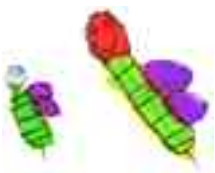
Environmental Report

2004

RED ELÉCTRICA DE ESPAÑA

CONTENTS



PRESENTATION

Energy is today the main chapter of the environmental programme. The challenge we are facing is to move the world without entailing a nonviable environmental cost.

This is a challenge that, with adequate criteria, we can face and can resolve, from Red Eléctrica, by joining our best efforts. Good proof of it are the initiatives and environmental actions included in this report.

Red Eléctrica, as electrical system operator and high voltage network manager, plays a key role because with the proper coordination it is possible to generate electricity minute by minute based on the most efficient energy. On the other hand, a good design of the network permits high cost savings by minimizing loss and by achieving the most efficient possible relation between generation and demand, once security of service has been assured. A clear example is the 400 kV Alqueva-Balboa interconnection line between Spain and Portugal, inaugurated in December of 2004, which permits the national electrical system a savings of the equivalent of the demand of a city the size of Soria.

At Red Eléctrica, we are aware of the importance of respecting the environment. Therefore, our environmental report shows with maximum transparency how our company works in carrying out each of its activities, all of which are subject to strict environmental controls.

Moreover, when developing our work we are always conscious that we must integrate conservation of the environment with social well being. Therefore environmental impact studies are done on all projects of new facilities, regardless of them being legally mandatory.

We also seek to minimize the environmental effects of our facilities in service by permanently monitoring and controlling them and we carry out research projects and environmental studies with the aim of reducing to a minimum our impact on flora and fauna. This year, for example, we have completed a study on the Lesser Kestrel (Falco Naumanni) at substations, showing concentrations of thousands of these birds at the facilities, without causing risks for the birds or altering the habitual functioning of the facilities.

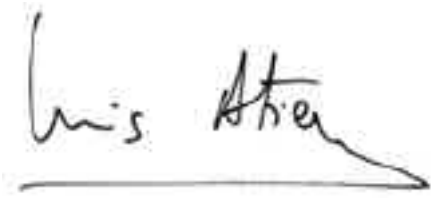
On the other hand, we have initiated communication activities and collaboration with organizations and institutions related to environmental subjects. These include agreements signed for the protection of birdlife with the autonomous regions of Aragón, Extremadura and Murcia.

Within the same line of responsible work we continue searching for new ways to day-to-day improvement. This year we participated as sponsoring company and contributed very actively, with several interventions, in the VII National Congress of Environment "Sustainable Development Summit Conference", where subject areas related to basic principles of sustainable growth, environment, society and economy were developed.

This exchange of experience and knowledge, together with that which we maintain with the Administration, universities, associations and other organizations of renamed prestige enrich our way of doing things.

Nor is of less importance the obtention during this year of the certificates for the environmental management systems of our subsidiary companies, Red Eléctrica Telecomunicaciones and REDESUR (Peru), which added to the existing certificates make us the first company group in the electrical sector to be awarded environmental certification for all its activities and facilities of electrical energy transmission.

Before finishing, I would like to thank all the people who form part of our work team, including our suppliers and other collaborators, for making the compromise of preserving the environment their own and for helping us to successfully achieve all the environmental goals our company is focused upon.



Luis Atienza Serna
President of RED ELÉCTRICA DE ESPAÑA

CHAPTER 1

Who is Red Eléctrica?

RED ELÉCTRICA is a leading electricity transmission company. It is responsible for operation of the Spanish electricity system and management of transmission grid.

Red Eléctrica operates the Spanish peninsular electrical system, ensuring the appropriate technical conditions so that electricity flows continuously from power stations to the centres of demand through the transmission grid throughout the country.

Red Eléctrica is the owner of most of the Spanish high voltage transmission network. Its facilities also comprise the electrical control systems which handle and monitor operation of the system through a circuit of 27,831 km of high voltage transmission lines, 1,924 circuit breakers at substations and a total transforming capacity of 35,666 MVA.

Evolution of Red Eléctrica facilities

		2002	2003	2004
Lines Km of circuit	Km of circuit	27,006	27,560	27,831
	400 kV	15,781	16,307	16,547
	220 kV and less	11,225	11,253	11,284
Substations	Num. of circuit breakers	1,730	1,801	1,924
	400 kV	639	681	738
	220 kV and less	1,091	1,120	1,186
	Transformers (MVA)	26,966	31,616	35,666

Structure of the environmental management system

President
Approval of the environmental policy and monitor its application

Assistant General Manager
External communications

Legal Division
Support on environmental issues

Communications & Institutional Relations Division
External communication

Technical Secretary
Audits
Documentation

Human Resources Division
Training
Internal communications
Emergency plans

Transmission Division
System checking
Effect identificaton and evaluation
Definition of goals and targets

Operation Division
Environmental actions
- Environmental viability studies
- Waste management
- Consumption
- External communication

Corporate Accounting and Finance Division
Control of environmental costs
Consumption
Suppliers

Engineering and Construction Division
Environmental actions
- Environmental Impact Studies
- Vegetation
- Birdlife
- Landscape
- Electromagnetic fields
- Waste management

Maintenance Division
Environmental actions
- Vegetation
- Birdlife
- Landscape
- Electromagnetic fields
- Waste management
- Consumption

Technology and Environment Division
System co-ordination

All Red Eléctrica's activities are conducted in accordance with a strict environmental policy and with an ethical commitment to society. It integrates environmental protection with business management to create value in a persistent manner. For this purpose it has an environmental management system that was certified in May 1999 under the UNE-EN ISO 14001 Standard. This has been registered with the EU Environmental Management and Auditing System (EMAS) since October 2001.

Red Eléctrica has an Environment Department, with a staff of 18 persons trained in different areas, which provides technical support to all company units in the development of activities. However, environmental activity is not the exclusive task of the Environment Department. All employees must carry out their work with maximum respect for the environment. They contribute to the preservation of habitats, proper waste management and to minimising consumption at work, taking into account the corresponding duties defined in the internal code.

CHAPTER 2

Highlights of 2004

Milestones in 2004 include the following:

- Obtention in this year of the certificates, according to Standard UNE-EN-ISO-14.001, for the Environmental Management Systems of our subsidiary companies, Red Electrica Telecomunicaciones and REDESUR (Peru), which together with the existing certificates make us the first company group in the energy sector to be awarded with environmental certification for all its activities and facilities of electrical energy transmission.

Participation of the President of Red Eléctrica in the VII National Congress of Environment.

- Participation in the VII National Congress of Environment "Sustainable Growth Summit Conference", held in Madrid in November of 2004. Subject areas related to basic principles of Sustainable Growth, Environment, Society and Economy were treated in this Congress. Red Eléctrica was involved as a sponsoring company, with an exhibitor, a dynamic room and several interventions, informing the audience of environmental actions carried out during its 20 years of existence.

CHAPTER 3

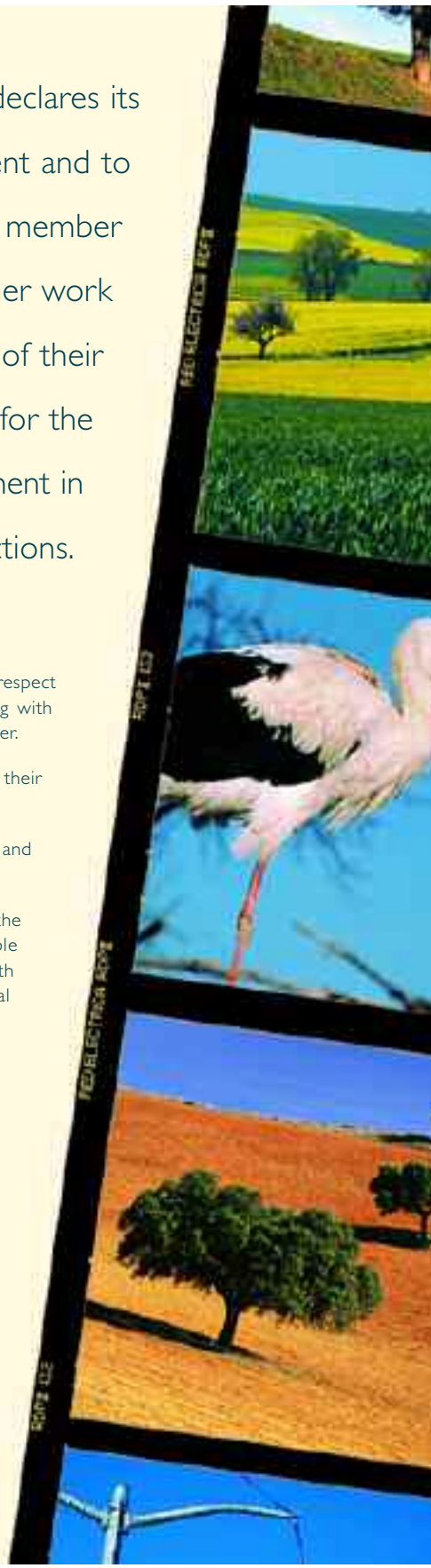
Environmental Policy

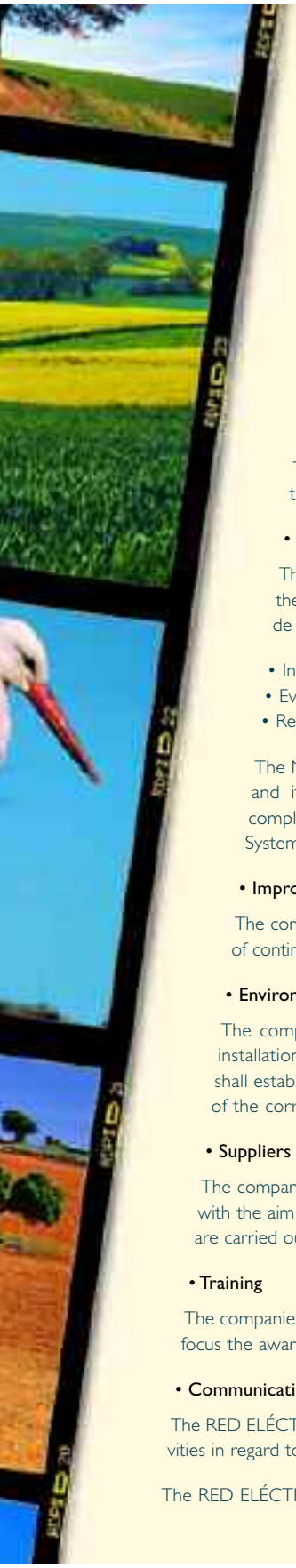
The Red Eléctrica Group declares its commitment to protect the environment and to undertake to help and encourage every member of the group to carry out his or her work reconciling the particular requirements of their activities with a maximum respect for the environment through continuous improvement in compliance with her or his duties and functions.

The **RED ELÉCTRICA GROUP** declares its commitment to protect the environment and to undertake to help and encourage every member of the Group to carry out his or her work reconciling the particular requirements of their activities with a maximum respect for the environment through continuous improvement in compliance with her or his duties and functions.

Principles

- To guide the GROUP towards sustainable development, integrating respect for the environment and encouraging progress and social well being with business aspects, with the goal of creating value in a persistent manner.
- To foster environmental leadership of the GROUP'S companies in their respective fields of activity.
- To ensure compliance with the environmental legislation, regulations and standards which apply to GROUP companies.
- To ensure that the activities carried out by the GROUP consider the environmental consequences, preventing or minimising possible environmental impact by evaluating and monitoring compliance with the GROUP'S Environmental Policy and with the Environmental Management Systems.
- To establish goals and objectives in regard to environmental protection that are in accordance with the commitment to continuous improvement.
- To be aware of and to apply the latest scientific and technical developments related to environmental protection within the GROUP'S areas of operation.
- To carry out environmental studies for all the GROUP'S new facilities projects.
- To ensure that suppliers comply with environmental requirements specified by GROUP companies.
- To set up permanent training, awareness and motivation actions for the GROUP employees respecting environmental protection.
- To develop channels and systems of communications to provide information and dialogue between the interested parties regarding GROUP action on environmental issues.





Guidelines

• The environmental management system

The RED ELÉCTRICA GROUP shall, whenever it considers it necessary to demonstrate a serious commitment to the environment in connection with its activities, obtain certificates for its Environmental Management Systems.

The RED ELÉCTRICA GROUP shall encourage design of Environmental Management Systems based on the UNE-EN-ISO 14001 Standard.

The RED ELÉCTRICA GROUP progressively aligns its Environmental Management Systems to the requirements of the EU Environmental Management and Auditing System (EMAS).

• Evaluation and monitoring

The companies of the GROUP will be provided with tools to evaluate and monitor compliance with the GROUP'S Environmental Policy and Environmental Management Systems. The main items include the following:

- Internal audits
- Evaluation of environmental aspects
- Reviews of the Environmental Management Systems

The Management of each company shall check the adequacy of the GROUP'S Environmental Policy and its Environmental Management System with the GROUP/company strategy by evaluating compliance with the GROUP'S Environmental Policy and with its Environmental Management Systems. Following this it shall consider the necessary modifications or improvements.

• Improvement

The companies of the GROUP shall be provided with tools to establish and check the goals and targets of continuous improvement with regard to protecting the environment.

• Environmental Studies

The companies of the GROUP shall analyse in advance the impact on the environment which new installation projects will have from the points of view of ecological, social and economic aspects. They shall establish preventive and corrective measures as necessary to prevent or minimise these by means of the corresponding studies.

• Suppliers

The companies of the GROUP shall have a methodology available to evaluate, qualify and monitor suppliers with the aim of ensuring environmental protection in those activities that affect the environment and which are carried out for GROUP companies.

• Training

The companies of the Group shall have tools available to set up training activities, to motivate and constantly focus the awareness of its personnel on environmental protection.

• Communication

The RED ELÉCTRICA GROUP shall develop channels and systems of communication to report the Group's activities in regard to environmental matters.

The RED ELÉCTRICA GROUP shall set up channels for constant dialogue with interested parties.

CHAPTER 4

Environmental Programme Goals and targets

Overall compliance with the 2004 Environmental Programme was 73.4%.

The table below summarises the goals and targets set for 2004 and the degree of attainment.

Environmental targets and goals in 2004

Areas	Goals	Targets	Achieved target	Target obtention rate	Achieved goal	Goal obtention rate
Improvement of environmental management	Improvement of Environmental Management System (SIGMA)	Improvement of the construction process of facilities	100 %	90 %	100 %	12 %
		Integration and improvement of environmental standards	100 %	10 %		
Protection of birdlife	Reduction of danger to protected **birdlife**	Launching R&D project concerning performance and duration of flight diverters "bird-savers" (1)	50 %	100 %	50 %	6 %
Protection of landscape	Analysis and reduction of the visual impact of installations	Landscape improvements for two substations	100 %	100 %	100 %	6 %
Prevention of contamination	Incorporation of the new assets in SIGMA	Environmental inventory and proposal of preventive and corrective measures for the rest of facilities of 2003 (2)	0 %	40 %	60 %	10 %
		Overhaul and checking of oil collecting systems in 10 substations	100 %	60 %		
	Reduction of accidental spillage risk	Conditioning of 3 oil pits in one substation (3)	0 %	20 %	60 %	14 %
		Conditioning and control of oil spillage of the 3 fuel deposits of one substation	100 %	20 %		
		Inventory of 50% of the expansion tanks of transformers and proposal of preventive measures (4)	0 %	20 %		
		Inventory of 30% of the auxiliary transformers and proposal of preventive measures	100 %	20 %		
		Revision of the prevention means and procedures for accidental spillages	100 %	20 %		
	Contamination prevention	Procedure for control of SF6 emissions	100 %	30 %	100 %	14 %
		Electromagnetic field and noise measurement programme	100 %	70 %		
		Revision of generated waste management in maintenance and proposals for improvement	100 %	100 %	100 %	8 %
Control of suppliers	Training and environmental qualification of suppliers	Revision and improvement of the supplier environmental qualification system (5)	0 %	100 %	0 %	10 %
Training	Training of personnel on environmental matters	Impart courses foreseen in the training programme for 2004	60 %	100 %	60 %	10 %
Communication	Improvement of communication	Design of a web site with the College of Physicists	100 %	50 %	100 %	10 %
		Publication of the book on the IV Journals concerning Electrical Lines and the Environment	100 %	50 %		
		Total				**73,4 %**

(1) Design of the new "bird-saver" device was completed after the deadline.
(2) The inventory has been completed, but not the proposal.
(3) To be carried out in 2005.
(4) Only 2 out of the 5 "Demarcaciones" (territorial maintenance divisions) have carried them out. Inventory of the rest will be carried out in 2005.
(5) The revision has been completed, but not the improvement.

And last, a table is presented hereinafter with the summary of the environmental goals and targets foreseen for 2005.

Environmental goals and targets for 2005

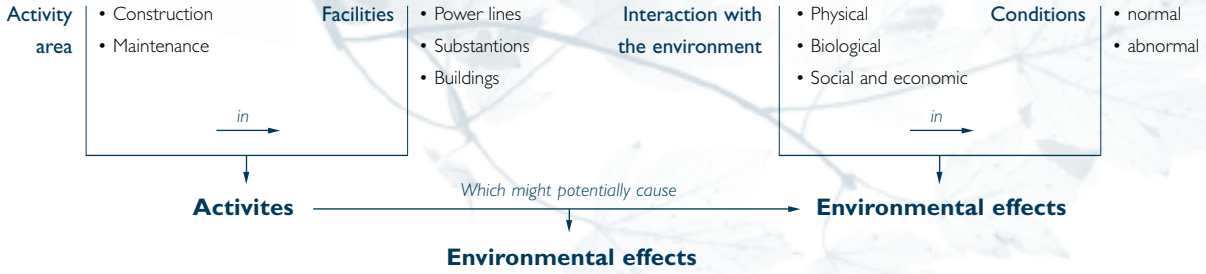
Areas	Goals	Targets
Improvement of environmental management	Improvement of Environmental Management System (SIGMA)	To adapt and integrate all document management of Environmental Area within the Document Management System.
		Improvement of the Environmental Management System in the Baleares and the Canary Islands.
		Study of applicability of ecoefficiency principles to activities, processes and facilities of Red Eléctrica.
Protection of birdlife	Reduction of danger to protected birdlife	Agreement with the Regional Goverment in Aragón: marking of facilities established for 2005.
Contamination prevention	Incorporation of the new assets in SIGMA	Enviromnental inventory and proposal of preventive and corrective measures for the facilities of the new assets which will be remotely controlled directly by Red Eléctrica, and which will be integrated into maintenance management before 30.11.05.
	Reduction of accidental spillage risk	To condition three oil pits in one substation.
		Inventory of 100% of the transformer expansion tanks and proposal of preventive measures if applicable.
		To implement a procedure of leakage contention of the auxiliary transformer in one substation.
		To complete the inventory of auxiliary transformers and proposal of preventive measures, if applicable.
		To guarantee that specific absorbent materials for hidrocarbons are provided in all substations where transformers and/or reactances can be found.
		Fulfillment of the programme for the analysis and removal of equipment contaminated with PCBs.
	Improvement of emissions control	Programme of measurement of electromagnetic fields and noise: to carry out measurements in 30 substations.
		Analysis, selection and purchasing of specific software for calculation and elaboration of noise maps. Adaptation to the characteristics of Red Eléctrica facilities.
		To establish the methodology for acoustic studies in substations.
		Proposal of preventive and corrective measures for noise in substations.
		To define a methodology for evaluation and reduction of light contamination caused by substations.
	Improvement of waste management	To carry out the 12 proposed improvement measures as a result of the management revision of 2004.
		To review the procedure of management of waste generated in the facilities, according to proposed improvement actions.
Protection of natural resources	Improvement of consumption management	To define new measurement index of basic consumption.
		Feasibility of an action plan to reduce basic consumption.
Control of suppliers	Environmental qualification of suppliers	To define and establish a graded and ranked series of qualification levels.
		To evaluate the present levels of Red Eléctrica suppliers according to the abovementioned series.
Training	Training of personnel on environmental matters	To impart the courses foreseen in the Training Plan for 2005.
Communication	Improvement of communications	Collaboration Agreeement with the Environmental Press Association (APIA).
		To define and implement a "Suggestion box for environmental improvement" for all Red Eléctrica personnel.
		To issue: "Red Eléctrica and birdlife: 15 years of Practical Research".
		Booklet for the general public on the use of Red Eléctrica Substations by the Lessel Kestrel (Falco Naumanni) in Navarra and Aragón: Its importance for the preservation of the species.
Interested parties	Collaboration with interested parties	Collaboration Agreement with the Spanish Society of Ornitology (SEO/Birdlife).
		To implement preventive, corrective and compensatory measures for the REMO Project (electrical reinformcement of the West Mediterranean Interconnection).

CHAPTER 5

Environmental effects

Red Eléctrica identifies all those environmental effects of engineering, construction and maintenance activities at the different facilities (lines, substations and buildings) which might interact with the environment and produce some sort of negative impact. This process considers normal conditions as well as abnormal conditions of operation.

Identification of environmental effects



In order to establish the importance of these interactions with the environment and to act in the most environment-friendly manner possible, Red Eléctrica identifies and evaluates the environmental effects. Once these are identified and evaluated, those found to be significant are analysed. This leads to a definition of preventive and corrective measures as well as to the appropriate environmental goals and targets.

5.1 Aspects related to construction activities

During the first quarter of 2004, works related to enviromental improvement of facility construction activities have been carried out and, among other actions, the methodology of identifying and evaluating their enviromental effects has been modified.

We will now proceed to detail the construction activities for lines and substations that might generate enviromental impact.

Activities that generate environmental effects

Use of machinery
Storage and handling of oils and fuels
Storage and handling of waste
Excavation and filling
Compactation
Concreting and tank cleaning
Clearing, trimming and pruning
Cable installation (lines)
Equipment installation (substations)
Site camp (substations)

The new methology of identification and evaluation of aspects was applied in all construction activities initiated during the second quarter of the year (6 new lines, 5 new substations and 43 enlargements, renovations or improvements of substations).

The environmental effects which have been significant in construction activies are shown below, indicating the percentaje of facilities where they have been detected.

Line construction

Significant environmental effects		% of lines with significant effect: New
Risk of fire		33
Dangerous waste	Cloth impregned with dangerous susbtances	67
	Containers which have coontained dangerous substances	67
	Soil contaminated with dnagerous substances	50
	Greases	17
	Lubricants	17
Impact on cultural and historic patrimony		17
Impact on vegetation		17
Potential risk of impact on birdlife		17

Substation construction

Significant environmental effects and improvements		% of substations with significant effects: New	Enlargements, renovations and improvements
Impact on fauna		20	1
Impact on soil		60	3
Impact on cultural and historic patrimony		40	1
Impact on vegetation		20	0
Dust generation		80	1
Noise generation		0	13
Site camp disposals		20	37
Non-dangerous waste	Solid urban waste	100	2
	Plastics	100	2
	Timber	100	2
	Paper and cardboard	20	2
	Scrap	100	2
	Plant waste	40	1
Dangerous waste	Cloth impregned with dangerous susbtances	100	94
	Containers which have coontained dangerous substances	100	98
	Soil contaminated with dangerous substances	20	2
Risk of fire		40	31
Risk of oil and fuel spillage during use of machinery		40	3
Risk of oil and fuel spillage during their storage and handling		60	10
Risk of oil spillage during equipment installation		60	4
Risk of potential effects on water during earth moving		20	11

5.2. Aspects related to maintenance activities

Activities of Red Eléctrica that have the potential to generate environmental concerns are shown below.

Activities that generate environmental effects

Presence of the building	
Presence of the power line	
Presence of the substation	
Transmission equipment and transformers	
Maintenance of gardens and electrical yards	
Maintenance of power line right-of-ways	
Maintenance of power line towers	
Use of machinery to maintain power lines	
Use and maintenance of equipment	Diesel generator
	Fuel tanks
	Evaporating condensers
	Air-conditioning equipment
	Current transformers and capacitive voltage transformers
	Power machines
	Auxiliary transformers
	Oil collection pits
	Equipment with sulphur fluoride
Transfer of oil for equipment maintenance	
Stockpiling and/or storage of contaminants	
Consumption	
Waste *	

* More details are provided in Chapter 7.4 – "Waste".

Of all the identified environmental aspects, those which were found to be significant following assessment in 2004 were as follows:

- **Use and maintenance of equipment**

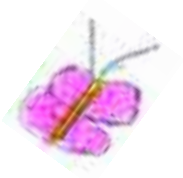
The risk of oil spillage from power machines was significant due to the non-coincidence in some cases of the location of their expansion tanks with the location of the collecting oil pits. During 2004, overhauls were carried out and preventive measures proposed in some facilities, and during 2005 the remainder of the expansion tanks of the power machines will be revised.

The risk of spillage or oil leaks from auxiliary transformers was significant due to the lack of preventive and corrective measures for transformers with capacities of less than 1000 litres. The analysis and proposal of preventive measures was carried out in 2004 for the 30% of the transformers, and during 2005 the proposed preventive measurements shall be enforced and work on the inventory will continue.

400/110 kV power transformer with collecting oil pit. Calders Substation.

The risk of spillage or leaks from equipment containing PCBs was significant. It is foreseen that removal of this equipment, started in 2004, will be done progressively before 2011.

The risk of spillage from oil collecting pits was significant due to the lack of preventive measures for three fuel tanks at one substation. These tanks will be conditioned in 2005.

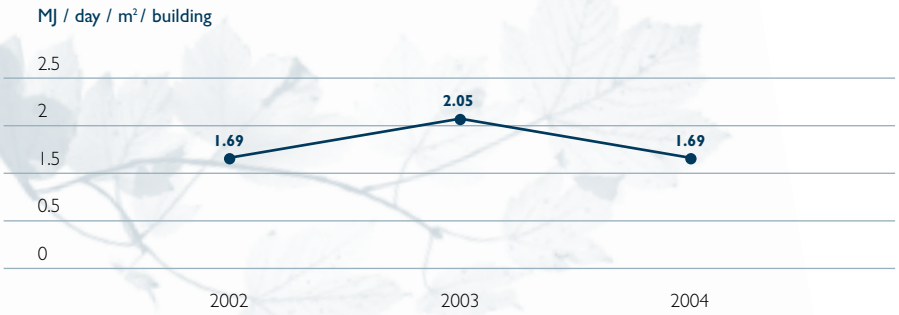


- **Consumption**

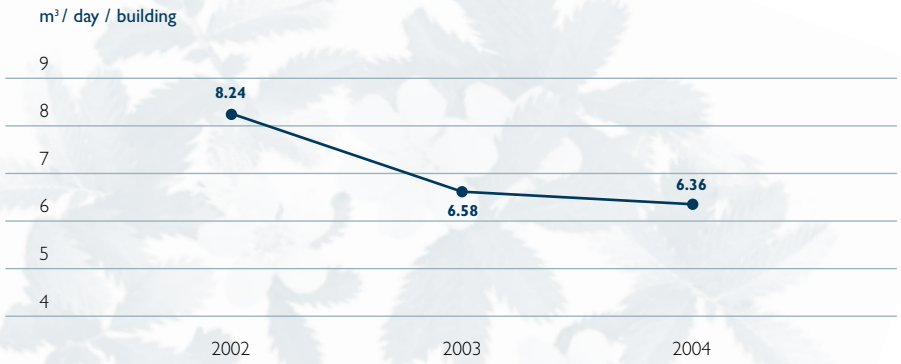
During 2004, use of electricity, water and paper was significally reduced thanks to good management focused on enhancing the awareness of each employee regarding proper use of resources on a daily basis.

However, the consumption of water, electricity and paper was significant in some buildings, so the same line of improvement will be continued, by awareness campaigns. A good sign of this is the development of the document management system, which will be operative during 2005-2006. This system permits easy access to filed documentation and diminishes the printing of useless paper copies.

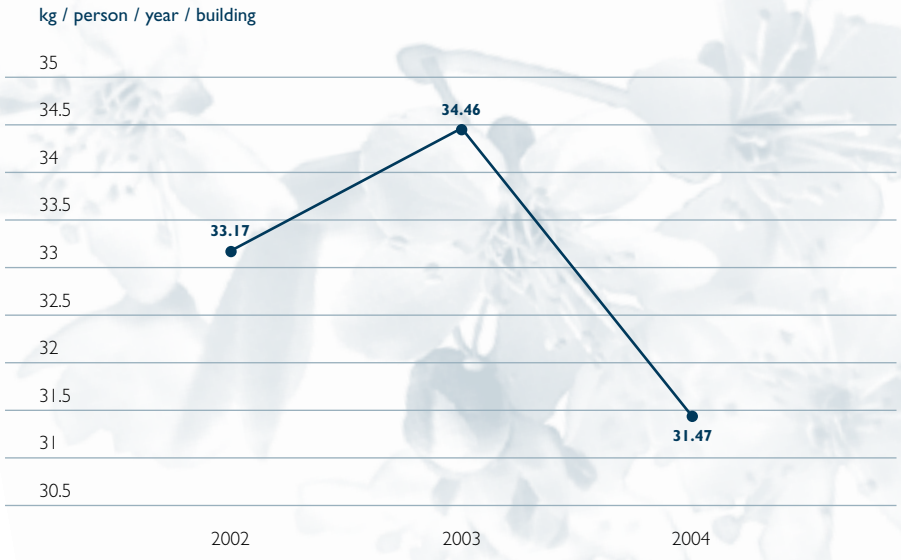
Average consumption of electricity



Average consumption of water



Average consumption of paper



• Waste

Segregation between dangerous waste and non-dangerous waste.

Storage and removal of waste was significant because in some cases the final management which was utilised was not the most appropriate. Because of this, during 2004 final management of waste due to maintenance was revised and some proposals for improvement, which will be enforced in 2005, were defined.

(These aspects will be treated in more detail in Chapter 7.4 – "Waste".)

The percentages of significant environmental effects during the last three years respecting the total are shown below. The increase in significance during this year is due to modification of the evaluation methodology for environmental effects which was carried out in order to be much more exacting in evaluating, so as to achieve our compromise of continuous improvement.

Evolution of significance percentage

2002	2003	2004
8.51 %	9.30 %	17.2 %

Headquarter building. Madrid.

CHAPTER 6

Environmental actions

Red Eléctrica, a company specialised in electrical energy transmission, is the responsible for electrical system operation and transmission network management.

As transmission network manager, Red Eléctrica must assure development and expansion of the high voltage network using homogeneous and coherent criteria, must carry out facility maintenance of its facilities so as to provide the required reliability and availability and must guarantee access of third parties to the transmission network.

During 2004, project and construction activities by zones have been as follows:

In the **Northern Zone** of the Peninsula, network development is focused principally on increasing transmission capacity in the "Northern Corridor", designed to evacuate energy from Asturias, Cantabria and the Pais Vasco.

In **Aragón and Cataluña,** reinforcement of the transmission network is oriented towards supplying the high speed Lérida-Barcelona-French Frontier train, towards construction of a new electrical interconnection between Spain and France, and also towards evacuation of electrical energy produced by wind farms located in that region.

Also, engineering work continues on the energy evacuation corridor from Galicia to Asturias.

At the same time, in the **Central Zone,** engineering and construction work continues on the transmission corridor which will allow evacuation of energy from Galicia and Castilla-León to Madrid, together with reinforcement of the Madrid High Voltage Ring.

Also, work has started on the Transmanchego Project (the line that will pass through La Mancha).

In the **Southern Zone,** work on one interconnection between Spain and Portugal has finished but the preliminary engineering studies to reinforce the transmission corridor between Extremadura and Andalucía continue. In this last region, work continues on reinforcing the transmission network, with the construction of facilities to evacuate energy produced by the combined cycles and wind farms located in this zone, specifically those which will supply the high speed Córdoba-Málaga train.

Facilities of CECOEL

Finally, it should be noted that in the **Eastern Zone,** network development is focused on construction of facilities to evacuate energy from wind farms, reinforcing of the electrical supply to Murcia and, in general, to the coast.

The preliminary engineering studies have also started for the future "Peninsula-Baleares" Islands interconnection.

Red Eléctrica works with a deep respect for the environment in all these activities, integrating protection into the normal development of activities. During the project stage, Red Eléctrica carries out environmental studies of the facilities in order to find the alternative which, being technically and economically feasible, has the least impact on the social and natural environment, and during the construction stage, Red Eléctrica carries out comprehensive environmental supervision of all its sites.

Environmental action of working facilities is carried out systematically, in accordance with the internal standards for each activity. Any environmental incidences that might arise are detected during periodic inspections of facilities and through environmental audits carried out during the year. This allows preventive and corrective measures to be defined and applied and checks the effectiveness of measures taken during the construction phase.

6.1 Environmental actions during the project phase

Red Eléctrica, as established in its Environmental Policy, carries out environmental studies of all facility projects. These studies are presented to the appropriate corresponding Environmental Organization for approval and execution.

During 2004, the competent environmental organization gave the "green light" to the construction of the following facilities:

Lines
New electrical supply to Girona
Balboa-Portuguese Frontier Line
Parla Urbanization Consortium
Substations
S.E. Ayora y la E/S en Ayora de la L/ Cofrentes-Benejama
S.E. El Cereal y E/S en la S.E. El Cereal de la L/ Entronque Galapagar –Entronque en S.S. de los Reyes
S.E. Galapagar 220
S.E. Segovia
S.E. La Espluga y la E/S en la Espluga de la L/Ascó-Pierola-Begues

At the same time, the legal procedure continues for 42 lines and 21 substations (SEE MAP IN ANNEX 1).

6.2 Environmental actions in construction

Red Eléctrica carries out environmental supervision in the construction of new lines and substations and also of the enlargements, renovations and improvements of the existing working facilities. This supervision consists mainly in enforcing preventive and corrective measures, and in verifying their effectiveness.

During 2004, new environmental supervision work was carried out on the construction of 13 new lines, 11 new substations and the enlargement, renovation and improvement of 7 lines and 61 substations (SEE MAP IN ANNEX 1).

A list of some indicative values of the environmental activities carried out in Red Eléctrica facilities during the construction stage are shown below:

Indicative values	2003	2004
Landscape restorations / New facilities constructed (1)	33 %	14%
Archeological surveys / New facilities constructed	47 %	62%

(1) Construction has concluded

Of all the environmental activities carried out during facility construction during 2004, the following have stood out either because of environmental characteristics or because those of the facility:

Balboa-Portuguese Frontier Line

Characteristics of the environment / facility	Outstanding environmental actions
	→ Installation of "bird-saver" devices on 22.6 km of the line.
Passage through protected areas. Presence of the Black Stork and the Eagle Owl.	→ Biological grace period from January to July during construction.
	→ Installation of devices for discouraging nesting on 35 out of a total of 98 towers.
Presence of evergreen oak.	→ Tower height increased to avoid clearing a safety right-of-way.
Presence of areas defined as priority habitats.	→ Marking of access to towers 24 and 25 to totally define the access zone and worksites.
Presence of Nerium Oleander associated with river beds.	→ Manual laying of pilot wires between towers 43-45 and 47-48.
Presence of archeological remains in the area.	→ Archeological survey on two towers before starting the work, and archeological supervision on 18 towers during excavation stage.

Hoisting a tower by sections with a small crane, Balboa-Portuguese Frontier Line.

Conductor installation, Balboa-Portuguese Frontier Line.

Tower foot during construction of Balboa-Portuguese Frontier Line, showing restoration of the affected ground.

Increasing height of the Belesar-La Lomba Line

Characteristics of the environment / facility		Outstanding environmental actions
Zones with steep inclines.	→	Regeneration of two accesses reconstructing the slopes and providing water passage.
The "Camino de Santiago" passes under span 177-178.	→	Restoration of a part of the Camino de Santiago with excavation residue. Soil was added and compacted with a manual leveling machine

The Belesar-La Lomba Line where it passes through O Cebreiro.

The Belesar-La Lomba Line where it passes through the Valcarcel Mountains.

Transformation of the 132 kV Mudarra-La Olma Line into a 220 kV line

Characteristics of the environment / facility		Outstanding environmental actions
A major passage of storks in the area.	→	Installation of "bird-saver" devices on 3.6 km of line.

Boimente Substation

Characteristics of the environment / facility

The northeast slope of the substation presented gullies and landslides due to hydric erosion.

Outstanding environmental actions

Slope regeneration: The profile was reconstructed, a layer of turf added, hydroseeding was carried out, a fiber mantel installed, *Salix Atrocinerea* was sown and ditches of stone and gravel were constructed to prevent erosion.

Landscape conditioning of the Boimente Substation.

Evolution of recovering a slope at the Boimente Substation.

Integration of the Aparecida Substation in its environment.

Furthermore, archeological surveys were carried out near and around the derivation of the Asco-Pierola-Begues Line to the La Espluga Substation and at the La Espluga, La Roda de Andalucia, Cabra and Olmedo Substations because of the proximity of areas rich in archeological sites. It can be emphasized that during the archeological survey of the Olmedo Substation, prehistoric remains were found; a well with organic remains, a vessel and a grain store. These were deposited in the Museum of Valladolid.

Finally, landscaping work was carried out at the La Eliana, Castejón, Almazán, Santa Engracia, Aparecida and Boimente Substations to diminish visual impact and to improve the integration of facilities in the environment.

Landscaping work

La Eliana	Located near houses. The existing vegetation screen has been improved by sowing very resistant native varieties and a new barrier has been created by planting olive, pine and carob trees as well as bushes.
Castejón	Located on the banks of the Ebro river. A vegetation screen has been created using a mixture of gallery forest tree species characteristic of Ebro groves, as previously agreed with the Government of Navarra.
Almazán	Located in a rural environment, near National Road 111. Arboreal species and bushes have been sown in the substation area, forming a small mixed coppice. Also, a vegetation screen has been created using native species.
Santa Engracia	Located in a rural environment. 50 almond trees, 10 pine trees, and 100 units of different bushes (broom, sloe, tencrium, cotoneaster) and aromatic plants (lavender, rosemary and thyme) have been planted. All substations slopes were also hydrosown.
Boimente	Located in an area with an ample visual basin. A vegetation screen has been created using native species *(Betula pubescens, Salix alba, Castanea sativa y Quercus robur)*.
Aparecida	Located in a rural environment. All substation buildings have been built with materials which concord with the landscape.

6.3 Environmental actions in maintenance

Environmental actions during facility maintenance is systematically carried out by periodic inspection of facilities and through environmental audits made during the year. These permit definition and application of preventive and corrective measures and check the effectiveness of measures taken during the construction phase.

Activities related to the **protection of birdlife:**

- A new project has been initiated in collaboration with the Doñana Biological Station, to analyse the efficiency of anticollision marking with "bird-saver" devices and also to determine their life expectancy on electric energy transmission lines owned by Red Eléctrica. For this purpose approximately 10 km of the 400 kV Palos-Guillena Line have been marked, 8 of these kilometres were marked with spiral bird flight diverters and 2 kilometres with an experimental "bird-saver" device designed by Red Eléctrica.

Installation of bird flight diverters ("bird-saver" devices).

- Marking the lines with spiral bird flight diverters was completed in the Andalucía, Aragón, Castilla-León, Extremadura, Madrid and Murcia Regions. During 2004 an agreement of collaboration was signed with Aragón and the pending activities previously agreed with Extremadura and Murcia for correction of some electrical line laying and reduction of the collision rate continued.

Evolution in marking during the last four years is as follows:

Kilometres of marked lines	Until 2001	2002	2003	2004
	316	400	448	544

Installation of devices to discouraging nesting on the Sanabria-Mudarra Line.

- Avifauna monitoring studies have been carried out in the connection of the Pinar-Tarifa line to the Puerto de la Cruz Substation.

- Work on monitoring nesting and installing devices for discouraging white stork nesting have continued in the regions of Andalucía, Castilla-La Mancha, Castilla-León, Extremadura and Galicia.

As for activities related to the **protection of the landscape:**

- Landscaping of five substations was improved as follows:
  - Two substations were closed off by using native plants to do so.
  - Waste areas at two substations was upgraded.
  - Planting was carried out at one substation.
  - Reduction of the visual impact at three substations; substituting the fence, painting of access gates, etc.

Activities related to **preventing contamination:**

- Conditioning has been carried out to control spillage from the three fuel tanks at the Tarifa Substation.
- A revision of 30% of Red Eléctrica's auxiliary transformers was carried out and in view of the results a proposal containing the necessary preventive measures was elaborated. During 2005 systems will be set up for controlling spillage on 11 transformers.

Measuring of electromagnetic fields at the Centenario Substatio.

- An environmental revision was made of related systems of oil collection at power transformers in 10 substations to assess the environmental status of the new assets acquired by Red Eléctrica on 31 December 2002 and a proposal of necessary preventive measures was elaborated.

Activities related to **electromagnetic field and noise control:**

- During 2004 the programme to measure electromagnectic fields and the noise level was put into practice, the object being to measure these parameters at Red Eléctrica lines and substations over the next 5 years.

Measuring electromagnetic fields under the Sabiñánigo-Escalona line, near Sardá (Sabiñánigo).

During 2004 the level of exposure to electrical fields, magnetic fields and audible noise for the general public in the vicinity of Red Eléctrica facilities was determined (measurements were taken under line conductors and at substation perimeters).

Measurements were taken at 173 points (137 lines and 36 substations), which means a total of 1,116 electrical field measurements, 1,116 magnetic field measurements and 1,070 noise level measurements.

- Because of the absence in Spanish Law of rulings on electric and magnetic fields, we use the European recommendation concerning public exposure which states that the public should not be exposed to 50 Hz electric and magnetic fields over 5 kV/m and 100 μT, respectively.

In the case of magnetic fields, the recommendation has been attained because none of the measurements has surpassed a value of 100 μT.

In the case of electrical fields, the recommendation has been attained in all the measurements taken outside the right-of-way (10-15 m) of the lines. In the case of measurements taken under line conductors, the recommendation was surpassed at 7 points, but points were not very frequented. At substations, only one point surpassed the recommended value.

Measuring noise fields under the Sabiñanigo-Escalona Line, near Sardá (Sabiñanigo).

Measuring electromagnetic fields under the Valdecaballeros-Guillena/ Valdecaballeros-Don Rodrigo Line.

Evaluation of the sound level measurements is more complicated, there is no national ruling that can be applied because at most of the points at which measurements were taken, the noise was due not to the facility but rather to traffic, machinery, planes taking off, etc. However, when the main source of noise was a high voltage line, the noise did not surpass, in any case, a value of 50 dBA.

6.4 Waste

Waste is generated by maintenance as well as by construction of power lines, substations and buildings.

As a result of its **maintenance work,** Red Eléctrica has identified the waste material shown on the following table, giving the amounts generated in the last three years.

Waste from maintenance activities

	Waste		The amount dealt with (kg) 2002	2003	2004
Non-dangerous waste	Sludge from septic tanks		50 *	37 *	37 *
	Scrap	Metal	1,347,029	1,859,244	1,054,951
		Inert		407,932	100,920
	Paper and cardboard		103,685	87,609	75,155
	Toner		356	466	530
	Timber		33,827	73,385	46,010
	Vegetable waste		2,180	611,780	349,540
	Plastics		-	750	5,260
	Vegetable oil from kitchens		400	320	320
Dangerous waste	Used oil		79,065	51,925	61,042
	Oil and water mixtures		14,060	178	58,760
	Transformers with PCB		0	0	0
	Oil with PCBs		0	3,238	0
	Lead batteries		1,097	3,436	3,750
	Nickel/Cadmium batteries (1)		15	13,323	16,084
	Small batteries		262	120	141
	Fluorescent tubes		341	258	356
	Hydrocarbon impregnated soil		800	10,495	4,762
	Containers that have held dangerous substances		448	1,134	164
	Absorbent and filter materials, cleaning cloths and protective clothing contaminated by dangerous substances		550	1,909	1,139
	Silica gel (2)		-	113	328

* Amounts in m³

(1) Many Ni/Cd batteries have been replaced.
(2) This product is being replaced.

Storage area for waste in the Don Rodrigo Substation yard.

Maintenance activities do not imply regular generation of waste, either in terms of type or quantity. This is the reason why there are large variations in the figures for different years.

For this reason it is difficult to set targets for reducing waste to a minimum.

Therefore improvements are aimed at finding the most appropriate method of handling the waste, through re-use, recycling or valuation of items of waste where this is possible. The final destination of waste generated in 2004 is shown below:

Non-dangerous waste		Management
Sludge from septic tanks		Purification / Elimination
Scrap	Metal	Recycling
	Inert	Elimination
Paper and cardboard		Recycling
Toner		Recycling
Timber		Resale / Elimination
Vegetable waste		Add to soil / Resale / Elimination
Plastics		Recycling
Vegetable cooking oil		Resale

Dangerous waste	Management
Used oil	Recovery / Resale
Oil and water mixtures	Recovery / Resale / Elimination
Oil with PCBs	Decontamination and destruction
Lead batteries	Lead recovery / Elimination
Nickel cadmium batteries	Resale / Elimination
Small batteries	Recovery / Elimination
Fluorescent tubes	Recovery / Elimination
Non-halogenated solvents	Elimination
Hydrocarbon impregnated soil	Elimination
Containers that have held dangerous substances	Recycling / Elimination
Absorbent and filter materials, cleaning cloths and protective of clothing contaminated by dangerous substances	Resale / Elimination
Silica gel	Elimination

To control waste generated by **construction activities,** Red Eléctrica provides contractors with copies of the corresponding environmental specifications (these are part of the contractual conditions) before the work begins. The specifications define the corresponding storage and handling requirements. The correct fulfillment of the specifications is verified during environmental supervision of sites and in-house audits.

6.5 Emergency plans

Since the creation of Red Eléctrica in 1985, the most frequent accidents have been leaks and spillage of contaminating material, followed by fires. In 2004 there were seven accidents with spillage of contaminating material and two fires due to power line failures and in each case action was taken immediately, applying the necessary corrective measures.

The following table shows accidents that have occurred at Red Eléctrica in the last six years and for 2004 alone:

Accidents in Red Eléctrica

	Total	2004
Explosions	**2**	**-**
Power machines	-	-
Current transformers (CT) and capacitor voltage transformers (CVT)	2	-
Fires	**7**	**2**
Due to line faults	7	2
Due to burning forest waste	-	-
Spills and leakage (use, maintenance, storage)	**13**	**7**
Fuel tanks	2	-
Oil in power machines	2	1
Auxiliary transformer oil	1	-
CT and CVT oil	2	2
Circuit breaker oil	1	1
Contaminants in stored equipment	1	-
Movement of equipment during maintenance	4	3
Other	**3**	**-**
Flooding of carpark and pump room	1	-
Tower collapse	1	-
Mixture of bleach and nitric acid by cleaners	1	-

After considering the environmental consequences of the accidents, it can be seen that they were few in number and the environmental effect was low, mainly due to preventive measures.

In the case of spillage of contaminant materials and to avoid consequences derived from this type of accidents, Red Eléctrica carries out a periodic maintenance of the equipment containing these types of substances. The installation, storage and handling of equipment and contaminant material is done on waterproof surfaces to avoid spillage to the ground.

Practicing fire fighting with fuel spillage. Red Eléctrica´s Emergency Group.

As a preventive measure to avoid consequences arising from fires produced by power line failure, Red Eléctrica carries out felling of trees and selective pruning to clean the right-of-ways and to ensure that minimum safety distances are maintained, at an approximate cost of 2,952,405 million Euros.

6.6 Collaborators

Red Eléctrica considers suppliers and contractors an important part in developing its activities. Red Eléctrica extends its commitment to the environment to each of them as an integral part of the Red Eléctrica team.

An increase has been detected in the number of suppliers offering qualified products and services who have adopted, or are in the process of adopting, an environmental management system certified by an external organization. This is a sign of increased awareness and implication on the part of our suppliers.

It is necessary to establish a grading system to define the criteria to select those who can guarantee a well-done and qualified job so that all the work developed by our collaborators is carried out in accordance to Red Eléctrica principles.

In 2004 a workshop was created to revise the list of qualified suppliers and to analyse the problems that arise in their daily work. The results indicated that a more in-depth study of the qualification process was needed and that it should be more demanding.

Because of this, a systematic ranked and graded series of qualification levels is to be defined and established in 2005, to permit evaluation of the actual levels of products and services that Red Eléctrica defines as "qualified".

CHAPTER 7

Research and development

The activities of Red Eléctrica attract considerable attention from the public and this, added to its own initiative, compel us to fund a programme of active and continuous research

in collaboration with other organisations and government agencies for environmental protection studies and projects. For this reason, 9.54% of the total R&D budget for 2004 was assigned to environmental studies and projects.

The environmental research projects carried out by Red Eléctrica in 2004 are given below:

BIRDLIFE

"Analysis of the Performance and Life Expectancy of the Anti-collision Bird Flight Diverters ("Bird-savers") on Electric Energy Transmission Lines", in co-operation with the Doñana Biological Station (Scientific Research Board-CSIC). This project was launched in 2004 and is programmed to end in 2006.

Experimental marking on the Palos-Guillena Line.

Red Eléctrica continues to investigate new manners to further increase birdlife protection. The anti-collision measures presently installed are called "bird flight diverter spirals" ("bird-savers"). These have shown to be highly effective in several research studies in which organizations of renowned prestige have participated.

In 2004 Red Eléctrica initiated a project which has not yet produced any definite results. Its principle objectives are as follows:

- To carry out laboratory tests regarding color loss of the flight diverter spiral ("bird-saver"), and of a new marking device designed by Red Eléctrica.
- To carry out on site tests regarding the performance of the new marking device, and to compare it to flight diverter spirals.
- To carry out on site tests regarding the efficiency of different colors for the flight diverter spirals in relation to different bird species.
- To carry out laboratory and on site tests regarding the durability of the material of both types of marking devices.

An experimental study has been initiated in which about 10 km of line has been marked, 8 km of which have been marked with the flight diverter "bird-saver" spirals and 2 km with the new devices. A line located in the southern part of the Iberian Peninsula was selected for the study because part of the line passes through an IBA (Important Birdlife Area).

A study, in co-operation with the Doñana Biological Station (under the Scientific Research Board-CSIC), **on the utilisation of Red Eléctrica Power Substations by the Lesser Kestrel *(Falco naumanni)*) in Navarra and Aragón – and their importance for preservation of the species at a national level.** The project started in 2002 and will be completed in 2004.

This study revealed a surprising fact: There are flocks of thousands of Lesser Kestrels *(Falco Naumanni)* from very diverse origins at Red Eléctrica Substations in Navarra and

Aragón. In 2004 occupancy was detected in six substations, two more than during previous years. The conclusion is that the presence of these birds does not generate any risk for them, nor does it alter normal functioning of the facility.

"Use of Power Line Towers for Nesting by Birds of Prey", in collaboration with the Wildlife Section of the Territorial Service of the Environmental Council of the Autonomous Community of Castilla-León. The object is to protect the Peregrine Falcon *(Falco Peregrinus)* in the province of Valladolid.

Peregrine Falcon nest with eggs.

This project monitors the condition of the Peregrine Falcon population in Valladolid. In 2004 a total of 33 Peregrine Falcon nests were detected, 36% on natural bluffs and the remaining 64% on power line towers. The results indicate that the power lines play a significant ecological role where the natural habitat lacks adequate supports for bird nests.

Peregrine Falcon chicks.

"Monitoring Nesting Habits of the White Stork *(Ciconia ciconia)*", in collaboration with Asistencias Técnicas CLAVE. The project was initiated in 2000.

Because of the increasing number of White Stork (Ciconia Ciconia) colonies which have settled in our facilities, the object of these long years of research is to find practical solutions to power line maintenance problems without undermining the important ecological role that towers play on occasions as supports for bird nests.

In 2004 monitoring work on the White Stork (Ciconia Ciconia) nesting habits continued, verifying the effectiveness of devices used to discourage this (the device was patented in 2000) on Red Eléctrica electrical towers in Andalucia, Castilla-León, Extremadura and Madrid.

VEGETATION

"Treatment of Tree Stumps in Electric Line Right-of-Ways" , by Biotic and Abiotic Means", in collaboration with the Forest Pathology Unit of the Woodlands and Pasture Cultivation Department of the Faculty of Mountain Engineering of the Madrid Polytechnic University. Initiated in 2003 and concluded in 2004.

Abiotic treatment of tree stumps of eucalyptus.

The object of this project was to develop a method of preventing renewed growth of the stumps of trees felled in the process of clearing the right-of ways which, because of their fast growth characteristics, could pose a threat to the safety distances of conductors. The results obtained in 2004 from the inoculation campaign carried out during the previous year demonstrate that the use of certain abiotic treatments in appropriate doses avoids renewed growth, although it should be pointed out that when biotic products are used, a longer study period is needed to obtain reliable results, because the process is slower.

ELECTROMAGNETIC FIELDS

"Currents Induced in the Human Body by Electromagnetic Fields of Industrial Frequency", in collaboration with the Salvador Velayos Institute of Applied Magnetism (supported by the Complutense University of Madrid), RENFE, the Scientific Research Board-CSIC and UNESA. The project was started in 2003 and is scheduled to conclude in 2006.

Equipment to generate and measure the magnetic field and the currents induced into a simulated human body.

The objective is to develop a model to measure the density of currents induced into the human body by external fields, based on a morfological simulation, as accurate as possible, and on the detailed analysis of the electrical and magnetic parameters of the different organs and tissues of our bodies.

"Effects of Low Frequency Electromagnetic Fields on Programmed Cellular Death (PCD)–Implications for the Immune System", in collaboration with the University of Valladolid and UNESA. The project finished in 2004.

During previous research projects carried out by the University of Valladolid, UNESA and Red Eléctrica, it was demonstrated that electromagnetic fields of industrial frequency do not directly affect cellular processes essential for the development of any type of cancer, such as proliferation. However, there was a persisting doubt concerning any indirect effect of these fields on the tumor development.

The purpose of the study was to clarify whether electromagnetic fields of industrial frequency have any effect on the most important alternative way to promote cancer: failure of the immune system. In particular, it would study if Programmed Cellular Death would be affected. This is a mechanism of cellular "quality control" responsible for eliminating possible defective cells before they transform themselves into tumors.

The results obtained from both the in-vitro cellular studies and from in-vivo experiments with laboratory animals show that electromagnetic fields of industrial frequency, within the levels recommended by the European Union (100 μT), cannot affect the immune system via the alteration of the Programmed Cellular Death mechanism.

CHAPTER 8

Training

Red Eléctrica believes that it is strategic to train its employees in environmental matters so that they will be able to carry out their duties in a more environmentally conscientious manner.

This is the reason why 5.4% of the employees received specialised environmental training in 2004. Training is more than simple professional training; an additional goal is to improve the environmental habits of the family of employees.

2004 environmental training activities for Red Electrica employees were as follows:

Environmental Department Technicians during a bird identification course.

Line Maintenance Technicians during a practical session of nest dissuading device installation.

Courses		For
Environmental legal procedure for facilities		Managers
Protected Natural Spaces and Natura 2000 Network in facility planning		
Good environmental practice en el mantenimiento de instalaciones	Environmental Management System	Line and substation maintenance departments
	Legal requirements	
	Environmental actions in maintenance work	
	Treatment of vegetation	
	Birdlife	
	Electromagnetic fields	
	Noise	
Specific clearing and trimming		Line Maintenance Department
Right-of-way clearing (access to facilities)		Line Maintenance Department
Installation of nest dissuading devices in situ		Line Maintenance and Engineering & Construction Departments
Company dangerous waste management system		Assistant Technicians of the Maintenance Department
Following-up environmental cost budget		Environmental Department
Identification avifauna		
Identification of vegetation		
Operation of electromagnetic field and noise measurement equipment		
Use of visual simulation software		
Planning and management of environmental risks		
Improvement in the use of cartography		

An analysis of training requirements for all Company areas is carried out annually. The resultant training plan for 2005 is shown below.

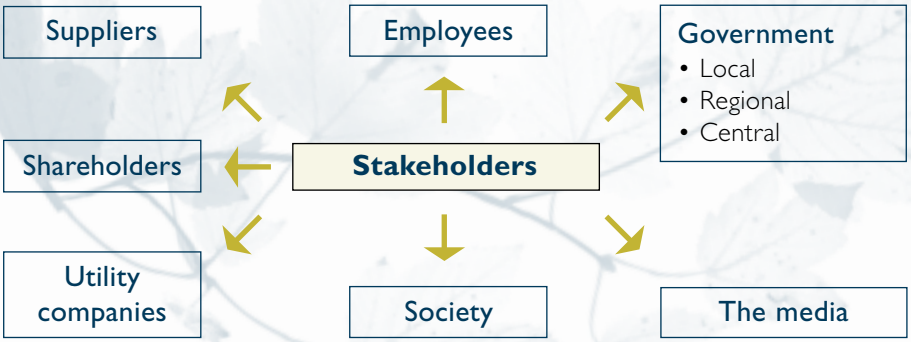
Courses		Goal	For
Environmental Management System (SIGMA)		Foster employee awareness of the importance of complying with the Environmental Policy and with the SIGMA Procedures and Requirements, and to alert them to significant environmental effects caused by their activities and of the environmental benefits of better behavior on their part.	All employees
Environmental site supervision of Power Lines and Substations	SIGMA Legal requirements Environmental Technical Specifications for Line and Substation construction Treatment of vegetation Birdlife Electromagnetic fields Noise	To become acquainted with and learn to understand the environmental impact caused by construction of high-voltage power lines and substations and to learn how to manage environmental factors in accordance with SIGMA.	Engineering & Construction Technicians of the Line & Substation Departments
Good environmental practice in facility maintenance	SIGMA Legal requirements Environmental maintenance practices Treatment of vegetation Birdlife Electromagnetic fields Noise	To learn about the environmental impact caused by high-voltage power line and substation maintenance and about the SIGMA Envoironmental Requirements.	Line and Substation Maintenance Departments
Felling, trimming and accesses		To get to know the features of a forest and the relationship between fauna and vegetation so that felling, trimming and clearing activities can be carried out in accordance with environmental criteria.	Line Maintenance Department
Installation of devices to discourage nesting		To acquire the knowledge and skills needed to increase the efficiency of devices that discourage nesting.	Line Engineering & Construction and Maintenance Technicians
The Environmental Management System in building maintenance		To learn about the duties and responsibilities of each job so that the Environmental Policy and the SIGMA requirements can be applied.	Building maintenace technicians
Electromagnetic fields and noise		To become acquainted with the environmental impact caused by electricity at Red Electrica installations (description, rules, measurements, impact on the population, etc.).	Managers

CHAPTER 9

Communication

Red Eléctrica is conscious of the interest aroused by the environmental aspects of its activities and facilities. It therefore believes its duty as a company is to constantly improve communications, to inform interested parties and to establish an open, fluid and continuous dialogue with them.

Relationship with interested parties



The **VII Environmental National Congress**, designated "Summit Conference for Sustained Development" was held in November 2004. As sponsor, Red Eléctrica had its own corporate stand, while managers and technicians participated in forums, round-table conferences and working groups.

The President of Red Eléctrica, Mr. Luis Atienza, was one of the speakers and he participated in the dissertation on "Development of Sustained Facilities" and "Ten Years of Environmental Press", in this last one with the former and present Ministers of Environment, Elvira Rodríguez and Cristina Narbona, respectively.

In addition, our professionals participated in the round-table debates on "Sustainable Energetic Models" and "New Challenges in Environmental Information" during the Technical Conference on "The Challenge of Environmental Education in the Face of Sustained Development" and in several work groups on acoustic contamination, the Natura 2000 Network, infrastructure planning, sustainability reports, etc. They wanted

with their participation to make a statement concerning the continuous effort made by Red Eléctrica to reconcile sustainable development in construction work with the continuity of a secure and reliable power network.

Besides the release of the documentary film "The Forest of Forests", produced by Red Eléctrica and directed by the naturalist Joaquín Araujo, the organizers reserved a session for our company to present its activities as electrical system operator and network manager, together with its Policy and Environmental Management System.

Also worth noting is the publication and propagation in 2004 of the book "IV Technical Conference on Electrical Lines and Environment", organised by Red Eléctrica in 2003. This publication includes the conference report, as well as written contributions on various subjects related to the environment and the electrical sector.

The book "Articles of IV Technical Conference on Electrical Lines and Environment".

We also continue to promote **collaboration** with several organizations.
The most important are listed below:

- Collaboration with SEO to carry out the national White Stork census in 2004.

- Collaboration with the Doñana Biological Station (CSIC), to develop the project for "Analysis of Efficiency and the Life Expectancy of Bird Flight Diverters ("bird-savers") on Electric Energy Transmission Lines", initiated in 2004 and programmed to conclude in 2006.

Marking the Gurrea-Sabiñánigo Line where it passes the ZEPA "La Sotenera".

- A collaboration agreement with the Regional Government of Aragón, to develop projects on electrical lines, to minimise collision risks for threatened birdlife. Programmed for completion in 2007.

Poster of the Life Naturaleza Project "Preservation of the Bonnelli´s Eagle".

- A collaboration agreement with the Murcia Council for Agriculture, Water and Environment to protect and recover the population of Bonelli's Eagle by marking power lines. This project is included in the Life-Naturaleza Project "Preservation of Bonelli's Eagle (Hieraaetus Fasciatus) – Almenara, Murcia" and will be continued to 2006.

- A collaboration agreement with the Council of Agriculture and Environment of the Regional Government of Extremadura to analyze potentially dangerous sections of the line and to install bird flight diverters ("bird-savers"). This agreement will extend to 2005.

- An agreement between Red Eléctrica and the Doñana Biological Station (Scientific Research Board–CSIC) to study the use made of the Red Eléctrica Power Transmission Substations by the Lesser Kestrel *(Falco Naumanni)* in Navarra and Aragón and their importance for preservation of the species on a national level.

- Collaboration with the Board of Directors of the "Los Alcornocales" Natural Park in restoring cork trees to a 67 acre estate which belongs to the park. Restoration finished in 2004.

- Financing a sensitivity study of the Bear and the Capercaillie (in Spanish-"Urogallo") in Cantabria in collaboration with the Doñana Biological Station (Scientific Research Board–CSIC). This study started in 2004 and will continue in 2005.

Red Electrica speech at the International Seminar on Electromagnetic Fields and Health in Asunción (Paraguay).

- An agreement of collaboration with the Institute of Applied Magnetism of the Complutense University of Madrid, RENFE, the Scientific Research Board (CSIC) and with UNESA for the Project "Currents Induced in the Human Body by Industrial Frequency Electromagnetic Fields", which started in 2003 and will continue to 2006.

- Collaboration with the University of Valladolid and UNESA on a Research Project on the "Effects of Low Frequency Electromagnetic Fields on the Programmed Cellular Death Mechanism: Implications for the Immune System", which concluded in 2004.

Exchanging experience on electromagnetic fields with Japan.

- An agreement with the Spanish College of Physicists to sponsor the web site: www.fisicaysociedad.es, on 50 Hz Electric and Magnetic Fields.

- An agreement with the Entorno Foundation to promote environmental improvement of the company through training, investigation and research activites in collaboration with the business world.

We also participated actively on various domestic and international work groups on different subjects, together with other technical staff and experts. They included the following groups:

Exchange of Experience	**Organisers**
Electromagnetic fields	
Work group on electromagnetic fields	UNESA
Dealing with experience from all the companies belonging to the group on management and communication of all aspects related to electromagnetic fields	Chugoku Electric Power Co. Inc. Tokio Electric Power Company Japan Nus Co.Ldt.
International seminar on "Electromagnetic Fields and Health"	CIER
Electromagnetic field mitigation techniques	CIGRÉ
Birdlife	
Round-table conference "Birdlife and Electrical Lines"	The Technical School of Engineering - Sevilla
8th International Symposium on Enviromental Concerns in Right-of-way Management	EPRI
Sustainability	
VII National Congress on the Environment	CONAMA
Utility practices in sustainable development	CIGRÉ
Environment and society	EURELECTRIC
"Social responsibility of the Corporation" by Jonathan Porritt	The Entorno Foundation
Social Responsibility of the Corporation: The Creation of Sustainable Value	The San Pablo University-CEU
II Congress on Excellence and Quality in the Region of Madrid	Madrid Excelente
Congress on Sustainable Development	ENDESA and AEC
Subcommittee on "Environmental Management Systems"	AENOR
"React with energy" against climatic change	General Manager of Environmental Quality of the Regional Government of Aragon
Noise	
Regulations of Law concerning Noise	MIMAM
Environmental costs	
Evaluation of environmental costs in the electrical sector	AENOR
Electrical system	
Study Committee "Environmental Impact of Electrical Systems"	CIGRÉ
XII Master Course on Contamination Processes and Defense of the Environment in Madrid	Politechnic University Rector Bureau - Madrid
SF6 in the electrical industry	CIGRÉ
Evaluation of environmental impact	MIMAM
II Advanced Course on Environmental Management Policies and Instruments	The Carolina Foundation and the San Pablo University-CEU

Red Eléctrica offers the public various channels of communication to handle queries and claims of an environmental nature. The channels include the web site (www.ree.es).

Consultation evolution

Field	2002	2003	2004
Birdlife	5	13	1
Electromagnetic fields	45	8	5
Green certificates	-	4	1
Environmental costs	-	-	1
Facilities	5	4	4
General environmental information	6	8	4
Publications	4	11	13
Noise	2	-	1
Total	**67**	**48**	**30**

Claim evolution

Field	2002	2003	2004
Impact on the landscape	-	-	1
Facilities	-	1	1
Administrative requirements	-	-	3
Fire risk	-	1	-
Noise	2	3	-
Total	**2**	**5**	**5**

Among the year's internal communication activities during the year the following are outstanding:

- A quarterly bulletin with the latest news on 50/60 Hz electrical and magnetic fields.
- *"Entre Líneas"*– A magazine containing news, company activities and significant events. It also includes articles on the environment.
- "*Red en Línea"*– An on-line publication on company activities which includes articles on the environment.
- *Internal web site*– a page containing details of company environmental activities.

CHAPTER 10

Environmental costs

One of the principles of the Environmental Policy of the Red Eléctrica group is "To guide the Group towards sustainable development, combining respect for the environment and support for progress and social welfare with business aspects, with the object of persistently creating value".

In 2004 Red Eléctrica invested 1,704,464.50 Euros (1,575,328.23 Euros in 2003) in environmental activities of new facilities. These investments correspond to the Environmental Impact Studies made on all projects, on enforcement of preventive and corrective measures, and on environmental supervision of electrical facilities during construction.

In the same manner, in 2004, Red Eléctrica spent 4,893,172.86 Euros (3,956,309.87 Euros in 2003) for environment protection and improvement. These costs correspond to enforcement of preventive and corrective measures on working facilities to prevent contamination; to the protection of avifauna, of vegetation and of soil; to carrying out environmental improvements on facilities, to good management of generated waste and to launching an electromagnetic field and noise measurement programme; together with other expenses which include an organizational unit composed of 18 technicians exclusively dedicated to these works, to diverse communication and training activities, to research projects related to environment and to the support of the environmental management system.

The environmental costs for 2004 are shown in the following table.

Environmental coast	**2004 (euros)**	**2003 (euros)**
Investments	1,704,464.50	1.575,382.23
Design and construction of new facilities	**1,704,464.50**	**1,575,382.23**
Expenses	4,893,172.86	3,956,309.87
Environmental Management System	**24,639.79**	**13,681.54**
Preventive and corrective measures at working facilities	**3,527,413.47**	**2,863,660.74**
Contamination prevention	121,833.00	-
Birdlife protection	131,555.61	114,770.26
Protection of vegetation	2,952,405.00	2,495,163.30
Protection of the soil	121,268.00	122,087.00
Electromagnetic field and noise management	100,047.10	-
Environmental improvements at substations	44,743.00	65,986.38
Waste handling	55,561.76	54,451.78
Research and development	**225,315.58**	**127,701.05**
Training and communication	**210,386.42**	**138,887.75**
Training and environmental awareness	4,606.00	15,355.93
Communication	205,780.42	123,531.82
Taxes and levies of an environmental nature	**2,815.90**	**13,205.59**
Overheads of Environment Department personnel	**902,601.70**	**799,173.20**

CHAPTER 11

Legal compliance

Red Eléctrica persists in a line of continuous improvement, and achieves it thanks to the increasing concern of employees in their daily tasks.

		Evolution of case files			
		Status			
		Filed	Fine and filed	Pending	Total
Year	2002	12	2	-	14
	2003	-	3	2	5
	2004	2	-	6	8

There were five case files were opened in 2003, four of which remained pending of resolution. During 2004, two of them were filed and qualified as non-serious, one resulted in a fine of 30.05 Euros because the trimming and clearing work was not carried out on a right-of-way, and another one resulted in a fine of 280 Euros because a track was built without a favorable environmental report.
Two proceedings are still pending.

In 2004 there were eight case files, one of which was qualified as serious. This encourages us to continue working and to adopt stricter measures to prevent a repetition of unwelcome situations.

Details are given below for the violation committed in each case file and its status.

	Evolution of case files		
	Status		
Violation	Filed	Fine and filed	Pending
Construction of tracks without authoritation	2	-	1*
Deviation of a water course	-	-	1
Occupation of mountains of declared public use	-	-	4
Total	**2**	-	**6**

(*) This case file has been qualified as serious.

CHAPTER 12

Environmental behaviour indicative values

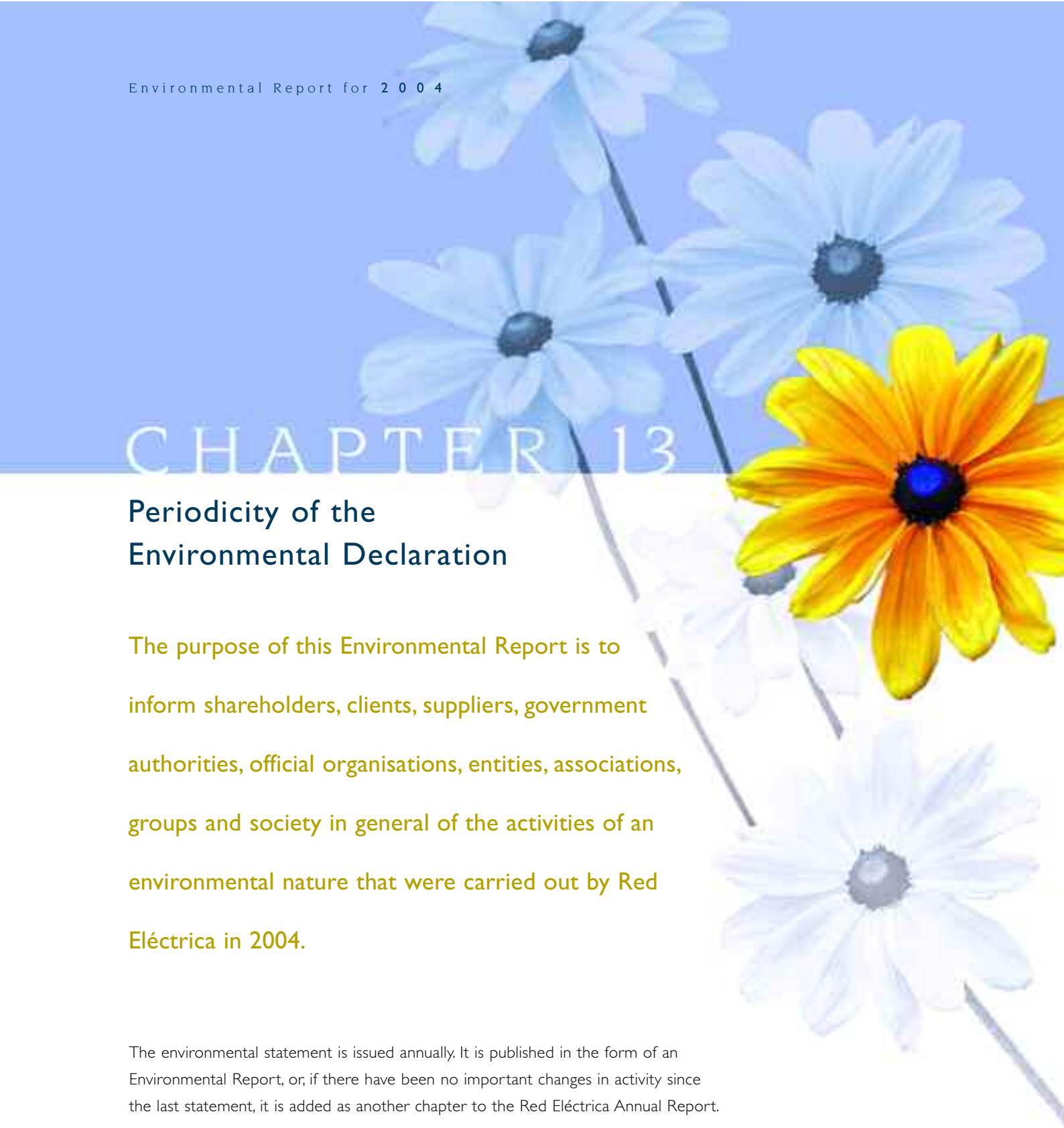
During 2004 work was carried out to find and design indicators which would allow us to recognise at any time, in a clear and concise way,

the actual results of our effort related to environmental matters and to transmit to our stakeholders the evolution of our environmental behaviour.

The work on this subject will be continued, so new indicators will be included in future issues of the report.

A table of environmental behaviour indicators is included below. This table relates each indicator to the chapter of this document where further information can be found.

Environmental behaviour indicative values		2002	2003	2004	Chapter
Percentage of environmental programme achieved	Environmental goals achieved / Total of environmental goals	73.69	72.20	73.40	4
Percentage of environmental effects in maintenance	Significant environmental effects / Total environmental effects in maintenance	8.51	9.30	17.20	5.2
Electricity consumption	MJ / day / m^2	1.55	2.01	1.69	5.2
Water consumption	m^3 / day	8.24	6.58	6.29	5.2
Paper consumption	kg / person / year	33.17	34.45	30.79	5.2
Percentage of habitat restored	New facilities constructed with landscaping restoration / New facilities constructed	-	33	14	6.2
Percentage of habitat protected	New facilities with archeological survey during construction / New facilities constructed	-	47	62	6.2
Marked lines (accumulated km)		400	448	544	6.3
Total production of dangerous waste (kg)		96,638	86,129	146,526	6.4
Total production of non-dangerous waste (kg)		1,546,477	3,085,146	1,676,346	6.4
Accidents with environmental consequences		15	6	9	6.5
Percentage of environmental R&D costs	Environmental R&D costs / Total R&D costs	3.90	6.80	9.54	7
Percentage of environmental training	Employees with environmental training / Total of employees	-	-	5.40	8
Environmental consultations (num.)		67	48	30	9
Environmental claims (num.)		2	5	5	9
Enviromental investment (Euros)		1,379,419.18	1,575,382.23	1,704,464.50	10
Environmental costs (Euros)		2,734,189.29	3,956,309.87	4,893,172.86	10
Case files open (num.)		14	5	8	11
Case files fined and filed (num.)		2	3	0	11



CHAPTER 13

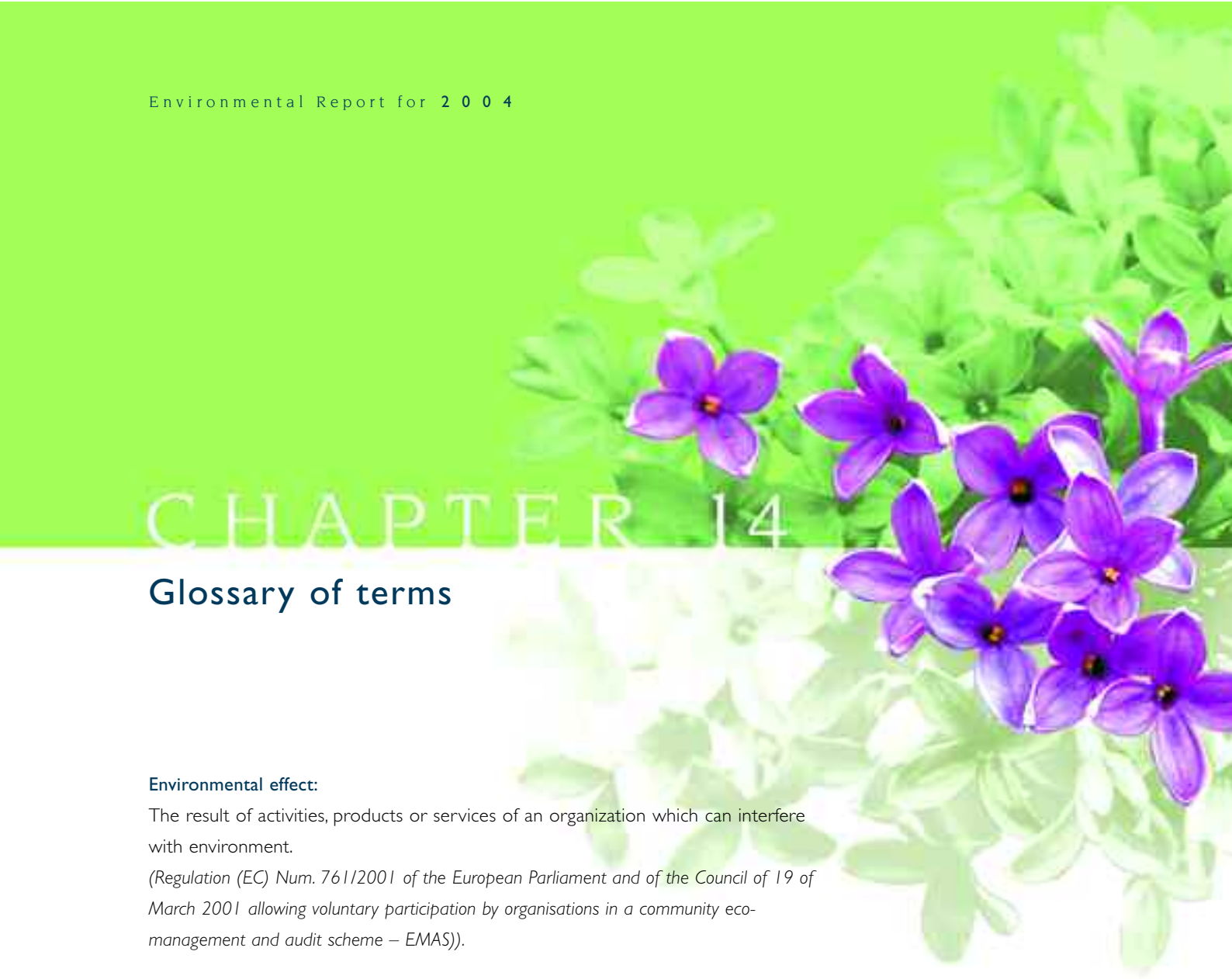
Periodicity of the Environmental Declaration

The purpose of this Environmental Report is to inform shareholders, clients, suppliers, government authorities, official organisations, entities, associations, groups and society in general of the activities of an environmental nature that were carried out by Red Eléctrica in 2004.

The environmental statement is issued annually. It is published in the form of an Environmental Report, or, if there have been no important changes in activity since the last statement, it is added as another chapter to the Red Eléctrica Annual Report.

The Spanish Standard and Certification Association (AENOR) has offices at Calle Genova 6, 28004 MADRID, and is an accredited verifying organisation, number E-V-0001. It verifies that the Red Eléctrica environmental statement complies with the requirements of Regulation (EC) Nº 761/2001 of the European Parliament and of the Council of the of 19 March 2001, allowing voluntary participation by organisations in a Community Eco-Management and Audit Scheme (EMAS).

The next statement will be presented and made public in the first semester of 2006.



CHAPTER 14

Glossary of terms

Environmental effect:

The result of activities, products or services of an organization which can interfere with environment.

(Regulation (EC) Num. 761/2001 of the European Parliament and of the Council of 19 of March 2001 allowing voluntary participation by organisations in a community eco-management and audit scheme – EMAS)).

Significant environmental effect:

Environmental effects which, having been evaluated under criteria defined by an organization, surpass the established limit.

(Definition by REE).

Environmental audit:

Management tool which includes a systematic, documented, periodic and objective evaluation of the efficiency of the organization, of the management system and of the procedures devoted to protecting the environment, in order to promote the operative control of those practices which might have an impact on the environment and to evaluate the execution of the environmental policy of the organization, especially of its environmental goals and targets.

(Regulation (EC) Nº 761/2001 of the European parliament and of the Council of 19 March 2001 which permits voluntary participation of organisations in a community eco-management and audit scheme – EMAS)).

Electric field:

In a point in space, it is the force that a stationary unit of charge experiments at that point. It is expressed in volts per meter (V/m).

(Electric and magnetic fields of 50 Hz. REE and UNESA, 1998).

Magnetic field:

In a point in space, force exerted on an element of current located in that point. It is expressed in amps per meter (A/m). The measurement unit in the International System is Tesla (T) or its fractions, in particular microtesla (μT).
(Electrical and magnetic fields of 50 Hz. REE and UNESA, 1998).

Dissuasive nesting device:

A device composed of various elements of galvanised steel, of various dimensions, which avoids nest construction and alighting of birds on the place where it is installed or on the device itself.
(Definition by REE).

Environmental impact:

Any change in the environment, either adverse or beneficial, which might derive from the activities, products or services of an organization.
(Regulation (EC) Nº 761/2001 of the European parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a community eco-management and audit scheme – EMAS)).

Environmental objective:

A general-purpose environmental objective stemming from the environmental policy which an organisation sets itself to carry out and which, as far as possible, is quantifiable.
(Regulation (EC) Nº 761/2001 of the European parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a community ecomanagement and audit scheme – EMAS)).

Environmental policy:

General objectives and principles of an organisation in regard to the environment, including compliance with all pertinent requirements and a commitment to continually

improve environmental behaviour. The environmental policy is the framework for establishing and revising the environmental goals.
(Regulation (EC) Nº 761/2001 of the European parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a community eco-management and audit scheme – EMAS)).

Waste:
Any substance or object belonging to any of the categories included in the annex to the Waste Act, which its owner disposes of, or has the intention or obligation to dispose of. In any event, items listed in the European Waste Catalogue will be included in this definition.
(Waste Act – Law 10/1998 of April 21st).

Bird flight diverter or Spiral (known as "Bird-savers"):
A white or orange polypropylene spiral in the form of a spindle, 30-35 cm in diameter and 100 cm in length. It is wrapped round the earth wire or conductor to act as a marker to prevent the birds from colliding into the wire.
(Definition by REE).

Visual simulation:
Infographics (a computer-aided graphic simulation technique) used to obtain a picture of a project which provides a very approximate idea of its appearance after construction. It includes the component parts and their integration with the local surroundings.
(Definition by REE).

Environmental Management System (SIGMA):
Part of the general management system that includes the organisation, planning, responsibilities, procedures, processes and resources to develop, apply, achieve, revise and maintain environmental policy.
(Regulation (EC) Nº 761/2001 of the European parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a community eco-management and audit scheme – EMAS)).

AENOR Asociación Española de Normalización y Certificación

ANEXO

ESQUEMA EUROPEO DE ECOGESTIÓN Y ECOAUDITORÍA (EMAS)

Eco-Management and audit scheme (EMAS)

VDM-01/004

Los Centros Certificados del Sistemas de Gestión Medioambiental de acuerdo con el esquema europeo de Ecogestión y Ecoauditoría (EMAS) de RED ELÉCTRICA DE ESPAÑA, S.A. nº VDM-01/004 son los siguientes:

The Establishments included in the Environmental Management System Certified according to the Eco-Management and Audit Scheme (EMAS) RED ELÉCTRICA DE ESPAÑA, S.A. nº VDM-01/004 are the following:

Delegación Regional Sur **CL INCA GARCILASO, 1** **EDIFICIO REE** **41092-ISLA DE LA CARTUJA** **(SEVILLA)**	**Delegación Regional Noroeste** **AV PARALELO, 55 EDIFICIO REE** **08004-BARCELONA**	**Delegación Regional Norte** **AV DE ENEKURI, 60** **EDIFICIO REE** **48014-BILBAO** **(VIZCAYA)**	**Delegación Regional Oeste** **CL ZALAETA, S/N EDIFICIO REE** **15002-LA CORUÑA** **(A CORUÑA)**
CECORE **CL ISAAC NEWTON, 13** **EDIFICIO REE** **28760-TRES CANTOS** **(MADRID)**	**Demarcación Bética (24 Subestaciones)** **CR SEVILLA-UTRERA, Km 17** **41500-ALCALÁ DE GUADAIRA** **(SEVILLA)**	**Demarcación Duero-Sil (35 Subestaciones)** **CR N-601, MADRID-VALLADOLID-LEÓN, Km 218** **47630-LA MUDARRA** **(VALLADOLID)**	**Demarcación Ebro (32 Subestaciones)** **CR ZARAGOZA-SARIÑERA, Km 9,2** **50162-VILLAMAYOR** **(ZARAGOZA)**
Demarcación Mediterráneo (22 Subestaciones) **CR ANTIGUA CASTELLBISBAL-RUBÍ, S/N** **PI CAN PI DE VILAROC** **08191-RUBÍ** **(BARCELONA)**	**Demarcación Tajo (24 Subestaciones)** **CR N-1 MADRID-BURGOS, Km 20,7** **28700-SAN SEBASTIÁN DE LOS REYES** **(MADRID)**	**Almacén General** **CR N-601 MADRID-VALLADOLID-LEÓN, Km 218** **47630-LA MUDARRA** **(VALLADOLID)**	**Delegación Regional Levante** **CL PUEBLA LARGA, 18** **46183-LA ELIANA** **(VALENCIA)**

Fecha de validación: 2005-04-15
Validation Date

AENOR Asociación Española de Normalización y Certificación

Por AENOR. El Director General
On behalf of AENOR. The General Manager

AENOR Asociación Española de Normalización y Certificación

ESQUEMA EUROPEO DE ECOGESTIÓN Y ECOAUDITORÍA (EMAS)

Eco-Management and audit scheme (EMAS)

VDM-01/004

La Asociación Española de Normalización y Certificación (AENOR) a través de procesos de auditoría acreditados, certifica que:
The Spanish Association for Standarization and Certification (AENOR) through acreditated audit processes certifies that:

RED ELECTRICA DE ESPAÑA, S.A.

tiene implantado un sistema de Gestión Medioambiental que cumple los requisitos del Reglamento Europeo 761/2001
has implemented an environmental management system that complies with the requirements of the European Regulation 761/2001

para las actividades de:
for the activities of:

LA INGENIERÍA, LA CONSTRUCCIÓN Y EL MANTENIMIENTO DE LA RED DE TRANSPORTE DE ENERGÍA ELÉCTRICA Y OPERACIÓN DEL SISTEMA ELÉCTRICO.

THE ACTIVITIES RELATED FOR THE DESIGN, CONSTRUCTION AND MAINTENANCE OF POWER TRANSMISSION NETWORK AND THE OPERATION OF THE ELECTRIC POWER SYSTEM.

que se realiza/n en o desde los establecimientos:
which is/are carried out in or from the establishments:

Sede Social
PO CONDE DE LOS GAITANES, 177
28109 - ALCOBENDAS
(MADRID)

VER DIRECCIONES INDICADAS EN EL ANEXO
LAS LÍNEAS CORRESPONDIENTES A LA RED DE TRANSPORTE

y que la información incluida en la declaración medioambiental se ajusta a los requisitos expresados en dicho Reglamento y ha sido validada con fecha 2005-04-15.
and the information included in the environmental declaration complies with the requirement of that European Regulation and has been validated on 2005-04-15.

Fecha de validación: 15 de abril de 2005
Validation Date

AENOR Asociación Española de Normalización y Certificación

Firma: D. Ramón NAZ PAJARES
Signature **Director General de AENOR**
General Manager of AENOR.

20 aniversario
1985 · 2005

P° del Conde de los Gaitanes, 177
28109 Alcobendas - Madrid
www.ree.es