Environmental Report

Environmental Policy

2000

Basic Principles of EDP Board of Directors Declaration on Environmental Policy

Considering electric energy as a crucial factor for the development and improvement in 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 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, transmission, distribution and final use of electricity;
- To encorage 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 for environmental information;
- To encourage the use of clean technologies and suitable waste-management practices.

1994

EDP
Electricidade de Portugal, S.A.

The 2000 Environmental Report is illustrated with themes relating to the project "Plantas da Arrábida" based on the use of part of the residual heat emitted by the cooling wastewater from the Setúbal Thermoelectric Power Station's main cooling circuit. The heat is used for heating greenhouses where indigenous plants are produced with the aim to help restore the original vegetation in deteriorated regions of Serra da Arrábida.

This project is being sponsored mainly by EDP/CPPE. The other partners are INETI (technical-scientific coordinator), Parque Natural da Arrábida/ICN and Setúbal and Palmela municipal councils.

This way, EDP seeks to underline its commitment to safeguarding natural values by contributing to more sustainable development.

Contents

Chairman's Message

This Report aims to disclose EDP's attitude towards the environment, during 2000. It covers, in particular, the main actions taken by the company in its course to ensure a continuous improvement in environmental performance.

It was a year of significant changes for the National Electricity Sector: the major control of EDP went to the hands of private investors; the government transformed REN – Rede Eléctrica Nacional into an independent entity. EDP Group began an important stage in its business life, renovating its operating strategy and revealing a new institutional image.

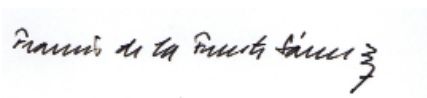
The consolidation of this image is being accomplished by improving the quality of our service and increasing the efficiency of our business areas. Concomitantly, we continue to reinforce our role as a citizen corporation, assuming the protection of the environment and the discussion over sustainable development as fundamental concerns in our activities.

Amongst the numerous initiatives undertaken, the monitoring of international trends in the issue of climate change and the curbing of atmospheric emissions were of special note.

The use of more sustainable energy forms and a more rational use of the energy we produce are imperatives and will have to be assumed by everyone, at a national level. Conscious of its role in the Portuguese electricity market, it is EDP´s desire to be prepared to assume the challenge by increasing the production of electricity from renewable energy sources and promoting demand-side management.

In 2000 some initiatives in these fields continued and, among others, we carried on with the expansion of wind farms and organised the IUE's (International Union of Electricity Applications) Conference devoted to the theme "Electricity for Sustainable Urban Development", where more than 100 international experts in the fields of energy efficiency and demand-side management met in Lisbon. According to international standards, we continued the environmental certification process of our thermoelectric power plants and we actively participated in the second European exercise of Greenhouse Gas Emission trading simulation.

We have walked a long way, which can now be also attested through the form, periodicity and emphasis we use when reporting our performance. Next year our challenge will be to publish the Environment Report together with the Report and Accounts awarding the environmental component its adequate status.



Francisco de la Fuente Sánchez
Chairman

Framework

Framework

EDP is one of Europe's major electricity sector operators and a leading Portuguese business group.

In recent years, the Company has been extending its activities to new business areas and new markets.

Organisational Structure

EDP Group

Electricity

Generation

- CPPE
- EDP Energia
- Hidrocenel
- HDN
- TER
- Enernova
- EDP Cogeração

Distribution

- EDP Distribuição

Engineering and Studies

- Hidrorumo
- Proet

Support Services

- LABELEC
- MRH
- SÃVIDA
- EDP Serviços
- Energia RE
- EDP Imobiliária
- EDALPRO
- EDP Finance BV

Internationalisation

- EDP Internacional
- EDP Brasil
- Investments in other markets

Telecommunications and Information Technologies

- ONI, SGPS
- EDINFOR

Multi-Utility and Investments

- EDP Águas
- EDP Participações SGPS

In Portugal, current development strategy is focused on reinforcing its electricity business interests, expanding into telecommunications and information technologies, and positioning itself as a multi-utility company integrating value-added attributes in the gas and water areas.

However, EDP is not only a major force in Portugal: it is one of the biggest investors in Brazil's electricity sector and is also present in Cape Verde, Morocco and Guatemala.

Key Operating Data

	2000	1999
	In Portugal	
No. of Employees	12 722	13 879
Electricity	*10 526*	*12 051*
Telecommunications and IT	*1 470*	*1 095*
Other businesses	*726*	*733*
Electricity generation (GWh)	25 754	25 112
Electricity sales (GWh)	34 176	32 280
No. of electricity customer	5 415 313	5 291 520
No. of telephone lines supplied	290 652	n.a.
No. of registered internet accounts	263 576	n.a.
	Overseas [1]	
Electricity sales (GWh)	53 765	48 799
No. of employees	12 524	11 232
No. of customers	8 224 974	7 536 302

[1] Taking in account the total value of the companies with EDP participation

Key Economic and Financional Data

	2000	1999
		10^6 PTE
Turnover	771 153	615 883
Net income	110 059	103 035
Total capital expenditure	437 160	308 955
Net total assets	2 984 562	2 748 522

Supporting its own activities – but also (and increasingly) working outside the Group – EDP Group companies provides engineering, consultancy and laboratory services.

1997 saw EDP embark on a progressive privatisation programme. The 4th phase took place in 2000 with majority control passing to private shareholders. The Portuguese State's shareholding now stands at around 30%.



Shareholder Structure

	%
Portuguese State	31
Banco Comercial Português	5
Iberdrola	4
Other private shareholders	60
TOTAL	100

EDP currently owns about 75% of the Portuguese Electricity Sector's installed capacity, operates all of the country's large-scale hydroelectric power-generating centres and has recently invested heavily in renewable energies, notably wind power.

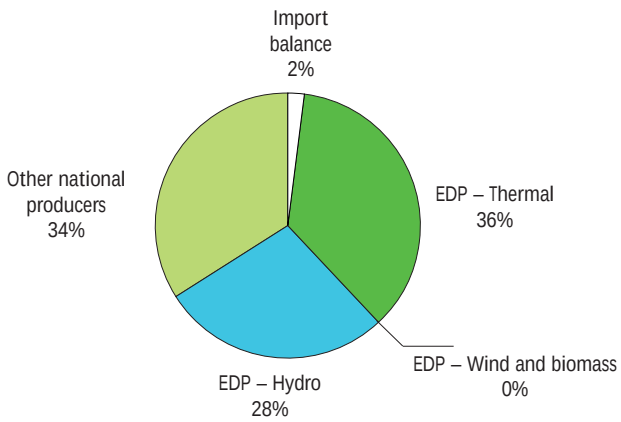
In addition to generation, EDP undertakes the distribution of electricity to some 5.5 million customers throughout the country.

Installed Capacity at Power-generation Centres

	MW
Hydraulic	4 198
Thermal	3 281
Wind	30
Biomass	9
TOTAL	7 585

EDP's Production in the Electricity Consumptions Structure, Portugal 2000

Figure 1



Distribution Network Main Characteristics

	2000	1999
Overheads lines (Km)	150 532	148 253
Underground cables (Km)	33 946	32 304
No. of substations	368	365
No. of transforming stations	47 060	46 134

Besides progressive liberalisation, recent trends in Portugal's electricity sector have been marked by the robust growth in electricity consumption: in 2000, consumption continued to outpace the European average, posting a rise of 5.6% relative to 1999.

From the hydrological standpoint, the year was extremely favourable, with EDP taking full advantage of its installed capacity, thus generating 44% of total electricity output from its hydroelectric plants.

Fuel Consumption for Electricity Generation

	2000	1999
Coal (10^3 t)	3 456	3 491
Fuel-oil (10^3 t)	1 052	1 536
Natural gás (10^3 m^3)	142 059	376 278
Diesel (10^3 l)	14 359	1 732
Forest waste (10^3 t)	19	11

In this period EDP reinforced its presence in the non-binding national electricity sector with the entry into operation of the first generating units at its third wind farm (at Cabeço da Rainha) and the formation of TER-Termoeléctrica do Ribatejo, the company that will launch the construction of a new combined-cycle natural-gas-fired power station.

Still in 2000, two significant events occurred in the company's life. At the beginning of the year, the Group's four electricity distribution companies (EN, CENEL, LTE and SLE), which operated at regional level, were merged, giving birth to a single business undertaking, EDP DISTRIBUIÇÃO – Energia, S.A. At the end of November and within the context of the sector's liberalisation presently under way, the Portuguese State decided to grant greater independence to REN – Rede Eléctrica Nacional, S.A., the National Transmission Grid's concession holder. In order to achieve this, the State acquired 70% of REN's capital from EDP, with the latter retaining a 30% interest.

Performance in 2000

Performance in 2000

Highlights

One of EDP's chief strategic management objectives is the full integration of environmental issues into its various activities.

During 2000, EDP undertook a series of initiatives forming part of previously-defined strategic guidelines and took important steps towards fulfilling some of the established goals. Some highlights are:

- Accompanying the international debate on Climate Change and the limitation of atmospheric emissions.

- Continued expansion into renewable energies: the entry into operation of EDP's third wind farm and beginning of construction work on a fourth facility of this type.

- Conclusion of a system installation for reducing the emission of atmospheric pollutants (nitrogen oxide) at the Sines Thermoelectric Power Station.

- Ongoing implementation of environmental management systems: a further two of EDP's thermoelectric power stations were certified in accordance with ISO 14 001 Standard.

- Further work on the Environmental Impact Assessment studies for two new power-generating centres: the Baixo Sabor – Alto Côa hydroelectric complex and the Ribatejo combined-cycle natural gas power station.

The present report describes EDP's environmental initiatives and performance in 2000, giving particular prominence to innovative action, which marked the evolution in the company's monitoring of environmental issues.

Although the report has significantly extended its coverage – reporting as well on consultancy activities, environmental services and research and development projects in which the company is involved – this edition still does not allow a global assessment of the EDP Group's environmental performance in all its numerous activities. It focuses essentially on the Company's presence in the electricity sector, that is, the area in which its environmental impacts are most significant.

Privet

Phillyrea latifolia L.

Climate Change

EDP continued to keep an attentive eye on the Climate Change issue during the course of 2000, with its action continuing to follow the guidelines of recent years.

These guidelines will, in future, be adjusted to a national programme for Climate Change, to be defined shortly by the Portuguese government. The programme will have as its primordial goal ensuring compliance with the international undertakings assumed by the European Community nations as signatories of the Kyoto Protocol, in terms of which they must reduce greenhouse gases (GHG) by 8% in the period 2008-2012 vis-à-vis 1990 values. Consequently, we anticipate the promulgation of internal measures and policies to be applied in an adjusted and proportional manner relative to the economic activities covered.

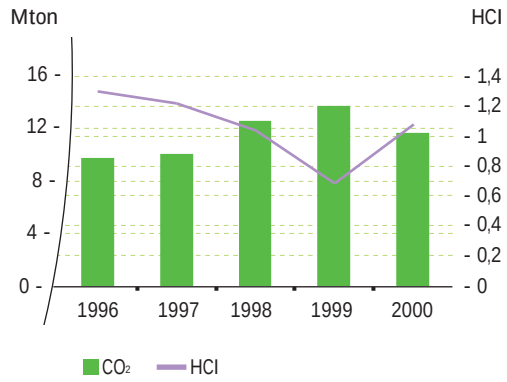
Electricity generation is broadly recognised as constituting a significant source of carbon dioxide (CO_2) emissions, the main gas associated with the greenhouse effect. In the case of EDP's generating capability, this contribution presents an inter-annual variation, depending on the behaviour of the hydro component, that is, the Hydroelectric Capability Index.

EDP has concentrated an important part of its efforts on permanently monitoring national and international developments in this domain.

In its quest to become progressively acquainted with the use of the flexibility mechanisms defined in the Kyoto Protocol, namely emission trading, EDP participated in the second phase of the simulation exercise of a CO_2 emissions permit market – *GETS2 – Greenhouse Gas and Energy Trading Simulation*. This event, which was once again staged by EURELECTRIC – an association of European electricity companies of which EDP forms part – made an important contribution to defining the positions assumed by the electricity sector at the 6th Conference of the

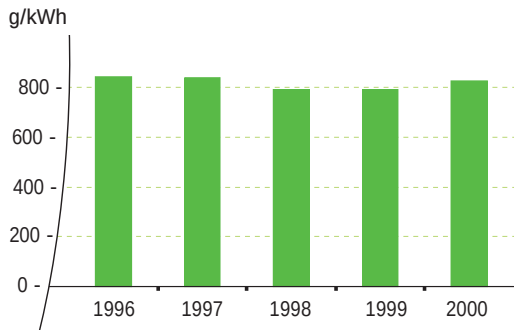
Total CO_2 Emissions from Thermal Power Plants and Hydroelectric Capability Index (HCI)

Figure 2A



Specific CO_2 Emissions

Figure 2B



Parties to the Framework Convention on Climate Change, which was held in November at The Hague (see box).

Simultaneously, the Company proceeded with the identification and definition of specific measures for curbing emissions, not only on the electricity generation side (with the continued focus on renewable energies), but also on the demand side, with action directed at enhancing energy efficiency and consumption rationalisation.

GETS 2: Greenhouse Gas and Energy Trading Simulation

Between January and July 2000, 40 "Virtual Companies" from 16 countries participated in an exercise simulating a dual market for electricity and greenhouse gases emission permits. Organized by EURELECTRIC – *The Union of the Electric Industry*, GETS2 constituted the second phase of GETS, performed in the previous year. The streamlining of certain functioning parameters and the introduction of new variables marked the 2000 version.

Amongst the participants were 26 electricity producers and 14 companies, which are intensive energy consumers from another 6 industrial sectors, ranging from paper pulp to chemicals and cement.

The simulation covers the period 2005 – 2015, divided into three emission-reduction periods, each one with increasingly demanding goals. The participants had to meet these targets through the adoption of internal emission-curbing measures and the simultaneous trading of electricity and CO_2 emission permits.

Complementing emissions trading, this exercise also tested the use of other flexibility mechanisms envisaged in the Kyoto Protocol: Clean Development Mechanism and Joint Implementation. It also tested two different methods for the initial allocation of emission permits to companies.

This exercise resulted in the issue of a series of key messages by EURELECTRIC at the 6th Session of the Conference of the Parties in November, amongst which the following:

- The emission market allows companies to integrate environmental goals into their business strategies and optimize the timing of their investments.
- The remaining flexibility mechanisms can be advantageously incorporated into the emission trading system.
- There is no preferential allocation method for credits in terms of repercussions for environmental goals.

Renewable Energies

Electricity generation based on renewable sources is an important factor in the diversification of primary energy sources. Moreover, it constitutes a fundamental component of a strategy directed at sustainable development and, in particular, the combat against Climate Change.

In 2000, EDP (*via* ENERNOVA) followed its expansion in renewable energies with the commissioning of a new wind farm – Cabeço da Rainha. This complex, located in the Serra dos Alvelos, comprises 20 wind-driven generators, with a total installed capacity of 10.2 MW.

Electricity Generation Based on Renewable Sources

	2000	1999
		(MWh)
Wind	70 313	52 901
Biomass	4 718	1 900
Small-scale hydro plants (<10MW)	146 451	128 645
Hydro plants (>10MW)	10 700 653	6 774 445

Still in this year, a start was made to the construction of the Cadafaz Wind Farm located in Serra da Lousã, where 20 wind-driven generators are scheduled to be installed with a total capacity of 10 MW.

Adjustments were made to the operating conditions at the Mortágua Biomass Power Plant (already fully functional), and its generating output substantially boosted. However, problems with the supply of forest waste persisted, a situation that forced the periodic recourse to natural gas as the substitute fuel.

The electricity output contribution from small and medium-sized hydroelectric power stations registered a significant increase relative to 1999 as a direct consequence of the more favourable hydrological conditions.

Considering also electricity generated at major hydroelectric installations, EDP continued in 2000 to be the main national producer of electricity generated from renewable sources, accounting for roughly 94% of the country's total.



Energy Efficiency

In parallel with the use of renewable sources, increased efficiency – both in the generation and distribution of electricity and in its final consumption – represents another of the critical measures for curbing GHG emissions in the electricity sector.

In this area, EDP has been working on three fronts:

- Internal control over energy efficiency at its generating and distribution facilities;
- Active participation in cogeneration projects;
- Promotion of Demand-Side Management initiatives.

EDP regularly monitors its own energy consumption and electricity losses at generating and distribution sites, taking the necessary action to ensure their minimisation.

The ISO 14 001 Standard certified thermoelectric power stations also have specific programmes for the reduction and control of internal energy uses.

Committed to the combined production of heat and electricity, EDP offers

Cogeneration – Current projects

- Operations management – – SOPORGEN (SOPORCEL – – Figueira da Foz);
- Implementation of projects in Portugal – ENERGIN AZÓIA (SOLVAY PORTUGAL) and CARRIÇO COGERAÇÃO (UNITECA – *União Industrial Têxtil e Química*);
- Implementation of projects abroad – FAFEN – Fábrica de Fertilizantes Nitrogenados da Bahia, owned by PETROBRÁS, Brazil.

Holm-oak

Quercus coccifera L.

its major industrial customers a new energy service that, in many cases, results in a meaningful decrease in costs associated with their manufacturing processes.

Through EDP COGERAÇÃO, the EDP Group continued in 2000 to be actively involved in the implementation, construction and operational management of a number of national cogeneration projects, while at the same time boosting its international activity in this area (especially in Brazil).

On the electricity consumption side, in 2000, EDP promoted a series of awareness campaigns targeted at different consumer segments:

- Use of electric vehicles for urban transport: collaboration with the Energy Agency (AGEEN) in feasibility studies, and giving support to Portugal's first participation in the European Day without Cars which took place on September 22.

- Training programmes: collaboration with AGEEN in formulating a training plan in the areas of energy efficiency and management. This plan embraces training courses tailored specifically for industrial consumers and in-house training sessions for EDP DISTRIBUIÇÃO staff specially prepared to serve these customers.

In November, EDP hosted an International Conference for the IUE (*International Union of Electricity Applications*) subordinated to the theme *Electricity for Sustainable Urban Development*. This event brought together in Lisbon more than 100 international specialists in the field of energy and electrical efficiency. It contributed to the dissemination of new highly efficient electro-technologies, new measures for managing demand, and the fundamental role of electricity within the context of sustainable development.

Electric vehicles – Feasibility study

With the objective of gaining in-depth knowledge of rapid charging systems, EDP participated in the study "Evaluation of Opportunities for Electric Vehicle Penetration in Urban Areas and Technical Analysis of rapid Fast Charging Technologies"

Methodology

- Characterisation of possible market niches for the electric vehicle in urban environment;

- Identification of incentives for electric vehicle penetration in the market.

Principal conclusions

- It is possible to overcome the user's psychological barrier to battery failure;

- The use of rapid charging systems must be analysed carefully in the light of problems that may arise in managing the load diagram.

Training courses

EDP DISTRIBUIÇÃO staged an in-house training course devoted to "Management of Electric Energy for Business Customer Managers"

Objectives:

- Gaining basic knowledge in the areas of energy efficiency and energy management;
- Updating knowledge about the most efficient energy technologies;
- Training dealing with rational energy use practices;
- Information relating to Demand – Side Management measures.

In addition, EDP participates regularly in the international UNIPEDE ETA (η) AWARD. This prize, which seeks to promote more efficient technologies, is given to a manufacturing unit, which, through the adoption of electrical methods and processes, has substantially improved the energy efficiency of its productive process. The 2000 winner in category II (companies with more than 100 workers) was Atlantis – Cristais de Alcobaça, proposed by EDP for the international competition.

Atmospheric Impact

2000 saw EDP continue to concentrate on efforts directed at reducing and controlling atmospheric emissions associated with the operation of its thermoelectric power stations. This work was carried out in accordance with predefined environmental protection programmes.

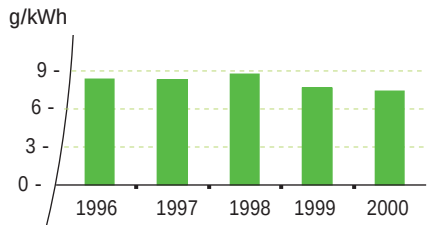
It covers the continuous monitoring of sulphur dioxide (SO_2), nitrogen oxides (NO_x) and particulate emissions from thermal installations. At the same time, a close watch is kept regarding compliance with the Company's specific responsibilities under the National Plan for the Reduction of Emissions, signed in 1997.

Total Emissions

	2000	1999
		kt
SO_2	105,0	133,5
NO_x	37,4	53,0
Partículates	2,3	3,3
CO_2	11 732	13 810

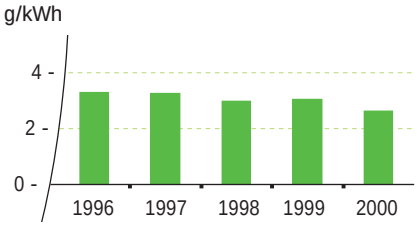
Specific SO_2 Emissions

Figure 3A



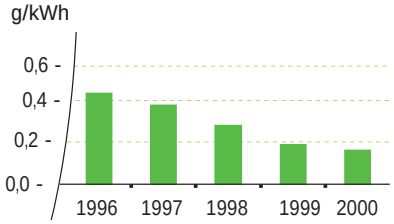
Specific NO_x Emissions

Figure 3B



Specific Particulates Emissions

Figure 3C



The project was initiated in 1997 and involves the introduction of primary measures for reducing NO_x at the Sines Thermoelectric Power Station. It was concluded in the first half of 2000. This investment, which covers the burning systems of all the plant's generating units, guarantees emission figures around 750 mg/Nm^3, which correspond to a reduction of around 50%.

The atmospheric impact of thermoelectric generation is also assessed by means of the air quality monitoring networks located in the vicinity of the company's sites, a procedure which EDP has been conducting since the beginning of the 1970's.

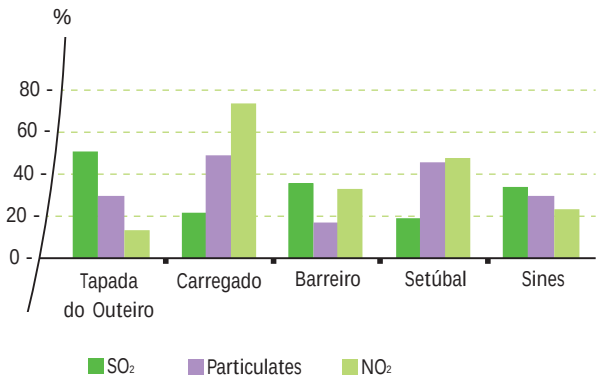
The continuous measurement of pollutants at ground level and the transmission of real-time information to a central system enables decisions to be taken timeously as regards possible corrective and control measures in terms of atmospheric emissions.

In 2000 the air quality index for each pollutant – defined according to the highest value (as a percentage) of the respective limit of applicable legislation – presented low values for each of the networks, only recording a figure in excess of 50% in the case of NO_2 at the Carregado network.

These results indicate an insignificant adverse impact stemming from the thermoelectric power plants in their respective areas of influence.

Air Quality Index in 2000

Figure 4



Hydro Resources

Water Resources Quality Monitoring

The importance that water assume today is echoed in the growing concern with which EDP has continued to take appropriate action to protect, monitor and control this resource.

Amongst the steps taken, it can be refered the ongoing research work being undertaken at the Sines Thermoelectric Power Station since 1997/98. The results obtained allowed the plant to suspend the chlorination of its main cooling circuit for three months (December, January and February). Moreover, it was concluded that it would not be possible to extend this period without the occurrence of an unacceptably high rate of biological fouling, with consequent drawbacks for the power station's functioning.

Thermoelectric power plants also produce wastewater in quantities that are dependent upon the respective functioning regime, giving rise to chemical, oil and domestic effluents. All power stations are equipped with selective treatment stations, that is, specific facilities for each type of effluent. The physical and chemical characteristics effluent before rejection is subjected to extensive analytical control in the form of 24-hour compound samples taken on consecutive days, whe-

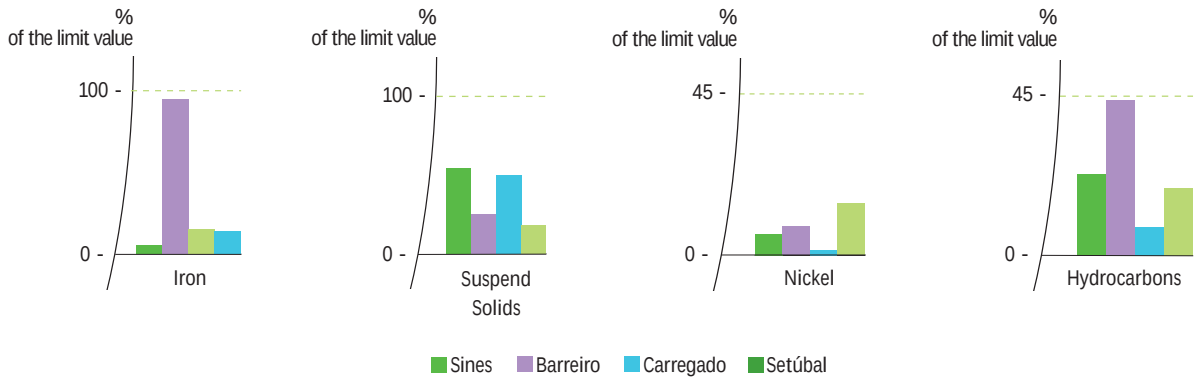
reby some 20 parameters per sample are controlled. Simultaneously, certain parameters are monitored continuously (dissolved oxygen, turbidity, pH and temperature).

The analytical values obtained are evaluated against the values stipulated in the wastewater rejection licences issued to each power station, as well as against the reference levels laid down in applicable legislation (Decree-Law 236/98).

The following charts show the average concentration levels of the Maximum Admissible Value percentage, obtained in 2000 for the main parameters.

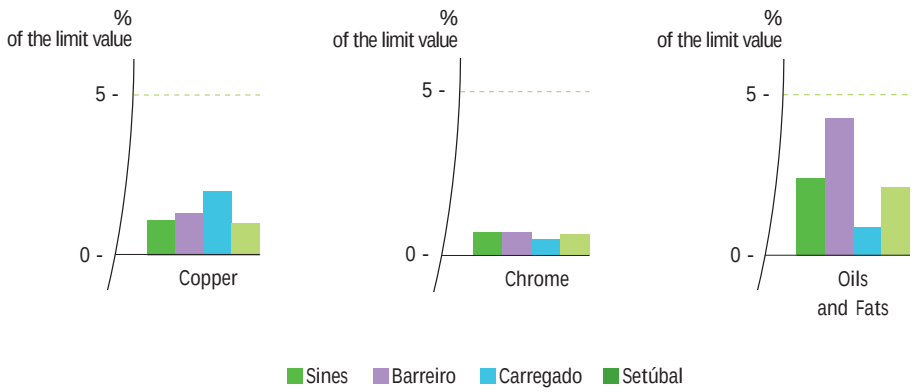
Wastewater Quality Index in 2000

Figure 5A – Iron, Suspend Solids, Nickel and Hydrocarbons



Wastewater Quality Indexes in 2000

Figure 5B – Copper, Chrome, Oils and Fats



Reservoir Water Quality

EDP continued to conduct hydro-chemical observation of reservoir water and water released by the drainage systems of dam foundations. This process involves the characterisation of certain parameters in order to assess in good time the deterioration originated by percolation water. This is a fundamental task from the standpoint of controlling dam safety.

Reservoirs in operation are periodically subjected to physical/chemical and bacteriological control (annual, biannual or tri-annual) according to a well-defined pro-

gramme. Reservoirs providing water supply to populations or which are subject to major environmental “pressures” are object of an annual control.

The control of each reservoir entails the performance of four separate campaigns, which coincide, with the seasons of the year. Samples are normally taken at 2/3 predefined seasons and at three different depths (surface, water intake and deep level).

This analytical control programme for reservoirs involves extensive laboratory work aimed at establishing around 1,100 parameters per reservoir and per annum, corresponding to more than 20,000 yearly analyses.

Of the parameters analysed, special attention is paid to those, which can be used as indicators of the trophic state of reservoirs (dissolved oxygen, chlorophyll a; nitrogen; total phosphorus and Secchi disk) and the degree of bacteriological pollution (total coliform bacteria and faecal coliform bacteria).



Waste

The integrated management of waste produced by its different activities is one of EDP's primary concerns. The Company has been searching for the most appropriate solutions taking into consideration the danger they pose and the possibility of enhancing the recovery rate of the various categories of waste products.

Work in this direction was pursued in 2000 with the implementation of operating level measures aimed at improving management and raising recovery levels:

- Metal scrap and used oils continued to be collected separately and delivered exclusively to licensed entities specialising in recycling and energy recovery;

- Work continued on the programme for the special and phased elimination of equipment with polychlorinated biphenyls (PCB) – the object of a detailed inventory that is periodically updated by the company – and on the laboratory programme for the detection of transformers contaminated with this compound;

- Framework agreements were concluded with companies specialising in waste collection at power-generating centres;

- A proper system was implemented for the selective collection of recyclable waste from thermoelectric power stations;

- The national authorities recognised that fly ash produced at coal-fired power stations – object of a recovery programme implemented by EDP over a decade ago – should be not regarded as waste, but rather as a by-product. These ashes constitute a raw material of high technical quality in the manufacture of cement, with evident environmental and economic advantages.

Quantities and Recovery Rates for the Main Waste Categories

	2000		1999	
	Total (t)	% Recovery	Total (t)	% Recovery
Coal fly ash	349 561	97	346 780	100
Fuel-oil fly ash and bottom ash	34 268	0	37 658	0
Used oils	482	100	635	100
Metal scrap	3 298	100	3 656	100
Equipment and oils with PCB	35	0	60	0

Environmental benefits from the use of coal fly ash in the production of cement

The use of 1 ton of ash in the cement production represents, in average terms:

- Reduction of 0,8 tons in the consumption of incorporated cement;
- Reduction of 3 600 MJ in energy consumption;
- Reduction of 0,5 m^3 in the mine extraction of raw materials;
- Reduction of 0,76 t of CO_2 emitted in the calcination of calcium carbonate and in the use of fossil fuels.

EDP participates in a national programme for the recovery of ash characterised by:

- A well-defined commercial circuit;
- Investments in the process of coal milling and combustion, and in the processes involving the retrieval, handling and storage of fly ash in such a manner as to guarantee product quality;
- Stringent quality control in order to verify compliance with international and national quality standards.

Noise

The preservation of a quality environment in terms of noise levels in the vicinity of sites and equipment deployed in EDP's activities represents an aspect of increasing awareness in environmental management.

Environmental noise levels were measured at the Carregado, Barreiro, Setúbal and Sines thermal power stations in 2000. In all cases, the acoustic characterisation of surrounding areas and the evaluation of the noise impact induced by operating plants is of extreme importance on account of the proximity of sensitive recipients (such as residential clusters), and/or the simultaneous presence of other emission sources, notably road traffic.

Procedures included the measurement of noise levels at various points representing zones deemed to be the most susceptible to exposure, not only during daytime, but also at night.

The values obtained (with installations functioning) at the points closest to the most sensitive recipients are characteristic of areas occupied not solely for residential purposes.

From the standpoint of the infrastructures associated with electricity distribution, EDP has implemented and reinforced acoustic-insulation measures in order to minimise any discomfort, especially in residential areas.

Installation of silencers at the Setúbal Thermoelectric Power Station

In 2000, silencers were installed at each Setúbal power station's four generating units, in the turbine purges and in start-up ejector escape. This measure seeks to curb the noise associated with the power station's start-up operations.

The recent need to apply these measures is attributable to the growing residential occupation of surrounding areas.
In the case of the start-up ejector, the noise abatement obtained was about 20%.

Electric and Magnetic Fields

The increasing use of electric and electronic devices in developed societies has brought in its wake concomitant consumer's concerns with the effects of human exposure to electric and magnetic fields engendered by electrical currents.

This concern is mirrored by the scientific community's involvement in research work in the medical and biological field with a view to establishing a cause-effect relationship between the presence of electromagnetic fields and their influence on individuals. Complementarily, numerous epidemiological studies have been conducted, with all the attendant analysis difficulties these involve.

EDP has been systematically monitoring the progress of these investigations and studies, paying close attention to the conclusions and recommendations of internationally renowned scientific institutions. In this way, the company strives to create the conditions for contributing in a decisive and totally unbiased fashion to informing the public on this issue.

With this overriding objective, EDP sponsored the publication in Portuguese of a document produced in June 1999 by the World Health Organisation – Regional Centre for Europe, dealing with electromagnetic fields. The document is essentially directed at informing local entities about this topic and, due to its clarity and unbiased stance, constitutes a reference point around the world. The Portuguese version of the paper became available in the first quarter of 2000 and is distributed free of charge to entities and the public wishing to acquire more knowledge before forming an opinion on this subject.

Installations and the Environment

In its quest to strike an acceptable balance between the operation of its installations and the surrounding natural and human environment, EDP undertakes the regular reassessment of the impact of its activities, in particular with regard to natural ecosystems.

This aspect is particularly important for those infrastructures built in an era when impact assessment studies were not yet a pressing issue. In such cases, EDP seeks to identify and implement measures aimed at adequate minimisation procedures.

Insofar as electricity generation is concerned, it is worth mentioning the Convention, signed in 1997 between EDP and the Ministry of the Environment and Territorial Planning (MAOT), for the Environmental Optimisation of Operating Conditions of Alto Lindoso and Touvedo Hydroelectric Schemes on the river Lima.

In the electricity distribution domain, protection is centred on bird-life and the landscape integration of EDP Distribuição's infrastructures.

Convention relating to Alto Lindoso and Touvedo hydroelectric schemes on the river Lima – Measures taken in 2000

- Landscape recovery of the Parada/Lindoso debris;
- Start to the construction of fish ladders at the retention dam upstream from the Alto Lindoso hydroelectric plant's discharge canal.

"Impact of Dams on the Distribution and Ecology of the Otter: the Aguieira Dam, a Case Study"

The final report of the study conducted by the Lisbon Science Faculty (within the context of a protocol with EDP), concluded that:

- The otter regularly uses the reservoir as a source of food and refuge on its shores, with the result that the dam does not constitute a risk for the species survival, nor does it represent a factor for concern;
- There is a need to extend measures for the species preservation throughout its distribution area in order to ensure its long-term viability and the maintenance of its existing privileged situation in Portugal.

Locust-tree

Ceratonia siliqua L.

2000 saw an increase in the number of kilometres of power lines equipped with flight signallers, notably in areas of preferred habitats of certain species, such as the white stork (*Ciconia ciconia*), and in areas of pigeon breeding.

In areas designated as environmental or architectural protection zones, EDP Distribuição has been carrying out the landscape integration of its network, essentially by means of three types of action depending on each situation:

- Conversion of overhead to underground network;
- Landscape visual integration efforts by substituting concrete poles for wooden poles;
- Alterations to line routings, adapting these to terrain contours so as to minimise visual impact.

EDP Group companies also participate in regional and local protection projects, with particular focus in the areas surrounding its sites.

Minimising visual impact – some projects

- Landscape blending of the network in Verandas, Melgaço and Monção: substitution of concrete poles for wooden poles;
- Transformation of overhead lines to underground cables for low voltage and public lighting consumption within the scope of projects for the reclassification of historical villages.

Nature conservation programmes – – some projects in progress in 2000

- Setúbal Thermoelectric Power Station – 3rd year of the project for the production of Mediterranean species and the reforestation of Serra da Arrábida. Start to the large-scale production of indigenous species in greenhouses heated using cooling wastewater from the Setúbal power station;
- HIDROCENEL – Programme for the Control of invasive ligneous plants developed in collaboration with Serra da Estrela Nature Park.

Environmental Impact Assessment

The Environment Impact Assessment (EIA) of new projects is an EDP practice for each one of its capital developments, irrespective of whether they are covered or not by national legislation in this domain.

When a project is located in a designated special-protection area, EDP maintains close contact with the respective managing entities and acts in accordance with their guidelines, a situation that is frequent for projects involving new wind farms or small-scale hydroelectric facilities.

Owing to their importance, it is worth highlighting the EIA carried out in 2000 relating to the Baixo Sabor hydroelectric scheme – whose Environmental Impact Study was substantially extended in order to contemplate the comparative evaluation of the alternative locations of Baixo Sabor and Alto Côa – and the Ribatejo thermoelectric power station, the first combined-cycle natural-gas-fired unit to be built exclusively by EDP, located alongside the Carregado thermoelectric power station.

Proposals for the EIA Scope Definition were drawn up for these two projects. EDP was one of the first Portuguese companies to use this innovative procedure, envisaged for the first time in national legislation. To this end, the Company was able to count upon the experience gained in 1999 from the pilot project for the Alqueva-Sines high voltage overhead line.

Environmental Impact Studies in progress in 2000

- Baixo Sabor hydroelectric scheme;
- Ribatejo thermoelectric power station;
- Additional capacity at the Sabugeiro I hydroelectric complex – Serra da Estrela Nature Park;
- Cinfães wind farm project;
- Serra do Açor wind farm project

Environmental Management Systems

EDP recorded significant progress in 2000 in attaining the objective, set in 1996, of gradually implementing Environmental Management Systems (EMS) at its installations. This process was initiated at thermoelectric plants, after which it will extend to hydroelectric power stations and, in the final phase, to the company's other facilities.

The development of EMS and the respective certification provides assurance to the populations of adjacent areas that the measures required for the continuous improvement of the company's environmental performance have been adopted; in other words, that EDP's behaviour is environmentally responsible.

In the second half of the year, Barreiro and Carregado thermoelectric power stations had their EMS certified according to International ISO 14 001 Standard. With these two certifications, the environmental certification of all CPPE's thermal power plants enters its final stage: the only thermoelectric power station still to be certified is Sines.

Environmental Management Systems – ISO 14 001 certification

Certified facilities:

- October 1999 – Setúbal Thermoelectric Power Station;
- October 2000 – Barreiro Thermoelectric Power Station;
- December 2000 – Carregado Thermoelectric Power Station.

Consultancy and Environmental Services

Environmental impact – some coordination projects

- Environmental impact studies for the Cinfães and Serra do Açor wind farms, and additional capacity at the Picote hydroelectric complex;
- Assessment study into the environmental incidence of the enlargement of the Caldeirão power station – – Ilha de S. Miguel, on behalf of Electricidade dos Açores;
- Study covering the Impact of Gaseous Emissions of the thermal power stations of Coloane A&B, for Companhia de Electricidade de Macau;
- Environmental Impact Study of the Hydroelectric Project for *Station de Transfert d'Energie par Pompage d'Afourer*, on behalf of the Office National de l'Electricite de Marrocos.

Backed by the knowledge and experience accumulated in environmental matters, the EDP Group has been consolidating and diversifying its consulting and service activities in this arena, both at home and abroad.

The environment-oriented component had a significant expression on the combined activities in 2000 of the Group's engineering companies – PROET and HIDRORUMO – and the laboratory-services company – LABELEC.

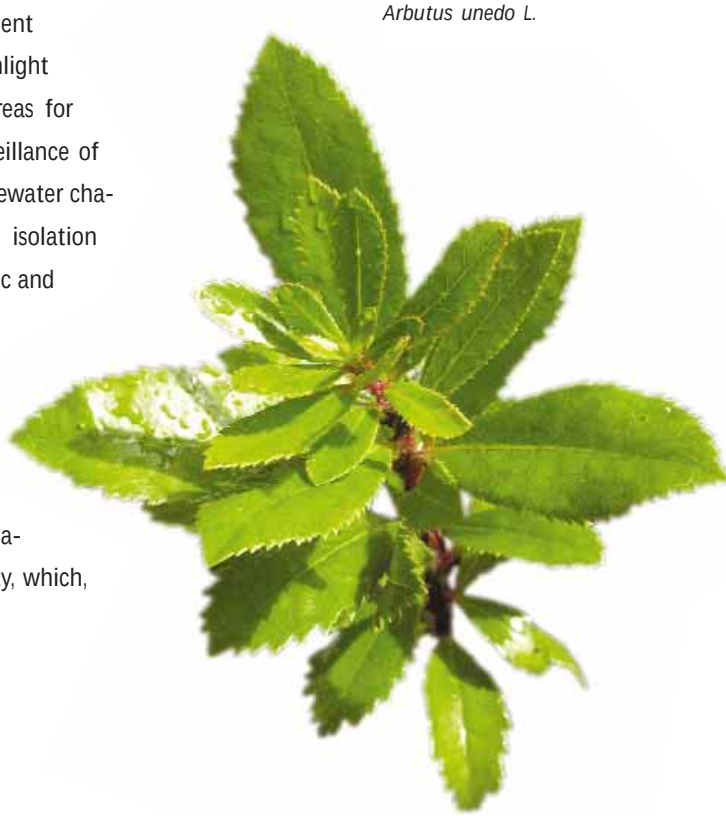
Expertise in this field includes, amongst others, the management and coordination of Environmental Impact Studies, the realisation of a wide array of laboratory analyses for environmental monitoring, and campaigns directed at the characterisation of atmospheric emissions on behalf of various industries.

Due to the variety of environment monitoring, it is worth to highlight some of the most significant areas for EDP such as: water quality surveillance of reservoir and ground water; wastewater characterisation; PCB detection in isolation materials and equipments; electric and magnetic fields characterisation and continuous measurement of atmospheric pollutants.

EDP already possesses a mobile laboratory for measuring air quality, which,

Arbutus-tree

Arbutus unedo L.



since the end of 2000, has been placed at the service of LABELEC in order to optimise its utilisation. The unit has carried out several periodic monitoring assignments contracted by external entities.

Environmental monitoring – – some projects worth highlighting

- Environmental Diagnosis of the conception and support in the implementation of an EMS at the Ave hydroelectric system;
- Study covering the revision of the Plan for the Serra da Estrela Nature Park on behalf of the Instituto de Conservação da Natureza (Nature Conservation Institute);
- Continued development of the Hydrographic Basin Plans of the Douro, Lima, Cávado, Ave and Leça rivers.
- Study for the characterisation of the water quality of cross-border rivers within the ambit of the Application and Development of the Portuguese – Spanish Convention, on behalf of the Instituto Nacional da Água (National Water Institute).

Research and Development

EDP undertakes research and development work on a regular basis, essentially through its participation in a number of projects supported by the European Community, both at national level, and in international collaboration initiatives.

Besides the strictly technological facet, many of these projects also present appreciable environmental advantages. This is apparent in numerous projects in the area of renewable energies, amongst which it is worth highlighting, in 2000, the Ourique Project, a pilot experiment in the combined use of renewable energy sources for supplying power to isolated populations.

Still in 2000, EDP participated in preparatory work for the Project OREMA – Integrated Efficiency and Environmental Optimisation at Thermoelectric Power Stations. This project aims to improve efficiency in thermoelectric generation, with a consequent reduction in associated atmospheric emissions. The effective launch of this project is scheduled for January 2001, with EDP's collaboration being undertaken directly via CPPE's integration in a European consortium.

Ourique project

With the support of the Ourique municipal council, EDP-Distribuição, together with the Centre for Energy Conservation (now the Energy Agency - AGEEN), developed a pilot project for the electrification of isolated residential clusters located in the Ourique district.

This project is designed to meet the electrical power needs of 120 residents, including the supply of drinking water and the irrigation of 50 ha of agricultural land.

The system resorts to 3 hybrid plants comprising a total of 3 wind generators (55 kW), 3 photovoltaic fields (42 kWp), batteries (688 kWh) and 3 diesel back-up generating units (45 kVA).

The project was co-financed by the European Commission under the THERMIE programme and, at national level, by the Energy Programme.

Installations 49

Installations

EDP GENERATING PLANTS IN OPERATION AT 31.12.2000

BARREIRO THERMAL POWER PLANT

CPPE – Companhia Portuguesa de Produção de Electricidade, S.A.
Lavradio, 2835 LAVRADIO – 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	1978
Stack height (m)	104
Air quality surveillance network	3 posts
Gas treatment	None
Combustion modifications	None

Operational Data

Net electricity generation (MWh)	179 097
Steam production (GJ)	1 930 068
Fuel consumption (t)	97 006
Cooling water consumption (m^3)	35 189 784
Gross water consumption (m^3)	732 179

Environmental Data

Atmospheric Emissions [1]		
	Total (kt)	Specific (g/kWh)
SO_2	4,86	7,56
NO_x	0,82	1,28
CO_2	302	471
Particulates	0,11	0,17

Air Quality				
	($\mu g/m^3$)	Alto da Paiva	B. Banheira	Barreiro
SO_2	Median	10	11	1
	P98 DMV	68	60	89
Particulates	Average	20	8	19
	P95 DMV	51	15	50
NO_2	P98 HMV	65	0	0

Wastewater	
Suspended solids (mg/l)	15,3
Iron (mg/l Fe)	1,89
Copper (mg/l Cu)	0,01
Zinc (mg/l Zn)	0,07
Nickel (mg/l Ni)	0,16
Vanadium (mg/l V)	0,30
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,64
Hydrocarbons (mg/l)	0,44

Waste	
Fuel-oil fly ash (t)[2]	–
Bottom ash (t)	3
Used oils (t)	5
Metal scrap (t)	0
PCB containing equipment (t)	0

[1] Total emission calculated on the basic of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation
[2] Power station without electrostatic precipitators

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

Characteristics

Type of power station	Steam Turbine
Fuel	Fuel-oil / Natural gas
Installed capacity (MW)	710,2
No. of generating units	6
Entered into service	1968
Stack height (m)	100
Air quality surveillance network	6 posts
Gas treatment	Electrostatic precipitators
Combustion modifications	None

Operational Data

Net electricity generation (MWh)		1 257 411
Fuel consumption	Fuel-oil (t)	174 165
	Natural gas ($Nm^3 x10^3$)	142 296 470
Cooling water consumption (m^3)		240 578 208
Gross water consumption (m^3)		421 089

Environmental Data

Atmospheric Emissions [1)]

	Total (kt)	Specific (g/kWh)
SO_2	8,91	7,09
NO_x	2,76	2,20
CO_2	857	682
Particulates	0,11	0,9

Air Quality

	($\mu g/m^3$)	Castanheira	Faiel	Ironfer	RDP	TAK	Vinha
SO_2	Median	3	3	2	3	3	9
	P98 DMV	54	19	8	14	15	34
Partículates	Average	62	69	73	70	61	67
	P95 DMV	93	105	129	104	123	91
NO_2	P98 HMV	0	147	0	0	0	0

Wastewater

Suspended solids (mg/l)	29,90
Iron (mg/l Fe)	0,30
Copper (mg/l Cu)	0,02
Zinc (mg/l Zn)	0,04
Nickel (mg/l Ni)	0,03
Vanadium (mg/l V)	0,59
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,13
Hydrocarbons (mg/l)	0,08

Waste

Fuel-oil fly ash (t)[2)]	534
Bottom ash (t)	40
Used oils (t)	40
Metal scrap (t)	150
PCB containing equipment (t)	12

[1)] Total emission calculated on the basis of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation.

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

Characteristics

Type of power station	Steam turbine
Fuel	Fuel-oil
Installed capacity (MW)	946,4
No. of generating units	4
Entered into service	1979
Stack height (m)	200
Air quality surveillance network	7 posts
Gas treatment	Electrostatic precipitators
Combustion modifications	None

Operational Data

Net electricity generation (MWh)	3 194 062
Fuel consumption (t)	772 097
Cooling water consumption (m^3)	490 820 940
Gross water consumption (m^3)	901 131

Environmental Data

Atmospheric Emissions [1]	Total (kt)	Specific (g/kWh)
SO_2	42,54	13,32
NO_x	8,04	2,52
CO_2	2 406	753
Partículas	0,35	0,11

Air Quality	($\mu g/m^3$)	Palmela	S. Filipe	S. Ovídio	Subestação	Tróia
SO_2	Median	4	8	11	9	7
	P98 DMV	29	35	47	24	14
Partículates	Average	64	59	56	59	68
	P95 DMV	106	85	82	92	105
NO_2	P98 HMV	0	0	7	46	95

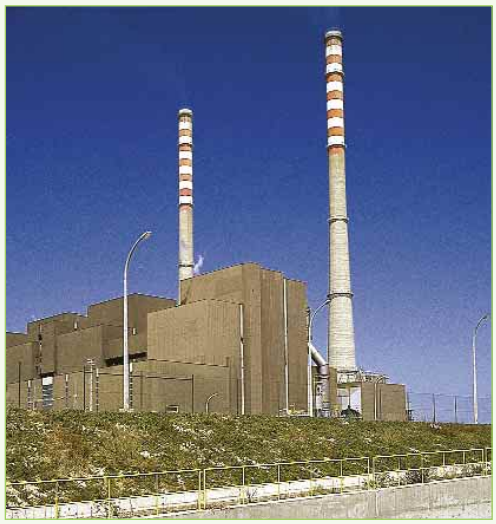
Wastewater	
Suspended solids (mg/l)	11,00
Iron (mg/l Fe)	0,27
Copper (mg/l Cu)	0,01
Zinc (mg/l Zn)	0,05
Nickel (mg/l Ni)	0,29
Vanadium (mg/l V)	0,80
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,32
Hydrocarbons (mg/l)	0,19

Waste	
Fuel-oil fly ash (t)	1 622
Bottom ash (t)	0
Used oils (t)	120
Metal scrap (t)	168
PCB containing equipment (t)	0

[1] Total emission calculated on the basis of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation.

SINES THERMAL POWER PLANT

CPPE – Companhia Portuguesa de Produção de Electricidade, S.A.
S. Torpes, 7520-089 SINES



Characteristics

Type of power station	Steam Turbine
Fuel	Bituminous coal
Installed capacity (MW)	1 192
No. of generating units	4
Entered into service	1985
Stack height (m)	225
Air quality surveillance network	5 posts
Gas treatment	Electrostatic precipitators
Combustion modification	Low-Nox burners in all units

Operational Data

Net electricity generation (MWh)		9 090 667
Fuel consumption	Fuel-oil (t)	6 109
	Coal (t)	3 383 499
Cooling water consumption (m^3)		1 130 824 800
Gross water consumption (m^3)		2 049 500

Environmental Data

Atmospheric Emissions [1]	Total (kt)	Specific (g/kWh)
SO_2	48,47	5,33
NO_x	25,73	2,83
CO_2	8 154	897
Particulates	1,71	0,19

Air Quality	($\mu g/m^3$)	M. Chãos	Sonega	Santiago	M. Velho	Carbogal	Provença	EDP-N	EDP-S
SO_2	Median	7	15	11	6	0	0	0	0
	P98 DMV	26	83	49	27	0	0	0	0
Partículates	Average	0	0	0	0	44	43	38	40
	P95 DMV	0	0	0	0	75	80	80	86
NO_2	P98 HMV	45	38	25	17	0	0	0	0

[1] Total emission calculated on the basis of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation.

Wastewater	
Suspended solids (mg/l)	32,40
Iron (mg/l Fe)	0,10
Copper (mg/l Cu)	0,01
Zinc (mg/l Zn)	0,04
Nickel (mg/l Ni)	0,12
Vanadium (mg/l V)	0,02
Chrome (mg/l Cr)	0,01
Oils and fats (mg/l)	0,36
Hydrocarbons (mg/l)	0,23

Waste	
Fuel-oil fly ash (t)	31 833
Bottom ash (t)	349 561
Used oils (t)	104
Metal scrap (t)	437
PCB containing equipment (t)	0

TAPADA DO OUTEIRO THERMAL POWER PLANT

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

Characteristics

Type of power station	Steam Turbine
Fuel	National coal/Fuel-oil
Installed capacity (MW)	93,8
No. of generating units	1 (*)
Entered into service	1979
Stack height (m)	60
Air quality surveillance network	5 posts
Gas treatment	Electrostatic precipitators
Combustion modifications	None

(*) Generating Unit I decommissioned at the end of 1997

Operational Data

Net electricity generation (MWh)	11 389
Fuel consumption (t)	3 831
Cooling water consumption (m^3)	2 219 040
Gross water consumption (m^3)	8 033

Environmental Data

Atmospheric Emissions (1)		
	Total (kt)	Specific (g/kWh)
SO_2	0.17	15,14
NO_x	0.03	2,84
CO_2	12	1 048
Partículates	0,00	0,38

Air Quality					
	($\mu g/m^3$)	Aldeia Nova	Lever	Lixa	Vila Cova
SO_2	Median	3	6	50	6
	P98 DMV	24	46	96	36
Partículates	Average	35	27	29	39
	P95 DMV	88	59	70	88
NO_2	P98 HMV	26	0	0	0

Waste	
Fuel-oil fly ash (t)	236
Bottom ash (t)	0
Coal fly ash	0
Used oils (t)	1
Metal scrap (t)	0
PCB containing equipment (t)	0

(1) Total emission calculated on the basis of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation.

ALTO DO MIRA THERMAL POWER PLANT

CPPE – Companhia Portuguesa de Produção de Electricidade, S.A.
Estrada da Central, 1-R Serra da Mina, 2701 AMADORA

Gas turbine power station where start-up reliability is a fundamental parameter due to the fact that it is only used in peak load or emergency start-up situations. The number of hours this power station functions per annum is therefore relatively small.

Characteristics

Type of power station	Steam Turbine
Fuel	Diesel
Installed capacity (MW)	136
No. of generating units	6
Entered into service	1975
Stack height (m)	-
Air quality surveillance network	None
Gas treatment	None
Combustion modifications	None

Operational Data

Net electricity generation (MWh)	9 580
Fuel consumption (kl)	4 487

Environmental Data

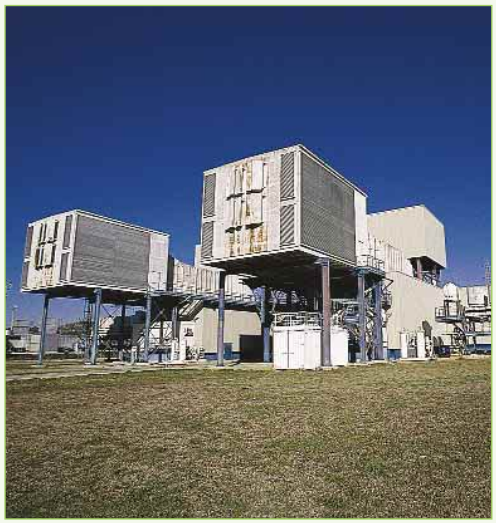
Atmospheric Emissions [1]	
	Total (kt)
SO_2	0,03
NO_x	0,02
CO_2	14,3
Particulates	–

[1] Total emission calculated on the basis of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation.

TUNES THERMAL POWER PLANT

CPPE – Companhia Portuguesa de Produção de Electricidade, S.A.
Central de Tunes, Apartado 4, 8365-906 TUNES – SILVES

Gas turbine power station where start-up reliability is a fundamental parameter due to the fact that it is only used in peak load or emergency start-up situations. The number of hours this power station functions per annum is therefore relatively small.



Characteristics

Type of power station	Steam Turbine
Fuel	Diesel
Installed capacity (MW)	197
No. of generating units	4
Entered into service	1973
Stack height (m)	-
Air quality surveillance network	None
Gas treatment	None
Combustion modifications	None

Operational Data

Net electricity generation (MWh)	28 676
Fuel consumption (kl)	9 852

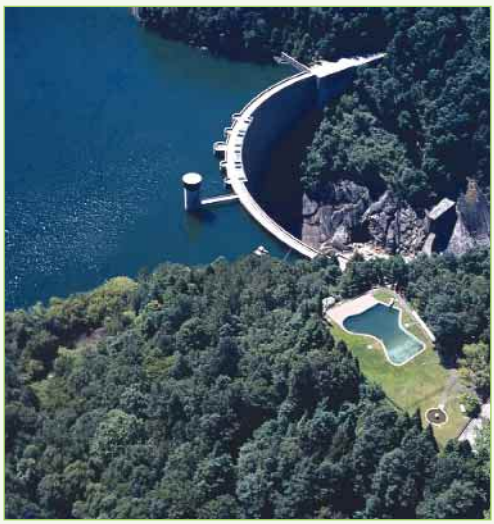
Environmental Data

Atmospheric Emissions [1]	
	Total (kt)
SO_2	0,07
NO_x	0,04
CO_2	36,4
Particulates	–

[1] Total emission calculated on the basis of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation.

CÁVADO-LIMA GENERATING CENTRE

CPPE – Companhia Portuguesa de Produção de Electricidade, S.A.
Paradela, 4845-043 VALDOSENDE – GERÊS



Caniçada Hydro Power Plant

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	Entered into service
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

Operational Data

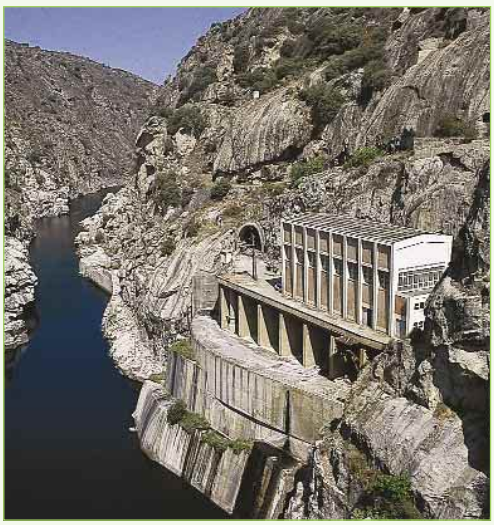
Net electricity generation (MWh)	2 618 232

Environmental Data

Waste	
Used oils (t)	58
PCB containing equipment (t)	0
Metal scrap (t)	55

DOURO GENERATING CENTRE

CPPE – Companhia Portuguesa de Produção de Electricidade, S.A.
Barragem de Bagaúste, 5050-421 Canelas PRG, PESO DA RÉGUA



Picote Hydro Power Plant

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	Entered into service
Miranda	Douro	Run-of-river	122	6,7	369	4	1960[1]
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] The entry into service of the 4th generating unit occurred in 1995

Operational Data

Net electricity generation (MWh)	5 863 892

Environmental Data

Waste	
Used oils (t)	7
PCB containing equipment (t)	0
Metal scrap (t)	11

TEJO-MONDEGO GENERATING CENTRE

CPPE – Companhia Portuguesa de Produção de Electricidade, S.A.
Castelo do Bode, 2300 TOMAR

Fratel Hydro Power Plant

Characteristics

Power plant	River	Type of complex	Area of Hydrographic basin (ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generating units	Entered into service
Caldeirão	Caldeirão	Reservoir	66	3,5	40	1	1994
Agueira	Mondego	Reservoir	2000	216,0	336	3	1981
Raiva	Mondego	Reservoir	230	12,0	24	2	1982
Cabril	Zêzere	Reservoir	1965	615,0	108	2	1954
Bouçã	Zêzere	Reservoir	500	7,9	44	2	1955
Castelo do Bode	Zêzere	Reservoir	3480	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

Operational Data

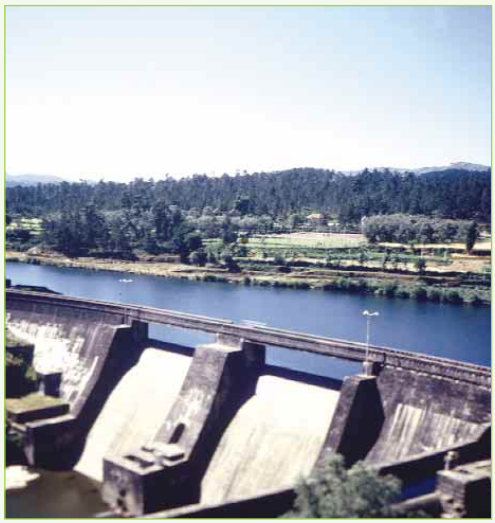
Net electricity generation (MWh)	1 746 660

Environmental Data

Waste	
Used oils (t)	14
PCB containing equipment (t)	0
Metal scrap (t)	0

NORTH EMBEDDED GENERATING CENTRE

HDN – Energia do Norte, S.A.
R. do Caires 292, 4704-518 BRAGA



Senhora do Porto Hydro Power Plant

Characteristics

Power plant	River	Type of complex	Area of Hydrographic basin (ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generating units	Entered into service
Guilhofrei	Ave	Reservoir	163	20,4	4,6	1	1939
Ermal	Ave	Run-of-river with reg.[1]	–	21,2	10,8	2	1947
Ponte da Esperança	Ave	Run-of-river with reg.[1]	–	21,2	2,8	1	1942
Senhora do Porto	Ave	Run-of-river with reg.[1]	23	0,2	8,8	2	1945
Lindoso	Lima	Run-of-river	–	0,5	42	2	1922
France	Coura	Run-of-river	5	0,1	7,7	1	1974
Penide I e II	Cávado	Run-of-river	69	0,5	4,8	2	1951
Varosa	Varosa	Reservoir	69,6	12,9	24,7	3	1934
Freigil	Cabrum	Run-of-river	3,3	0,3	4,6	1	1926
Aregos	Cabrum	Run-of-river	–	–	3,2	2	1958
Cefra	Ouro	Run-of-river	0,5	0,1	1,5	2	1950

[1] Run-of-river with regulation. Run-of-river power plant in cascade, where the generating company operates the upstream installation with regulating capacity.

Operational Data

Net electricity generation (MWh)	230 700

Environmental Data

Waste	
Used oils (t)	25
PCB containing equipment (t)	0
Metal scrap (t)	48

CENTRE EMBEDDED GENERATING CENTRE

HIDROCENEL – Energia do Centro, S.A.
Quintela, 6270-454 SEIA

Ponte de Julgais Hydro Power Plant

Characteristics

Power plant	River	Type of complex	Area of Hydrographic basin (ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generating units	Entered into service
Sabugueiro I	Rib. Caniça	Reservoir	240	15	13,2	3	1947
Sabugueiro II	Rib. Covão Urso	Reservoir	64,6	1,5	10	1	1993
Desterro I	Alva	Run-of-river with reg.[1]	1,6	–	14	4	1959
Ponte de Jugais	Alva	Run-of-river with reg.[1]	–	–	19,3	4	1923
Vila Cova	Alva	Run-of-river with reg.[1]	–	–	11,8	3	1937
Drizes	Vouga	Run-of-river	3	–	0,1	2	1917
Riba-Côa	Côa	Run-of-river	5,6	–	0,1	1	1906
Pateiro	Mondego	Run-of-river	0,3	–	0,5	2	1938
Figueiral	Carvalhinho	Run-of-river	0,5	–	0,2	1	1955
Pisões	Dinha	Run-of-river	–	–	0,1	2	1927
Rei de Moinhos	Alva	Run-of-river	2,5	–	0,7	1	1993
Ermida	Rib. S. João	Run-of-river	–	–	0,4	2	1943
Santa Luzia	Unhais	Reservoir	246	51,4	23,2	4	1943
Ribafeita	Vouga	Run-of-river	2	0,1	0,9	2	1955

[1] Run-of-river with regulation. Run-of-river power plant in cascade, where the generating company operates the upstream installation with regulating capacity.

Operational Data

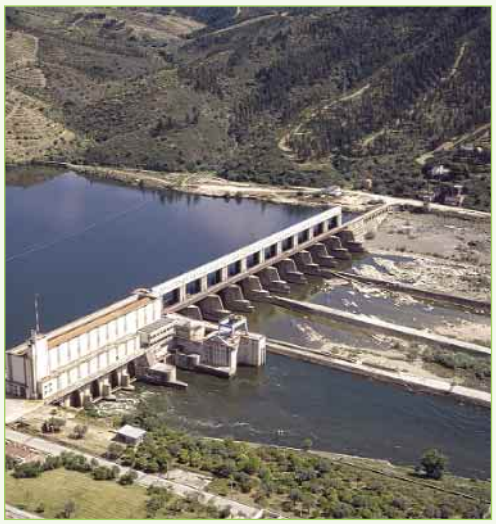
Net electricity generation (MWh)	234 557

Environmental Data

Waste	
Used oils (t)	0
PCB containing equipment (t)	0
Metal scrap (t)	334

TEJO EMBEDDED GENERATING CENTRE

EDP Energia, S.A.
Central de Belver, 6120-511 Ortiga, GAVIÃO



Belver Hydro Power Plant

Characteristics

Power plant	River	Type of complex	Area of Hydrographic basin (ha)	Reservoir's useful capacity (hm^3)	Installed capacity (MW)	No. of generating units	Entered into service
Belver	Tejo	Run-of-river	28,6	7,5	80,7	6	1952
Póvoa	Rib. Nisa	Reservoir	23,6	21,5	0,7	1	1927
Bruceira	Rib. Nisa	Reservoir	11	4,1	1,6	1	1929
Velada	Rib. Nisa	Reservoir	1	0,4	1,9	1	1935
Caldeirão	Almonda	Run-of-river	–	–	0,1	2	1927

Operational Data

Net electricity generation (MWh)	153 212

Environmental Data

Waste	
Used oils (t)	4
PCB containing equipment (t)	0
Metal scrap (t)	0

FONTE DA MESA WIND FARM

ENERNOVA – Novas Energias. S.A.
Fonte da Mesa, 5100 LAMEGO

Characteristics	
Implantation area (ha)	340
No. of generators	17
Tower height (m)	40,5
Diameter of blades (m)	42
Installed capacity (MW)	10,2
Average wind velocity (m/s)	7,7
Minimum wind velocity for normal power (m/s)	17
Expected gross generation (GWh/year)	28,6
Entered into service	1996

Operational Data	
Net electricity generation (MWh)	24 291

Environmental Data	
Waste	
Used oils (t)	1
Metal scrap (t)	–

PENA SUAR WIND FARM

ENERNOVA – Novas Energias. S.A.
Lugar de Pena Suar, 5000-071 CAMPEÃ – VILA REAL

Characteristics	
Implantation area (ha)	205
No. of generators	20
Tower height (m)	44
Diameter of blades (m)	40,2
Installed capacity (MW)	10
Average wind velocity (m/s)	8,9
Minimum wind velocity for normal power (m/s)	13
Expected gross generation (GWh/year)	29
Entered into service	1997

Operational Data	
Net electricity generation (MWh)	28 063

Environmental Data	
Waste	
Used oils (t)	–
Metal scrap (t)	–

CABEÇO DA RAINHA WIND FARM

ENERNOVA – Novas Energias. S.A.
Cabeço da Rainha, 6160-409 OLEIROS

Characteristics	
Implantation area (ha)	80
No. of generators	17
Tower height (m)	46
Diameter of blades (m)	44
Installed capacity (MW)	10,2
Average wind velocity (m/s)	7,7
Minimum wind velocity for normal power (m/s)	17
Expected gross generation (GWh/year)	28,6
Entered into service	2000

Operational Data	
Net electricity generation (MWh)	17 958

Environmental Data	
Waste	
Used oils (t)	–
Metal scrap (t)	–

MORTÁGUA FOREST-WASTE THERMAL POWER PLANT

ENERNOVA – Novas Energias, S.A.
Lugar do Freixo, 3450-116 MORTÁGUA

Power Sation`s Characteristics

Type of power station	Steam turbine
Fuel	Forest waste
Installed capacity (MW)	10
No. of generating units	1
Entered into service	1999
Air quality surveillance network	None
Gas treatment	None
Combustion modifications	None

Operational Data

Net electricity generation (MWh)		4 718 225
Fuel consumption (t)	Forest waste (t)	18 820
	Natural gas ($Nm^3 x10^3$)	499

Environmental Data

Atmospheric Emissions [1]	
	Concentration (mg/Nm^3)
SO_2	300
NO_x	340
Partículas	100

Waste	
Ash (t)[2]	1 320
Used oils (t)	–
Metal scrap (t)	–

[1] Total emission calculated on the basis of CORINAIR 90 emission factors. Specific emissions calculated on the basis of net electricity generation.
[2] Includes fly and bottom ashes.

DISTRIBUTION NETWORK AREAS

EDP Distribuição – Energia, S.A.
Rua Camilo Castelo Branco, 43, 1050-040 LISBOA

Network Characteristics

Substations	
No.	368
Installed capacity (MVA)	12 902
Transforming stations	
No.	47 695
Installed capacity (MVA)	12 775
Overhead lines (km)	
HV	6 885
MV	50 140
LV	93 507
Underground cables (km)	
HV	356
MV	10 058
LV	23 532

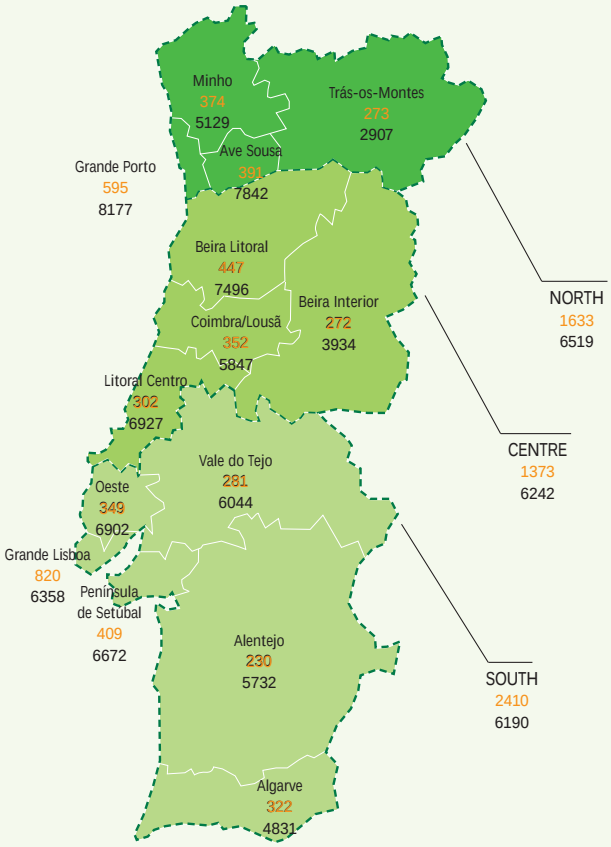
Operational Data

Electric Energy Balance (GWh)	
Bought for SEP supply	37 007
From REN	33 915
From PRE	2 469
From SENV	622
Sold to SEP	34 091
To other distributors	129
Tofinal customers	33 962
Own consumption	21
Supplied to EDP Group companies	27
For own consmption	16
For other purposes	11
Losses (SEP)	2 868
%	7,90%
Losses (SENV)	7

Environmental – Related Data

Waste	
Used oils (t)	104
PCB containing equipment (t)	23
Metal scrap (t)	2 095

Distribution Network Areas



Legend

	Total
Customers (thousands)	5415
KWh/customer	6295

Glossary

A

Ash solid waste from the burning of fuel arisen from mineral impurities contained therein. May also include unburnt fuel.

Atmospheric pollutant substance introduced, directly or indirectly, by man into the air and 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 potential 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.

D

Dangerous waste any substance or object which the holder disposes of, or has the intention or obligation to dispose of, and which presents characteristics which represent a danger to human health or to the environment.

E

Electromagnetic fields non-ionised radiation with frequencies between 0 and 300 GHz, which includes static fields, fields with extremely low frequency 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 organisational structure, planning of activities, the responsibilities, practices, procedures, processes and 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 ashes (see ashes) contained in combustion gases.

G

Greenhouse-effect 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. The hertz is the frequency of a periodic phenomenon that has a periodic time of 1 second.

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

Hydroelectric power station installation where the gravitational energy potential of water is converted into electrical energy.

I

ISO 14 000 standards group of *International Standards of the International Organization for Standardization* covering Environmental Management Systems.

K

Kyoto protocol document adopted by all Parties to the United Nations Framework Convention on Climate Change at the Kyoto conference, held in Japan in December 1997. It lays down targets for the differentiated reduction in emissions of a number of greenhouse gases for the period 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 (NO_x) gases composed of a nitrogen atom and a variable number of oxygen atoms. Atmospheric pollutants formed by the oxidisation of nitrogen at high temperatures. One of the agents responsible for the phenomena of photochemical fog and acid deposition.

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 at the end of the 70's, they were widely used as an insulation fluid in the world's electrical industry.

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 station 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. A watt is the power of an energy system in which energy of 1 joule per second is uniformly transferred.

Watt hour (Wh) unit of measurement of electricity produced or consumed. A watt-hour is the energy needed for the functioning of an electrical equipment during one hour.

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