

Environmental
Report
2003



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Letter from the Chairman



From the beginning, one of Enagas' priorities has been to integrate its activity with a total respect for the surrounding environment. For this reason an essential component of our operations consists in positively contributing to the conservation of natural resources of ecological, scientific, landscape and cultural interest, through strict compliance with national and international legislation and recommendations regarding the environment.

In 2003, all of the Company's facilities have renovated their certifications of our Environmental Management System, which have been audited by AENOR for their compliance with the international standard (ISO 14001) and all applicable environmental legislation.

Enagas actively participates with the Spanish Government and different social bodies to advance this commitment to provide solutions for the conservation of the environment, making the use of a cleaner and more efficient energy source possible: natural gas. This will allow us to address the problem of having to limit CO₂ emissions which are the cause of the greenhouse effect and thus contribute to fulfilling the commitments adopted by Spain in the Kyoto Protocol.

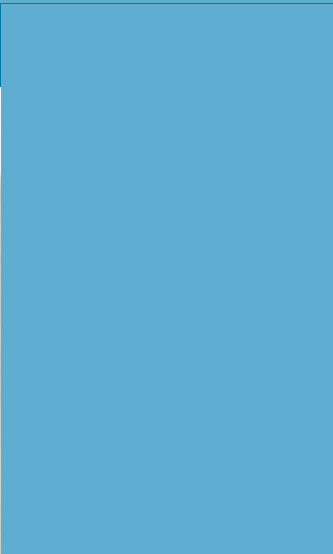
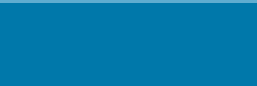
Furthermore, throughout this year we have reaffirmed our commitment to adhere to the UN Global Compact, which has total protection for the environment as one of its universal principles.

All of the operations carried out in 2003 figure in this report which I have the great pleasure of presenting to you. It is the result of the objective of our entire organisation to integrate environmental conservation in all our activities.

Thank you

A handwritten signature in blue ink, which appears to read 'Antonio González-Adalid'. The signature is fluid and cursive.

Antonio González-Adalid
Chairman



The Enagas Group



The Enagas Group



The Enagas Group

The Enagas Group is constituted by the following companies:

- Enagas, S.A.
- Enagas International Finance, S.A.
- Gasoducto Al-Andalus S.A.
- Gasoducto de Extremadura S.A.
- Gasoduto Campo Maior-Leiria-Braga, S.A.
- Gasoduto Braga-Tuy, S.A.

Enagas is the principal Natural Gas Transport, Regasification and Storage Company in Spain with a market share of 98%.

Royal Decree-Law 6/2000, concerning urgent measures for the promotion of competition in the goods and services market, designated Enagas as Technical Manager of the Spanish Gas System. The primary objectives of Technical Management are to ensure safety and continuity in the natural gas supply, as well as correct coordination amongst the access, storage, transport and distribution points.

Currently, Enagas provides third party access services to the network to 12 marketers who operate in the liberalized market and is responsible for the supply of gas to the tariff market.

In 2003, the Enagas group's net profit rose to 142 million euros, whilst operational profit rose to 249.5 million euros. On the 31 December, 2003, Enagas' personnel consisted of some 878 employees.

At the end of the 2003 financial year the Enagas' gas infrastructure was principally formed by:

- A network of 6,522 km of gas pipelines, designed to operate under maximum pressures of 72 and 80 bars
- Three regasification plants, located in Barcelona, Cartagena and Huelva, with a total vaporisation capacity of 2,250,000m³/h and a storage capacity of 560,000 m³ LNG.
- Nine compression stations with installed power of 137,410 HP and 280 measuring and regulation stations.

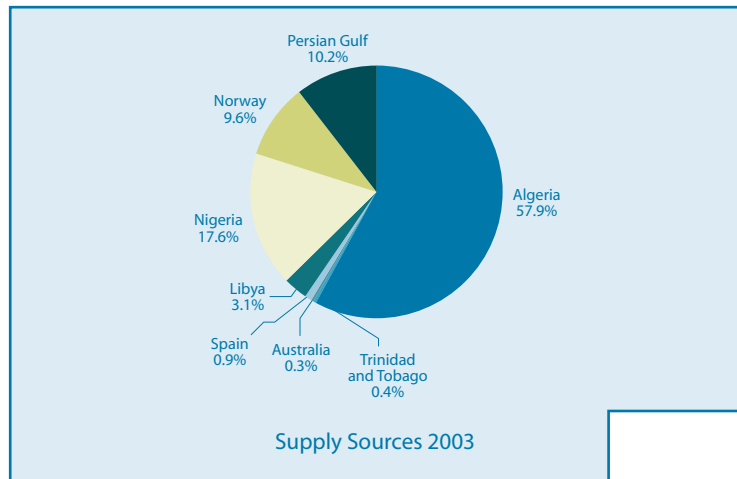
- Two underground storage facilities, Serrablo (Huesca) and Gaviota, which is an offshore platform located near Bermeo (Vizcaya), rented to Repsol YPF. Both are old natural gas fields which are now exhausted.
- 35 maintenance, operation and control centres distributed over six geographical areas, which ensure that the network is functional across all of the national territory.
- Technology Unit sited in Zaragoza.
- Principal Control Centre from which the supervision and control of the gas system is carried out without interruption.

The accumulated demand for transported gas in the year 2003 rose to 275,238 GWh, 13.2% higher than the figure for the previous financial year.

The demand destined for the liberalized market was some 70.1% of the total transported demand at the close of the 2003 financial year. Since 1 January, 2003, the Spanish market has been totally liberalized, which has brought about a rapid and efficient opening process.

The great majority of natural gas supplies that are later transported through the network are importations from other countries in the form of:

- Liquid Natural Gas (LNG), which is unloaded in the regasification plants of Huelva, Cartagena and Barcelona.
- Pipeline gas through the Maghreb Gas pipeline and the Larrau international connection





Natural gas
and
Sustainable
Development



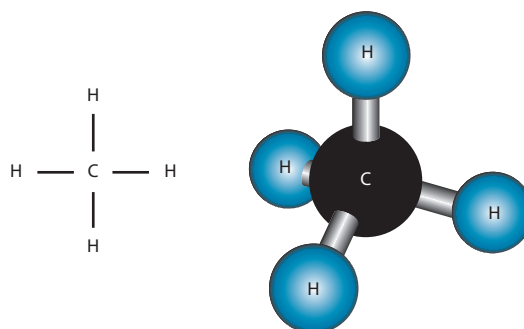
Natural gas and Sustainable Development



Natural gas and its consumption

Of all of the fossil fuels that are used as primary energy sources, natural gas generates least environmental impact from its extraction to its final use.

The principal component of natural gas is methane – approximately 90%. The molecular structure of methane is one carbon atom for every four hydrogen atoms, which means that its combustion emits less CO₂ per energy unit than any other fossil fuel: 25-30% less in comparison to petrol derivatives and 40-50% less in comparison to coal. On the other hand, the absence of sulphur, heavy hydrocarbons and other impurities in its composition, together with elevated performance in its combustion, bestow it with notable advantages in relation to the conservation of the atmospheric environment.



METHANE MOLECULE

The consumption of natural gas in Spain has doubled over the last few years, with annual average increases of 14%, passing from 7.7% of the total consumption of primary energy in 1995 to 14% in 2002. Nevertheless, the share of natural gas in primary energy consumed in Spain is below the average for countries in the European Union, where natural gas represented 23.6% in 2002.

International agreements to protect the environment will continue to drive national energy policy when planning

EMISSION FACTORS OF FOSSIL FUELS

Fuel	CO ₂ (tm/toe)	SO ₂ (kg/toe)	COV (kg/toe)
Coal	3.9	36.7	2.9
Lignite	4.2	58.2	2.9
Diesel	3.1	5.9	10.5
Fuel oil	3.3	51.1	5.9
LPG	2.6	0.9	18.3
NATURAL GAS	2.3	0.084	Negligible

toe: ton of oil equivalent

Sources:

For CO₂ "Energy policy options for responding to the climate change"
European Communities Commission. 1998

For other contaminants "University of Barcelona Bosch i Gimpera. 1997.

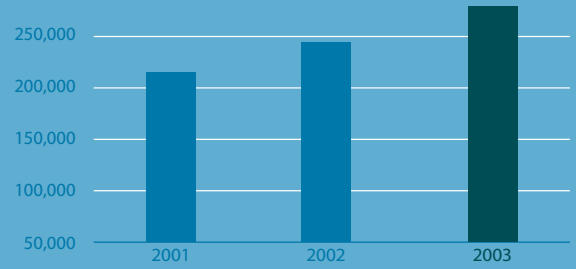
production and transformation technologies. Thus, it is anticipated that the demand for natural gas will be around 495 TWh in 2012, increasing by an average annual rate of 8.9% and representing 23.5% of all primary energy consumption in that year.

The principal changes predicted for energy consumption are based upon the replacement of coal and nuclear energy, conceding a more relevant role to natural gas and renewable energies as a consequence, primarily, of the modification in the structure of electrical generation.

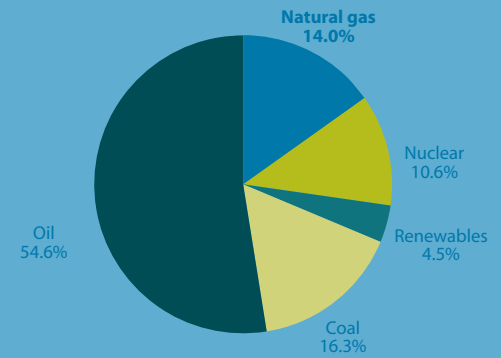
Greenhouse Effect

The greenhouse effect is a natural process provoked by the existence of determined gases contained in the atmosphere which facilitate the penetration of solar radiation towards the Earth, but at the same time retain energy reflected by the earth's surface towards outer space. In this way an effect similar to that of a greenhouse is produced, which lowers the temperature on the earth's surface and permits life on the planet.

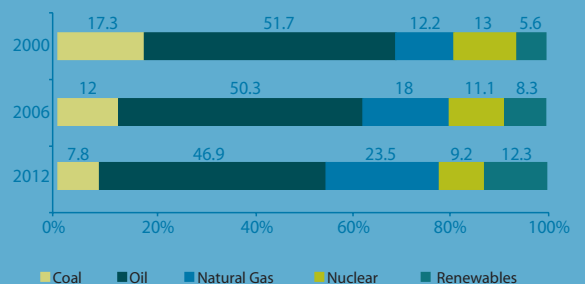
The principal gases that cause the greenhouse effect are carbon dioxide (CO₂), methane (CH₄), nitrous oxide N₂O,



Natural gas consumption (GWh)



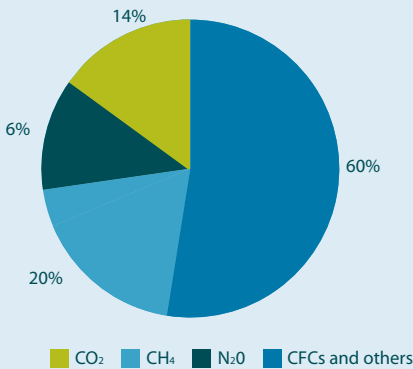
Primary-energy consumption in Spain in 2002



Expected primary energy consumption 2000-2012

Source: Strategy of Saving and Energy Efficiency in Spain 2004-2012
Secretary of State for Energy, Industrial development and small enterprises Ministry of Economy.

hydrofluorocarbons (HFC), per fluorocarbon (PFC) and sulphuric hexafluoride (SF₆).



Currently the human activity is causing an excessive concentration of these gases in the atmosphere, provoking an intensified greenhouse effect. This situation has resulted in the progressive warming of the earth's surface and an increase in average global temperature of between 0.3 °C and 0.6 °C over the last 100 years.

The Kyoto Protocol

The international response to the afore mentioned climatic change began in the year 1979 with the holding of numerous study forums concerning the subject, creating in 1998 the Intergovernmental Panel about the Climate Change (IPCC).

In the year 1995 the United Nations Framework Convention of Climate Change (UNFCCC) took place, where it was decided that a protocol would be negotiated with the objective of establishing obligations for the limitation and reduction of emissions of greenhouse effect gases that certain countries would have to adopt from the year 2000 onwards.

In 1997, in the Third Conference of the UNFCC parties, the Kyoto Protocol was signed, in which developed countries agreed to reduce emissions of greenhouse effect gases by 5% in the period 2008-2012, based on levels registered in the year 1990.

The signing parties adopted different individual objectives for the reduction of their emissions, to be met along with the general agreement adopted in signing the Kyoto Protocol.

Thus, the European Union agreed to reduce its 1990 emissions by 8% for the period 2008-2012. Later, within

Greenhouse Effect Gases (GEG)

Carbon dioxide
Methane
Nitrous Oxide
Halocarbons and related compounds

Anthropogenic emitting source

- Burning of fossil fuels. Changes in the use of land (deforestation)
- Agriculture, natural gas activities and rubbish dumps
- Use of nitrogen based fertilizers
- Refrigeration, air conditioning, aerosols and plastic foams.

Influence of human activity in the increase in the greenhouse effect
Source: IPCC 2001.

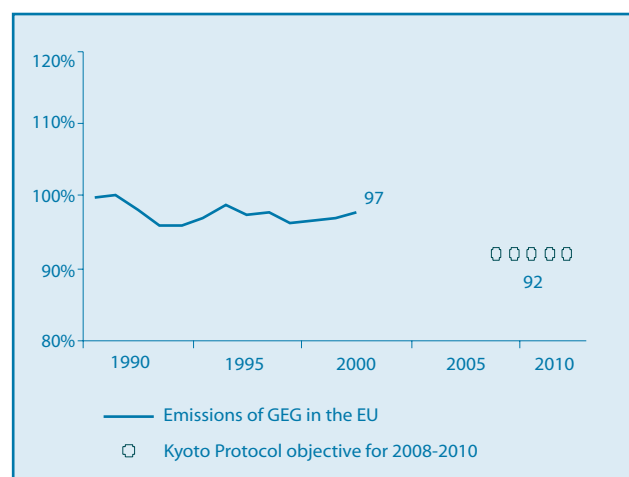


the European Union, each member was similarly assigned an objective to be met, which, in the case of Spain allowed an increase over the 1990 emissions of 15% for the same period.

On 31 May, 2002, the European Union ratified the Kyoto Protocol, after its prior approval in the corresponding National Parliaments of the member countries.

Since March of the year 2004 all of the regulations of the Kyoto Protocol are binding for the European Union countries upon the entry into force of the European procedures for the monitoring and communication of emitted gases.

Currently the European Union exceeds the agreement for the reduction in emissions established by the Kyoto Protocol for the period by 5%.



Evolution of the emission of Greenhouse Effect Gases in the European Union.
Source: UNFCCC (United Nations Framework Convention on Climate Change)

Enagas' Commitment

Enagas is actively participating with the Spanish Government and different social bodies to promote and permit the use of natural gas as an energy source and thus collaborate with the problem of climactic change.

The actions of the Company so that Spain can honour the commitments adopted in the Kyoto Protocol are effected both directly and indirectly.

Direct actions

Enagás, in the realization of its activities, only emits two greenhouse effect gases: methane and carbon dioxide. Carbon dioxide emissions are associated with the combustion of natural gas in its facilities.

Enagás manages to limit its carbon dioxide emissions through the appropriate maintenance of these facilities and the rationalization of energy consumption.

During the year 2003 carbon dioxide emissions have been 1.27 tm for every GWh transported, which has signified a decrease of 8.3% with respect to the figures for the year 2002, and a greater energy efficiency in the Company's group of transport facilities.

Methane emissions occur during certain operations in Enagás' facilities. In the year 2003 these emissions signified 0.07% of total gas transported, which represented a considerable reduction with respect to the values for 2002.

Indirect actions

The use of natural gas to substitute other fossil fuels, involves an important reduction in carbon dioxide emissions, due to the high content of hydrogen in its molecular structure.

In the year 2002 the importance of generating electricity using natural gas in combined cycle plants became apparent. Apart from the advantages of this process, given its high efficiency and low cost, it is important to highlight

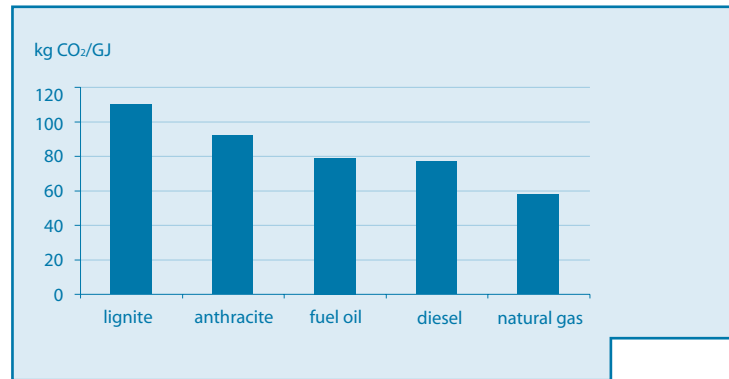


Figure: CO2 emissions in the combustion of fossil fuels
Source: Treasury Department

"Substituting coal with petroleum or natural gas and petroleum with natural gas can reduce the emission of greenhouse effect gases"

(Climate Change 1995: The Intergovernmental Panel on Climate Change, IPCC – Second Resolution)

the low environmental impact that the use of combined cycles supposes compared with conventional thermal power stations which use more contaminating fossil fuels.

The use of natural gas as fuel for electricity generation, supposes an reduction of approximately 40% in carbon dioxide emissions, principal cause of the greenhouse effect, when compared with an equivalent coal burning thermal power station. On the other hand, and using the same comparison criteria, nitrogen oxide emissions are reduced by half and sulphur dioxide emissions are





practically eliminated with the consequent positive effects, these gases being the principal causes of acid rain.

From 31 December, 2003 consumption from the 12 combined cycle plants in operation in Spain was 31,121 GWh, which represents 11.3% of the total demand transported. In accordance with the Mandatory Planning document approved in September 2002 by the Treasury Department, it is estimated that by the year 2011 there will be operative combined cycle plants in Spain with an installed capacity superior to 14,800 MW.

In the year 2003, Eurogas carried out a study where it was demonstrated that during a 10 year period, for every 1% increase in the consumption of natural gas as final energy

a reduction by 2% in the emissions of greenhouse effect gases occurs.

In the year 2003 the demand for transported gas was 275,238 GWh, an increase of 13.2% with respect to the 2002 financial year.

The increase in the consumption of natural gas that is occurring in Spain in all sectors requires the construction of an important infrastructure network, which constitutes the principal area of expansion in Enagás' strategy.

Enagás transported the cleanest and most efficient fuel so that it could be used by the greatest number of users from all sectors, thus contributing to an improvement in quality of life, the improvement of the environment and to both short and long term sustainable development.



Enagas'
Environmental
Policy
Document



Enagas Environmental Policy Document



Conservation of the environment is one of Enagas' operational objectives.

According to it, Enagas expresses and assumes the following commitments and environmental principles.

Environmental Commitment

To develop its activities in a manner that respects the environment, paying special attention to protection of the environment, its clients and the general public.

Environmental Principles

Minimizing the impact

To make a continuous effort in identifying, characterising and improving the environmental impact resulting from its activities and facilities and to ensure their efficient use.

Continuous adaptation of applicable regulations.

To comply with the environmental legislation applicable to its facilities and activities. To take into account international standards and legislative tendency when planning those actions that may have a significant environmental impact, especially in those areas where no applicable legislation exists.

Contamination prevention and potential risk evaluation.

To apply the fundamental principle of contamination prevention and evaluation of potential risks, from planning and decision evaluation to the execution and operation of new projects.



Environmental collaboration.

To collaborate, where necessary, with different administrations, non-governmental organisations and public or private entities to find the solution for the environmental problems posed.

Incorporation of environmental criteria in relation to contractors.

To incorporate environmental criteria when taking decisions about the granting of service and product contracts, as well as to communicate applicable environmental procedures and requisites to contractors working with Enagas.

Environmental communication and information.

To assist internal and external environmental communication using the criterion of transparency; informing all employees and the general public of objectives achieved and work in course, relating to the monitoring of environmental aspects.

Continuous improvement.

To ensure continuous improvement by systematic and periodical environmental evaluation of the Environmental Management System, for which end the realization of Environmental Audits will be considered to be a fundamental tool.



Enagas and the Environment



Enagas and the Environment



Activities carried out by Enagas are performed taking conservation of the environment into account, considering both present and future environmental repercussions.

For this reason necessary actions are carried out to guarantee enterprise management in the framework of continuous improvement, compatible with the reduction of contamination and the minimizing of possible environmental risks.

Enagas, in accordance with the requirements established by the UNE-EN ISO 14001 standard, adopts, as one of its operational principles, environmental conservation, equally ratified by the Company's own Environmental Policy.

Environmental Management System

Compliance with the commitments established under the Environmental Policy is assured by the Environmental Management System implemented in accordance with the UNE EN ISO 14001 Standard and certified by AENOR.



Organisation

Environmental management is a responsibility shared by the entire Enagas organisation. For this reason there is an organisational structure that plans, coordinates and integrates measures and efforts of an environmental nature for all the Company's units.

The organisation for the implementation and operation of the Environmental Management System consists in the following levels:

- The *Environmental Committee*, formed by the Company's executives, that establishes and approves the basic operating regulations.
- The *Environmental Groups*, which are responsible for executing said regulations.
- The *Quality and Environment Unit*, which performs the coordination between both levels, in addition to proposing basic actions for their approval by the Environ-

mental Committee in order to meet Enagas' environmental objectives.

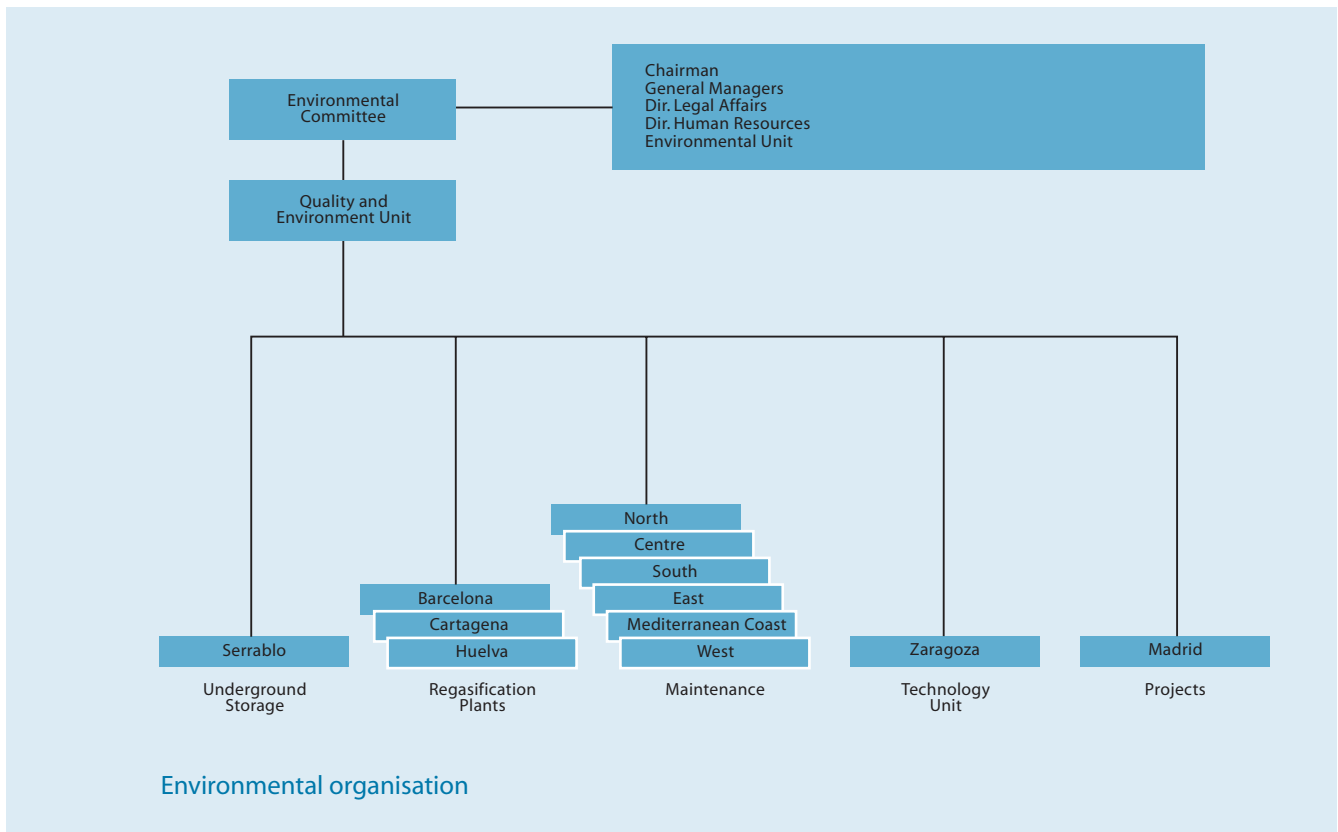
The Environmental Management System establishes responsibilities of an environmental nature for all of the Company's units. The objective is to guarantee maximum integration and cooperation between the different administrations that form its structure.

Documentation

The organisation, process descriptions and planning of activities are contained in the following documents:

Environment Manual

This is the principal document for the Environmental Management System. It describes Environmental Policy and documents both functions and basic responsibilities. Furthermore the most important regulations are established



for the planning of the most significant actions, as well as the principal interactions between the System's different elements.

General Environment Procedures

Contains a detailed description of operations carried out in Enagás and the control method established for the most relevant environmental aspects that arise from them. The application of its content ensures compliance with legal requirements and those that may have been voluntarily adopted, as well as the planning of actions that will lead to continuous improvement in environmental behaviour. These procedures develop the Manual's content and are applicable to all of Enagás' units.

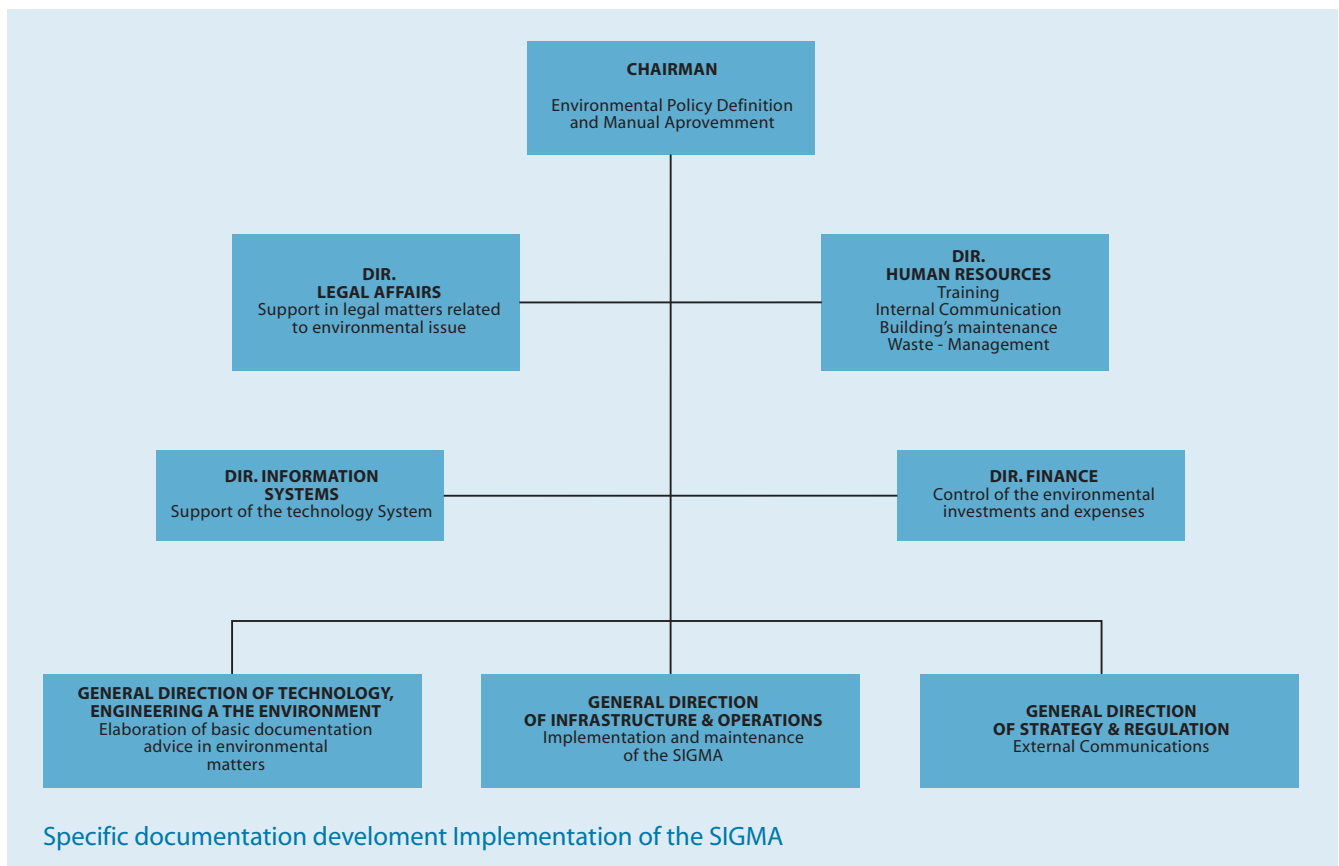
Specific Procedures or Technical Instructions

Describe specific activities and responsibilities of a determined unit, due to the singularities of its facilities or arising from a legal requirement of a regional or local nature.

Strategic Environmental Plan

The definition of objectives and environmental goals, together with the assignation of corresponding responsibilities is the basis of the Strategic Environmental Plan, the approval of which is the responsibility of the Environmental Committee.

The different levels of the organization, diverse activities and facilities which may have an impact on the environment and, in particular, significant environmental aspects, applicable legal requirements, technological op-





tions and the opinion of the interested units are considered when preparing this Plan.

The Strategic Plan is elaborated for a three year period and is revised annually in such a way that necessary changes and modifications may be established which guarantee its application and, as such, a continuous improvement.

The Plan which is currently in force, approved in July, 2002, establishes the Company's global objectives, which aim to improve environmental behaviour and the System's management and administrative tools.

Infrastructure Projects

Enagas applies the principle of environmental conservation in the planning, design and execution of infrastructure projects in such a way that their realisation involves minimum environmental impact.

Environmental activities associated with the development of any project are grouped into two phases - planning and execution, in relation to their period of application and those agents involved in them.

Planning phase

When the need for a new infrastructure is detected the basic project routes or alternatives are selected for their possible implementation and development. From this moment on, the requirement that environmental impact should be minimal is incorporated as one more project requisite.

Once the scope of the project has been established a detailed study is performed of possible resulting environmental impact, establishing a set of measures in order to minimise this. Similarly, a Corrective Measure Project is developed which defines concrete actions in order to correct any identified impact, restoring affected areas to their original state.

These analyses are gathered together in the Environmental Impact Study which is the document used so that the Competent Authority recognises the project's viability by means of the Environmental Impact Declaration.

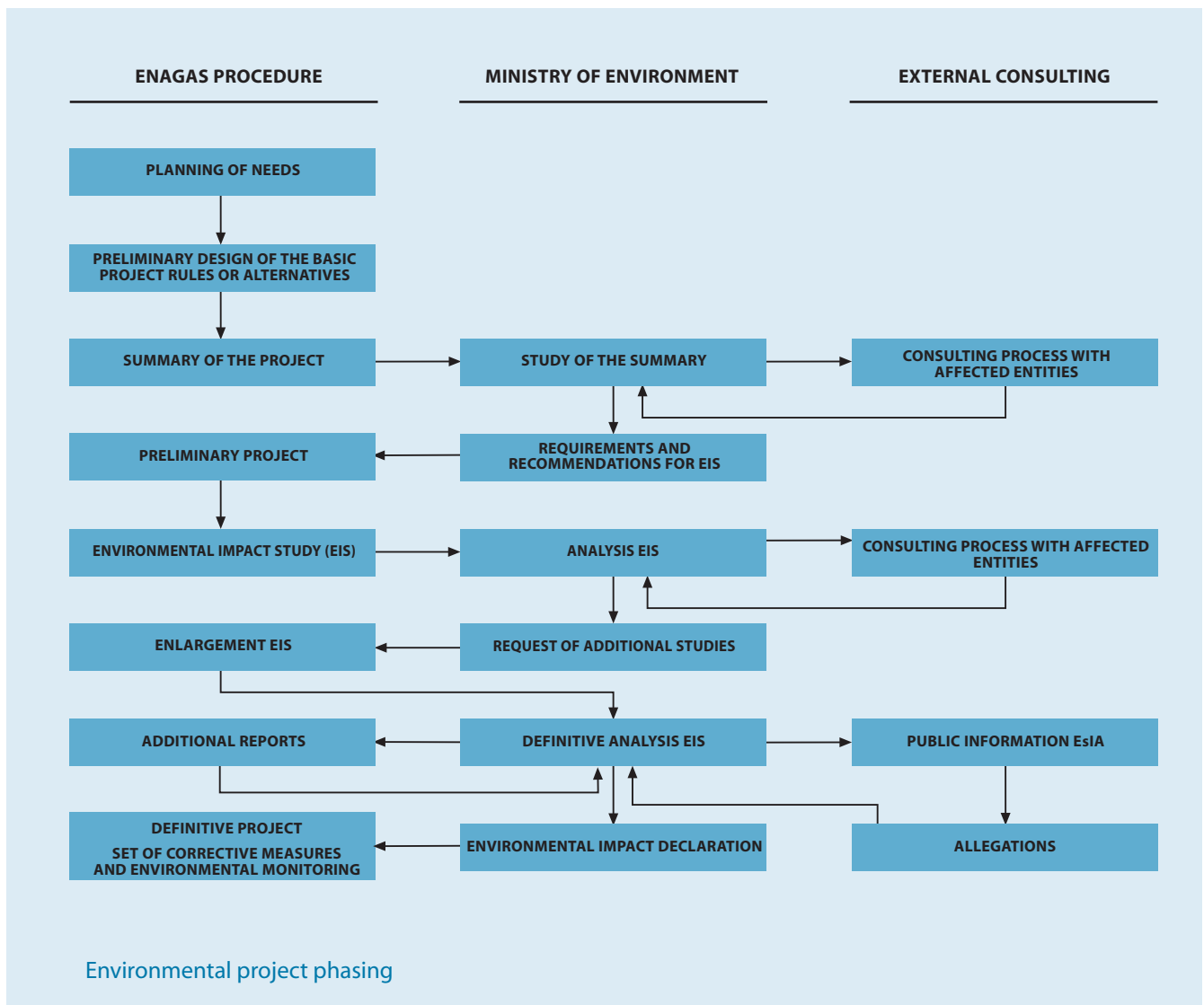
Applying the principal of compliance with applicable legislation all projects are submitted to the corresponding environmental proceedings.

Execution phase

This phase includes two types of activities:

- Environmental monitoring during works development.
- Restoration of the affected environment.

Upon beginning any works the Environmental Monitoring Plan is initiated, which is the tool that ensures compliance with the measures contained in the Environmental Impact Study, Environmental Impact Declaration,





Corrective Measures Project and any other commitment adopted by Enagas. It is based on the same principles that gave rise to the corrective and minimizing measures that emerged during the previous studies.

The desired objectives are:

- To prevent potential impact and minimize that which is unavoidable.
- To conserve natural resources.
- To manage generated waste appropriately.
- To restore altered ecosystems.
- To implement a policy of maximum respect towards the public and transparency and information in relation to the Government.

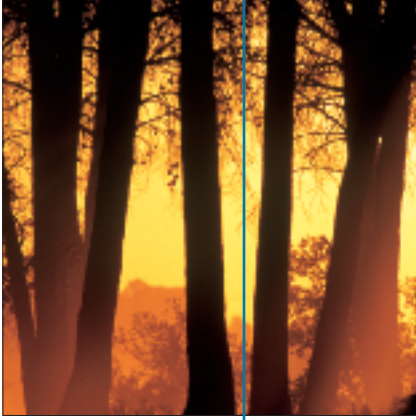
Compliance with the Environmental Monitoring Plan is carried out by the Environmental Technical Assistance team, which supervises the works' different phases. In addition, it establishes the necessary contacts with the Competent Authorities of the Government in order to report the most relevant events that occur during the works. The most relevant information in this phase is gathered in periodical reports that are sent to the Quality and Environment Unit for the environmental control and monitoring of the works.



Principal Actions



Principal Actions



Strategic Environmental Plan

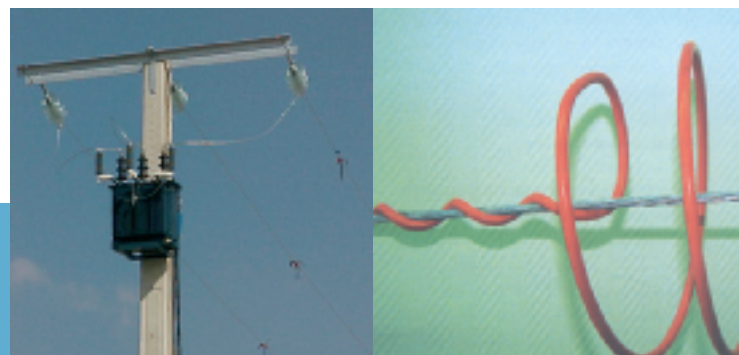
The situation of the actions included in the Strategic Environmental Plan is as follows:

Objectives to improve the Company's environmental behaviour:

- **Reduction of natural gas emissions into the atmosphere in the Barcelona Regasification Plant:** Environmental authorisation exists and the basic engineering is being developed to improve the "boil-off" recuperation system by the incorporation of a liquefier and associated equipment.
- **Noise reduction in the operational *ERM* (Measuring and Regulating Stations) in the basic gas pipeline network:** the most appropriate corrective measures were studied and selected for noise reduction, having already been successfully tested in the Tudela-Veguín station. These measures consist in acoustic insulation in doors and ventilation grills.
- **Noise reduction in the Measuring and Regulating Stations by employing different types of regulating valves:** The request for offers for the necessary material to carry out a pilot test in the Cigales (Valladolid) station was made.
- **Minimisation of the effects of electrical services on avifauna:** All of Enagas' electrical services were revised, and it was found that only five of them pass through a special protection area for birds. For this reason the corresponding projects must be analyzed, in order to check their adaptation to the necessary conservation measures.

Objectives for the improvement of the System's management and administration processes:

- **Implementation of a computer system for the updating of environmental legislation:** All of the certified centres and the headquarters have a computer application that provides users, electronically, with the entire



applicable legislation, thus facilitating its manipulation and consultation.

- **Implementation of a computerized system for the handling and management of non-compliance, corrective and preventative actions:** This objective was met by the implementation of the "Incident management" application which, apart from non-compliance, preventative and corrective actions, covers another series of activities relating both to the Environmental Management System and to the Risk Prevention System.

Audits

Enagas carries out internal, annual audits in all of the certified units, to evaluate the degree to which the Environmental Management System has been implemented.

This planning is in line with that performed by AENOR for the audits that form part of the Environmental Management System certification process.

During the year 2003 internal audits and those of AENOR were performed in the following facilities and units:

- Headquarters.
- Huelva, Cartagena and Barcelona Regasification Plants.
- Serrablo Underground Storage.
- Technology Unit.
- 18 Control, Operation and Maintenance Centres and 4 Compression Stations.

Emissions to the Atmosphere

Two types of emissions into the atmosphere are produced in Enagas' facilities: natural gas emissions and those generated at combustion points.

Natural gas emissions correspond to the starting and stopping of the Compression Stations, the introduction



of gas into new sections of gas pipeline, and the Barcelona Regasification Plant.

In the year 2003 the quantity of natural gas emitted into the atmosphere was more than 16.4 million m³, which represents 0.07% of the total gas transported. This amount signifies the emission of 10,477 tonnes of methane.

NATURAL GAS EMISSIONS INTO THE ATMOSPHERE

Area of activity	Quantity (m ³)
Regasification Plants	14,683,725
Serrablo Storage Facility	66,450
Basic Gas Pipesina Network	1,720,217
Total	16,469,392

¹Includes emissions from the Technology Unit

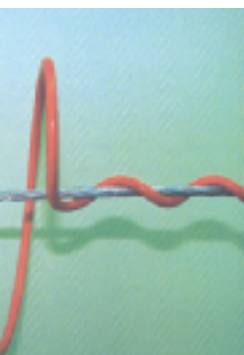
On the other hand, the emission of contaminating gases at combustion points is measured annually, which permits the verification of compliance with applicable legislation and the correct operation of these facilities.

The results of this monitoring program in the year 2003 indicate that the emission values of all of the measured parameters are greatly inferior to those allowed under the applicable legislation.

EMISSIONS FROM COMBUSTION POINTS

Area de Activity	CO (t)	CO ₂ (t)	NO _x (t)
Regasification Plants	24	84,202	18
Serrablo Storage Facility	15	21,071	10
Basic Gas Pipeline Network	27	243,978	127
Total	66	349,251	155

¹Includes emissions from the Technology Unit.



For methane there is an approximate average emission of 38 kg for each GWh of gas transported.

In the case of the emissions of CO₂ the average relationship is 1,268 kg for every GWh of gas transported. Of these emissions, approximately 63% corresponds to the turbo compressors of the Compression Stations in the Basic Gas Pipeline Network.

For CO and the NO_x the average emission relationships are around, respectively, 239 and 564 grams for every GWh of gas transported.

Control of Noise Emissions

The measurement of noise produced by Enagas' facilities allows their evaluation in relation to noise impact on the environment.

During the year 2003 the noise generated in twenty-two facilities was measured in order to evaluate noise impact and verify their degree of legal compliance.

Furthermore, development work started on a computer simulation program capable of predicting, during the design phase, noise emissions for the new Measuring and Regulating Stations once operational.

Residual Water Discharges

Enagas' activity generates two types of discharges: sea water used in the vaporisation of liquid gas in the regasification plants and sewage water.

In order to check the correct operation of the sewage water purification plants in those centres which, due to their geographical location, cannot connect effluent to municipal treatment plants, analyses were performed in thirteen facilities.

Furthermore, in the regasification plants appropriate checks were carried out in compliance with corresponding discharge authorization.

Waste Management

The Environmental Management System implemented in all of the work centres requires the segregation and control of generated waste, allowing its management in accordance with the legislation currently in force, thus avoiding contamination of soil and subterranean water.

During the year 2003, the established segregation system allowed the recuperation of approximately 240 tonnes of waste and the management of more than 1,880 tonnes of waste classified as hazardous.

WASTE RECOVERED	
Type	Quantity (t)
Paper and cardboard	48.2
Serap metal	152.8
Plastics	2.9
Wood	36.7
Total	240.6

DANGEROUS WASTE MANAGEMENT	
Type	Quantity (t)
Spent lights	0.6
Used batteries	4.7
Alkaline, saline and button batteries	0.7
Used oils	11.4
Empty chemical containers	7.4
Greasy rags and absorbents	7.7
Methanol water	1,753.0
Only waters	69.6
Others	25.1
Total	1,880.2

Energy Consumption

The Environmental Management System implemented by Enagas requires the rational use of energy employed in the development of its activities.

ENERGY CONSUMED

Area of the activity	Quantity (t)
Regasification Plants	471
Serrablo Storage Facility	104
Basic Gas Pipeline Network	1,220
Total	1,795

¹ Includes consumption by the Technology Unit

Energy consumption in Enagas' various facilities rose to 1,795 GWh, which represents 0.65% of the total energy transported. This indicator experienced an improvement in comparison to that registered in the previous year which showed a value of 0.7%.

Of this amount, the consumption of natural gas represents around 90% and the remainder corresponds to electrical energy. The majority of the energy consumed occurs in the Compression Stations in the Basic Gas Pipeline Network which are responsible for 61% of total consumption.

Environmental Impact

In order to address the increase in the demand for gas, an investment program was elaborated which allows the amplification of existing facilities and the development of new infrastructures.

Environmental Impact Studies form part of the engineering tasks for the corresponding projects. During the year 2003 the following studies were elaborated and submitted to the Ministry for the Environment:

- Málaga-Rincón de la Victoria Gas Pipeline Branch.
- Falces-Irurtzun Gas Pipeline
- Amplification of the Huelva Regasification Plant: 4th Storage Tank.
- Castellón-Onda Gas Pipeline.
- Amplification of the Cartagena Regasification Plant: 4th storage tank.
- Madrid Southwest Half-ring. Sections I, II, and III.

Similarly, during this year the following Environmental Impact Declarations were made, which form a necessary condition for works to be started:

- New revisions of gas pipeline shaft connections in Jaca.
- Castelnuovo-Fraga-Tamarite de Litera. Gas Pipeline.
- Splitting of the Arbós-Tivissa Gas Pipeline.
- Amplification of the Barcelona Regasification Plant: 6th storage tank.
- Branch to Campo de Gibraltar
- Cartagena-Lorca. Phase II. Gas Pipeline.

Monitoring Plans

Environmental monitoring is the tool that ensures correct compliance with the measures stated in the Environmental Impact Study, in accordance with the Environmental Declaration and environmental commitments that have been voluntarily adopted.

In the year 2003 the "Works Environmental Monitoring" specification was approved, which defines the obligations and responsibilities of all those who are involved in the execution of works in Enagas.

Environmental monitoring carried out throughout this year signified an investment of 155,000 euros destined to the following gas pipelines:

- Huelva-Sevilla Gas Pipeline.
- Sevilla-Cordoba Gas Pipeline.
- Cordoba-Santa Cruz de Mudela Gas Pipeline.
- Santa Cruz de Mudela-Alcázar de San Juan- Gas Pipeline Outlet in Cuenca.
- Getafe Gas Pipeline- Gas pipeline Outlet in Cuenca.

Landscape Recuperation

The intention of Enagas is that its infrastructures, once the corresponding works have finished, are integrated into the surrounding environment in the most appropriate fashion. For this reason damaged terraced land, walls and irrigation ditches are restored and ground that was affected

Principal Actions

ted by the movement of machines during the different construction phases is loosened.

Furthermore embankments are shaped to ensure that the final gradients are sufficiently gentle to ensure that soil is not washed away when it rains.

This year, more than 7 million m² were restored, signifying an approximate investment of 3.3 million euros.



Region	RESTORED SURFACE	m ²
Madrid		1,282,320
Castilla-La Mancha		3,870,072
Andalucía		1,234,960
Aragón		556,976
Basque Region		127,000
Total		7,071,328

Archaeological Surveys

In 2003 archaeological conservation activities were performed involving an investment of some 407,000 euros, the greatest part of which corresponded to the Huelva-Sevilla gas pipeline and the Santa Cruz de Mudela - Alcázar de San Juan - gas pipeline outlet in Cuenca.

In the latter gas pipeline the existence of a hitherto unknown archaeological deposit was discovered; located in the Alcázar de San Juan municipality and denominated *Cotillos de Bolsa*. In said deposit, material belonging to the Bronze Age, Iron Age and the Romanic Period were found. The remains discovered correspond to either settlements that were established around some kind of fortification, or totally undefended settlements. This deposit is situated on working land and, as such, the archaeological remains appear very eroded and fragmented.

In order to protect the discovered remains a variation in the gas pipeline route was performed in the area where they were found.

Protection of the Spanish Imperial Eagle

The Cordoba-Santa Cruz de Mudela gas pipeline goes through Cuencas del Rumblar, Guadalén and Guadalmena which are denominated places of public interest and its route passes through a zone near to the nesting and feeding area of three pairs of Spanish imperial eagles, a species that has been classified as being in danger of extinction in the National Catalogue of Endangered Species since 1990. Enagas, aware of the possible impact of this gas pipeline on the species, decided to design a series of actions in order to mitigate the widespread effects that this construction might have on the eagle's habitat, strengthening the natural system and reducing the project's global impact. These actions were complimentary to those included in



the Environmental Impact Study intended to correct direct impact from the project. They were approved, prior to their execution, by the Consejería de Medio Ambiente de la Junta de Andalucía [Environmental Ministry of the Andalusia Regional Government].

The Spanish imperial eagle is one of the rarest birds of prey in the world. 190 reproducing pairs currently exist, distributed over the Autonomous Regions of Andalusia, Extremadura, Castilla-La Mancha, Madrid and Castilla y Leon.

This situation motivated the administrations involved in its protection to create and operate the National Conservation Strategy, which aims to eliminate the danger of extinction for the species, promoting and instigating measures to limit the principal factors that place its survival at risk.

Amongst the most important factors figure: high mortality due to electrocution on electrical lines; loss and deterioration of its habitat; and the reduction in the population of its principal prey – the mountain rabbit.

The actions designed by Enagas aim to improve the species' habitat and to create a self-sufficient population of mountain rabbits to provide the eagle with a stable food source.

The activities carried out in order to fulfil these objectives consisted in: preparation and sowing of ground in order to create meadows; control of predators; construction of warrens and feeding and drinking troughs; and repopulation with specimens gathered from surrounding areas.

Similarly, work was carried out to increase the availability of food and water, which resulted in a general improvement of the ecosystem.

The UN Global Compact

Enagas abides by the United Nation's Global Compact. This declaration establishes nine principles of behaviour concerning human, labour, and environmental rights, which are based on the Universal Declaration of Human Rights, the International Labour Organisation's Fundamental Principles and Rights at Work, and the Declaration on Sustainable Development made in the Rio de Janeiro Earth Summit.

With regard to the Environment, adhesion to these declarations involves:

- Support for the precaution criterion with respect to environmental problems.
- Adoption of initiatives to promote greater environmental responsibility
- Encouraging the development and diffusion of ecologically rational technologies.

Expenses and Environmental Investment

Throughout the 2003 financial year investments and environmental expenditure were made of some 9,718,700 € in environmental actions, the breakdown of which can be seen in the attached table:

The most important investment corresponds to directional drilling executed in the crossing of the River Jarama in the Getafe Gas Pipeline – Gas Pipeline Outlet in Cuenca and in the Guadalquivir and Guadaira rivers, and the River Guadiamar's ecological corridor on the Huelva-Sevilla Gas Pipeline.

SUMMARY OF INVESTMENTS AND EXPENSES

Activity	Amount (Thousands of €)
Development, implementation and monitoring of environmental management Systems	123.0
Campaigns to monitor and control noise, emissions and spills	4.0
Waste management	734.7
Environmental monitoring and watch-out workfields	155.8
Landscape recuperation	3.328.2
Directed and horizontal drilling	4,498.1
Archaeological protection and recoveries	407.3
Other environmental process improvements	467.6
Total	9,718.7

Glossary of terms



Environmental Aspect: element of an organization's activities, products or services that can interact with the environment (UNE-EN ISO 14001).

Environmental Audit: systematic, documented verification process to obtain and objectively evaluate facts in order to determine if an organisation's environmental management system corresponds to the auditing criteria of the environmental management system defined by the organisation; and communication of the results to Management. (UNE-EN ISO 14001)

Boil-off: vapours resulting from the spontaneous evaporation of natural gas in a liquid phase.

Environmental Certification: official confirmation by an accredited Environmental certifier of compliance with the requirements of a determined standard and the reliability of data and information included in reports and documents.

Combined Cycle: system which combines the production of electricity in a gas turbine and a steam turbine, by the recuperation of residual energy from the exhaust gases of the former. Performance is greatly superior to that of traditional generation systems.

Chlorofluorocarbons (CFC): non-toxic hydrocarbon halogens, which contribute to the greenhouse effect, being around 10,000 to 20,000 times more effective than carbon dioxide. When released they reach the ozone layer and destroy it, thus allowing more ultraviolet light from the sun to reach the earth's surface. They have been widely used in human activities (refrigerators, sprays, etc), although their use has begun to fall since the 1985 Vienna Agreement.

Combustion: reaction of organic compounds with oxygen, producing principally carbon dioxide, water vapour and heat.

Environmental Behaviour: measurable results from the environmental management system, relating to the control by an organisation of its environmental aspects, based upon its environmental policy, objectives and goals. (UNE-EN ISO 14001).



Contamination: alteration of the physical, chemical or biological characteristics of the environment as a result of human activity. Contamination can affect soil, air and water. The most frequent pollutants are: organic substances (hydrocarbons, chloric hydrocarbons etc.); inorganic (asbestos, heavy metals etc); and noise, heat, radiation etc. Contamination may be seen on a local, regional or even global scale, as in the case of the greenhouse effect, acid rain and the disappearance of the ozone layer.

Sustainable Development: development that satisfies the needs of current generations without hindering the capacity of future generations to satisfy their own needs. (Brutland Report, 1987)

Environmental Impact Declaration (EID): declaration by the competent authority for the environment, in which the appropriateness (or not) of executing the proposed activity is determined with regard to its foreseeable environmental impact. If the declaration is affirmative, the conditions that must be established for the suitable conservation of the environment and natural resources are determined. (RD 1131/1988, 30 September, which approves the Regulations for the execution of RDL 1302/1986, 28 June, concerning Environmental Impact Evaluation)

Sulphur Dioxide (SO₂): gas produced in the combustion of fossil fuels with a high content of sulphur (carbon, fuel oil, coke etc.). It is a very common pollutant in cities and industrial areas, where concentration levels, along with those of other pollutants, can be increased beneath stable atmospheric conditions. It is one of the pollutants responsible for acid rain.

Carbon dioxide (CO₂): colourless and odourless gas, heavier than air, which is generated in the fossil fuel combustion processes, in animals' respiration, in the decomposition of organic material, in volcanic emissions etc. It is essential for photosynthesis in plants. It is found naturally in the atmosphere, although variations in concentration levels due to human activity can cause variations in the earth's surface temperature, given that it is the principal cause of the greenhouse effect.

Environmental Impact Study: technical document that the author of a project must present and which forms the basis for the Environmental Impact Declaration. This study has to appropriately identify, describe and evaluate, the most notable foreseeable effects that the project's execution will have on the various environmental aspects, in accordance with the special characteristics of each concrete case. (RD 1131/1988, 30 September, which approved the rules governing the execution of 1302/1986, 28 June, concerning the Evaluation of Environmental Impact.)

Evaluation of Environmental Impact: set of studies and technical systems that allow the estimation of the effects that the execution of a given project, works or activity causes on the environment. (RD 1131/1988, 30 September, which approved the rules governing the execution of 1302/1986, 28 June, concerning the Evaluation of Environmental Impact.)

Renewable Energy: inexhaustible energy sources which are periodically available for man's use, who can utilise and transform them into useful energy. That is, they are constantly renovated, in contrast to fossil fuels such as petrol, coal, gas and uranium, which have limited potential reserves. This concept includes hydroelectric, wind, solar, biomass, tidal, geothermal and wave energy. (European Union and Ministry for Industry and Energy)

Natural Gas: a mixture of gases from a fossil origin primarily composed by light hydrocarbons whose principal component is methane (CH_4).

Liquid Natural Gas (LNG): natural gas in liquid phase. At atmospheric pressure, the equilibrium temperature is -161°C .

(GEG) Greenhouse Effect Gases: gases which allow solar radiation to enter, but do not allow infrared radiation emitted by the Earth to escape to the exterior. This property, similar to that of greenhouse plastics (hence the name) alters the thermal equilibrium of the Earth and can cause increases in said temperature. The Kyoto Protocol refers to the following gases: Carbon Dioxide, Methane,

Nitrous Oxide, Sulphuric Hexafluoride, Per fluorocarbons and Hydro fluorocarbons.

HP (Horse Power): Power unit equivalent to 746 W.

m³: the volume of gas contained in a cube of 1m side, at 1 atm pressure and at a temperature of 0°C .

Environmental Goal: detailed action requirement, quantified whenever possible, applicable to all or part of the organisation, resulting from environmental objectives and which must be established and fulfilled in order to meet said objectives. (UNE-EN ISO 14001).

UNE-EN ISO 14001: international Standard for Environmental Management Systems.

Environmental Objective: environmental target of a general nature, which originates in an organisation's indi-



dual environmental policy, and which is quantified whenever possible (UNE-EN ISO 14001).

Environmental Policy: declaration by an organisation of its intentions and principles with regard to its general environmental behaviour. It provides an action framework for the establishment of its environmental objectives and goals (UNE-EN ISO 14001).

Kyoto Protocol: international protocol created in Kyoto in the year 1997, according to which, abiding countries are committed to the reduction of their Greenhouse Effect Gas emissions during the period 2008-2012, using as a basis emissions in the year 1999. Spain, together with all of the countries from the EU, began to observe the Protocol in the year 2003.

Waste: any substance or object belonging to the categories that appear in the appendices to the Waste Law,

which are discharged by their owner or who has the obligation or intention to discharge them. In any case, all wastes that figure in the European Waste List will have this status. (Law 10/1998, 21 April, concerning Waste).

Hazardous Waste: those that appear in the list of hazardous wastes, approved in Royal Decree 952/1997, as well as recipients and containers which have held them. Waste that has been classified as hazardous under Community Regulations and that which the government may approve in accordance with European standards or with international agreements to which Spain is a party. (Law 10/1998, 21 April, concerning Waste)

Environmental Management System (EMS): part of the general management system which includes the organisational structure, activity planning, responsibilities, practices, procedures, processes and resources to develop, carry out, revise and renovate environmental policy (UNE-EN ISO 14001).

Tonne of oil equivalent (toe): unit of energy equivalent to 11.63 MWh.



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