Environmental Report 2001

EDP
Electricidade de Portugal, S.A.

ENVIRONMENTAL POLICY

Basic Principles of EDP Board of Directors Declaration on Environmental Policy

Considering electric energy as a crucial factor for the development and improvement of the quality of life;

Recognising that the activities associated with electricity generation, transmission and distribution can produce adverse environmental effects;

In the incessant quest for a proper balance between its essential function and the safeguarding of environmental values;

EDP adopts the following principles:

- *To consolidate environmental assessment criteria in the company's activities and to audit its performance;*
- *To examine the importance of the environmental issues in generation, distribution and final use of electricity;*
- *To encourage rational energy usage systems;*
- *To increase knowledge concerning the interaction of the company's activities with the environment;*
- *To promote nature conservation and cultural advancement strategies;*
- *To guarantee appropriate mechanisms of environmental information;*
- *To encourage the use of clean technologies and suitable waste management practices.*

1994

Environmental Report 2001

EDP
Electricidade de Portugal, S.A.

Water is not necessary to life – water is life.

Antoine de Saint-Exupery

EDP Environmental Report 2001 is illustrated with water–related themes. Hydro resources are essential to natural ecosystems and to the survival of all living organisms. EDP makes an intensive use of this resource and strives to guarantee its sustainable management.

The images presented in this report were mainly taken in water streams near EDP's hydroelectric power plants and other installations.

Chairman's Message

Companies, in particular organisations similar to EDP, are witnessing an ever-increasing number and diversity of parties interested in their activities. Both inside and outside the company people require more information, not only regarding economic and financial aspects but also as concerns social and environmental matters.

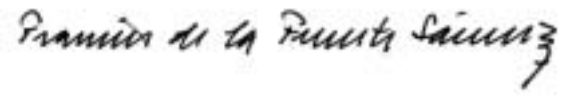
To meet such needs EDP has been striving to disclose information on more systematic basis. In 2001 we met our goal of simultaneously publishing the Annual Report and the Environment Report, in a clear manifestation of our desire to achieve a greater integration of the environmental, social and economic pillars of the company's overall management.

Our overriding objective is to ensure that the information we make available becomes a useful tool for our stakeholders in their evaluation of the company's performance. Thus, we now begin a process of progressive adaptation of the report's structure and content to the guidelines of GRI – Global Reporting Initiative. We are fully aware that it is not yet possible to comply with these completely; however, we do believe that the path to follow must adhere to the standards adopted by many of the world's leading institutions in the area of sustainable development.

In 2001, some particularly meaningful facts influenced EDP's action in the environmental arena: at European Community level, the preparations for the ratification of the Kyoto Protocol and the approval of Directives on the limitation of atmospheric pollutants; at home, the unveiling of the E4 Programme – Energy Efficiency and Endogenous Energies and the of the National Plan for Climate Change. EDP acted in a proactive manner, accepting these developments as opportunities to assert itself in a sector undergoing swift mutation and where concerns about sustainable development assume increasing significance.

Internally, 2001 was also a notable year: EDP obtained the ISO 14 001 environmental certification of Sines thermoelectric power plant. This concluded the process of securing the environmental certification of all our major thermal power generating centres. We shall now advance, in a systematic fashion, with a view to extending the certification process to our hydroelectric installations.

We are convinced that a company which turns in a good environmental performance in its activities – specially in a sector experiencing such rapid change as the electricity sector today – has greater prospects of creating sustainable value for its shareholders, anticipating new markets, reducing risks and bolstering its customer base. This is a challenge we are ready to face with confidence.



Francisco de la Fuente Sánchez
Chairman

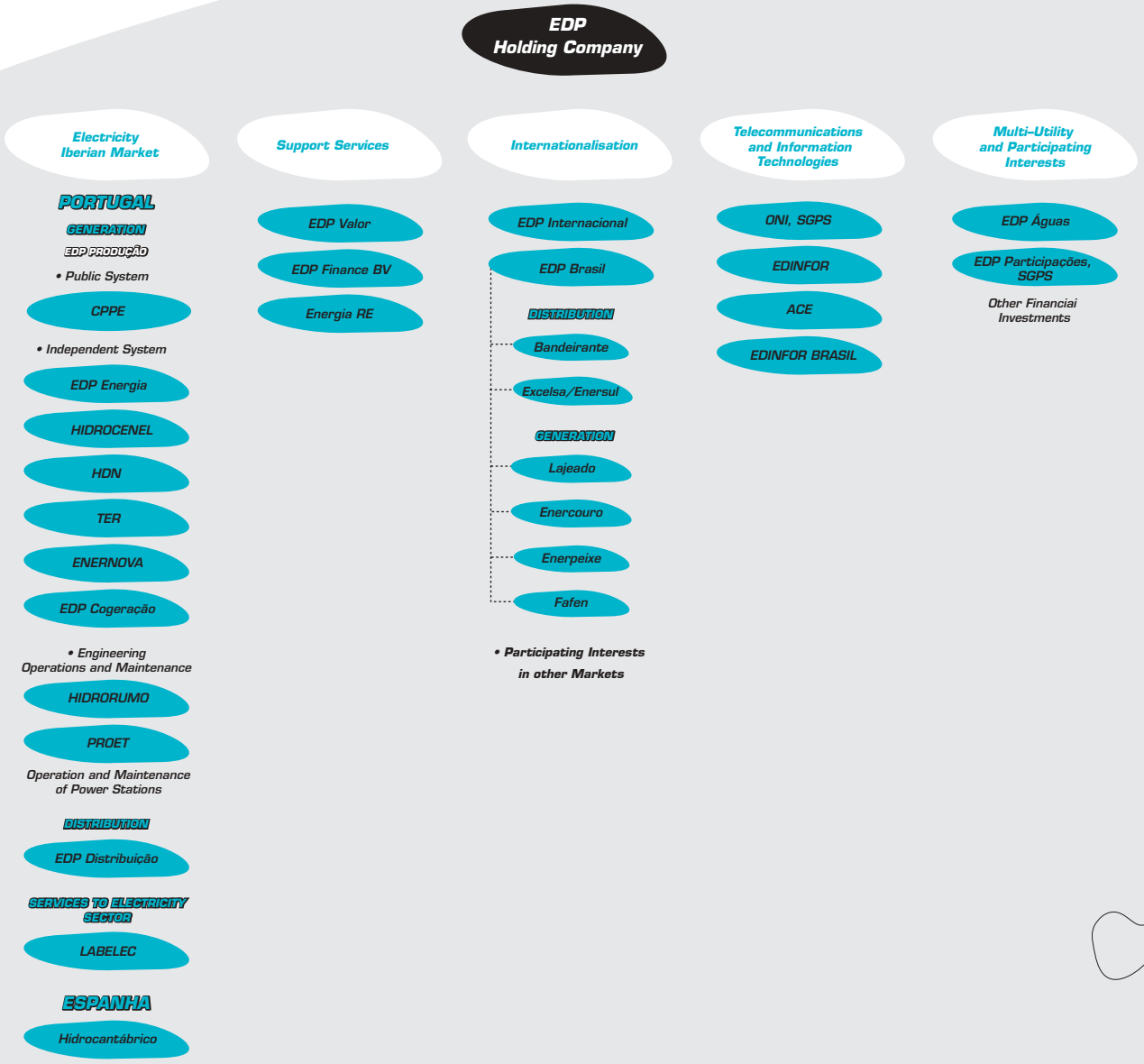
Management

BACKGROUND

EDP GROUP

EDP – Electricidade de Portugal, S.A. is a Portuguese business group, leader in the national electricity sector, whose business activities have been extended to the Telecommunications, Information Technologies and Multi-Utility areas, both at home and abroad.

EDP Group's Organisation Structure



In the wake of the privatisation process initiated in 1997, private shareholders now control around 70% of EDP's capital.

Shareholder Structure at 31/12/2001

	%
Portuguese State	31
Banco Comercial Português	5
Iberdrola	4
Brisa	2
Other private shareholders and treasury stock	58
TOTAL	**100**

In Portugal, EDP carries out electricity generation and distribution activities within both the Public Service Electricity System (Portuguese acronym SEP) and the liberalised market segment. In 2001, electricity generated by EDP's power stations supplied around 68% of national consumption and the company supplied electricity to more than 5.5 million customers.

In the Telecommunications and Information Technologies sectors, at the end of 2001 EDP was the leader amongst the new fixed-network operators in Portugal and national leader in the provision of integrated systems services.

Brazil is by far EDP's most important external market: electricity distribution in this country represented around 12% of the Group's turnover in 2001 and the company is currently expanding its activities to power generation. EDP also operates, albeit on a much smaller scale, in the electricity sectors in Guatemala, Macau and Cape Verde.

Recently EDP entered the Spanish electricity market, securing shareholder control in Hidroelectrica del Cantábrico. This strategic acquisition represents an important step in the constitution of the Iberian electricity market.

Still in 2001, EDP reorganised its power-generation activities and the provision of internal common services in Portugal through the creation of the sub-holding companies EDP Produção and EDP Valor, respectively.

Key Operating Data

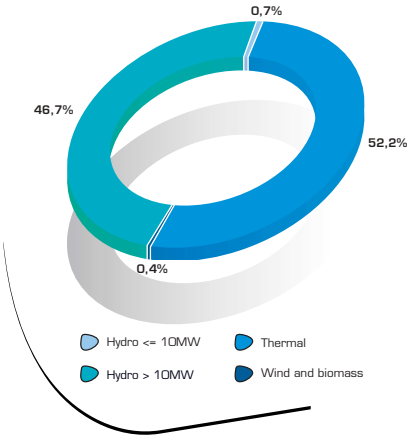
	2001	2000
Number of Employees	**14 722**	**12 729**
Electricity (Portugal)	9 352	10 526
Electricity (Brazil)	1 471	7
Telecommunications and Information Technologies	3 270	1 470
Other businesses	629	726
Electricity in Portugal		
Installed capacity (MW)	7 610	7 585
Net electricity generation (GWh)	28 268	24 712
Electricity sales (GWh)	36 025	34 176
Number of customers	5 541 418	5 415 313
Public system	5 541 396	5 415 304
Non-binding system	22	9
Electricity in Brazil		
Electricity sales (GWh)	11 727	13 444
Number of customers	1 142 034	2 168 525
Telecommunications		
Number of telephone lines	691 000	290 652
Accumulated telephone service (10^3 min)	1 197 000	115 000

Key Economic and Financial Data

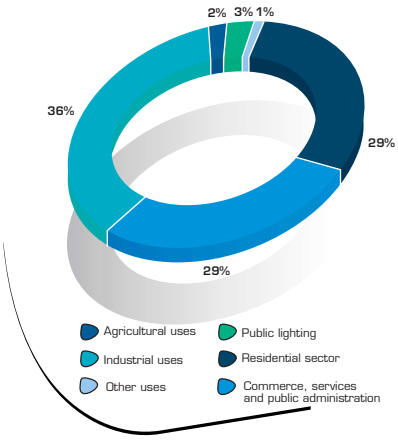
10^3 euro

	2001	2000
EDP Group Consolidated		
Turnover	5 650 374	4 388 911
Net income	450 833	548 973
Operating capital expenditure	815 169	699 220
Financial investment	587 820	1 546 863
Net total assets	16 233 143	14 886 931
Electricity (Portugal)		
Turnover	4 595 835	4 247 941
Net income	475 558	445 587
Operating capital expenditure	407 329	337 674
Electricity (Brazil)		
Turnover	690 509	701 390
Net income	69 847	14 949
Operating capital expenditure	65 730	63 828
Telecommunications and Information Technologies		
Turnover	376 955	158 519
Net income	- 48 806	2 015
Operating capital expenditure	309 996	249 599

Net Electricity Generated by EDP in Portugal in 2001



Electricity Distributed by EDP in Portugal in 2001



SCOPE OF THE REPORT

This Report presents EDP's environmental performance in 2001 and outlines the main initiatives undertaken by the company during the period. The previous report, covering 2000, was published in September 2001.

This edition embraces solely the activities carried out in the electricity sector in Portugal, including engineering, operation and maintenance of power stations and support services. In 2001, these activities accounted for 80% of the Group's turnover, 50% of operating capital expenditure, 99,8% of electricity generated and around 75% of electricity sold.

EDP's Annual Report contains more detailed information about the Group's various activities. Both Reports, as well as comprehensive data relating to EDP's Environmental Policy, are available at www.edp.pt.

With this year's edition, we initiate a process of progressive approximation to the guidelines of GRI – Global Reporting Initiative. Launched in 1997 by the Coalition for Environmentally Responsible Economies (CERES) in collaboration with the United Nations Environmental Programme (UNEP), it encompasses a diversified spectrum of participants. These include several non-governmental organisations, consultants, companies and universities, as well as organisations, which launched their own standardisation initiatives, such as the World Business Council for Sustainable Development. Eurelectric – the association of European electricity companies of which EDP forms part – has recently joined the initiative.

HIGHLIGTS AND KEY INDICATORS

KEY INDICATORS	2001	2000
Electricity generation and distribution		
Thermal (GWh)	14 762	13 790
Hydro (> 10 MW) (GWh)	13 208	10 701
Hydro (≤ 10 MW), wind and biomass (GWh)	298	221
Steam production (TJ)	3 331	1 930
Electricity distribution (GWh)	36 025	34 176
Fuel consumption		
Coal (kt)	3 223	3 456
Fuel-oil (kt)	1 373	1 052
Natural gas (10^3 Nm^3)	169 436	142 059
Diesel (kl)	21 441	14 359
Biomass (kt)	41	19
Total Atmospheric Emissions		
Nitrogen oxides NO_x (kt)	38,5	37,4
Sulphur dioxide SO_2 (kt)	119,9	105,0
Carbon dioxide CO_2 (Mt)	12,6	11,7
Particulates	1,9	2,3
By–products		
Coal fly ash (t)	304 112	339 099
Waste		
Total waste (t)	49 341	49 865

2001 HIGHLIGTS

- *ISO 14 001 environmental certification of Sines thermoelectric power station, thereby concluding the environmental certification process of EDP's large thermal power generating centres;*
- *Extension of Environmental Management Systems to small-scale hydroelectric generating centres at HDN and HIDROCENEL;*
- *Start-up of the construction of Ribatejo thermoelectric power, station following favourable report on the Environmental Impact Assessment process;*
- *Entry into experimental functioning of the new Cadafaz wind farm (10, 2 MW).*

STRATEGIC GUIDELINES

CHIEF ACTION FRONTS

• Phased implementation of an Environmental Management System in all the company's activities in the electricity sector;

• Active participation in the debate surrounding climate change and acidification issues;

• Improved efficiency in electricity generation and distribution and use of cleaner fuels;

• Strong commitment to renewable energies and incentive for more efficient energy uses;

• Systematic monitoring of developments in environmental matters at international level;

• Analysis of the potential for new technologies and the opportunity for their application.

EDP's action in environmental matters is part of a broader strategic vision: that the development of the company's activity must be underpinned by the social acceptance of its performance.

EDP is fully aware of the fact that growing environmental concerns will lead, over the long term, to new development models as far as energy use is concerned. In order to manage these issues over the short and medium term, EDP seeks:

- To guarantee rigorous compliance with environment-related legal obligations.
- To manage environmental problems in a systematic, stringent and constantly improved manner;
- To monitor development trends in this area, adopting a proactive stance in identifying opportunities for participation, with added value both for the company and society.

The first two points are the operating foundations for EDP's Environmental Policy. They are also the basis for another critical activity, the company's communication with society.

The third point is crucial for the business development strategy in the future. The identification of threats and opportunities has functional implications for all the company's business areas, and the potential economic and market implications make it an activity of particular interest for top management.

POLICY, ORGANISATION AND ENVIRONMENTAL MANAGEMENT SYSTEMS

ENVIRONMENTAL POLICY AND ORGANISATION

In 1994, EDP's Board of Directors publicly announced its commitment to the EDP Group's Declaration On Environmental Policy, which sets out the environment as a voluntary management objective in all the Group's activities.

Simultaneously, the EDP Group's Code of Good Practice for Environmental Issues was approved, which instituted a set of rules to be applied in a committed manner by all employees.

The organisation of the environmental function within the Group takes into account the need to ensure an integrated corporate vision, in which each individual company is accountable for its own environmental performance.

EDP has an Environment Board, a consultative statutory body composed of independent acknowledged environmental experts. This group advises the Board of Directors on the definition of strategic guidelines and issues recommendations on projects with greater environmental significance.

EDP's Corporate Environmental Office provides direct support to the Board of Directors and undertakes the general coordination of environment-related activities at Group level.

Electricity generation and distribution companies have their own environmental staff and structures. These units are responsible for the implementation of the Group's strategic guidelines and actions plans and ensure the ongoing improvement of environmental performance.

ORGANISATIONS MEMBERSHIP

- *EDP is a member of Eurelectric, the association of European electricity companies, and participates actively in its Environment and Sustainable Development Committee Working Groups.*
- *In 2001, EDP was one of the founding members of the portuguese structure of the World Business Council for Sustainable Development.*

IN 2001:

• 51% of the energy generated by EDP came from certified thermoelectric power stations;

• The installed capacity at certified power stations was 2 905 MW: 86,5% of all thermal power and 41% of the EDP Group's total installed capacity;

• Environmental training courses involved 969 workers, both from EDP and subcontractors, and accounted for a total of 3 230 training hours.

INCIDENTS AND COMPLAINTS

• A liquid fuel spill occurred which exceeded the containment system's capacity. The affected land was cleaned and the fuel-oil waste removed and sent for treatment.

• There were some operating incidents at thermoelectric power stations that gave rise to complaints about the emission of particulates. These situations were analysed and responded to in accordance with the procedures in force.

• Some complaints were received relating to noise inconvenience associated with the transforming stations and substations. Noise measurements were carried out and, where necessary, acoustic insulation measures were reinforced.

In addition, EDP Group has its own company specialising in the provision of laboratory services – vital for tracking the environmental performance of its installations –, and two engineering companies which support the development of new projects and technological modernisation.

ENVIRONMENTAL MANAGEMENT SYSTEMS

In 1996, EDP decided to gradually implement Environmental Management Systems in all the Group's activities. The process is based on the ISO 14001 International Standard methodology and began with the company's large-scale thermal power plants, the most demanding area in terms of environmental performance.

In 2001, Sines thermoelectric power station obtained its environmental certification, thus concluding the certification of EDP's four major thermal generating facilities. The process also extended to the smaller hydroelectric generating centres: the power plants on the river Ave have now been certified, and the process continues at Penide, Cefra and Serra da Estrela installations.

The implementation of Environmental Management Systems means full compliance with the environmental requirements applicable to installations, prevention and minimisation of risk situations, and a proper handling of complaints.

RELATIONSHIP WITH THE COMMUNITY

One of EDP's objectives is to ensure transparent mechanisms for interacting with the broad range of agents directly interested in its activities. This very wide spectrum embraces, amongst others, employees, shareholders, customers, neighbouring communities and non-governmental organisations.

Strengthening the importance of the environmental component in all the company's activities is dependent upon the enforcement of proper internal communication channels. In 2001, new sections specifically dedicated to environmental matters were introduced both on EDP's internal newspaper and intranet.

Throughout the year EDP carried out several initiatives with local communities, namely the Power Station Open Day; during the summer months, a number of thermal and hydroelectric power stations were opened to the public. Daily events included presentations directed at specific interest groups where environment was one of the keynote themes. Given this initiative's success, EDP foresees its continuity in 2002, on an expanded scale.

Local communities have also continued to show keen interest in ENERNOVA's wind farms.

EDP pursued its cooperation policy with research institutions, non-governmental environmental organisations and public entities in the area of nature conservation. Noteworthy in 2001, besides the sponsorship of a number of environmental activities, was HIDROCENEL's collaboration with Serra da Estrela Nature Park in the replanting of oak trees in Desterro, as well as the support given by CPPE to Douro Internacional Nature Park on the study of the use by bats of the dam tunnels and galleries at Miranda, Picote and Bemposta hydroelectric power stations.

Still in 2001, CPPE was invited by the Regional Division for the Environment and Territorial Planning to join the SINESBIOAR project, included in the European Community Programme LIFE-ENVIRONMENT. This project involves the characterisation

MAJOR SUPPORT AND SPONSORSHIP INITIATIVES

- *Portuguese Society for the Study of Birds (SPEA) – Continuation of the study and publication of IBAs - Important Bird Areas - in Portugal.*
- *Seminar "Carbon Economy", organised by Euronatura - Center for Environmental Law and Sustainable Development and Universidade Nova de Lisboa.*
- *APEA – Portuguese Association of Environmental Engineers. Holding of the VI National Environmental Engineering Congress.*
- *VII National Conference on Environmental Quality, organised by the Universidade de Aveiro.*
- *I National Congress of the Association of Biologists.*

of atmospheric pollution in Sines area with a view to improving the region's environmental quality, and counts on the assistance of both universities and major local industries.

Proximity to the outside public was also reinforced with the increased use of EDP on-line services, available at the company's Internet site, which received countless requests for information pertaining to the environment. In similar vein, the financial community demonstrated growing interest in the EDP Group's environmental strategy and performance, and specific mechanisms were introduced in order to cope with these requests.

Contact with customers and general public also entailed participation at fairs and exhibitions dealing with the environment. In 2001, EDP was again involved in the European Day Without Cars initiative, by making available its fleet of electric cars and scooters for exhibition and demonstration purposes.

RESEARCH AND DEVELOPMENT

EDP Group's Research and Development Policy aims at the promotion of projects in a vast range of technological sectors where environment, energy efficiency and renewable energies feature prominently.

During 2001, EDP submitted candidacies for programmes co-financed by the European Community in areas such as micro-trigeneration (µtrigen), decentralised generation, energy and domotic efficiency (SAVE II) and wave energy (SUBWAVE).

The year was marked by the start-up of the OREMA project – Integrated Efficiency and Environmental Optimisation at Thermoelectric Power Stations, co-financed by European Community funds: information concerning the operation of Carregado power station was gathered and work started on the development of the software that will optimise efficiency and reduce particulate emissions.

In electricity generation, EDP formed a joint venture with OCEANERGIA for the development of an R&D project on wave energy, using Archimedes Wave Swing technology developed by Dutch AWS BV, also a partner in this project. Further development are envisaged for 2002 to 2006, with the installation of a pilot station

(2 MW) on the Portuguese north coast and a 100 MW commercial operating complex. Capital expenditure on the pilot power plant amounts to EUR 8.4 million and will be partially subsidised from community grants.

Performance

PERFORMANCE

PERFORMANCE

CLIMATE CHANGE

Active quest for responses to climate change was one of EDP's priority work areas throughout 2001.

The company promoted and coordinated the project PGETS – Portuguese Greenhouse Gases and Energy Trading Simulation, a simulation exercise of greenhouse gas (GHG) emissions and energy market, at a strictly national level.

The company also co-financed a new study promoted by Eurelectric into GHG emissions and energy markets – GETS3.

EDP participated actively in the discussions concerning foreseeable new regulations in this domain: the proposed EU Directive on emissions trading and the National Programme for Climate Change. As regards the last-mentioned, in-depth studies were embarked on into the technical and economic feasibility of the proposed measures and the potential cutback in emissions.

PGETS - PORTUGUESE GREENHOUSE GASES & ENERGY TRADING SIMULATION

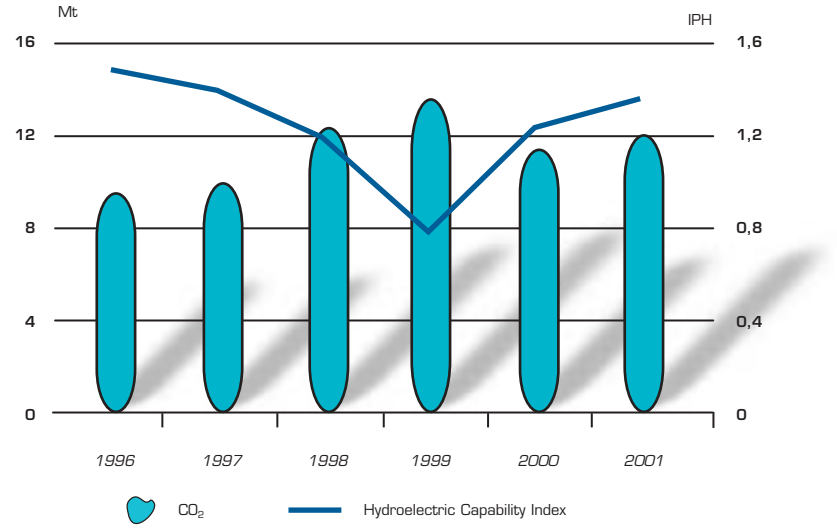
EDP's participation in the simulation exercises promoted by Eurelectric proved to be an excellent learn-by-doing opportunity on response strategies. The company then decided to stage a similar exercise, at a strictly national level.
A Monitoring Commission was set up for the purpose of defining the rules, and counted upon the participation of the National Departments of the Environment and of Energy. The exercise was conducted between October and December 2001 and involved 9 virtual companies: 4 electricity producers and 5 intensive energy consumers from the energy, paper, cement and glass sectors.
The simulated period was 2001-2012, and GHG emission reduction goals were set for three, successively more restrictive, three-year periods.
After the first free allocation of emission permits, the virtual companies carried out their specific activity while having to comply with pre-defined emission ceilings. They could invest in more efficient technologies and resort to the sale of electricity, emission permits and emission credits, the latter generated by means of another flexibility mechanism, Clean Development Mechanism.
For some of the participants, the simulation represesented the first contact with emissions trading.

GETS3 – GREENHOUSE GAS AND ENERGY TRADING SIMULATIONS

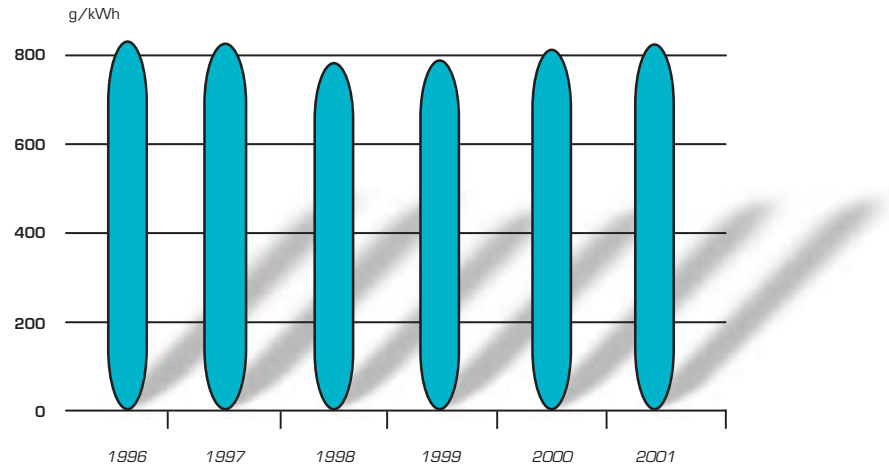
Between June 2001 and February 2002, 22 companies from 10 different sectors sponsored yet another project on GHG emissions and energy trading, promoted by Eurelectric, which was unique in that it did not involve the companies' direct participation.

Through the application of WHETHER simulation model – When to Emissions Trade and How to Estimate Risk – the effects stemming from the implementation of the proposed Directive on emissions trading where tested.

Total CO_2 Emissions and Hydroelectric Capability Index



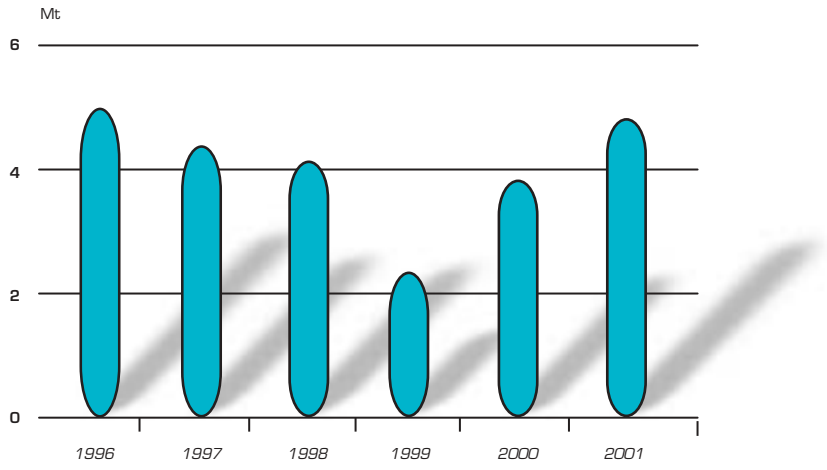
Specific CO_2 Emissions.



Anticipating response scenarios, EDP has been developing into renewable energies and preparing a far-reaching demand side management plan for the three-year period 2002-2004, founded on action targeted at boosting energy efficiency and consumption rationalisation.

Between 1996 and 2001, the use of renewable sources in electricity generation prevented carbon dioxide emissions (CO_2), the chief GHG, by an annual amount varying between 2,6 and 5,1 Mt. These figures are strongly influenced by the annual hydrological situation, which in turn determines the performance of the significant hydro component of EDP's power-generation capability.

Avoided CO_2 Emissions



Note: Calculated on the basis of the CO_2 emission factor for a natural-gas combined-cycle.

USE OF RENEWABLE ENERGIES AND ENERGY EFFICIENCY

In 2001, EDP's strategy for the use of renewable energy sources in electricity generation was redefined and strengthened taking into account the target laid down by the Portuguese State: 39% of electricity consumed in 2010 must be generated from renewable sources.

The company's prime solution involves boosting large-scale hydroelectric production – through the construction of the Baixo Sabor – Alto Côa hydro scheme – and wind power, with the expansion in installed capacity at wind farms programmed to be 800 MW by 2007.

In 2001, the new Cadafaz wind farm, located in Serra da Lousã, entered into experimental service and studies continued into the construction of other new facilities. By the end of 2001, ENERNOVA's four wind farms had a combined installed capacity of 40,6 MW.

There was a considerable increase in the use of renewable sources:

- The favourable hydrological conditions allowed more intensive use of the hydroelectric power stations;
- At Mortágua biomass power plant, work on adjusting functioning conditions was concluded, thereby leading to a significant rise in production;
- With the new Cadafaz wind farm, wind-generated electricity rose 29% relative to the previous year.

In global terms, electricity generated from renewable sources accounted for 48% of total electricity produced by the company in the year.

Net Electricity Generation from Renewable Sources

MWh

	2001	2000	1999
Wind power	90 570	70 131	52 901
Biomass	18 476	4 718	1 900
Hydro (≤10 MW)	189 231	146 451	128 645
Hydro (>10 MW)	13 208 167	10 700 653	6 774 445
Hydroelectric Capability Index	***1,19***	***1,08***	***0,68***

Besides promoting the use of renewable primary sources, EDP has also been directing its efforts at raising overall efficiency in the use of energy resources.

At the same time as monitoring and improving the yield from its generating and distribution units, the company continues to expand its activities into cogeneration projects fuelled by natural gas.

In 2001, SOPORGEN cogeneration power plant completed its first full year of operations, with production increasing 152% over the preceding year.

Production of Electricity and Steam at Cogeneration Installations

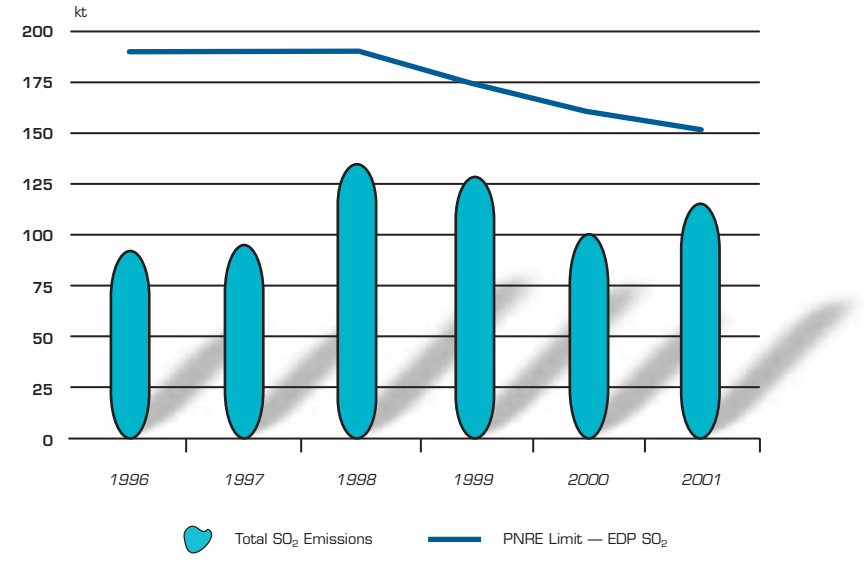
	2001	2000	1999
Maximum power rating (MW)	123	123	56
Net electricity generated (MWh)	632 917	179 252	245 821
Steam production (GJ)	3 331 085	2 566 068	1 491 000

EMISSION OF ATMOSPHERIC POLLUTANTS

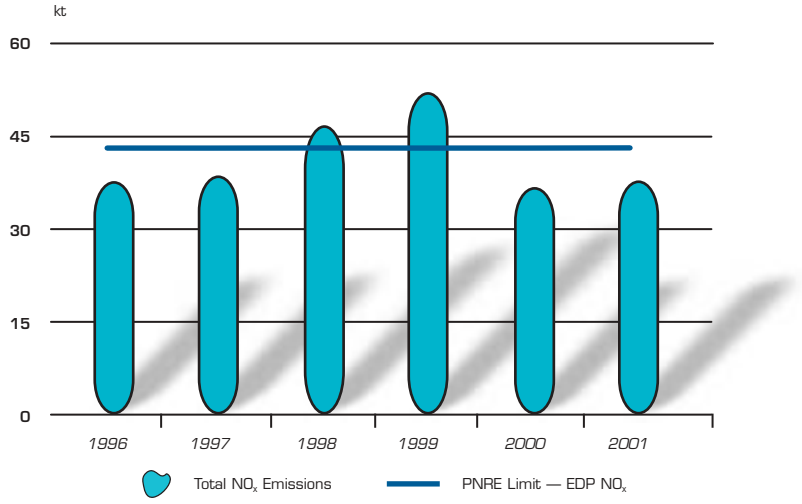
Ever since 1996, EDP has been modulating the operation of its thermoelectric power stations in order to comply with the acidifying pollutants emission limits set by the National Programme for the Reduction of Emissions from Large Combustion Plants (Portuguese acronym PNRE).

Recorded sulphur dioxide (SO_2) emissions have been consistently below PNRE limit-value. As regards nitrogen oxides (NO_x), although the 1998 target has not been met, there has been a significant reduction from 2000 onwards as a result of the installation of low NO_x, burners in all generating units at Sines thermoelectric power station.

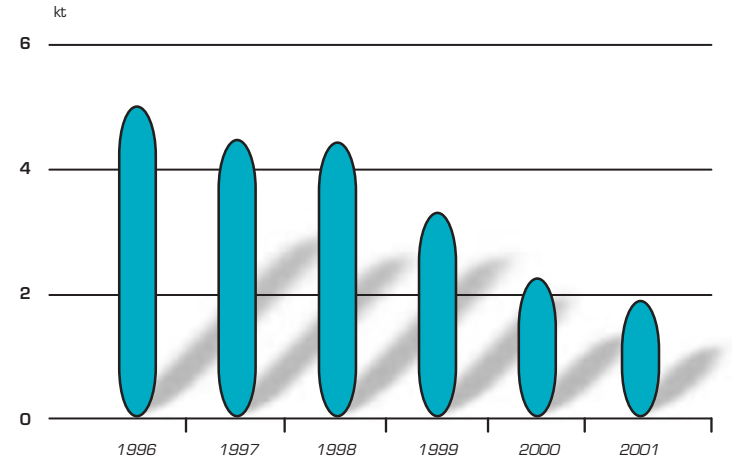
Total SO_2 Emissions



Total NO_x Emissions

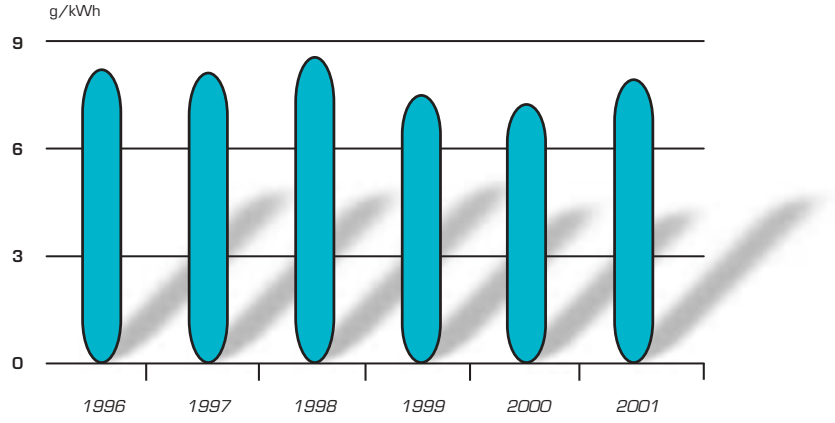


Total Particulate Emissions

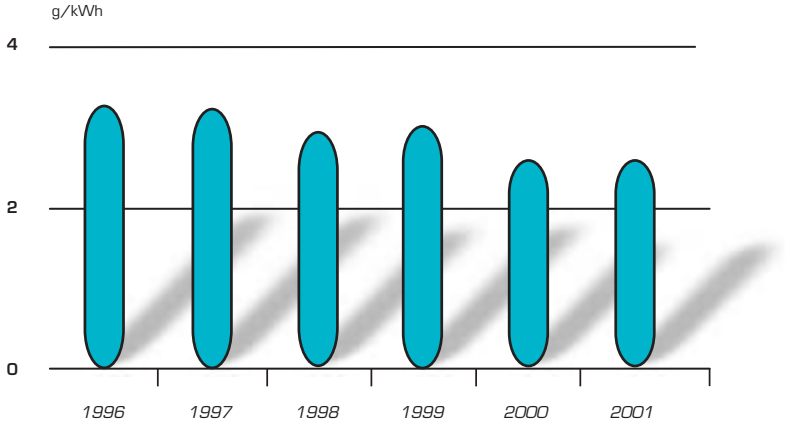


The systematic monitoring and control of atmospheric emissions continued in 2001. Periodic characterisation campaigns were carried out in order to measure minority pollutants, such as heavy metals, volatile organic compounds, dioxins and furans. These campaigns demonstrated compliance with national and European pollutions standards.

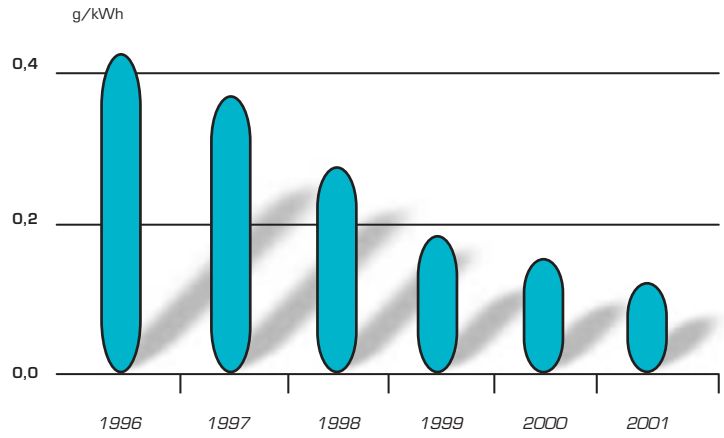
Specific SO_2 Emissions



Specific NO_x Emissions



Specific Particulate Emissions



There was a slight increase in specific SO_2 emissions relative to 2000. This can be ascribed to the increase in the sulphur content of the coal used. The specific particulate emission declined, while that of NO_x remained at the same level of the previous year.

During 2001, European Union regulations relating to the emission of atmospheric pollutants were amended, the effects of which will have a significant impact on EDP's activity. The transposition into national law of such regulations will lead to the drawing up of a new PNRE.

Considering the need to comply, in the short term, with more restrictive emission targets, an internal Working Group was set up for the conduction of more detailed analysis of the relevant implications for EDP's thermoelectric power stations, the identification of possible solutions, and the formulation of support scenarios for the definition of the most appropriate action strategy.

AIR QUALITY

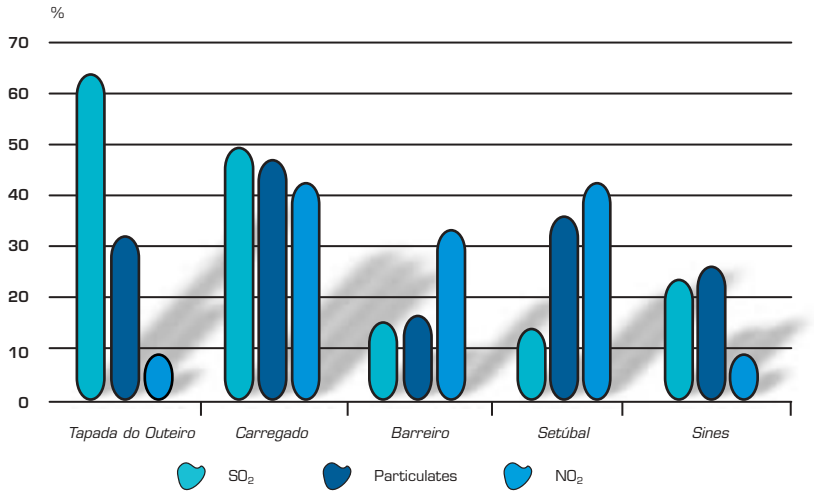
EDP records and evaluates air quality in the areas surrounding its thermal generating installations by means of air quality monitoring networks.

Today, each network comprises 3 to 5 monitoring posts continuously measuring the most common atmospheric pollutants associated with the burning of fossil fuels: SO_2, NO_x and particulates.

In 2001, within the network optimising process, two posts were deactivated in Setúbal and the location of the NO_x sensor at Carregado was changed.

In order to immediately assess the significance of the pollutant concentrations levels in the air, EDP builds up, for each calendar year, an Air Quality Index - the highest value (as a percentage) of the limit values prescribed for each pollutant in applicable legislation.

Maximum of the Air Quality Index by Monitoring Network in 2001



The values obtained point to a significant decrease in the atmospheric impact of EDP's installations in their area of influence.

HYDRO RESOURCES

Water is of paramount importance to EDP, not only for the operation of its hydroelectric facilities, but also for its usage in the steam cycles of thermal power plants. The company carefully monitors and protects the hydro resources it uses through systematic and thorough surveillance programmes.

Reservoir Water Monitoring

Operating the country's biggest hydroelectric facilities, EDP developed an extensive programme directed at the physical-chemical and biological monitoring of its reservoirs, many of which have other uses, such as the supply of water for human consumption and the hosting of recreational activities.

These programmes allow the assessment of possible changes in water quality and, if necessary, the adoption of mitigating operating measures, such as the forced air introduction in Vilar reservoir, in order to control eutrophication. Other routine operating measures include the periodic discharge of dissipation basins, also for the purpose of averting eutrophication, and the cleaning up of accumulated materials on the embankments, especially in water intake zones for human consumption, thus preventing water contamination.

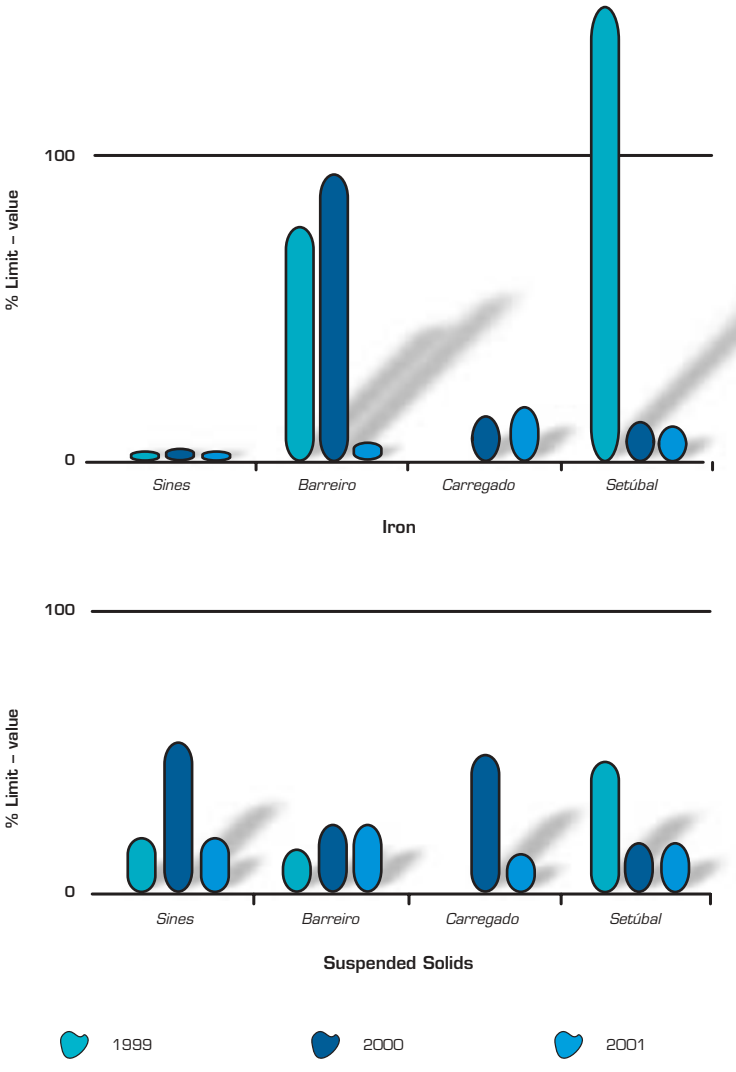
In 2001, the maintenance work carried out at Varosa hydroelectric complex – entailing the reservoir's virtual complete draining – were preceded by the drawing up of a Draining Plan that defined extensive measures of an environmental nature.

Wastewater Monitoring

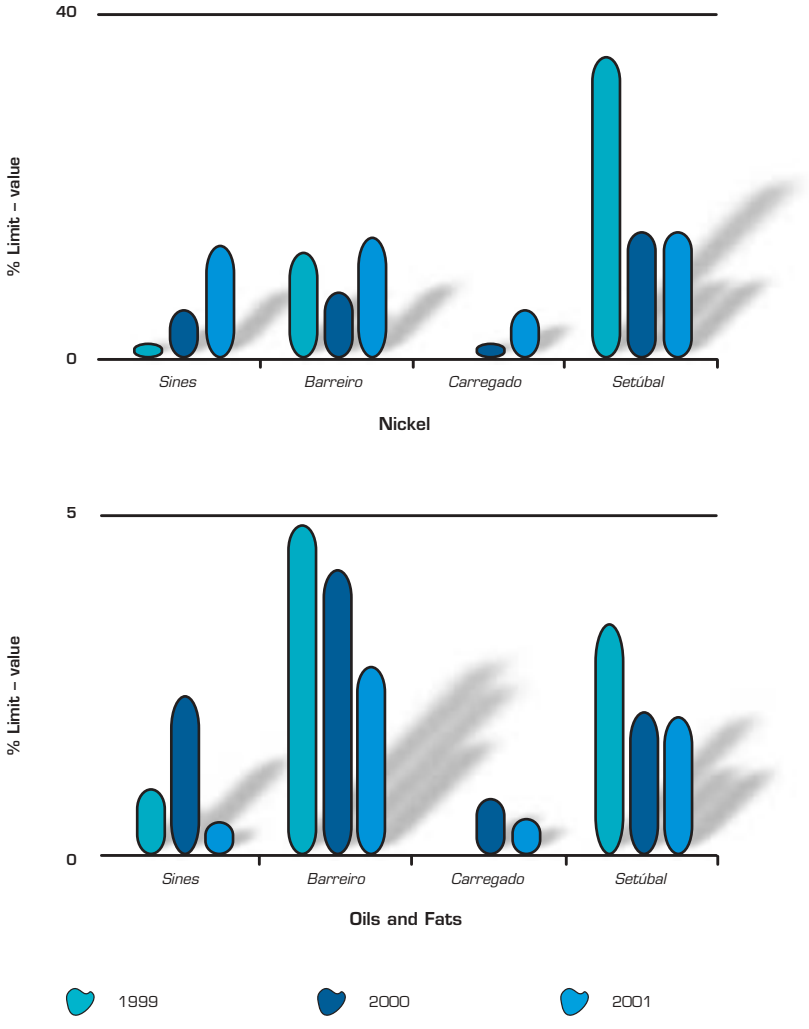
Thermoelectric power stations wastewater is treated in special purpose-built installations, where the physical-chemical treatment of coagulation/flotation is followed by sedimentation. Prior to rejection, the effluent is subjected to a monitoring plan – including continuous and periodic analyses of specific parameters – that guarantees conformity with the quality standards embodied in applicable legislation.

The representation of the daily average concentrations obtained for the main parameters in 24h compound samples (expressed as a percentage of the corresponding limit) reveals that the polluting loads are insignificant and some pollutants – such as chrome and copper – have average concentrations of less than 1% of the emission limit-value.

Wastewater Quality Index in 2001



Wastewater Quality Index in 2001



Cooling Water Monitoring

Thermoelectric power plants use large quantities of water in their open-circuit cooling systems. The water is returned to source with a minor increase in temperature and, at certain sites, a residual concentration of chlorine, used for the prevention of biological fouling.

In 2001 – complementary to the continuous control of temperature at the condenser outlet – EDP conducted aerial thermographic surveys at the rejection channels of Setúbal, Carregado and Barreiro power stations, and a characterisation of the in-depth temperature profile. The results prove that thermal dissipation takes place in a relatively confined space, with greater incidence at the surface, with no effects recorded on the aquatic ecosystem.

Work continued on biological studies into the optimisation of water chlorination. The results continued to show very low toxicity of the rejected water on the trial species, conclusions that can be extrapolated for the typical species inhabiting the local ecosystems.

These studies supplied data that now allows the suspension of chlorination at Sines thermoelectric power station between November and January. During this period, there is a decrease in the natural growth of marine species and the consequent diminution in fouling phenomena in the cooling circuits.

WASTE

Proper management of the waste produced in its various activities is one of EDP's prime concerns. Ever since it started detailed data collection procedures, in 1995, the company has been identifying means of improvement and adopting new recovery solutions.

In 2001, the system for the collection of forest waste ash in Mortágua biomass power plant was substituted so as to enable the selective retrieval of both fly and bottom ash. This system will enable new forms of recovery, which is presently done by incorporation into organic fertilizers. In the future, fly ash may be recovered directly as a fertilizer in tree plantations, and further experiments in conjunction with the Ministry of Agriculture are also envisaged with a view to determining other agricultural applications.

In electricity distribution activities – which generate waste in a geographically dispersed manner throughout the country – the basis were established for future systematic procedures of selective collection and recovery of used light bulbs, concrete posts and computer equipment: temporary storage sites were defined and innovative recycling circuits identified.

By-products and Main Categories of Industrial Waste Produced in EDP

	TOTAL PRODUCED (t)			FINAL USE
	2001	2000	1999	
By-products				
Recovered coal fly ash	304 112	339 099	330 480	Recovery in cement industry
Waste				
Unrecovered coal fly ash	12 043	10 462	16 300	On-site deposition
Biomass ash	904	1 320	–	Recovery in the production of organic fertilizers
Fuel-oil fly and bottom ash	2 907	2 435	7 018	Deposition in Sines power station special landfill site
Coal bottom ash	28 745	31 833	30 658	On-site deposition
Used oil	317	482	635	Energy recovery
Metal scrap	4 391	3 298	3 656	Material recycling
PCB containing equipment and oil	34	35	60	Incineration in special facility
TOTAL WASTE	**49 341**	**49 865**	**58 327**	
% Recovery	**11%**	**10%**	**7%**	

The systematic programme launched in 2000 for the recovery of urban-type waste at thermal power plants produced its first results, with some 40 t of waste being channelled to recovery processes.

Recovery of urban-type waste at thermal power plants

	TOTAL RECOVERED (t) 2001
Paper and cardboard	20,4
Plastics	10,6
Glass	9,1
TOTAL	**40,1**

Work continued on the laboratory screening programme for transformer oil polychlorinated biphenyls (PCB) contamination. Around 100 items of equipment were analysed, with no new contamination being detected.

NOISE

New Portuguese legislation covering noise pollution entered into force in May 2001. During the year, EDP defined the diagnostic actions to be undertaken by the Group companies with activities covered by this new legal regime, with a view to verifying compliance with the new requirements.

Insofar as generating installations are concerned, noise levels were measured at small-scale hydroelectric facilities on the Ave river and acoustic insulation measures were applied at Ponte da Esperança power station.

In the areas surrounding electricity distribution infrastructures, special attention was paid to initiatives involving the assessment and control of environmental noise, given that these are frequently located in the vicinity of residential zones.

In 2001, thermal and acoustic insulation measures were applied in the construction of these infrastructures. In certain existing installations, possible situations of discomfort were evaluated and, whenever necessary, noise-abatement measures

NOISE-ABATEMENT MEASURES IN ELECTRICITY DISTRIBUTION – SOME EXAMPLES IN 2001:

• Greater Oporto network area – Total substitution of the transforming stations located in Esposende, Gondomar, Matosinhos and Vila do Conde.

• Valpaços substation – Installation of acoustic barriers in order to improve the noise environment in the surrounding residential areas. A reduction of 31% was achieved.

reinforced. This involved the substitution of transformers and the placing of anti-vibration supports at transforming stations, as well as the construction of acoustic barriers at substations.

ELECTRIC AND MAGNETIC FIELDS

Appliances that use electric current increasingly form part of our daily lives. Concerns over the potential health effects of exposure to electrical and magnetic fields generated by such appliances have mobilised the global scientific community into research on a possible cause-effect relationship.

As no scientific evidence exists, to date, of any such relationship, the European Council of Health Ministers, based on the precautionary principle, issued in 1999 a Recommendation relating to the limitation of population exposure to electromagnetic fields with a frequency of 0 Hz to 300 GHz . These field limits are revised every two years.

In October 2001, the European Union's Scientific Committee for Toxicity, Ecotoxicty and the Environment concluded that there was insufficient scientific evidence to warrant changes to the Recommendation, keeping the exposure limits recommended in 1999: 5 kV/m for electrical field and 100 μT for magnetic field.

EDP complies with these requirements and keeps a close and systematic eye on scientific research in progress, as well as on the positions assumed by internationally renowned scientific institutes, namely the World Health Organisation.

In 2001, with a view to properly monitoring its activities, EDP Distribuição continued to request LABELEC to carry out periodic measurement of field levels at new infrastructures. Readings were also taken at infrastructures for which, due to their location, it was considered desirable to have experimental data.

ENVIRONMENTAL ASSESSMENT OF SUPPLIERS

In its different business operations, EDP deals with hundreds of suppliers of products and services.

The supplier qualification system now in force in electricity generating activities includes explicit references to environmental aspects. Moreover, the process of periodic evaluation also envisages in-depth assessment of the environmental performance that can significantly influence the overall result.

When the supplier's activity has a particularly relevant interaction with the environment, EDP includes, in the tender process, the obligation to comply not only with legal requirements, but also with a number of internal pollution prevention and impact minimisation procedures. Examples are the tender documents for the provision of maintenance services at thermoelectric and hydroelectric power stations and industrial waste management services. These requirements will soon be extended to the Group's other activities.

Also worth a special mention is the transportation by sea of thermoelectric power stations fuel. The contracts include specific clauses relating to compliance with national legislation, specific port regulations and international environmental agreements such as SOLAS – Safety of Life at Sea, and MARPOL- Maritime Pollution.

DEMAND-SIDE MANAGEMENT

EDP Distribuição continued to evolve initiatives in the area of energy demand management in 2001, encouraging its customers to employ rational consumption practices based on electrically efficient solutions.

EDP continued to organise training courses promoting rational energy usage by industrial customers, in collaboration with specialist entities. Furthermore, the company conducted various studies and projects in this area, in conjunction with universities.

Special attention was paid to the area of domestic consumption. Information concerning the rational use of electricity was improved. In addition, interactive functionalities at the EDP Group's website were developed which allow customers to calculate their domestic consumption and so opt for more efficient equipment. A start was made to preparations for a competition for electrically efficient housing, which is intended to promote the development of better quality housing.

Tariff Regulations were revised by the sector regulator (Portuguese acronym ERSE) in 2001. The new regulations make provision for specific incentives for demand side management initiatives. In this regard, EDP Distribuição drew up a tri-annual action plan centred essentially on the residential and services sectors.

EDP also participated in the coordination and drafting of the report "Added-Value Services on Energy Efficiency", prepared within Eurelectric. This document identified a significant number of energy-efficient services provided by European electricity companies, and thus constitutes a key benchmark for future action.

PROTOTYPE COMPETITION FOR ELECTRICALLY EFFICIENT HOUSING

Designed to reward efficient buildings, the Competition will evaluate the adoption of two types of solutions associated with construction:

- *Passive solar construction techniques, encouraging better quality thermal insulation;*
- *Efficient electrical solutions promoting the rational use of energy.*

MONITORING AIR QUALITY – MOBILE LABORATORY

In 2001, LABELEC's Mobile Laboratory for the Measurement of Air Quality was re-equipped with analysis devices for particulates (PM10), ozone (O3), volatile organic compounds (VOC) and carbon monoxide (CO). These improvements significantly increased its monitoring capability in industrial and urban environment.

The Laboratory is also equipped for monitoring fundamental meteorological parameters.

ENVIRONMENTAL CONSULTANCY AND SERVICES

The provision of services and consulting in the environmental sphere continues to be one of the EDP Group's activities. The portfolio of non-Group clients registered a good performance, both at engineering companies – PROET and HIDRORUMO – and at laboratory-services company LABELEC.

In 2001, the most noteworthy assignments included the conduction, management and coordination of Environmental Impact Studies and a number of environmental monitoring services in water, air and material fields.

The conception and implementation of Environmental Management Systems constitutes the latest area of expertise, which has been gaining importance to the extent that the adoption of these systems becomes widespread both within and outside the EDP Group.

ENVIRONMENTAL IMPACT STUDIES CONDUCTED IN 2001

• Comparative assessment of Baixo Sabor and Alto Côa hydro schemes

• Ribatejo thermoelectric power station (concluded)

• Lagoa Comprida hydroelectric power plant – Serra da Estrela (concluded)

• Serra do Açor wind farm (concluded)

• Cinfães wind farm project (concluded)

• Madrinha wind farm

ENVIRONMENTAL IMPACT ASSESSMENT

The Ribatejo thermoelectric power station's Environmental Impact Assessment process was concluded and approved in 2001. This new natural gas combined cycle unit will operate in the non-binding electricity system (Portuguese acronym – SENV). In the wake of its approval, construction work on the new power station began in 2001.

During the year, EDP also carried out Environmental Impact Studies for a series of renewable energy generating installations: a small-scale hydroelectric power plant and various wind farms.

Work continued on the Comparative Environmental Impact Studies for Baixo Sabor and Alto Côa hydro schemes, with the base technical studies having been carried out. These studies will allow equally in-depth analysis of the environmental repercussions of the two alternative projects.

In 2001, in compliance with the recommendations stemming from recently approved Environmental Impact Assessments processes, EDP launched a number of specific Monitoring Plans for hydro schemes. An inspection was carried out on the implementation of the minimisation measures envisaged for the construction phase of Cadafaz wind farm and the upgrading of installed capacity at Venda Nova hydroelectric power plant. In the latter, a start was made to the Water Quality Surveillance Plan for Salamonde and Venda Nova reservoirs, which enabled monitoring of various parameters, in particular copper concentration of in the reservoir water, given its proximity to the Borralha mines.

Installations

INSTALLATIONS

EDP GENERATING PLANTS IN OPERATION AT 31/12/2001

TAPADA DO OUTEIRO THERMAL POWER PLANT

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.
Rua da Termoeléctrica. 4515-430 MÊDAS - GONDOMAR

Power plant in a closing down process. Generating unit 1 was decommissioned in 1997 and no. 2 in 1999. The complete shut-down is envisaged for December 2002.

CHARACTERISTICS

Type of power station	Steam turbine
Fuel	Fuel–oil
Installed capacity (MW)	47
No. of generating units	1
Entered into service [1]	1959
Stack height (m)	60
Air quality surveillance network	4 posts
Gas treatment	Electrostatic precipitators
Combustion modifications	None
Wastewater treatment	Physical-chemical: coagulation/flotation/sedimentation

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation.

OPERATIONAL DATA

Net electricity generation (MWh)	29 702
Fuel consumption (t)	9 426
Gross water consumption (m^3) [2]	25 971
Cooling water consumption (m^3) [3]	5 648 616

(2) Total water consumed at the installation, except public network consumption.
(3) Water used in the main condensers cooling. Totally returned to source.

ENVIRONMENTAL DATA [4]

ATMOSPHERIC EMISSIONS [5]

	Total (kt)	Specific (g/kWh)
SO_2	0,32	10,81
NO_x	0,06	2,01
CO_2	29	989
Particulates	0,03	0,91

AIR QUALITY [6]

	($\mu g/m^3$)	Aldeia Nova	Lever	Lixa	Vila Cova
SO_2	Median DAV	3	nd	64	nd
	P98 DAV	16	nd	94	nd
Particulates	Average DAV	42	32	29	36
	P95 DAV	97	70	68	80
NO_2	P98 HAV	18	-	-	-

WASTE

Fuel-oil fly ash (t)	8,3
Fuel-oil bottom ash (t)	0
Used oils (t)	0,2
Metal scrap (t)	16,7
PCB containing equipment (t)	0

(4) Curtailed functioning of the power station during 2001 did not originate significant quantities of liquid effluent.
(5) SO_2 and CO_2 total emissions calculation based on theoretical emission factors; NO_x and Particulates total emissions calculated on actual emission factors; specific emission calculated based on net electricity generation.
(6) DAV - daily average values; HAV - hourly average values; na - value not available due to reduced functioning efficiency of the analyser; NO_2 is only measured at one station.

CARREGADO THERMAL POWER PLANT

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

Vala do Carregado. 2580-480 ALENQUER

Installation certified by ISO 14 001 Standard

CHARACTERISTICS

Type of power station	Steam turbine
Fuel	Fuel-oil/ Natural gas
Installed capacity (MW)	710
No. of generating units	6
Entered into service [1]	1968
Stack height (m)	100
Air quality surveillance network	5 posts
Gas treatment	Electrostatic precipitators
Combustion modifications	None
Wastewater treatment	Physical-chemical: coagulation/flotation/sedimentation

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	1 510 536
Fuel consumption	325 441 Fuel-oil (t) 59 970 Natural gas (Nm^3 x10^3)
Gross water consumption (m^3) [2]	494 523
Cooling water consumption (m^3) [3]	403 766 280

(2) Total water consumed at the installation, except public network consumption.
(3) Water used in the main condensers cooling. Totally returned to source.

ENVIRONMENTAL DATA

ATMOSPHERIC EMISSIONS [4]

	Total (kt)	Specific (g/kWh)
SO_2	14,31	9,48
NO_x	3,17	2,10
CO_2	1 147	759
Particulates	0,11	0,07

AIR QUALITY [5]

	($\mu g/m^3$)	Castanheira	Faiel	Ironfer	RDP	Vinha
SO_2	Median DAV	2	4	2	2	9
	P98 DAV	123	35	9	9	50
Particulates	Average DAV	66	63	59	64	71
	P95 DAV	103	89	84	89	101
NO_2	P98 HAV	85	-	-	-	-

WASTEWATER [6]

Suspended solids (mg/l)	8,97
Iron (mg/l Fe)	0,35
Copper (mg/l Cu)	0,01
Zinc (mg/l Zn)	0,03
Nickel (mg/l Ni)	0,12
Vanadium (mg/l V)	0,65
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,09
Hydrocarbons (mg/l)	0,05

WASTE

Fuel-oil fly ash (t)	1 002,6
Fuel-oil bottom ash (t)	11,2
Used oils (t)	21,6
Metal scrap (t)	2 103,9
PCB containing equipment (t)	9,4

(4) Total emissions of SO_2 and CO_2 calculation on the basis of theoretical emission factors; total emissions of NO_x and Particulates calculated on actual emission factors; specific emission calculated on the basis of net electricity generation.
(5) DAV - daily average values; HAV - hourly average values; NO_2 is only measured at one station.
(6) Characteristics after treatment of the chemical effluent.

BARREIRO THERMAL POWER PLANT

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

Lavradio. 2835 LAVRADRIO-BARREIRO

Installation certified by ISO 14 001

CHARACTERISTICS

Type of power station	Steam turbine
Fuel	Fuel-oil
Installed capacity (MW)	56
No. of generating units	2
Entered into service (1)	1978
Stack height (m)	104
Air quality surveillance network	3 posts
Gas treatment	None
Combustion modifications	None
Wastewater treatment	Physical-chemical: neutralisation/sedimentation

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	211 170
Steam production (GJ)	1 584 085
Fuel consumption (t)	104 362
Gross water consumption (m^3) (2)	578 229
Cooling water consumption (m^3) (3)	44 565 832

(2) Total water consumed at the installation, except public network consumption
(3) Water used in the main condensers cooling. Totally returned to source.

ENVIRONMENTAL DATA

ATMOSPHERIC EMISSIONS (4)

	Total (kt)	Specific (g/kWh)
SO_2	5,35	8,17
NO_x	1,23	1,88
CO_2	325	497
Particulates	0,24	0,36

AIR QUALITY (5)

	($\mu g/m^3$)	Alto da Paiva	B.Banheira	Barreiro
SO_2	Median DAV	4	7	2
	P98 DAV	21	39	15
Particulates	Average DAV	23	17	8
	P95 DAV	49	43	14
NO_2	P98 HAV	66	-	-

WASTEWATER (6)

Suspended solids (mg/l)	15,14
Iron (mg/l Fe)	0,15
Copper (mg/l Cu)	0,01
Zinc (mg/l Zn)	0,07
Nickel (mg/l Ni)	0,07
Vanadium (mg/l V)	0,26
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,42
Hydrocarbons (mg/l)	0,28

WASTE

Fuel-oil fly ash (t) (6)	-
Fuel-oil bottom ash (t)	3,0
Used oils (t)	2,5
Metal scrap (t)	29,2
PCB containing equipment (t)	1,8

(4) SO_2 and CO_2 total emissions calculation based on theoretical emission factors; NO_x and Particulates total emissions calculated on actual emission factors; specific emission calculated based on net electricity generation.
(5) DAV - daily average values; HAV - hourly average values; NO_2 is only measured at one station.
(6) Power station with no electrostatic precipitators

SETÚBAL THERMAL POWER PLANT

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

Praias do Sado. 2914-522 SETÚBAL

Installation certified by ISO 14 001 Standard

CHARACTERISTICS

Type of power station	Steam turbine
Fuel	Fuel-oil
Installed capacity (MW)	946
No. of generating units	4
Entered into service [1]	1979
Stack height (m)	200
Air quality surveillance network	3 posts
Gas treatment	Electrostatic precipitators
Combustion modifications	None
Wastewater treatment	Physical-chemical: coagulation/flotation/sedimentation

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	3 861 198
Fuel consumption (t)	923 813
Gross water consumption (m^3) [2]	802 842
Cooling water consumption (m^3) [3]	596 363 400

(2) Total water consumed at the installation, except public network consumption.
(3) Water used in the main condensers cooling. Totally returned to source.

ENVIRONMENTAL DATA

ATMOSPHERIC EMISSIONS [4]

	Total (kt)	Specific (g/kWh)
SO_2	47,06	12,19
NO_x	10,44	2,70
CO_2	2 879	746
Particulates	0,46	0,12

AIR QUALITY [5]

	($\mu g/m^3$)	S.Filipe	S.Ovídio	Subestação
SO_2	Median DAV	nd	9	14
	P98 DAV	nd	27	28
Particulates	Average DAV	nd	49	54
	P95 DAV	nd	68	73
NO_2	P98 HAV	-	16	84

WASTEWATER

Suspended solids (mg/l)	10,75
Iron (mg/l Fe)	0,24
Copper (mg/l Cu)	0,01
Zinc (mg/l Zn)	0,08
Nickel (mg/l Ni)	0,30
Vanadium (mg/l V)	0,88
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,31
Hydrocarbons (mg/l)	0,18

WASTE

Fuel-oil fly ash (t)	1 881,5
Fuel-oil bottom ash (t)	0
Used oils (t)	20,4
Metal scrap (t)	54,2
PCB containing equipment (t)	19,4

(4) Total emissions of SO_2 and CO_2 calculation on the basis of theoretical emission factors; total emissions of NO_x and Particulates calculated on actual emission factors; specific emission calculated on the basis of net electricity generation.
(5) DAV - daily average values; HAV - hourly average values; na - value not available due to reduced functioning efficiency of the analyser; NO_2 is only measured at two stations.

SINES THERMAL POWER PLANT

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

S. Torpes 7520-089 SINES

Installation certified by ISO 14 001 Standard

CHARACTERISTICS

Type of power station	Steam turbine
Fuel	Bituminous coal
Installed capacity (MW)	1 192
No. of generating units	4
Entered into service [1]	1985
Stack height (m)	225
Air quality surveillance network [2]	9 posts
Gas treatment	Electrostatic precipitators
Combustion modifications	Low NO_x burn in all units
Wastewater treatment	Physical-chemical: coagulation/flotation/sedimentation

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation
(2) Network does not belong to EDP

OPERATIONAL DATA

Net electricity generation (MWh)	8 677 431
Fuel consumption	10 405 Fuel-oil (t) 3 223 374 Coal (t)
Gross water consumption (m^3) [3]	2 358 109
Cooling water consumption (m^3) [4]	1 183 968 015

(3) Total water consumed at the installation, except public network consumption.
(4) Water used in the main condensers cooling. Totally returned to source.

ENVIRONMENTAL DATA

ATMOSPHERIC EMISSIONS [4]

	Total (kt)	Specific (g/kWh)
SO_2	52,03	6,00
NO_x	23,43	2,70
CO_2	7 914	912
Particulates	1,03	0,12

AIR QUALITY [5]

	($\mu g/m^3$)	M. Chãos	Sonega	Santiago	M.Velho	Sines	Provença	EDP-S
SO_2	Mediana VMD	12	8	6	8	-	-	-
	P98 VMD	36	59	47	25	-	-	-
Particulates	Média VMD	-	-	-	-	34	33	39
	P95 VMD	-	-	-	-	56	62	73
NO_2	P98 VMH	15	17	13	11	-	-	-

WASTEWATER

Suspended solids (mg/l)	12,24
Iron (mg/l Fe)	0,07
Copper (mg/l Cu)	0,01
Zinc (mg/l Zn)	0,06
Nickel (mg/l Ni)	0,27
Vanadium (mg/l V)	0,19
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,08
Hydrocarbons (mg/l)	0,05

WASTE

Unrecovered coal fly ash (t) [7]	12 043,2
Coal bottom ash (t)	28 745,1
Used oils (t)	155,4
Metal scrap (t)	241,3
PCB containing equipment(t)	0

BY-PRODUCTS

Recoverable coal fly ash (t) [8]	304 112

(5) SO_2 and CO_2 total emissions calculation based on theoretical emission factors; NO_x and Particulates total emissions calculated on actual emission factors; specific emission calculated based on net electricity generation.
(6) DAV - daily average values; HAV - hourly average values; SO_2, particulates and NO_2 are only measured at four stations. In 2001, no measurements were taken at the Carbogal and EDP-N stations.
(7) Non-recoverable fly ash produced on the start-up of the generating units.
(8) Fly ash recovered in the cement and concrete industry. Classified as secondary raw material.

GAS TURBINE THERMOELECTRIC POWER PLANTS

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

Administrative head office: Lavradio. 2835 LAVRADRIO-BARREIRO

Gas turbine power stations are only used in peak-load or emergency start-up situations. Thus, these installations have a minor number of operating hours per annum.

CHARACTERISTICS

Power plant	Location	Fuel	Installed capacity (MW)	No. of generation units	Stack height (m)	Entered into service [1]
Alto do Mira	Amadora	Diesel	132	6	10 (Units I and II) 11 (Units III to VI)	1975
Tunes	Silves	Diesel	197	4	9 (Units I and II) 17 (Units III to IV)	1973

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	
Alto do Mira	5 785
Tunes	44 339
Fuel consumption (kl)	
Alto do Mira	3 701
Tunes	17 740

ENVIRONMENTAL DATA

ATMOSPHERIC EMISSIONS [2]

	Total (kt)	Specific (g/kWh)
SO_2	0,11	2,18
NO_x	0,08	1,55
CO_2	57	1 127
Particulates	-	-

WASTE

Used oils (t)	3,6
Metal scrap (t)	2,6
PCB containing equipment (t)	0

(2) Total emissions calculation based on CORINAIR 90 emissions factor. Specific emissions calculation based on net electricity generation.

CÁVADO-LIMA HYDRO GENERATING CENTRE

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

Head office: Paradela. 4845-043 VALDOSENDE - GERÊS

CHARACTERISTICS

Power plant	River	Type of head installation	Hydrographic basin area(ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generating units	Enter into service [1]
Alto Lindoso	Lima	Reservoir	1 072	347,9	630	2	1992
Touvedo	Lima	Reservoir	172	4,5	22	1	1993
Alto Rabagão	Rabagão	Reservoir	2 212	550,1	68	2	1964
Vila Nova/Venda Nova	Rabagão	Reservoir	391	92,1	90	3	1951
Vila Nova/Paradela	Cávado	Reservoir	380	158,2	54	1	1956
Salamonde	Cávado	Reservoir	242	55,0	42	2	1953
Vilarinho das Furnas	Homem	Reservoir	344	69,7	125	2	1972
Caniçada	Cávado	Reservoir	689	144,4	62	2	1954

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	3 281 989

ENVIRONMENTAL DATA

WASTE

Used oils (t)	0
Metal scrap (t)	21,5
PCB containing equipment (t)	1,0

DOURO HYDRO GENERATING CENTRE

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

Head office: Barragem de Bagaúste. 5050-421 Canelas PRG - PESO DA RÉGUA

CHARACTERISTICS

Power plant	River	Type of head installation	Hydrographic basin area(ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generation units	Entered into service [1]
Miranda	Douro	Run-of-river	122	6,7	369	4	1960
Picote	Douro	Run-of-river	244	13,4	195	3	1958
Bemposta	Douro	Run-of-river	405	20,0	240	3	1964
Pocinho	Douro	Run-of-river	829	12,2	186	3	1983
Valeira	Douro	Run-of-river	795	13,0	240	3	1976
Vilar-Tabuaço	Távora	Reservoir	670	95,5	58	2	1965
Régua	Douro	Run-of-river	850	12,0	180	3	1973
Carrapatelo	Douro	Run-of-river	952	13,8	201	3	1971
Torrão	Tâmega	Reservoir	650	58,5	140	2	1988
Crestuma-Lever	Douro	Run-of-river	1 298	22,3	117	3	1985

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	6 935 683

ENVIRONMENTAL DATA

WASTE

Used oils (t)	41,9
Metal scrap (t)	5,0
PCB containing equipment (t)	0

TEJO-MONDEGO HYDRO GENERATING CENTRE

CPPE - Companhia Portuguesa de Produção de Electricidade, S.A.

Head office: Castelo de Bode. 2300 TOMAR

CHARACTERISTICS

Power plant	River	Type of head installation	Hydrographic basin area(ha)	Reservoir's useful capacity (hm^3)	Installated capacity(MW)	No. of generation units	Entered into service [1]
Caldeirão	Caldeirão	Reservoir	66	3,5	40	1	1994
Agueira	Mondego	Reservoir	2 000	216,0	336	3	1981
Raiva	Mondego	Reservoir	230	12,0	24	2	1982
Cabril	Zêzere	Reservoir	1 965	615,0	108	2	1954
Bouçã	Zêzere	Reservoir	500	7,9	44	2	1955
Castelo do Bode	Zêzere	Reservoir	3 480	902,5	159	3	1951
Pracana	Ocreza	Reservoir	547	95,6	41	3	1993
Fratel	Tejo	Run-of-river	750	21,0	132	3	1974

(1) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	2 389 700

ENVIRONMENTAL DATA

WASTE

Used oils (t)	14,6
Metal scrap (t)	9,0
PCB containing equipment (t)	0

NORTH NON-BINDING HYDRO GENERATING CENTRE

HDN - Energia do Norte, S.A.

Head office: R. do Caires 292. 4704-518 BRAGA

CHARACTERISTICS [1]

Power plant	River	Type of head installation	Hydrographic basin area (ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generating units	Entered into service [2]
Lindoso	Lima	Run-of-river	-	0,2	44,1	4	1922
Ermal	Ave	Reservoir	-	21,2	11,2	2	1937
Varosa (Chocalho)	Varosa	Reservoir	69,6	12,9	25,0	3	1934
France	Coura	Run-of-river	5	0,1	7,0	1	1974
Penide I e II	Cávado	Run-of-river	69	0,5	4,9	2	1949
Guilhofrei	Ave	Reservoir	163	20,4	4,0	2	1939
Ponte da Esperança	Ave	Reservoir	-	21,2	2,8	1	1942
Senhora do Porto	Ave	Reservoir	23	1,1	8,8	2	1945
Cefra	Ouro	Run-of-river	0,5	0,1	1,1	2	1995 [3]
Freigil	Rib. Cabrum	Run-of-river	3,3	0,1	4,6	1	1988 [3]
Aregos	Rib. Cabrum	Run-of-river	-	-	3,1	2	1958
Caniços (ETE)	Ave	Run-of-river	-	-	0,9	2	1946

(1) Figures revised in 2001 for all power plants
(2) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation
(3) Reformulation

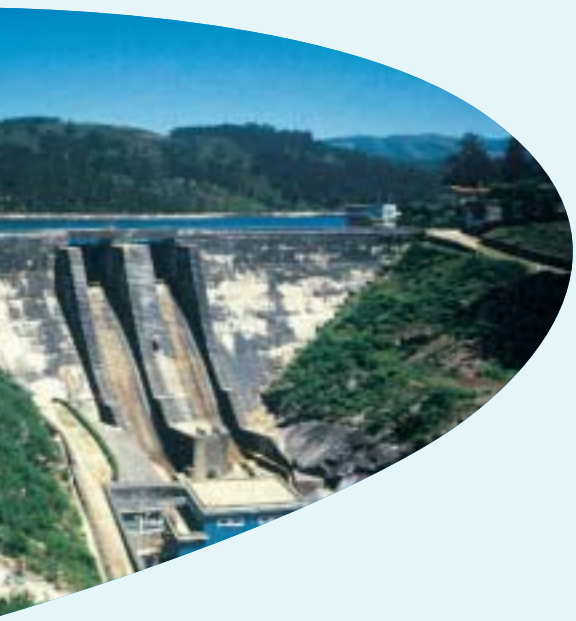
OPERATIONAL DATA

Net electricity generation (MWh)	245 075

ENVIRONMENTAL DATA

WASTE

Used oils (t)	1,5
Metal scrap (t)	9,1
PCB containing equipment (t)	0



CENTRE NON-BINDING HYDRO GENERATING CENTRE

HIDROCENEL - Energia do Centro, S.A.

Head office: Quintela. 6270 - 454 SEIA

CHARACTERISTICS

Power plant	River	Type of head installation	Hydrographic basin area (ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generations units	Entered into service [1]
Sabugueiro I	Rib. Lagoa	Reservoir	240	15	12,8	3	1947
Desterro	Alva	Run-of-river	1,6	-	13,2	2	1959
Ponte de Jugais	Alva	Run-of-river	-	-	20,3	2	1923
Vila Cova	Alva	Run-of-river	-	-	23,4	2	2001 [3]
Santa Luzia	Rib. Unhais	Reservoir	246	50,5	24,4	4	1943
Sabugeiro II	Rib. Covão Urso	Reservoir	64,6	5,1	10,0	1	1993
Riba-Côa	Côa	Run-of-river	5,6	-	0,1	1	1906
Pateiro	Mondego	Run-of-river	0,3	-	0,3	2	1938
Ribafeita	Vouga	Run-of-river	2	0,1	0,9	2	1907
Drizes	Vouga	Run-of-river	3	0,2	0,2	1	1917
Pisões	Dinha	Run-of-river	-	-	0,1	2	1927
Figueiral	Carvalhinho	Run-of-river	0,5	-	0,2	1	1932
Rei de Moinhos	Alva	Run-of-river	2,5	-	0,8	1	1927
Ermida	Rib. S. João	Run-of-river	-	-	0,4	2	1943

(1) Figures revised in 2001 for all power plants
(2) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation
(3) Reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	286 142

ENVIRONMENTAL DATA

WASTE

Used oils (t)	6,3
Metal scrap (t)	10,0
PCB containing equipment (t)	0

TEJO NON-BINDING HYDRO GENERATING CENTRE

EDP Energia, S.A.

Head office: Central de Belver 6120-511 ORTIGA-GAVIÃO

CHARACTERISTICS [1]

Power plant	River	Type of head installation	Hydrographic basin area (ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generating units	Entered into service [2]
Belver	Tejo	Run-of-river	28,6	7,5	80,7	6	1951
Póvoa Rib.	Nisa	Reservoir	23,6	19,7	0,7	1	1927
Bruceira	Rib. Nisa	Reservoir	11	4,1	1,6	1	1928
Velada	Rib. Nisa	Reservoir	1	0,4	1,9	1	1935
Caldeirão	Almonda	Run-of-river	-	-	0,2	2	1927

(1) Figures revised in 2001 for all power plants
(2) Entry into service date of the 1st generating unit or of the installation's far-reaching reformulation

OPERATIONAL DATA

Net electricity generation (MWh)	258 808

ENVIRONMENTAL DATA

WASTE

Used oils (t)	3,0
Metal scrap (t)	0
PCB containing equipment (t)	0

WIND FARMS

ENERNOVA - Novas Energias S.A.

Head office: Av. Estados Unidos da América, 55, 11º. 1749-061 LISBOA

CHARACTERISTICS

Power plant	Location	Implantation area (ha)	No. of generators	Tower height (m)	Diameter of blades (m)	Installed capacity (MW)	Average wind velocity (m/s)	Minimum wind velocity (m/s)	Expected gross generation (GWh/year)	Entered into service
Fonte da Mesa	Serra Meadas (Lamego/Resende)	340	17	41	42	10,2	7,7	17	25,0	1997
Pena Suar	Serra Marão (Amarante/V. Real)	205	20	44	40	10,0	8,9	13	26,2	1998
Cabeço da Rainha	Serra Alvelos (Oleiros/Sertã)	80	17	46	44	10,2	8,5	14	30,1	2000
Cadafaz	Serra Lousã (Góis)	60	17	46	44	10,2	8,5	14	26,3	2001

OPERATIONAL DATA

Net electricity generation (MWh)	90 570

ENVIRONMENTAL DATA

WASTE

Used oils (t)	1,3
Metal scrap (t)	0

MORTÁGUA FOREST WASTE THERMAL POWER PLANT

ENERNOVA - Novas Energias, S.A.
Mortágua. 3450-116 MORTÁGUA

CHARACTERISTICS

Type of power station	Steam turbine
Fuel	Forest waste
Installed capacity (MW)	9
No. of generating units	1
Entered into services	1999
Stack height (m)	50
Air quality surveillance network	None
Gas treatment	Electrostatic precipitators
Combustion modifications	None
Wastewater treatment	None

OPERATIONAL DATA

Net electricity generation (MWh)	18 476
Fuel consumption (t)	40 574 Biomass (t) [1]
	582 Natural gas (Nm^3x10^3)

(1) Includes forest waste, pinetree and eucalyptus bark and other types of biomass.

ENVIRONMENTAL DATA

ATMOSPHERIC EMISSIONS [2]

	Concentration (mg/Nm^3)
SO_2	300
NO_x	340
Particulates	100

WASTE

Ash (t) [3]	903,6
Used oils (t)	0,6
Metal scrap (t)	0

(2) Emission figures guaranteed by the equipment supplier.
(3) Includes fly and bottom ash from the burning of forest waste.

SOPORGEN COGENERATION POWER PLANT

EDP Cogeração - Produção de Electricidade e Calor, S.A.

Central de Cogeração SOPORGEN. Lavos. Apartado 5. 3081 - 851 FIGUEIRA DA FOZ

CHARACTERISTICS

Type of power station	Cogeneration-Combined cycle
Fuel	Natural gas
Installed capacity (MW)	67
No. of generating units	2
Entered into services	2000
Air quality surveillance network	(1)
Gas treatment	None
Combustion modifications	None
Wastewater treatment	(2)

(1) SOPORCEL possesses its own surveillance network
(2) Wastewater is channelled to SOPORCEL's treatment facility

OPERATIONAL DATA

Net electricity generation (MWh)	421 747
Steam supplied to SOPORCEL (GJ)	1 747 000
Fuel consumption (Nm^3x10^3)	108 884

ENVIRONMENTAL DATA

ATMOSPHERIC EMISSIONS (3)

	Total (kt)	Specific (g/kWh)
SO_2	-	-
NO_x	0,08	0,09
CO_2	243	267
Particulates	-	-

WASTE (4)

Used oils (t)	0,5
Metal scrap (t)	0,2

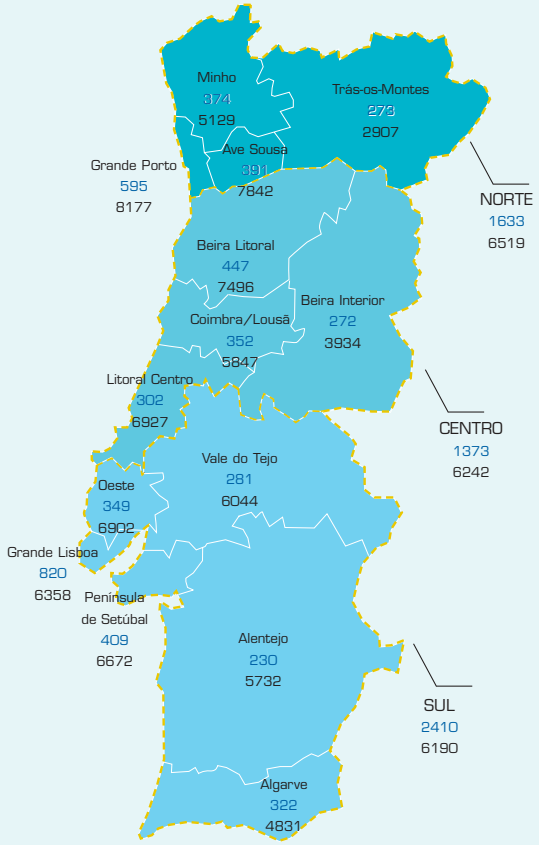
(3) Emissions calculated on the basis of characterisation survey of gaseous effluent
(4) The management of waste is undertaken by SOPORCEL

DISTRIBUTION NETWORK

EDP Distribuição - Energia, S.A.

Head office: Rua Camilo Castelo Branco, 43. 1050-040 LISBOA

DISTRIBUTION NETWORK AREAS



Legend

Total

Customers (thousands) 5415

KWh/customer 6295

CHARACTERISTICS

Substations		
	No.	368
	Installed capacity (MVA)	12 971
	No. of transformers	651
Transforming stations		
	No.	49 165
	Installed capacity (MVA)	13 432
Overhead lines		
	HV (km)	6 925
	MV (km)	50 712
	LV (km)	95 059
Underground cables (km)		
	HV (km)	352
	MV (km)	10 542
	LV (km)	23 044

OPERATIONAL DATA

ENERGY BALANCE (GWh)

Electricity delivered to distribution		39 245
	Own consumption	40
	Losses	3 180
	% Losses	8,1%
	Total electric energy sold	36 025
	Sold to SEP	35 505
	Sold to SENV	520

ENVIRONMENTAL DATA

WASTE

Used oils (t)	44,7
Metal scrap (t)	1 888,1
PCB containing equipment (t)	2,9

Glossary

A **Ash** Solid waste from the burning of fuel derived from mineral impurities contained therein. May also include unburnt fuel.

Atmospheric pollutant Substance introduced, directly or indirectly, by man into the air which has an adverse impact on human health and/or the surrounding environment.

B **Biomass** Non-fossilised organic material of biological origin, which can be partially used as an energy resource.

Bottom ash Thick-grain ash (see ash) accumulated at the bottom of the combustion chamber.

C **Carbon dioxide (CO_2)** Colourless and odourless gas, a natural constituent of atmospheric air. Besides its natural sources, human-origin sources include the burning of fossil fuels and various industrial processes. Although it does not have a direct effect on human health, it is a greenhouse gas, contributing to global warming.

Cogeneration Installation where the energy released by a fuel, is partially used for the production of electricity.

Combined cycle Installation for the production of electricity, composed of a gas turbine whose exhaust gases feed a heat recovery unit, which in turn generates steam for setting into action a second turbine.

E **Electromagnetic fields** Non-ionizing radiation between 0 and 300 GHz, which includes static fields, fields with extremely low frequencies and radio-frequency fields, including microwaves.

Environmental Impact Study Series of technical documents and studies drawn up by the entity submitting a project. Includes, amongst other information, the identification and assessment of probable effects (positive and negative) that the project may have on the environment and the measures directed at avoiding, minimising or compensating the expected negative effects.

Environmental Management System Part of an overall management system. Includes the organisation structure, planning of activities, responsibilities, practices, procedures, processes resources required for the development, implementation, review and maintenance of an Environmental Policy.

Eutrophication Process of excessive enrichment in nutrients of a mass of water. The uncontrolled growth of algae and aquatic plants and their subsequent decomposition drastically reduces the levels of oxygen dissolved and provokes the disappearance of other life forms.

F **Fly ash** Fine-grain ash (see ash) contained in combustion gases.

G **Greenhouse-effect gases** Gases in existence in the terrestrial atmosphere which absorb and re-emit infrared radiation. They are the result of natural processes and human action.

H **Hertz (Hz)** Unit of frequency. 1 Hertz is the frequency of a periodic phenomenon with a periodic time of 1 second.

Hydroelectric Capability Index (HCI) Indicator that allows quantifying the deviation of the total value of electrical energy produced by means of hydro resources over a given period relative to that which would have been produced in a period of average hydrological conditions.

Hydroelectric Power Plant Installation where the gravitational potential energy of water is converted into electrical energy.

I **ISO 14 000 Standards** Set of International Standards on Environmental Management Systems issued by the International Organisation for Standardisation.

K **Kyoto Protocol** Document adopted by all parties to the United Nations Framework Convention on Climate Change at the Kyoto conference in Japan in December 1997. It lays down targets for the differentiated reduction in emissions of a number greenhouse gases for the period of 2008-2012, for the countries listed in Annex B (developed countries).

N **Net Electricity Generation** Total electricity generated after subtracting own consumption in electricity generation processes.

Nitrogen Oxides (NOx) Gases composed of a nitrogen atom and a variable number of oxygen atoms. Atmospheric pollutants formed by the oxidisation of nitrogen at high temperature. One of the agents responsible for the phenomena of photochemical fog and acid deposition.

Non-Binding Electricity System (SENV) Part of the National Electricity System that satisfies of its own or third party needs in terms of the generation and distribution of medium and high voltage electric power through non-regulated commercial contracts. These contracts are freely established by its participants.

P **Particulates** Atmospheric pollutant composed of finely separated material suspended in the air.

Polychlorinated Biphenyls (PCB) Group of toxic and persistent chemical compounds of synthetic origin. Up until their manufacture was prohibited in the late 1970's, it was widely used as insulation fluid in the world's electricity industry.

Public Service Electricity System (SEP) Part of the National Electricity System that guarantees, through mainland Portugal, the satisfaction of electric energy consumption needs under a public service regime. It comprises the National Transmission Grid (RNT) and a group of power-generating installations and distribution networks operated under a binding licence regime.

S **Sulphur dioxide (SO_2)** Atmospheric pollutant emitted by natural and human process, such as the burning of fossil fuels and various industrial processes. One of the

agents responsible for the phenomenon of acid deposition.

T **Thermoelectric Power Plant** Installation where the chemical energy contained in fuel is converted into electrical energy by means of a thermodynamic process.

Transformer Equipment used for transferring electric energy between different circuits by means of magnetic induction.

W **Watt (W)** Unit of power. 1 Watt is the power of an energy system in which 1 Joule of energy is uniformly transferred for 1 second.

Watt Hour (Wh) Unit of measurement of electricity produced or consumed. 1 Watt hour is the energy needed for the functioning of electrical equipment of 1 Watt power, during one hour.

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