helicopter to hoist 14 towers in the works to improve the 123 kV Ciutadella-Mercadal line.

Hanging of line by hand in areas located in priority habitat, for the 220kV Torremendo-San Miguel de Salinas line and the incoming and outgoing feeder lines of the Torremendo substation.

Biological stoppages of varying duration [between 4 and 6 months] for 6 lines, to avoid impacts on various species.

Removal of Sweet tabaiba [Euphorbia balsamifera] for its subsequent use in the restoration works of the incoming and outgoing feeder lines of the El Sabinal substation.

Transplanting of 25 Olive trees affected by a tower of the incoming and outgoing feeder lines of the Godelleta substation, for their subsequent use in the restoration of said substation.

Planting of different species to offset tree felling works.



Red Eléctrica's current infrastructure

occupies only 0.08% of the Red Natura Española. Of the total infrastructure currently in existence, only 15% of the lines and 6% of the substations are located in protected areas [Red Natura].



effect measure to reduce the risk of collision is to mark the grounding cables with devices that increase their visibility.

In 2016, the project 'Birds and Power Lines: mapping of bird flight paths' was completed, for which the Company has received various awards. Thanks to this project, 47 species (considered prone to collision) have been identified and selected according to diverse criteria. The most complete and updated data on the presence and flight paths of these species has been reflected in a geographic information system.



With this information, sensitivity maps (areas where these species can be found) and risk maps (sensitive areas in which there are also factors that influence the probability of accidents occurring) have been drawn up, and are being used to draft a multi-year line-marking plan.

Fire prevention

In order to minimise the risk of fire associated with the presence of transmission lines, strict compliance with the safety distances between flora and facilities is critical. Therefore, within the management of safety corridors, every



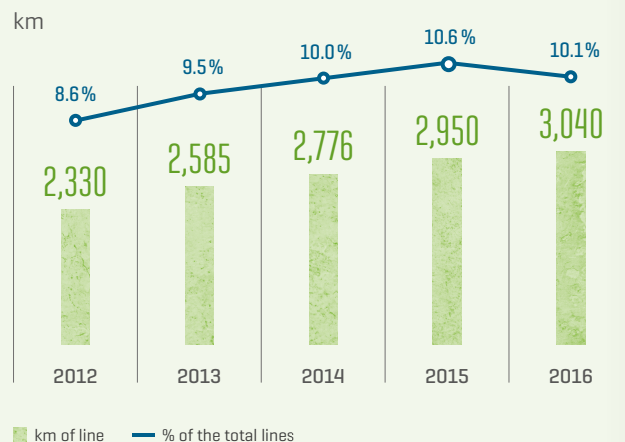
MARKING OF LINES OF CRITICAL PRIORITY

218 km

of line marked up to 2016 (29,5%)

Objective for 2023: marking of 739 km (100%)

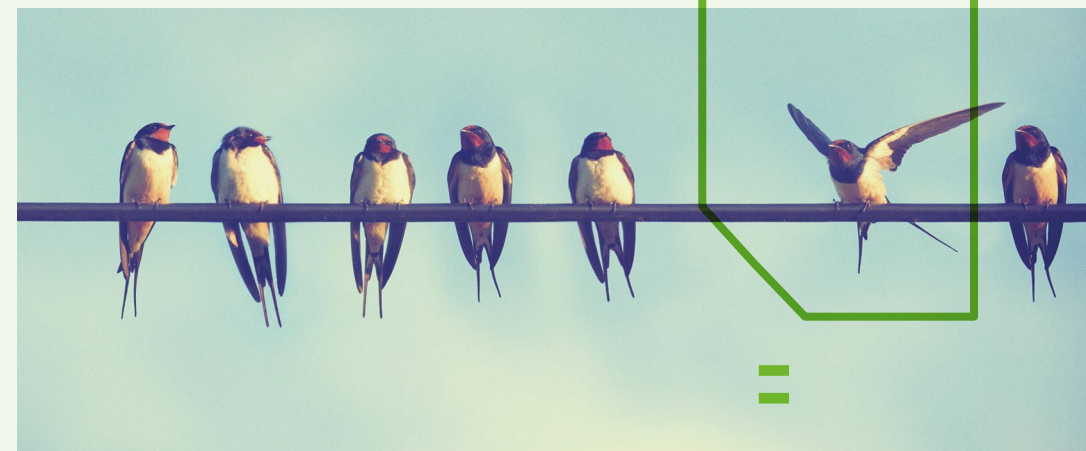
Marking with bird-saving devices [1]



[1] Cumulative data for the Spanish Peninsula at the end of each year.



In 2016, Red Eléctrica collaborated on projects related to biodiversity and the conservation of flora and fauna species in ten Autonomous Communities.



year all infrastructure is reviewed and the necessary forestry works carried out periodically.

Similarly, Red Eléctrica aims to sign agreements with the various competent administrations in forestry management. In these, issues are reflected related to the management of safety corridors where electricity lines run through and additionally other commitments related to firefighting are set out.

Contribution to biodiversity conservation

Red Eléctrica actively contributes to the conservation of biodiversity in Spain spearheading or participating in various projects and conducting dissemination activities and environmental training.

The Company aims to carry out conservation projects in all Autonomous Communities. In 2016, it collaborated on projects related to biodiversity in ten of these. Most of these projects are linked to the conservation of birdlife, although work is also carried out on other species of flora and fauna.



The fight against forest fires

Currently, there are 11 agreements with Public Administrations, with an associated overall budget of €1.1 billion euros every five years.



Marine Forest

In 2016, the R&D+i project 'Recovery of *Posidonia oceanica* seagrass meadows' was completed, using the experimental technique for their recovery by replanting laboratory-germinated seeds of *Posidonia oceanica*, and fragments of this species obtained as a result of natural fragmentation. As a continuation of this project, in which survival rates of around 50% have been obtained, the Company has decided to launch the project 'El Bosque Marino de Red Eléctrica' ('The Red Eléctrica Marine Forest') in collaboration with the Government of the Balearic Islands, with the aim of restoring two hectares of *Posidonia* in a degraded area of the Bay of Pollensa [Balearic Islands].

Also relevant are the actions aimed at the restoration of degraded habitats encompassed within the 'Red Eléctrica Forest' project.

Conservation projects in connection with endangered species

- **Nesting platforms** for the Osprey [*Pandion haliaetus*] in Andalusia.
- **Reintroduction** of the Bonelli's Eagle [*Hieraetus fasciatus*] in Majorca.
- **Study of the true impact** of food supplementation on the spatial and reproductive ecology of the Bonelli's Eagle [*Hieraetus fasciatus*] in the region of Valencia.
- **Monitoring,** conservation and recovery of the population of the



Spanish Imperial Eagle [*Aquila adalberti*] in Doñana.

- **Adaptation** of the facilities of the Bearded Vulture [*Gypaetus barbatus*] breeding centre in La Alfranca.
- **Foraging areas** and movements of the Canary Island Parakeet [*Chlamydotis undulata fuertaventurae*].

Red Eléctrica Forest

Started in 2009 and of an ongoing nature, this project is twofold: to offset Red Eléctrica's emissions through the planting of trees and the recovery of degraded natural areas of public 'common' land, thus contributing to the conservation of biodiversity.



This initiative also seeks to contribute to the development of local economies by contracting work to companies or groups in the area, and

also raise awareness and involve the local population and Company employees.



+ **INFO**
in the 'Red Eléctrica Forest' video.

Red Eléctrica Forest in figures (2009-2016)



TREES AND SHRUBS PLANTED

638,145 units



EMISSIONS OFFSET

183,483 t CO₂-eq.



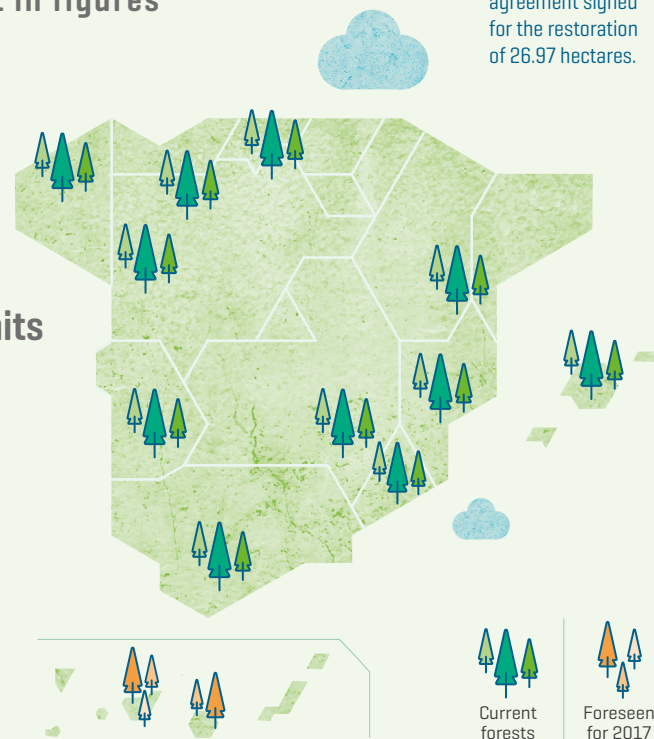
SURFACE AREA RECOVERED

761 hectares



INVESTMENT

1,795,914 euros



Red Eléctrica Forest (milestones 2016)

La Carballeda Forest (Zamora). Restoration of 55.68 hectares of highlands affected by forest fires.

Tremuzo Forest (Galicia). Restoration of 40.87 hectares.

Firgas Forest (Gran Canaria). An agreement signed for the restoration of 16.96 hectares.

Chajaña Forest (Tenerife). An agreement signed for the restoration of 26.97 hectares.

Noteworthy R&D+i projects

Development of a sustainable and flexible transformer

Development of a modular transformer, consisting of single-phase banks that allow the interchangeability with existing three-phase or single-phase units, of a sustainable character, or of low environmental impact, with hybrid technology that reduces the size and weight required.

Validation of the use of natural esters as a cooling fluid

Substitution of mineral oil for vegetable esters in standardised power transformers.

Analysis of conductor displacement

The object is to delve into the knowledge regarding the real conditions of displacement of the conductors of overhead lines when they are subjected to wind action.

Use of seeds and fragments of *Posidonia oceanica*

Definition and development of the necessary actions to validate the replanting technique which uses seeds of *Posidonia oceanica* germinated in the laboratory and fragments obtained from natural fragmentation of the *Posidonia* seagrass meadows.

Oficina horizonte 2020

Project aimed at demonstrating the feasibility of ending the use of traditional media (paper, CD, etc ...) and optimising the control of information that is handled electronically [e-mails, etc.] at work.

ACURED - Noise reduction in substations

Identification and characterisation of the noise sources in facilities, analysis of the current legislation on noise and a study of possible solutions to reduce noise emissions in the vicinity of electricity substations.

Study on the use of transmission lines as stepping-stones for fauna

Analysis of the possibility of the intelligent use of linear infrastructure as stepping-stones

for fauna of the various protected natural areas nationwide.

Tecnosuelos

The project seeks to delve into the knowledge regarding certain types of soils designed with specific characteristics that could be used for different projects in Red Eléctrica.

Vegeta Cycle

Methodology for the optimum management of the entire treatment cycle of the vegetation that grows within the limits of safety corridors of high-voltage electricity lines. The second phase of the project has been extended to the region of Extremadura.

Methodology for repairing SF₆ leaks in GIS installations

Development of a methodology and systems for repairing SF₆ leaks in GIS installations that are different from conventional repair systems.

Geothermal HVAC

Implementation of the project in the building located in San Sebastián de los Reyes.

Climate change

Red Eléctrica as transmission agent and operator (TSO) of the Spanish electricity system is a key player in the progress towards achieving greater sustainability in our energy model.

Climate Change Action Plan

Red Eléctrica has a climate change strategy which has been in place since 2011 and which was revised and approved by the Chairman in 2014. In 2015, Red Eléctrica launched its Climate Change Action Plan that is based on four main courses of action:

Contribution to a sustainable energy model

Includes the actions of the Company as operator and electricity transmission agent that contribute to the achievement of the European sustainability goals. Contemplated in this course of action are:

- The construction of infrastructure that allows the reduction of emissions from the electricity system, such as electricity interconnections and facilities for the

connection of renewable power capacity and for rail transport network.

- Projects to promote the maximum integration of renewable energies.
- Activities aimed at contributing to the efficiency of the electricity system: Demand-side

Cornerstones of the climate change strategy



Integration of renewable energies



Commitment to energy efficiency at all levels



Reduction of Greenhouse Gas Emissions



Protection of forested areas: fire prevention and the promotion of reforestation projects



Development of climate change adaptation projects



Extending the commitment to stakeholders, mainly suppliers





OFFSETTING OF EMISSIONS

+20%

of the total direct emissions

Fulfilment of the annual goal of the Climate Change Action Plan

management and research projects related to smart grids and electric mobility.

Reducing the carbon footprint

The Action Plan sets the reduction or offsetting of 21% of the Company's emissions compared to 2010 as an overall target for 2020. The activities are grouped into four main areas:

- Improving the calculation of the carbon footprint. To this end, work is being carried out on widening the scope of the emissions inventory and the improvement of its calculation.
- The reduction of SF₆ gas emissions, through improved procedures for the control and identification of gas leaks and the replacement of old equipment for equipment with lower leakage rates. During 2016, 1,076 t of CO₂ were avoided, with the goal of avoiding 1,500 t CO₂-eq per year by 2020.
- The greater efficiency in the consumption of electricity. In 2016, energy efficiency measures were undertaken, which will mean an estimated saving of electricity in the range of 116,000 kWh per year.



- The reduction of fuel consumption in the use of fleet vehicles and business trips. In 2014, the Sustainable Mobility Plan was approved in order to achieve improvements in the efficient management of vehicles and to promote a new culture of mobility that can help in the reduction of emissions.

Stakeholder involvement

Development of different channels of collaboration with the public administration and definition of actions for extending the commitment to the Company's suppliers.

Adaptation to climate change

In addition to working on mitigation actions, it is necessary to carry out actions in the field of adaptation to climate change. For this reason, the Company has evaluated both the risks and opportunities arising from climate change and has begun to carry out actions resulting from said analysis.



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