Saras S.p.A.
Environmental Declaration
2009

Saras S.p.A. Environmental Declaration 2009

Revision 24 July 2009
(performance data updated as at 31 December 2008)

drawn up in accordance with EC regulation no. 761/2001

Saras S.p.A.

Head office and production site: Sarroch (CA), Sardinia, Italy
Located at km 19 of National Route SS 195 “Sulcitana”

General management and administrative office: Milan, Italy
Galleria De Cristoforis, 1

Activity codes: NACE 19.20 (Refinery) and 35.11 (IGCC)
IPPC activity codes: 1.2 (Refinery) and 1.1 (IGCC)

Revision 24 July 2009 (performance data updated as at 31 December 2008)
of the Environmental Declaration of Saras S.p.A.
EMAS Registration no.: IT – 000995 of 20 October 2008

The accredited Environmental Inspector that validated
Saras's Environmental Declaration pursuant to EC Regulation 761/2001 is
Lloyd's Register Quality Assurance Italy S.r.l.

EMAS Registration no.: IT-V-0010 of 19 September 2008

This document informs the public and all concerned parties about the following:
- the activities carried out by Saras;
- the environmental aspects, direct and indirect, associated with these activities;
- the objectives for environmental improvement that the company has set itself.

The document is aimed at the communities inside and outside the company, and its objective is to establish a transparent relationship with all the social parties concerned, and specifically the general public, the local authorities and the employees, who are an active party to the correct management of the activities carried out.

The Environmental Declaration will be updated annually and reissued completely in 2011.

The Environmental Declaration was written and edited by:
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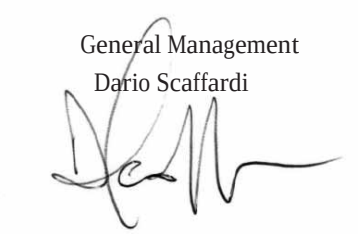
Presentation

2008 was a year of major targets for Saras, particularly in environmental terms.
One of the most important was EMAS registration, the result of a programme and of the commitment with which we supported sustainable development for several years. Two of the cardinal points of this commitment are greater transparency and communication with the region.
Also in 2008 we conducted the programme to obtain EIA authorisation (Environmental Integrated Authorisation), which concluded with a positive outcome in January 2009. Saras is the first Italian refinery to have achieved EIA, an authorisation which systematically examines the impact of productive activities on all environmental matrices.
In 2008, investments in environmental protection amounted to EUR 64 million, representing 35% of investments in the refinery division. This figure, which is constantly growing, comprises improvements to the plants, the construction of new units, and training on safety and the environment.
The investments also include the construction of the TGTU (Tail Gas Treatment Unit), used for treating tail gases and recovering sulphur, to further reduce emissions of SO_2.
Always attentive to staying a step ahead of the market, in 2008 construction of the petrol desulphurisation plant was completed. This plant enables the refinery to meet the new European specifications which came into force on 1 January 2009, and which specify a sulphur content in petrol of 10 ppm.
We have always spent a significant portion of investments on training our people, through an ongoing process that involves all employees at the refinery (including employees of contracting companies) and of Saras Group, with the objective of creating a high level of awareness of environmental issues.
In this context of ever-increasing commitment to transparency and ongoing investments in training, we cannot forget the recent tragic accident that ended the lives of three employees of an external company who were working on our systems. This event leads us to reflect with great humility upon our daily activity, and it supports the firm belief that lasting results can be achieved only with the cooperation of all stakeholders.

Sarroch, 15 July 2009

General Management
Dario Scaffardi



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A NOTE ON THE TEXT

In this document, which gives a detailed illustration of the Saras company in its activities and interactions with the environment and with the region where it is located, a number of graphical conventions have been adopted for an easier reading experience and to aid in the clear comprehension of the document.
These conventions are presented below.

Opening each chapter is a short introductory section containing the main points of the information that is presented in the following pages: this short paragraph highlights the concepts that are explored in more detail in that section.

In the chapters, the blue headings in the margin are extracts from the main points of information that are discussed on that page.

Similarly, in chapter 4, which contains the data on the principal environmental aspects, the margin notes contain the references of legal authorizations that are cited in the main body of text.

Where appropriate, the text refers the reader to the "Environmental objectives and programmes" table (chapter 5, page 121). This table summarises the improvement objectives and actions to which the company will devote particular attention in the coming years, and the improvement activities carried out in 2008.

Of the charts presented, those with an orange frame contain the measurement of a figure in relation to a limit set by current legislation or authorisation.

Lastly, boxes with a blue border contain information that, although it does not refer directly to Saras or its activities, offers useful information for a better and more complete understanding of the company and the context in which it operates.


SARAS

1.
Presentation of the company

Saras's heart is in Sardinia.

From 1962 to the present day, it has become a Group operating in the energy sector in Italy and internationally with diversified activities: production, distribution and sale of oil products, production of electricity from equivalent and renewable sources, computer services, research and environmental services.
The Sarroch refinery in Sardinia, in the heart of the Mediterranean, represents the company's principal activity for over 45 years.

The site today is one of the most important in Italy and Europe, in terms of complexity, capacity and production quality. Ours is an industrial site where respect for the environment, health and safety guides every corporate decision, and every corporate decision is taken in a climate of ongoing dialogue with the region. This is the context in which, in October 2008, Saras obtained EMAS registration.

1. Presentation of the company

1.1 – The Saras Group

Saras Group operates in the energy sector and is one of the principal independent European oil refining companies.

[2,000 employees, 7,000 jobs maintained by Saras's economic impact]

At the end of 2008, the Group had around 2,000 employees, of which 1,266 in the parent company Saras S.p.A., which is the subject of EMAS Registration.

With its head office and production site in Sarroch (where 1,102 are employed) and its administrative and financial office in Milan (164 employees), Saras is the most important employer in Sardinia with over 7,000 jobs being supported by its economic impact.

In recent years, activities in oil refining have been extended to include other activities in the energy sector, specifically the production of electricity:

- through the construction of the IGCC (Integrated Gasification Combined Cycle[1]) plant, closely integrated with the refining cycle, which annually produces over 4.4 billion kWh of electricity, or over 30% of the regional requirements;
- through the construction of a wind farm generating 72 MW in Ulassai (also in Sardinia).

[a group in constant growth]

Since May 2006, the Saras S.p.A. has been listed on the electronic stock market of Borsa Italiana.

With sales at end-2008 of over EUR 8.7 billion (+29% versus 2007), a comparable[2] gross operating margin of EUR 673.3 million – up by 15% – and an adjusted[3] net profit of EUR 327.1 million – an increase of 31% compared to end 2007 – Saras is a constantly growing Group that is capable of remaining highly competitive even during the worst periods in the global economy. This is also due to the company's ongoing investments which, in 2008, amounted to EUR 257 million – an increase of 22% over 2007 (EUR 210 million). Investments in safety and the environment in 2008 amounted to EUR 64 million, representing 35% of investments in the refinery division (EUR 182.3 million).

[1] **Combined Cycle Gasification**: The IGCC plant transforms the heavy hydrocarbons, deriving from refinery processing, into electricity.

[2] **Comparable Gross Operating Margin**: gross operating margin, calculated by valuing inventories using LIFO and adjusted for non-recurring items.

[3] **Adjusted net profit**: net profit adjusted for the difference between inventories valued using LIFO (Last in First Out – oil stocks at historical values) and inventories valued using FIFO (First in First out – oil stocks at current values), after taxes, non-recurring items after taxes, and changes in the fair value of derivatives after taxes.

FIGURE **1.** Location of the Saras site

The Sarroch production site

Saras's production site in Sarroch, located to the southwest of Sardinia's capital, Cagliari, around 20 km from the city, hosts one of the biggest refineries in the Mediterranean in terms of production capacity and is one of Western Europe's "super-sites" in terms of complexity (source: Wood Mackenzie, February 2007).

With a refining capacity of 15 million tons a year (300,000 barrels a day), the Saras refinery represents around 15% of the total distillation capacity in Italy. The refining cycle is integrated with the IGCC plant, used to generate electricity.

Over time the geographic location of the Sarroch production facility has shown itself to be optimal and strategic for trade with the western and central Mediterranean, encompassing both European and North African countries, while the close proximity of the Polimeri Europa and Sasol Italy factories enable it to add petrochemical production to its refinery operations (see box on page 13).

1.1.1 – Group companies

[oil products, electricity, services]

Saras SpA – Is the parent company and a subsidiary of Angelo Moratti S.a.p.a. It was established in 1962 to carry out refining activities, and today it owns the Sarroch production plant.
Saras operates in the energy sector and is one of the principal Italian and European oil refining companies.
Arcola Petrolifera markets oil products on the Italian wholesale market, in Sardinia and in northern and central Italy. As well as the commercial activity, which represents the core business, at the depot in the municipality of Arcola (La Spezia), the company provides primary operators with reception, storage and redelivery services, via sea and land, of oil products for the fuel distribution network and for marine bunker sales.
Sarlux, a company 100% controlled by Saras, is the owner of the IGCC plant. Sarlux manages the sale of electricity produced by the IGCC, while the plant's operational management is entirely Saras's responsibility. (Paragraph 3.1.3, page 34.)
Saras Energia SA distributes oil products in the Spanish retail and wholesale market, through a highly competent and professional commercial organisation with expert knowledge of the market.
Sardeolica manages the wind farm located in the municipality of Ulassai (OG). This is one of the most important wind farms in Sardinia, with 48 authorised wind-power generators, of which 42 are already installed, for a power generation capacity of 72 megawatts.
At full operation it produces 165 GWh/year, corresponding to the energy needs of 60,000 families.
Akhela is a computer technology company, with significant experience gained in managing the computer systems at the Sarroch refinery. The company develops high-end tools and applications for the automotive, audio processing and avionics sectors.
Sartec (Saras Ricerche e Tecnologie) provides engineering services and research technology for the environment and for industry. Sartec's environmental consulting and monitoring services, design services, and optimisation of production processes and of industrial automation are aimed at supporting innovation and sustainable industrial development in Italy and internationally. Sartec also designs, manufactures and implements modular plants to identify environmental emissions.

1.2 – Saras in Sarroch

[in Sardinia since 1962]

Saras' connection with Sarroch dates back to 1962, when Angelo Moratti identified it as a strategic location for an oil refinery. In 1963 work began on building the refinery plant and systems, and in 1965 work began on refining.
Until the end of the 1980s, Saras mainly provided refining services for third parties, i.e. it refined crude oil owned by other oil companies that provided Saras with the raw materials to produce oil products.
In the mid-1990s, as a result of a major reduction in demand for high-sulphur fuel oils, Saras began a project of great industrial importance centring on the construction of a plant to gasify heavy refining distillates and subsequently cogenerate heat and electricity using a combined cycle (an IGCC plant).

[the IGCC project]

With the coming into operation of the IGCC, the oil production cycle is closely integrated with the electrical cycle, which enables us to maximise the conversion of raw materials into finished oil products and energy.
In the meantime we have continued investing in technological upgrades to the existing plants and improving the environmental qualities of the fuels, and this is also in response to increasingly stringent quality levels set by European legislation.

[technological advances continue]

FIGURE 2. The Saras production site and the surrounding region

The Sarroch industrial plant

The industrial plant that grew up in the Sarroch area in the 1960s has helped create employment and wealth in the region.

Around the big industrial names in this estate – like Saras, Polimeri Europa, Sasol Italy, Air Liquide, Liquigas and Agipgas – over the years many small and medium enterprises in related industries have emerged. They work on the construction and maintenance of the plants in the estate, in the process generating major induced economic benefits. Saras maintains industrial exchange relationships with all of these factories.

The facility that unites Polimeri Europa and Sasol Italy was started in the early 1970s, under the name of Saras Chimica (with a partial holding owned by Saras). The name was changed several times over the years, until the current names of Polimeri Europa and Sasol Italy were adopted.

The plants in Polimeri Europa receive their raw materials from Saras and use them for production for the plastics industry. The plants in Sasol Italy also receive raw materials from Saras (mainly diesel and kerosene), from which they derive products used in detergents and bases for synthetic lubricant oils.

Air Liquide is a company that produces liquid oxygen, which is used in the plants in Saras (the IGCC plant). Lastly, the Liquigas facility stores and sells LPG received from Saras (figure 10, page 36).

These investments have led to a progressive reduction in the percentage of sulphur in the refinery's oil products and to an improvement in the quality of middle distillates and gasoline.

[new construction initiatives]

In 2008 construction of the petrol desulphurisation plant (Unit 800) was completed. This plant enables the refinery to meet the new European specifications, which came into force on 1 January 2009 and which specify a sulphur content in petrol of 10 ppm.

[communication to the authorities of 23/12/2008[1] for commissioning the Auto Oil and MTD units]

Together with the desulphurisation unit, the new hydrogen plant (Unit 600) has been completed and brought online at the IGCC. This new unit will allow an increase in the rated production capacity of hydrogen at the IGCC, from 40,000 Nm^3/h to 60,000 Nm^3/h.

In addition, in 2008 the TGTU[2] plant for treating tail gases and recovering sulphur was completed and brought online. The TGTU enables the content of sulphurous emissions to be significantly reduced.

The installation of the U800 plant is part of the environmental impact containment objectives that Saras had committed itself to reach by 2008, while for the TGTU plant the objective was to be reached by 2009 (see chapter 5 on page 123).

1.3 – The company organisation

The chart shown here gives the internal organisation of Saras S.p.A.

In the diagram, all functions that can have an influence on the management of the Sarroch facility are highlighted.

Most of these functions have a direct correlation to environmental management (shown in orange) and therefore report to General Management, with the exception of the Purchasing and Tenders Service which reports to the Chief Financial Officer.

[operations]

The two elements at the top of the organisation - General Management and the Chief Financial Officer - report directly to the company's Board of Directors.

General Management is above the Industrial Operations Department, which directs and coordinates Saras's operations along three main lines:

- site Facility Management, based in Sarroch;
- engineering and Construction Management, based in Sarroch;
- the Group's Health, Safety and Environment (HSE) Service, based in Sarroch.

Management of operations conducted at the Sarroch site is the responsibility of the Refinery Department, which takes care of the functions (listed below) that have a direct influence on the management of environmental aspects (see definition on page 44):

- movement, Shipping and Wharf Production Area, responsible for receiving raw materials, internal movements and shipping of products;
- distillation and Desulphurisation Production Area, responsible for the refining plants;
- conversion Production Area, responsible for the conversion plants;
- targas and Utilities Production Area, responsible for the IGCC plant and for auxiliary services.

[other services in the facility]

The above functions are assisted and supported in managing the site and the environmental aspects by the following services at the facility:

- maintenance Service, responsible for maintenance;
- materials Warehouse, responsible for the temporary storage of auxiliary materials and substances;

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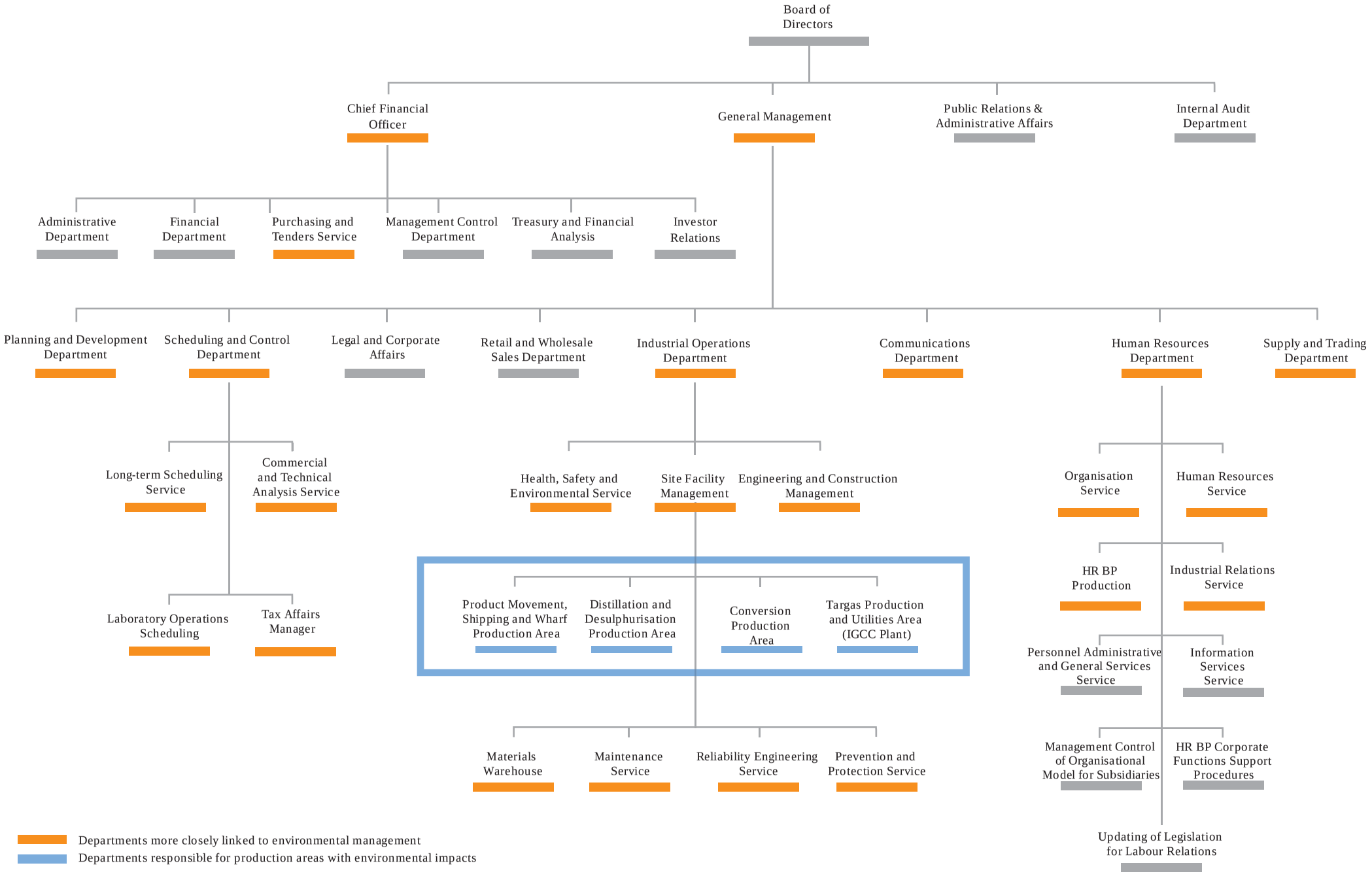
[1] **Legislation references:** European Directive 98/70/EC, modified by European Directive 2003/17/EC, and the following provisions in Italy: Prime Ministerial Decree no. 434 of 23/11/2000, DPCM no. 29/2002, Law no. 306 of 31/10/2003.

[2] **TGTU:** Tail Gas Treatment Unit.


Board of Directors
Chief Financial Officer
General Management
Public Relations & Administrative Affairs
Internal Audit Department
Administrative Department
Financial Department
Purchasing and Tenders Service
Management Control Department
Treasury and Financial Analysis
Investor Relations
Planning and Development Department
Scheduling and Control Department
Legal and Corporate Affairs
Retail and Wholesale Sales Department
Industrial Operations Department
Communications Department
Human Resources Department
Supply and Trading Department
Long-term Scheduling Service
Commercial and Technical Analysis Service
Laboratory Operations Scheduling
Tax Affairs Manager
Health, Safety and Environmental Service
Site Facility Management
Engineering and Construction Management
Product Movement, Shipping and Wharf Production Area
Distillation and Desulphurisation Production Area
Conversion Production Area
Targas Production and Utilities Area (IGCC Plant)
Materials Warehouse
Maintenance Service
Reliability Engineering Service
Prevention and Protection Service
Organisation Service
Human Resources Service
HR BP Production
Industrial Relations Service
Personnel Administrative and General Services Service
Information Services Service
Management Control of Organisational Model for Subsidiaries
HR BP Corporate Functions Support Procedures
Updating of Legislation for Labour Relations
Departments more closely linked to environmental management
Departments responsible for production areas with environmental impacts

- reliability Engineering Service, responsible for promoting and ensuring the ongoing improvement of the operational reliability and safety of plants and equipment;
- the site's Prevention and Protection Service.

[the Prevention and Protection Service]

The site's Prevention and Protection Service (PPS), in addition to carrying out the tasks specified in health and safety legislation (Legislative Decree no. 81/2008, article 33), also provides support to Management and to the other refinery functions to observe environmental legislation and to carry out the safety and environmental management systems implemented at the site.

The PPS also controls the organisation for handling emergencies. As well as its own personnel, this organisation also has suitably trained and formally designated personnel who belong to the operational organisations of the various different areas.

[communications]

The communication functions are divided into internal and external communications. The internal communication function reports to the Organisation Service which reports to the Human Resources Department, and external communication is managed directly by the Communications Department which operates at the Sarroch site in Cagliari and in Milan. Although they do not have a direct functional link, the two departments work closely together and coordinate their communications.

1.4 – Object of EMAS registration

[the Sarroch site and the Milan office registered for EMAS]

On 20 October 2008 the Ecolabel and Ecoaudit committee, EMAS section in Italy, passed a resolution to register the Saras S.p.A. organisation under no. IT-000995. The object of EMAS[1] registration is the Saras S.p.A. company in its entirety, for the Sarroch site and for the Milan office.

With EMAS registration, the Environmental Management System is compliant with EC Regulation no. 761/2001.

In 2004 the company obtained environmental certification in accordance with the ISO14001[2] reference standard, issued by Lloyd's Register Quality Assurance Italy.

Saras has its legal office at the Sarroch site, and all of its production is carried out there (the extent of the site is indicated by the white outline in figure 2 on page 13).

The activities covered by this certification concern both the Sarroch site and the Milan office. Specifically, they are:

a) on the Sarroch site, the processes of "Production of products from the refining of oil, scheduling, preparation and delivery of finished products, production of electricity. Management of design, engineering and construction of internal plants";
b) at the Milan office, the activities of "Management of design and engineering of internal plants".

All processes and activities that have a direct or indirect influence on the company's environmental management are controlled under the certified Environmental Management System.

It should be pointed out that the Saras activities directly connected to significant environmental aspects are conducted at the Sarroch site, while the environmental aspects of the Milan office are not significant, as was found in the environmental analysis given in paragraph 4.1 on page 44.

Consequently, the principal areas concerned by the environmental aspects of Saras activities are basically located in the Sarroch area and in Cagliari province.

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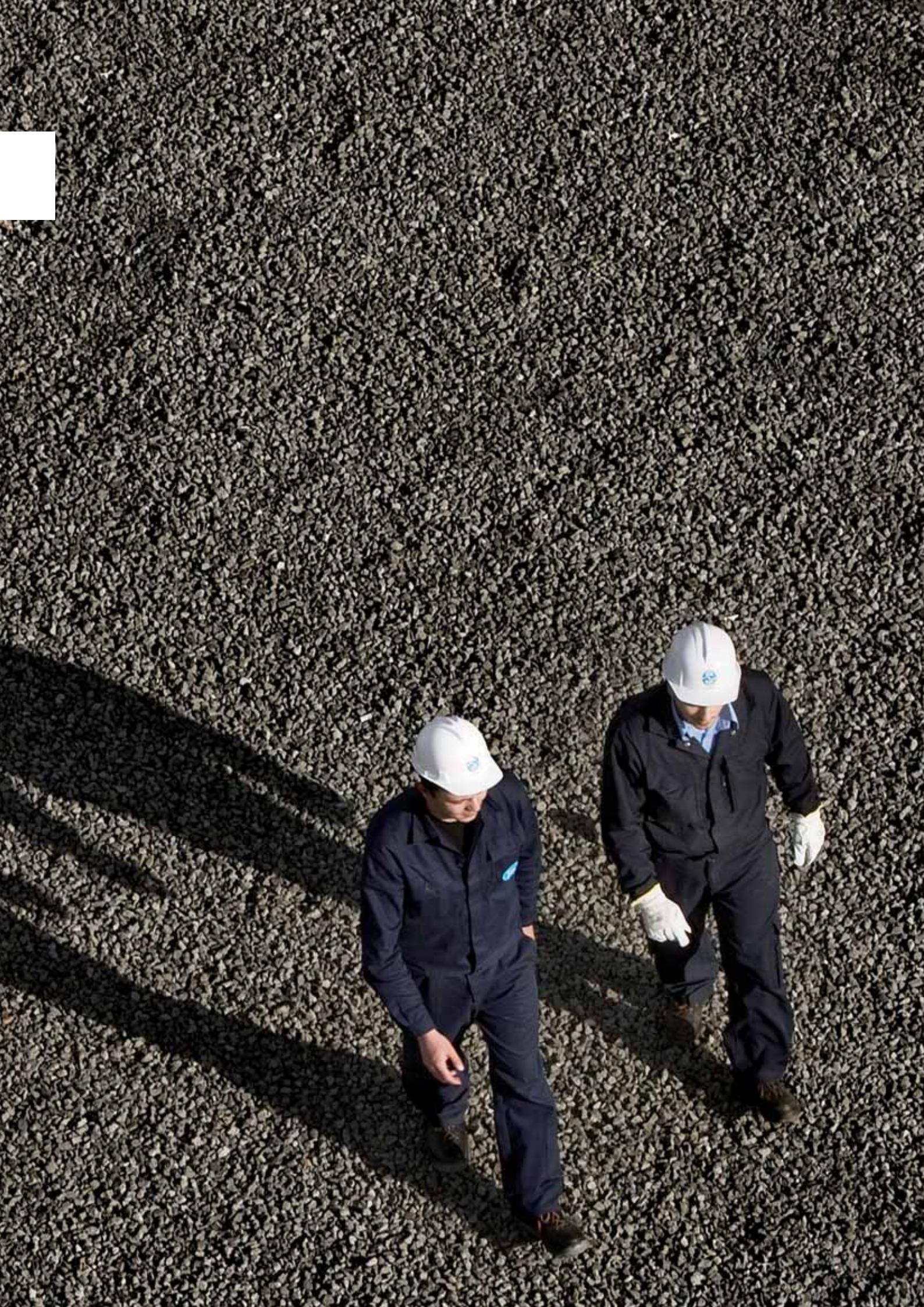
[1] **EMAS registration certificate** issued on 20 October 2008 by Ecolabel-Ecoaudit, in accordance with EC regulation no. 761/2001, which will expire on 25 July 2011.

[2] **Certificate** issued on 1 June 2004 in accordance with ISO standard 14001:1996, subsequently updated to ISO 14001:2004 with LRC certificate no. 180526/14 of 30 July 2007, which expires on 1 June 2010.



2.
The commitment to protect the environment, safety and health

Saras's commitment to safety and environmental sustainability is continually growing.

The process began many years ago and, in addition to observing legal requirements, it included a search for technical and management solutions that would enable us to go beyond what the law required, to translate our commitment to the region where the site is located into fact.

Important tools adopted along the way include an Environmental Management System certified to ISO 14001 standard in 2004, a Management System for Health and Safety at Work certified to OHSAS 18001 standard in 2007, and the consolidation of initiatives for openness and cooperation with the local communities that resulted in Saras's obtaining EMAS registration in October 2008.

2. The commitment to protect the environment, safety and health

2.1 – Environmental management

The Environmental Management System

[the commitment to ongoing improvement]

The drawing up and public distribution of the Environmental Declaration is part of the process of continually improving our environmental management, which was begun by Saras many years ago:

- in May 2002 all employees were given the company's Environmental Policy, containing the inspiring principles and commitments of Saras's environmental management policy;
- subsequently the Environmental Management System (EMS) Manual was drawn up, together with the related procedures to implement it, thus codifying the actions and conduct for all company personnel;
- objectives for improvement have been defined and approved by the Management Committee. These objectives are verified and updated annually;
- following this, internal audits were conducted to periodically verify that the EMS has been applied correctly;

[ISO 14001 certification]

- in June 2004 Saras obtained the certification of its EMS to the ISO 14001:1996 reference standard. Subsequently (in May 2006) certification was obtained to the ISO 14001:2004 reference standard;
- in June 2007 the three-year verification of the EMS was carried out, to renew the environmental certification. In addition, as required by the control procedures conducted by certifying body Lloyd's Register Quality Assurance, inspections of the site are carried out every six months by Lloyd's;
- in May 2008 the revised Environmental Policy was released (figure 4), and distributed to all direct employees and to all employees of contracting firms working at the site.

[EMAS registration]

In October 2008 the process of evolution of the company's Environmental Management System was concluded. This enabled the Saras facility to be registered under EMAS (Eco-Management and Audit Scheme), the European standard for eco-management and auditing (EC Regulation no. 761/2001). This registration resulted in the public release of the first Environmental Declaration (for 2008).

For a company, taking the decision to work towards EMAS registration means undertaking a path of continual improvement, being subjected to annual inspections and audits not just by external public bodies, both local and national, but also by stakeholders present in the region: members of the public, Public Administration, and other areas of society affected.

Today EMAS represents the most advanced voluntary instrument available for attesting to a company's commitment to environmental sustainability. For Saras, the decision to adhere to EMAS, which was arrived at several years ago, has meant progressing along the path of continual improvement that takes a structured view of our relationship with the environment and the region.

Saras SpA

SARAS'S ENVIRONMENTAL POLICY

Saras considers respect for and protection of the environment to be of primary importance in achieving its development objectives and for an appropriate integration of its activities in the area where it operates.

The criteria underlying the management of Saras's activities include the preventive assessment of the possible environmental consequences of new activities and products, the adoption of the reference principles, standards and solutions indicated in the "BREF for refining" (Best Available Techniques Reference documents, a document drawn up to apply the 61/96/EC IPPC Directive: Integrated Pollution Prevention and Control), the utmost transparency and cooperation with the general public and with the authorities, and the involvement and accountability of its personnel and of all those who access the site on the subject of environmental protection.

Through the introduction and maintenance of the Environmental Management System applied to the refining and electricity production activities at the Sarroch Refinery, SARAS aims to guarantee the efficient and proper management of the systems and activities conducted on site and to achieve, over and above the due observance of current legislation and the other regulations subscribed to by the company, the twin objectives of continuously improving environmental performance and preventing pollution.

Specifically, Saras commits to:

- Pursue the reduction of atmospheric emissions, to ensure minimum impact on air quality
- Pursue the prevention of sea pollution, by acting on seagoing transport vessels and on the waste water treatment system
- Minimise the use of fresh water from external sources
- Improve the waste management cycle, by favouring recovery
- Develop its own monitoring system for emissions and for environmental quality
- Improve accessibility and usability of the data found and of the studies conducted
- Mitigate the impacts deriving from company activities that can be perceived by the surrounding community.

It is Saras's firm belief that achieving the above goals is only possible with the active contribution of all its people, and to address these issues the company has developed a system of information and ongoing training.

Every person in Saras is directly responsible for putting the environmental policy into practice when carrying out their activities, and conduct consistent with these issues is one of the objectives at both an individual and group level.

The management is on the front line of responsibility for putting this policy into practice.

Saras is committed to promoting its environmental policy and to requiring its application by contracting firms, suppliers and any other person who works on behalf of the organisation, and to this end the company provides training and information. The responsibility, conduct and attitudes to environmental aspects of the abovementioned parties are significant elements in judging the quality of performance, and the parties must also set up adequate training and information on these issues.

Saras undertakes to ensure provision of the human and technical resources necessary to achieve and maintain the environmental policy at the Sarroch site.

Sarroch, 23 May 2008

Saras S.p.A
The General Manager

FIGURE 4. Saras Environmental Policy

2.2 – Safety and health management

[health and safety priority commitments]

Occupational Health & Safety Management System

The first Safety Policy was introduced in 1996 and since then Saras has achieved positive results in constantly safeguarding its employees: "SARAS shall accord safety with a level of importance similar to production, quality and costs."

In 2008 the special Policy for Prevention of Major-accident hazards (figure 5, page 23) was drawn up for the Sarroch facility, following the issuing of the Ministerial Decree of 09 August 2000. This decree established the terms for setting up a Management System for Prevention of Major-accident hazards.

The passing of specific legislation to safeguard the health and safety of employees (formerly Legislative Decree no. 626/1994, now Consolidated Act Legislative Decree no. 81/2008) suggested the need to do something extra, and not merely observe the law. Saras considers the protection of health and the prevention of all forms of accident or injury (for everyone who operates within the site) to be primary values, as stated in the Policy for Health and Safety at Work (figure 6 on page 24), defined by the General Management in July 2007. The implementation of a Management System for Health and Safety at Work has introduced performance measurements and the planning of improvement objectives and targets that are lacking in the sector regulations.

[OHSAS 18001 certification]

Occupational Health & Safety Management System (OH&S) is now an integrated system (Major-accident hazards, Health and Safety at Work) which takes best advantage of the parts in common.

Following a similar path to that taken for the EMS, in December 2007 Saras obtained certification of its Management System for Health and Safety at Work (OH&S) to the OHSAS 18001:2007 standard, issued by Lloyd's Register Quality Assurance Italy[1].

In the future, Saras's objective is to integrate Occupational Health & Safety Management System (OH&S) with the Environmental Management System.

Accidents

The principal indicators in Occupational Health & Safety Management System are the accident indicators.

The indices considered confirm the good results achieved for the ongoing improvement of employee safety, as shown in table 1.

TABLE 1 Accidents

Parameter	2005	2006	2007	2008
INAIL frequency index* (no. accidents per 1,000,000/total no. hours worked)	5.7	5.7	7.4	6.4
Severity index** (no. days lost per 1,000/total no. hours worked)	0.129	0.120	0.120	0.172
Average duration of accidents (days)***	22.8	21.3	16.5	26.7

* Accidents of duration longer than 1 day

** Calculated taking the number of days lost due to accidents

*** Calculated as the ratio (days for accidents in the year + days for accidents ongoing from the previous year) / no. of accidents in the calendar year

Comparison of the figures shows a substantial stability of the Frequency Index, which can be directly correlated to the number of accidents. The severity index and the average duration in 2008 also take account of the days lost due to accidents that occurred in 2007, and which were concluded in 2008. If we took account of only the accidents which occurred in 2008, the trend would be in line with previous years.

[1] LRC certificate no. 8180526 of 9 January 2008, which expires on 9 January 2011.

Saras SpA

POLICY FOR PREVENTION OF MAJOR-ACCIDENT HAZARDS

In the overall framework of its policy for Safety, Health and the Environment, the Operator of the Saras S.p.A. Refinery in Sarroch undertakes the following:

- To pursue the utmost levels of safety for its employees and for every person present on the Site
- To implement every action and initiative that is useful to preventing major-accident hazards and to reducing to a minimum the possible consequences for persons, the environment and the property
- To observe Italian legislation controlling major accident hazards
- To ensure observance of its internal safety regulations, standards and procedures, which are periodically verified, updated and upgraded wherever and whenever considered necessary, to improve the prevention of major-accident hazards
- To promote continuous improvement through the use of new and more advanced standards of safety
- To ensure that all its employees and those of subcontracting firms, with respect to their skills and responsibilities, are trained to operate in full knowledge of the potential risks associated with activities, both under ordinary operating conditions and in the event of an emergency
- To distribute the policy to suppliers, subcontractors and any other third party who accesses the site for reasons of work
- To distribute the policy to all employees and to actively involve the entire site organisation (executives, managers, employees and their Safety Representatives), each with respect to their skills and responsibilities, in Safety Management
- To periodically assess the major-accident hazards associated with the company's activity, identifying the safety objectives and defining the consequent programmes for continual improvement
- To ensure control of any emergency, by means of implementing specific internal plans and in close coordination with the respective authorities, including regarding the information needs of the general public and the activation of the External Emergency Plan
- To implement the Safety Management System and periodically assess its effectiveness and efficiency, and make any necessary revisions and updates
- To maintain a relationship of utmost cooperation and transparency with the general public and with public institutions.
- To achieve the above-mentioned objectives the active contribution of all personnel will be necessary, and implementing the policy will be an objective at both individual and group level.

Operator

Sarroch, 31 March 2008

Figure 5 Policy for prevention of major-accident hazards

SARAS POLICY FOR OCCUPATIONAL HEALTH & SAFETY

SARAS considers health and safety in the workplace to be of primary importance and ensures its protection in the execution of its productive activities.

In addition to observing the obligations set out by legislation, SARAS aims at continual improvement and for this reason the company undertakes to adopt principles, standards and solutions that make up the best practices in the sector.

SARAS undertakes to manage its activities with the goal of preventing work-related accidents, injuries and illnesses and in particular it undertakes to:

- Ensure that the design, construction and maintenance of plants, machines and equipment destined for its site protect the health and safety of employees
- Draw up increasingly efficient operational methods and organisational structures with the goal of preserving the health and safety of employees, external personnel accessing the site and members of the community, of which Saras is part
- Notify employees and employee representatives of the industrial hygiene monitoring programmes and the results obtained
- Ensure that all employees are provided with information and training on the specific risks inherent in the roles they play, and ensure that employees are updated if they change role
- Ensure external personnel accessing the site are provided with information and training on the specific risks inherent in the activities conducted at the facility
- Involve, and make aware, employees and personnel employed by subcontractors so that they cooperate in the pursuit of the objectives to protect health and safety
- Build up a relationship of constructive cooperation, characterised by the utmost transparency and trust, both within the company and with the general public, regarding the problems associated with health and safety.

Further preventive measures to safeguard the health and safety of employees will be put in place, even though they may not be directly connected with the site activities.

The company defines, and maintains active, methods to make personnel aware of the importance of their actions with regard to the policies and requirements of the Health and Safety Management System, emphasising the consequences that each employee has on health and safety through their activities.

The management is on the front line of responsibility for putting this policy into practice.

SARAS undertakes to distribute this policy to employees, suppliers, contractors and anyone who accesses the site, and undertakes to provide all the necessary resources (human, instrumental and economic) to make the policy operational.
Implementation of the aforementioned principles, through the Health and Safety Management System, and conduct in conformance with it, is the goal and the responsibility of all employees of the organisation, each according to his or her role and responsibilities.

Sarroch, 19 July 2007

The General Manager

Figure 6 Saras's health and safety policy in working places

2.3 – Environmental communication

Saras places particular attention and importance on communication, both internally and towards its external stakeholders.

2.3.1 – Internal communication

[involvement of employees]

Internal communications are aimed at increasing the involvement and contribution of Saras's employees, and of the employees of subcontracting firms who work at the facility, in improving the environmental management at the site. To this end, a "suggestion box" system has been put in place through which employees of Saras and of contracted companies can submit questions and observations, via e-mail and/or on paper, and Saras publicly responds to these employee communications on the notice boards and in the EMAS section on the corporate intranet.
In addition, periodic awareness-raising campaigns and workshops to discuss topics concerning safety, health and the environment are held for employees of Saras and of subcontracting firms, the objective being to encourage and stimulate dialogue and internal feedback.
Lastly, the "Blu Saras" newsletter, published every six months, is a further instrument for involvement and information. It is aimed mainly at employees, former employees and local institutions.

2.3.2 – External communication

[the Environmental and Safety Report]

The general public and local communities, authorities, schools, universities, customers and suppliers: for each of these stakeholders, Saras has for some time conducted a series of activities aimed at reinforcing information about the actions taken in line with its environmental commitment. First and foremost is the Environmental and Safety Report for the site, which has been published since 2003 and is sent externally to institutional stakeholders. It is publicly accessible on the company website, www.saras.it, in the "Sustainability" section. Two other communications tools intended for external consumption are the Financial Statements and the Environmental Declaration. These are also publicly accessible on the corporate internet site.

2.3.2.1 – Communication activities aimed at the region

[meetings with the region and with local authorities]

Even more than in the past, for Saras Environment, Health and Safety mean greater involvement with the local community, and this is represented by an approach to communication and dialogue characterised by the utmost transparency.
Confirmation of EMAS registration represents an important tool for sustainable development in the region, in an outlook of sharing and participation. Among the initiatives carried out in 2008 to communicate with the region, of note are the following:

- publication in local newspapers of information about the environmental improvement programmes to be achieved in the 2008-2012 period (July 2008);
- meeting with the Environmental Commission to illustrate the new Environmental Declaration (September 2008);
- meetings with local associations called by Saras, to discuss the environmental improvement objectives planned for the 2008-2012 period (October 2008);
- in December, Saras held an event titled "La parola ai cittadini: Saras incontra il territorio" ("Your chance to speak: Saras meets the community"), a day-long meeting with the people of Sarroch to inform them about activities at the refinery and to answer questions about the principal environmental sustainability issues. Saras technicians and managers were present.

These meetings took place in the presence of the Sarroch Municipal Administration, which actively took part in the event, and which made the Sarroch Community Social Centre available to hold the meeting.

At the meeting, the members of the public who attended were given the 2008 Environmental Declaration, the extract from the Environmental Declaration and a leaflet that summarised the principal points of EMAS registration.

[700 students]

- the same month, approximately 700 students from primary and middle schools and technical institutes in the Province of Cagliari and the surrounding region were taken on guided tours of the refinery to give them the opportunity to see it up close.

To continue Saras's programme of meetings and dialogue with the local community, the following meetings are planned:

[meetings with the local authorities and the region for ongoing feedback]

- meetings with the Environmental Commission and later with the Environmental, Cultural, Humanitarian and Sporting Associations present in the region, to discuss the principal issues linked to the sustainable development of the region.

  These meetings will address the recommendations stemming from the Environmental Integrated Authorisation, which Saras obtained in early 2009, and the 2008 Environmental and Safety Report will also be distributed;
- meetings with the region, which will be repeated in the autumn, will be held to present the 2009 Environmental Declaration with updated environmental improvement objectives, which will be a focus of discussion at the meetings.

Lastly, to encourage and facilitate communications between Saras and the surrounding region, anyone - including individual members of the public - can contact the company to ask questions or request information, using the postal and/or email addresses given at the beginning of this Environmental Declaration.

On the Saras website (www.saras.it) further contact details for specific areas of interest are available on the “Contact Us” page.

2.3.2.2 – The Saras School Project

[cooperation with educational institutions and workshops with children and families]

The Saras School Project is by now a well-established tradition that forms part of the company's general choice to maintain transparency to external stakeholders. The project was launched in 1999 in association with the Municipality of Sarroch, the Municipality of Villa San Pietro, the Italian National Olympic Committee (CONI) and UNICEF, and it aims to promote the culture of energy among children in their final year of primary school. The project has been expanded over the years, and has become a valuable opportunity for meeting and debating with local institutions as well as with schools. Since 2006, the Saras School Project has concentrated on the concept of "ecological footprint", by now a well-known idea and an established indicator of sustainability that tells us how much "nature" we are using to sustain our lifestyle.

The school project is a programme that accompanies the activities of around 300 children throughout the school year in the elementary schools of the neighbouring municipalities, raising their awareness of the sensible use of natural resources and the importance of saving energy, beginning by calculating the ecological footprint of the children's own school.

In this phase, external teachers help the pupils to approach the problem and to develop 10 "eco-tips" to help their school achieve a "light" footprint. The project concludes in June with a closing party, when a prize is awarded to the best project, i.e. the project considered to have the most original "eco-tips" adopted in the school year.

Part of the project consists of a visit to the Sarroch refinery, a further important opportunity for the students to meet Saras's technicians. These visits represent reciprocal opportunities for discovery and awareness, especially from the point of view of transparency and openness towards our external stakeholders.

A special internet site has been set up for the project: www.sarasperlascuola.it. This site is an invaluable tool for communication for the students conducting the project.

3.
Information about the Sarroch production site

Oil products and electricity from clean technology.

This is what Saras does at its site in Sarroch, and it is the source of products for daily domestic use (vehicle fuels, other fuels, and electricity) and for industrial application.

A facility where over 1,000 employees look after plants and equipment to receive raw materials, process crude and generate electricity, make internal movements and store raw materials and products, and finally ship the finished products and coordinate the support activities performed by external subcontracting firms.

It is a complex system, managed in safety using a dense network of systems and equipment and with constant attention to observing all the legislative authorisations and regulations that regulate the site activities.

3. Information about the Sarroch production site

3.1 – The activities carried out on the site

The activities conducted at the Sarroch site are functionally divided as follows:

- reception of raw materials and shipping of products via the marine terminal;
- production of oil products;
- generation of electricity in the IGCC;
- storage of raw materials, liquid products and liquefied gases;
- shipping of products over land;
- auxiliary services (electricity generation in the thermoelectric power plant, inbound water treatment, wastewater treatment);
- offices, workshops, warehouses;
- activities conducted by contracted firms.

Figure 7 shows the areas concerned by the various different types of activity carried out within the facility, and the following paragraphs provide a brief description of them.

3.1.1 – Reception of raw materials and shipping of products via the marine terminal

The marine terminal linked to the refinery has a wharf 1,600 m in length, and platforms known as "islands" connected to it by a 1,200 m piling.

[reception and shipping by sea]

Here all raw materials are received, and from here most oil products are sent. In the three-year period 2006-2008, the percentage of oil products shipped by sea was 79%.

The terminal has eleven independent docking berths, nine of which are for shipping finished oil products and receiving semi-finished products, and can receive oil tankers of up to 65,000 tons.

These docking berths contain two platforms which enable ships of up to 300,000 tons of deadweight capacity to dock for receiving crude oils.

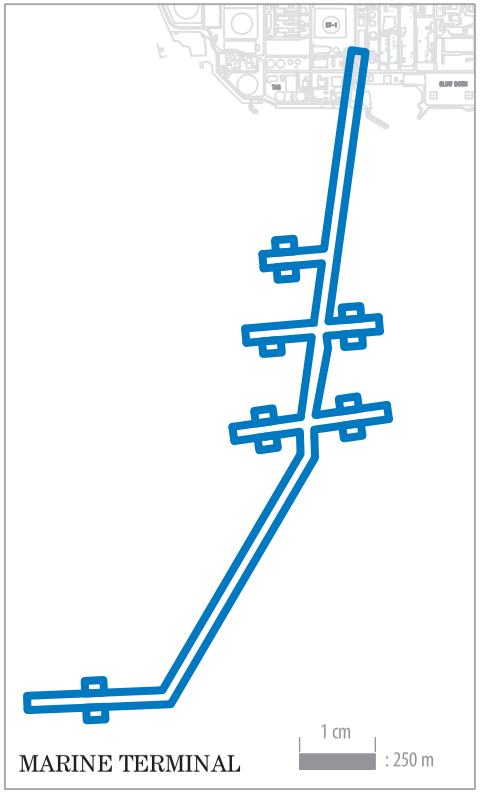
[ongoing control of operations and of ships]

The various docking berths can operate simultaneously, thus reducing waiting times for anchored ships. Advanced monitoring systems ensure that all loading and unloading operations take place under conditions of the utmost safety: the phases of docking and mooring of ships and their connection to loading booms to transfer raw materials and finished products from land to ship and vice versa are carried out under continuous surveillance.

To be permitted to dock at the Saras marine terminal, all incoming ships must observe high safety standards conforming to internationally-recognised criteria, to which are added requirements defined by Saras (paragraph 4.3.2, page 113).

A dedicated control room, which is manned and operational 24 hours a day, is in continuous radio contact with the ships operating in the terminal, and ensures that all operations fully comply with all safety and environmental protection requirements.

FIGURA 7. General plan of the Saras site



- Reception of raw materials and shipment of products by sea
- Production of oil products
- Electricity production (IGCC)
- Storage of raw materials and products (tank farm)
- Storage of liquefied gases (LPG spheres & cigars)
- Storage of liquid products (National Deposit)
- Shipping of products over land
- Auxiliary Services
- Offices, workshops and warehouses
- Area for contracted firm

3.1.2 – Production of oil products

The production process is graphically illustrated in the simplified diagram given in figure 8 and it takes place through the following units:

- distillation plants for atmospheric distillation (topping) and vacuum distillation of raw materials to produce the primary fractions;
- conversion plants (visbreaking, mild hydrocracking 1 and 2, fluid catalytic cracking or FCC), which perform the transformation of heavy hydrocarbons and distillates into middle/light fractions. Heavy hydrocarbons are sent from the visbreaking plant to the IGCC plant;
- catalytic reforming plant (CCR), which transforms the light distillates (naphtha) into high-octane components, simultaneously producing hydrogen which is used in desulphurisation treatments;
- plants for improving the technical characteristics of petrol (alkylation and TAME, Tert–Amyl–Methyl Ether plant);
- desulphurisation plants, which subject middle distillates (kerosene and diesel) to catalytic hydrogenation processes to remove the sulphur and improve product quality;
- plants to recover the sulphur and convert it to solid form for sale;
- plants for treating non-condensable fuel gas to remove sulphurous compounds and subsequently reuse the gas for internal use;

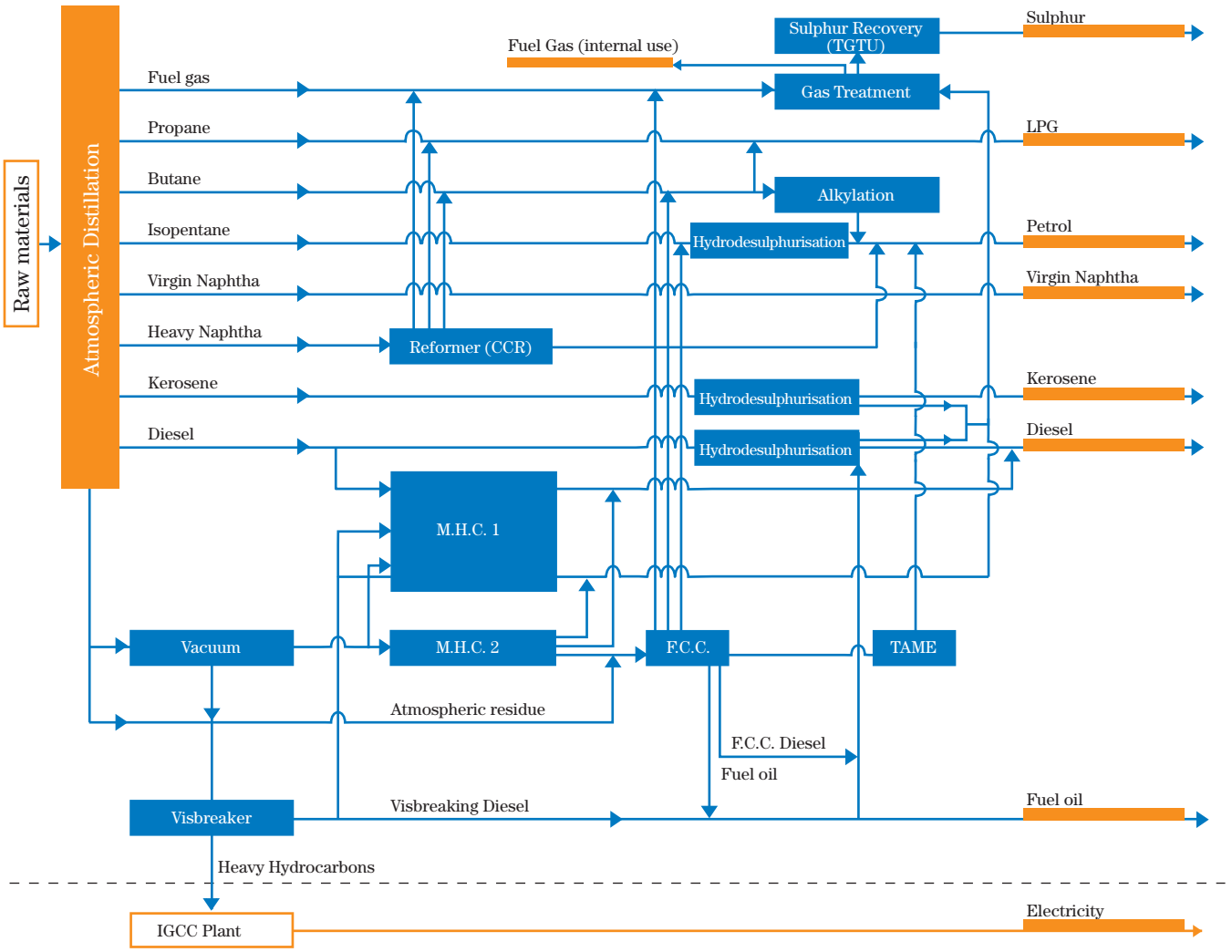


Figure 8 Production cycle at the Saras site: oil products and production of electricity

- new TGTU plant (Tail Gas Treatment Unit, also recovers sulphur);
- new hydrodesulphurisation (U800) plant, for removing sulphur from certain types of petrol (MCN and isopentane).

[oil products]

Oil production at the Sarroch facility has a high yield of medium products (diesels) and light products (LPG, naphtha, petrol), which in 2008 represented overall around 80% of total production, as shown in table 2 which gives the production figures for the four-year period, 2005 – 2008.

TABLE 2 Oil products (t/year)

	2005	2006	2007	2008
LPG	363,000	341,000	323,000	359,000
Gasoline	3,036,000	2,945,000	3,110,000	3,184,000
Virgin Naphtha	873,000	936,000	916,000	862,000
Kerosene	449,000	388,000	467,000	544,000
Diesel	6,423,000	6,713,000	6,813,000	7,498,000
Fuel oil	1,149,000	1,033,000	788,000	896,000
Sulphur*	106,000	111,000	112,000	110,000
Heavy hydrocarbons in IGCC	1,172,874	1,217,391	1,190,195	1,179,604

* Includes recovered sulphur, both from refining and from the IGCC.

[Saras at the centre of the Mediterranean]

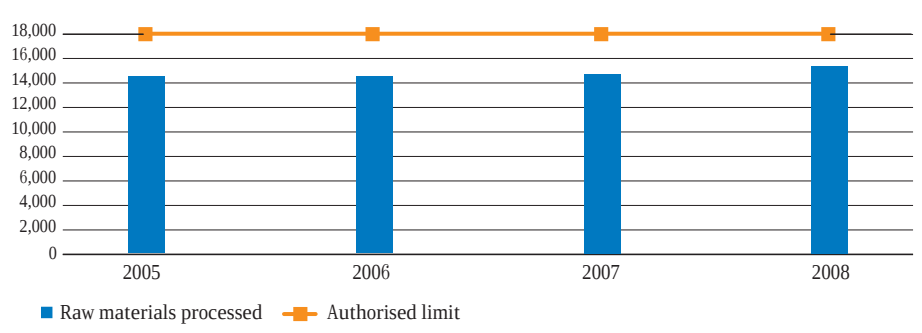
The raw materials come mainly from the Mediterranean area (North Africa and the Middle East), from the former Soviet Union and from Northern Europe.
The primary, but not sole destination of refinery products is the central and western Mediterranean basin. During the three-year period 2006-2008, almost a quarter of total production of oil products was absorbed by the regional market.

To show the trend of refinery processing for the 2005-2008 period, chart T3 shows the trend in annual production compared with the maximum authorised quantity (18 million tons/year) specified by the Concession to Process Mineral Oils for the refinery (Decree of Italian Ministry for Productive Activities no. 17086 of 7/07/2003).

TABLE 3 Processed raw materials (kt/year)

2005	2006	2007	2008
14,423	14,515	14,593	15,517

CHART T3 (kt/year)



3.1.3 – Power generation

[electricity, hydrogen, steam]

The IGCC (Integrated Gasification Combined Cycle) plant produces electricity, hydrogen, steam and sulphur from the heavy hydrocarbons deriving from the refining process, and overall it is recognised as one of the best available techniques for the refining sector.
As shown in figure 9, the plant is divided into two main sections:

- gasification;
- combined cycle.

In the gasification section, using oxygen supplied by the Air Liquide facility, the heavy hydrocarbons deriving from the visbreaking plant are transformed into a synthesis gas (abbreviated to "syngas") which, purged of the sulphur and metals contained in it, is then burned in the combined-cycle section.

[electricity to the external distribution grid]

The electricity is produced on three identical lines, each comprising a gas turbine, a steam recovery boiler and a steam turbine. The three lines have an overall net rated power of 551 electrical MW, and the electricity is sold to GSE (Gestore Servizi Elettrici, the operator of the national electricity transmission grid). Part of the steam produced and not used to generate electricity, and the hydrogen deriving from the gasification section, are sent to the refinery for use in the refining process.
As with the sulphur recovered from the refining cycle, the sulphur recovered by removing sulphuric acid from the syngas is sold (see table 4 for figures).

[recovery of metals]

The metals removed from the syngas go to create a solid sediment known as "vanadium concentrate" or "filter cake", and this is sent to external plants to recover the metals.
Hence the operation of the IGCC plant enables the Saras production site both to maximise the conversion of raw materials into products of value, and also to minimise the generation of waste.

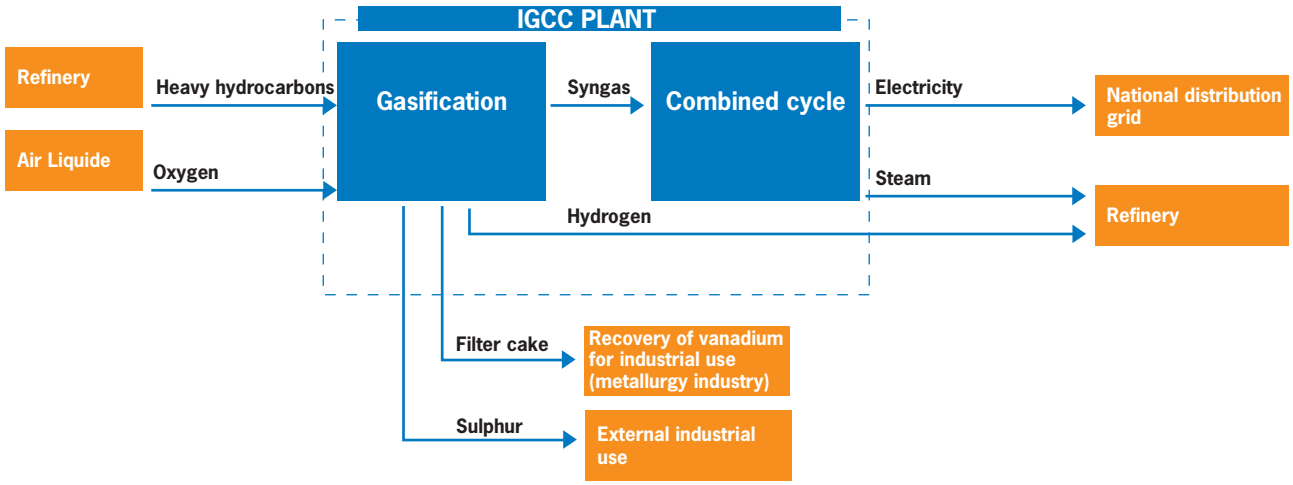


Figure 9 The IGCC plant: flow chart

Table 4 gives the production figures for the IGCC for the last four years.

TABLE 4 IGCC products

	2005	2006	2007	2008
Electricity (kWh)	4,363,035,390	4,473,702,675	4,432,135,634	4,251,352,752
Low-pressure steam (t/year)	590,262	608,042	556,828	539,680
Medium-pressure steam (t/year)	702,237	677,703	568,650	667,763
Hydrogen (kNm^3)	285,652	360,220	307,083	322,226
Sulphur* (t/year)	53,821	48,184	42,589	49,752

* The quantity shown is included in the amount given in Table 2 on page 33, "Oil products"

[efficiency and reliability of the IGCC]

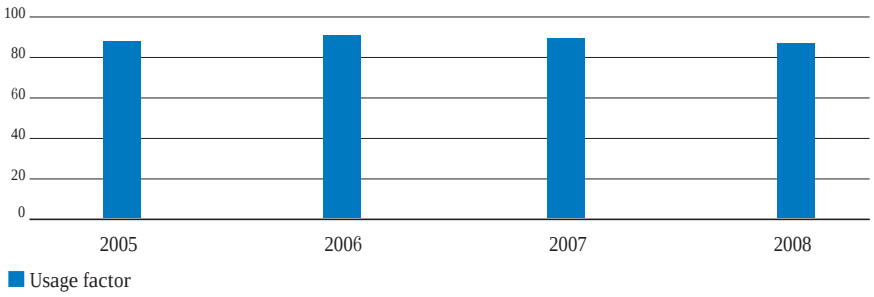
The three-line configuration of the IGCC plant ensures continuity of production, both of electricity and of hydrogen & steam for site internal use. The figures recorded to date confirm the effectiveness of the processes and technology used in the plant, which has demonstrated superior reliability as shown in table 5 and chart T5.

TABLE 5 The IGCC plant: usage factor

Indicator	2005	2006	2007	2008
Energy produced / that can be produced* (%)	90.0	92.7	91.5	87.8

* Energy that can be produced is calculated by multiplying the available power by the maximum number of hours in 1 year.

CHART T5 (%)



3.1.4 – Storage of raw materials and products

The storage facilities on the site are subdivided as follows:

- storage of raw materials and products in the tank farm;
- storage of products, for which excise duties have been paid, in the National Deposit which is located outside the "bonded area" beyond National Route no. SS 195;
- storage of liquefied gas in special pressurised tanks ("spheres" and "cigars").

Overall, there are 161 tanks with an overall capacity of approximately 3.5 million cubic metres.

[extensive and widespread safety systems]

All tanks are fitted with permanent fire-prevention systems and containment basins of reinforced concrete (35 tanks), or with earthworks (126 tanks).

The fire prevention system in the liquefied petroleum gas (LPG) storage area is controlled by a device that, depending on various factors (including wind direction), activates systems to prevent fires and contain any product leaks. In addition, to prevent fires, the LPG tanks are also equipped with instrumentation that monitors and protects against unexpected pressure surges.

Internal site movement of raw materials and products – between plants, storage areas and for shipping – is done using the following systems and equipment:

- pumping lines and systems, including oil pipelines connecting to the National Deposit and to the marine terminal;
- systems for measurement and additivation of products before shipping;
- land-loading systems (loading bays);
- sea-loading systems (marine terminal equipment).

3.1.5 – Shipping of products over land

Products are shipped over land by means of special loading gantries for tanker trucks:

- a gantry with 3 loading points for LPG and 12 loading lanes for liquid products (kerosene, diesel and fuel oil), located near the facility's manned gatehouse;
- 10 loading lanes for petrol and diesel, located in the National Deposit.

[the synergy between the companies in the Sarroch petrochemical industry]

The Saras site is connected to Agipgas and Liquigas via gas pipelines, and to the adjacent petrochemical facility (for commercial exchange of semi-processed products and services) and to the National Deposit via two oil pipelines (figure 10).

3.1.6 – Auxiliary services

The facility is equipped with the following units, which provide services which are necessary to the production cycle:

- thermoelectric power plant for the refining cycle. This produces an amount of electricity and steam that is necessary for the processes;
- air compression system, comprising 4 compressors and 2 distribution networks, one for the instrumentation and one for services;
- unit for treating water brought in to the site (taken from the industrial aqueduct);
- treatment plant for the wastewater generated by site activities (Process-Water Purification plant, PWP).

Internal infrastructures enable the distribution of services (water, steam, electricity, fuels, and nitrogen), and the collection of wastewater to be sent to the treatment plant before being discharged into the sea.

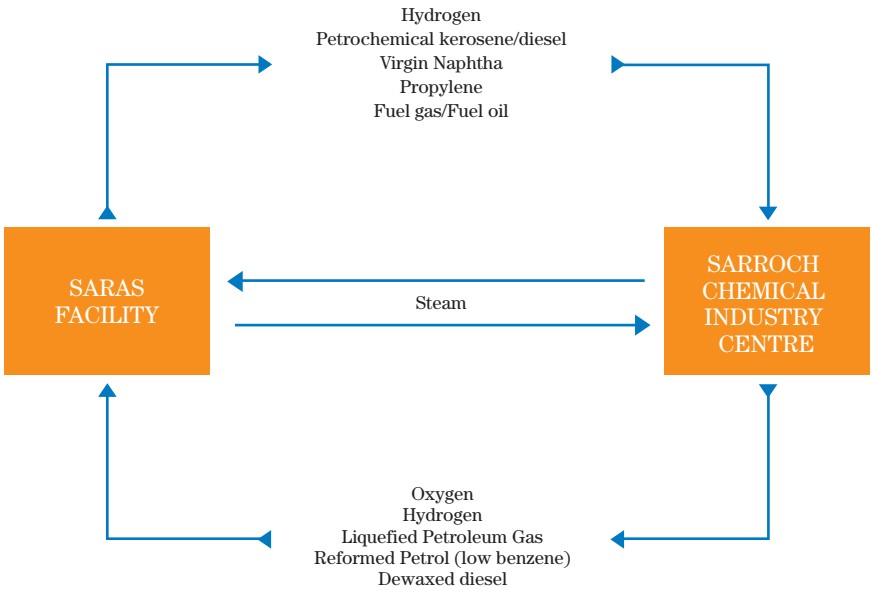


Figure 10 Synergy between the Saras facility and the adjacent centre of chemical industry

3.1.7 – Offices, workshops, warehouses and other services

The office buildings are located beside the production area. Opposite the offices are the mechanical workshop, the electrical workshop, and part of the warehousing space, where auxiliary substances and consumables are stored while waiting to be sent to where they are needed. Other areas designated for storing materials (pipe fleet) are in the centre of the tank farm and in the National Deposit. In addition, in the office zone there are other general services such as the canteen and the medical centre.

3.1.8 – Activities conducted by contracted firms

Contracted firms which continually carry out activities at the Saras site (maintenance, construction, mechanical & instrumentation controls etc.) have a logistics base on-site in designated, dedicated areas, allowing these firms to optimise the execution of their work and reduce the need for external movements. There are two external companies with which Saras has a long term working relationship. These companies handle waste for managing the waste inertisation plant, and they manage an area where materials (mainly ferrous and electrical) are selected and recovered (paragraph 4.2.6).

3.2 – Authorisation status of Sarroch site

3.2.1 – The Environmental Integrated Authorisation

[January 2009: Environmental Integrated Authorisation (EIA) process concluded]

The first few days of 2009 saw the conclusion of the authorisation process to obtain the Environmental Integrated Authorisation (EIA), pursuant to Legislative Decree no. 59/2005 implementing EC Directive no. 91/61, for the integrated prevention and reduction of pollution.

In 2008 the preliminary investigation was carried out to investigate the application for authorisation submitted by Saras in January 2007 for the entire Sarroch site.

Comparison with the BREFs (Best Available Techniques REFerence document) in the preparation of the application for authorisation was essential to identifying the directives to follow in order to improve environmental performance.

The authorisation process was conducted by the Investigating Commission, which was formed by representatives of the Ministry for the Environment, the Sardinia Region, the Province of Cagliari, and the Municipality of Sarroch, and also by technicians from ISPRA (formerly APAT) and from ARPAS.

Saras is the first Italian refinery to have obtained the EIA.

The integrated approach to preventing and reducing pollution contained in the EIA, which will replace all existing authorisations in the environmental field, represents an innovative tool for environmental protection.

All the technical and environmental improvement projects submitted by Saras have been approved by the Investigating Commission and have been suitably measured “so that both overall, and in every time phase, there is an improved environmental situation”.

The EIA has replaced and brought together the principal environmental authorisations, i.e. those concerning atmospheric emissions, water discharges and waste treatment.

The EIA decree (DSA-DEC-2009-0000230 of 24/03/2009) was published in the Official Gazette of the Italian Republic on 9 April 2009.

[new limits on emissions]

The principal new features in the authorisation are:

1. New limits on atmospheric limits for the Refinery;
2. New limits on atmospheric limits for the IGCC plant;
3. Limit on the refinery flares;
4. New control and limit parameters on waste water;
5. New management criteria on waste.

[monitoring and control plan]

The Monitoring and Control Plan is perhaps the only truly innovative element introduced by the EIA. Its full operability will be deployed as 2009 progresses, and the first effective communication of the Plan will refer to the second half of 2009, and therefore it will be issued by 31 March 2010. In addition to changing the perspective in the management of environmental issues, implementing the Plan will enable Saras to continue its ongoing improvement.

3.2.2 – Existing authorisations

Refining activities at the site are carried out in accordance with the "Concession to Process Mineral Oils", the latest update to which was the Decree of the Minister for Productive Activities on 7/07/2003.

For all of 2008, the existing environmental authorisations are listed below:

- authorisation no. 445 of 22/11/2004, re-issued to Saras by the Province of Cagliari. *The authorisation is for discharging water from the facility into the sea and into the Rio Mascheroni channel;*
- judgement of environmental compatibility of the IGCC project, no. DEC/EIA/2025 of 28/12/1994 issued by the Ministry for the Environment, supplemented by the letter ref. no. 854/05/SIAR of the Ministry for the Environment.
  The provisions contain the opinion in favour of building the IGCC and give specifications concerning, in particular, emissions into the atmosphere from the IGCC and from the entire facility;
- decision no. 2510/IV of 04/11/2004 and Decision no. 964/IV of 31/05/2005 (supplement to the previous Decision), issued to Saras by the Sardinia Regional Government.
  The provisions authorise the treatment of water contaminated by hydrocarbons, to be carried out in the BWT (Ballast Water Treatment) plant.
  The BWT plant can treat the bilge water collected in the ships' hulls, the ballast water and the water used to wash oil tankers, and the water pumped from wells in the safety containment hydraulic barrier on the Saras site.

3.3 – Plans and procedures for handling emergencies

The Refinerys Safety Report

The activities carried out on site involve the presence and use of substances with which different characteristics and danger levels are associated.

[1989: the first Safety Report]

In 1989, following the coming into force of the Italian legislation implementing the first European directive for "major hazard" facilities, Saras drew up the 1st Safety Report for the activities carried out at the Sarroch site.

[an in-depth analysis of risk]

To draft the site Safety Report, the company carried out an exacting and in-depth analysis of its activities, with regard to their associated risk deriving from the processes and from the substances used.

[Legislative Decree no. 334/99]

Since then the document has been continually updated, in accordance with the applicable legislation (currently this is Legislative Decree no. 334/99 and subsequent modifications and supplements, which requires five-yearly updates), and with the goal of documenting all plant variations carried out over time.

The Safety Report studies all types of dangerous substance, characterised by varying degrees of inflammability (e.g. crudes, petrol, liquefied petroleum gas or LPG), toxicity (e.g. hydrogen sulphide), and danger to the environment (e.g. diesel, kerosene).

[information card on major hazards for the general public and employees]

Based on the quantities and types of substances present and on the processes in which they are used, possible events and accident scenarios have been identified, such as fires, explosions, toxic gas clouds, and spills of dangerous substances on the soil or into the sea. The potential consequences of the accident scenarios identified have

been studied, in terms of impact on the safety of persons, inside and outside the site, and on the environment.
Currently, analysis of possible accident scenarios has led to the exclusion of their being able to have significant consequences outside the site. Any involvement of external areas is limited to one area, towards National Route SS 195, where there are inhabited settlements.
At the marine terminal, limited quantities of hydrocarbons can be potentially spilled or leaked into the sea. To effectively combat the effects of a possible spill into the sea, vehicles and equipment are available internally for prompt intervention. This is briefly discussed on page 41.

[2005: five-yearly update of the Safety Report]

In October 2005, Saras S.p.A. submitted its five-yearly update of the Safety Report, in fulfilment of the provisions of Article 8 of Legislative Decree no. 334/99, and at the same time the company sent the local Municipality an information card which was intended for the general public.
Note that the 2005 Safety Report contained the risk analysis for the new TGTU and U800 plants, which were commissioned at the end of 2008.

[December 2006: most recent update to the Safety Report]

In accordance with the provisions of Article 23 of Legislative Decree no. 238/05, which modified and supplemented Legislative Decree no. 334/99, in December 2006 Saras submitted the update of its Safety Report – including the state of progress of the recommendations made by the Sardinia CTR in the investigative phase of the Refinery's Safety Report (October 2000 edition) – and sent the Municipality of Sarroch an updated version of the information card intended for the general public.

[The investigation of the Regional Technical Committee, CTR]

On completion of the investigation phase, the Sardinia Regional Technical Committee for Fire Prevention (known by its Italian acronym, CTR) expressed its Final Technical Evaluations on the cited Safety Report (October 2005 edition) and subsequent supplements, as per the report ref. no. 4921/P12 of the session of 19/07/2007. The conclusions state:

[omitted]
In acknowledging the measures executed, those currently being executed and those planned, we consider that the company has positively followed up on the recommendations made by the CTR upon conclusion of the investigation of the Safety Report (2000 edition) and has, on its own initiative, put in place plant/procedural solutions which have contributed or will contribute to implementing the level of safety overall.
However, as found previously, a number of issues require further investigation and a number of the measures executed or planned could be further improved. That apart, it is in the company's interest to take action to verify the above, specified in detail according to the priorities identified on the basis of the critical importance of the individual measures, and to provide prompt notification of said action, in whole or in part.
[omitted]

[May 2008 – October 2010: a programme of interventive measures]

In June 2008, Saras notified CTR of the measures taken in the period October 2006–May 2008, with reference to the recommendations received, and the measures planned for the period May 2008–October 2010.
On completion of the planned activities, in accordance with Ministerial Decree no. 19/03/2001 concerning fire prevention procedures for major hazard activities, on 26/11/2008 Saras submitted an application to the Fire Brigade of the Sardinia Region for its Fire Prevention Certificate. Inspections are currently underway by the Commission nominated by the Sardinia Regional Technical Committee (CTR) for fire prevention, to conduct the verifications necessary to issue the certificate. An initial report of the inspections has been released (20/04/2009) from which it emerges that some

problems have already expired (final opinion of the CTR in the 2005 Safety Report, see above), while others, restricted to the Topping1 and Topping2 plants, the Chemical Laboratory, the Office Building and the Wharf, will need to be completed before the conclusion of the inspections.
The update to the Safety Report is scheduled for October 2010.

Internal Emergency Plan (IEP)

[the personnel and equipment for effective intervention]

After defining the risk scenario for the internal plant area, the company drafted its Internal Emergency Plan (IEP), which includes the procedures to be adopted and action to be taken in the event of an accident, with the aim of managing any such occurrence with maximum efficiency and minimum impact via the co-ordinated intervention of people and vehicles.
The objective of the IEP is to ensure the company reacts as effectively as possible to accidents by:

[prevention and control]

- preventing and limiting injury and providing assistance to anyone hurt;
- bringing accidents under control and limiting their effects;
- preventing and minimising environmental damage;
- preventing and minimising damage to company property.

The IEP also includes the Marine Pollution Prevention Plan, drawn up to deal with emergencies resulting from oil spills into the sea or other critical events that could occur at the sites marine facilities.

[classification of emergencies]

Based on the content of the Refinerys Safety Report, the IEP defines the criteria for a reportable accident, and distinguishes between two types (i.e. levels) of emergency:

- limited emergency: an accidental event limited to a well-defined area;
- general emergency: an accidental event with the potential to spread to other areas, inside and/or outside the site.

Table 6 gives the data for emergencies recorded in the four year period, 2005 – 2008.

Table 6 Emergencies

Parameter	2005	2006	2007	2008
No. of General Emergencies	7	4	6	7
No. of Limited Emergencies	25	27	21	18

In 2008 seven General Emergencies were recorded, all of which were managed in accordance with the facility's Internal Emergency Plan, involving only the internal organisation and without resorting to outside assistance. The emergencies always affected limited areas of the facility only, and never generated accidents and/or significant environmental impacts, directly or indirectly. It should also be noted that the duration of the Emergencies never exceeded twenty minutes.
Tools for communications and reporting are distributed throughout the refinery area (fire alarm buttons, telephones, radio receiver/transmitters both fixed and portable), which employees can use to obtain a real-time emergency response from the employees reporting to the Emergency Coordination Centre. The Centre notifies and informs external bodies with an interest in the emergency (fire brigade, the Prefecture, adjacent industrial sites, the Municipality of Sarroch, the carabinieri (police) of Sarroch, the Italian State Police and the Port Authority) and provides them with constant updates on the developing situation, until the emergency is completely dealt with.

[extensive internal communication system]

The effectiveness of the EEP and its implementation is monitored via accident response exercises involving all persons working at the production site (evacuation drills).

External Emergency Plan (EEP)

[a plan for the entire industrial area of Sarroch]

The Internal Emergency Plan and External Emergency Plan (EEP) are closely related. The EEP is drawn up in conjunction with the Prefecture of Cagliari following a consultation phase involving numerous local bodies, law enforcement agencies and emergency services, including the regional and provincial authorities, the Municipality of Sarroch, the fire service and the local health authority (ASL).

The plan concerns the Sarroch industrial complex as a whole, and considers hypothetical accidents affecting sites belonging to the various companies located there (Saras, Polimeri Europa, Sasol Italy, ENI, Liquigas, Air Liquide, Agipgas) that could result in harmful consequences for the area outside the facilities.

In addition, the safety reports for the various production facilities and analyses of hypothetical accident scenarios (study of the local area, urban districts and infrastructure) are used to plan the best way of managing accidents given the potential effects on people living nearby.

Procedures have been defined for executing and managing the EEP, from raising the alarm to intervention by all company and third-party personnel with responsibilities for the various roles required to deal with the emergency, such as direct management of internal accidents at the site, control and monitoring of the surrounding area, dissemination of information to external authorities and services, and providing assistance for local residents (road management, health services, information media etc.).

[a programme of regular drills]

The effectiveness of the EEP and its implementation is monitored via accident response exercises involving the companies and organisations responsible. The EEP currently in place was last reviewed in September 2005.

Safety systems at the facility

The Sarroch refinery has a complex safety system designed to detect potentially dangerous situations immediately.

[the fire prevention/fighting network]

The water distribution system for fires comprises an extensive network that covers the whole plant.

[cooling systems on the tanks]

All the storage tanks are protected by cooling systems; the most critical of these are activated automatically if a tank overheats. Similar systems are installed on all the pressure tanks, LPG storage and loading equipment, and any other piece of equipment for which a rise in temperature could compromise safety.

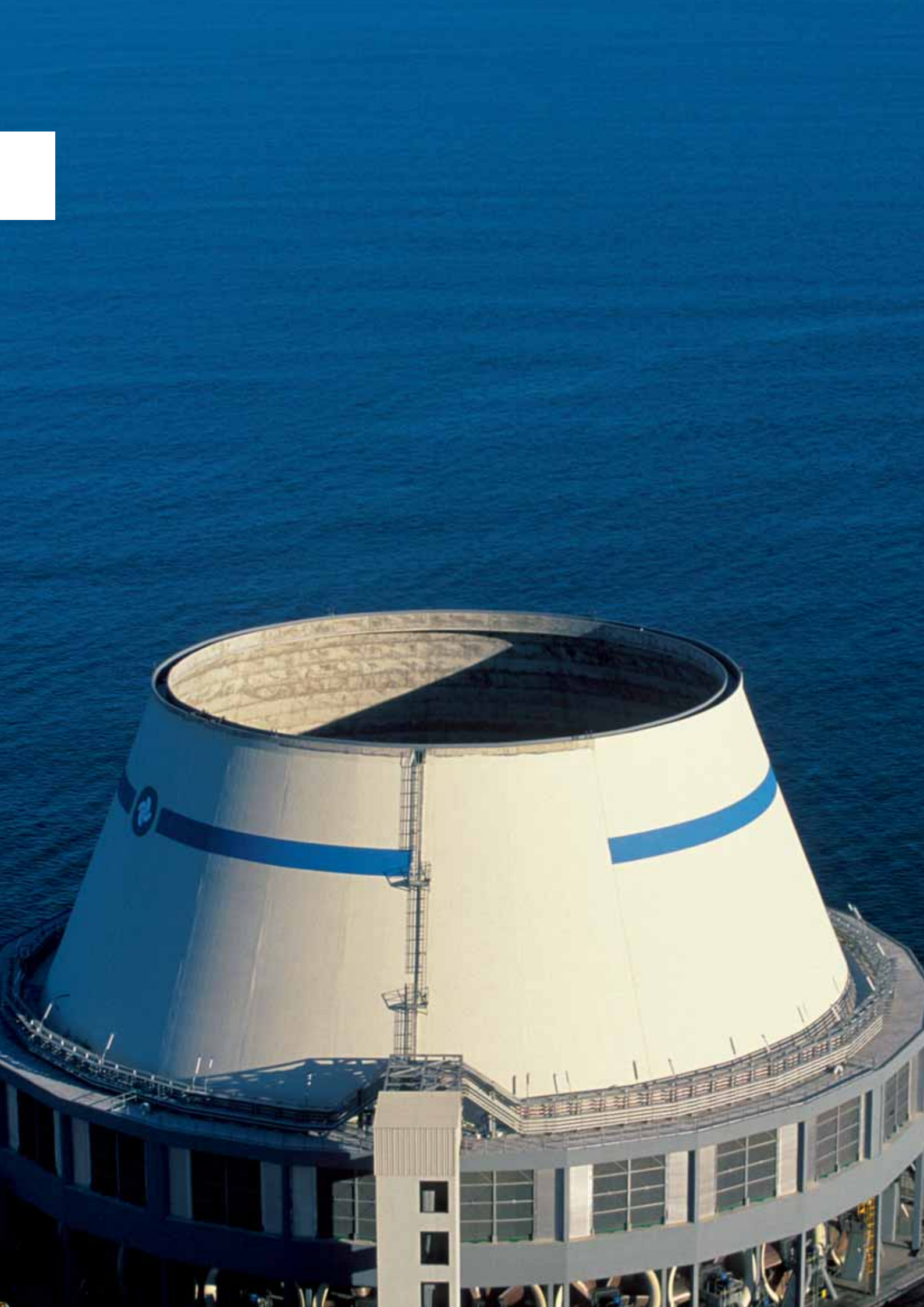
[7 fire tenders]

The facility also has seven fast and easily manoeuvrable fire trucks carrying powder and foam extinguishers, which can be operated quickly in emergencies and act as a backup to the fixed systems installed. Safety equipment and systems are regularly checked, and carefully and routinely maintained.

[rapid intervention seagoing vessels]

In the event of a spill into the sea, vehicles and equipment are available to deal rapidly with the accident, following procedures laid down in the Internal Emergency Plan, which as stated previously includes the Marine Pollution Prevention Plan.

The facility has 4 vessels, which are operational 24 hours a day, and a wide range of equipment (skimmers, floating booms etc.), all of which ensure the facility's full and rapid capacity to respond to and contain and collect any product spills.



4.
The environmental aspects

Completeness, correctness and transparency of information are the principal basis for any dialogue.

In this chapter, Saras presents all the necessary data to understand how its production interacts with the environment and the region. The information and figures given here show the improvement that has been achieved over time, and the areas in which we are working towards other environmental goals expected in the years to come: these are the fruit of technology and management choices that have always aimed at making simultaneous progress in safety, health, the environment, and quality of production.

This is an investment in clarity and completeness that will, over time, allow us to continue to conduct dialogue that is clear and definite, to give the local population the answers they expect.

4.
The environmental aspects

4.1 – General

[the environmental analysis]

In accordance with the EMAS Regulation (761/2001/EC), modified by Regulation 196/2006/EC, a complete environmental analysis has been conducted of the activities carried out by Saras under normal operational conditions, as well as abnormal and emergency conditions. The environmental analysis, which is updated periodically and whenever changes occur, is illustrated in a special document which is available for consultation at the facility's Prevention and Protection Service.

Definitions of Regulation 761/2001/EC
Environmental aspect: *element of an activity, product or service of an organisation which can interact with the environment. A* ***significant environmental aspect*** *is an environmental aspect that has or can have a* ***significant environmental impact.***

Environmental impact: *any change to the environment, positive or negative, deriving in whole or in part from the activities, products or services of an organisation.*

[the environmental aspects]

With reference to Enclosure VI of the EMAS Regulation, the direct and indirect environmental aspects of Saras's activities have been identified, and of these the significant aspects have been identified.
Direct environmental impacts are those on which the organisation can exert control to manage them. Examples of direct aspects are: atmospheric emissions and wastewater discharges.
Indirect environmental impacts are those on which the organisation can exert an influence, although it does not control them directly. Examples of indirect aspects are: transport of raw materials and products.

In normal operating conditions, the significance of each environmental aspect has been evaluated on the basis of the following criteria:
- extent of the impact on the environment;
- presence of legislation, authorisations and other regulations to be observed;
- sensitivity of the general public to the issue in question.

Abnormal and emergency events that can give rise to major-accident hazards, such as fires, explosions, and spills into the sea, have been analysed and assessed in the Safety Report (described in paragraph 3.3, page 38).

Other types of abnormal or emergency event, which are not included in the category of events that could generate major-accident hazards, have however been identified in the Environmental Analysis and have been assessed based on an estimate of their probability of occurrence and their potential consequences.

In the past no accidents have occurred, nor have environmental responsibilities arisen such to determine significant impacts at the present time, with the exception of accidental spills on soil and subsoil, which are discussed in paragraph 4.2.7, page 99.

In summary, the direct environmental aspects identified as significant are the following:

Significant direct environmental aspects
Consumption of raw materials
Energy consumption (fuels, electricity)
Water consumption
Atmospheric emissions
Waste
Emissions into water
Spills on soil and subsoil (past activities, prevention activities)
Noise
Odours
Visual impact

For indirect environmental aspects, the degree of influence that Saras can indirectly exercise to control these aspects has been evaluated. The evaluation conducted has led to the identification of the following indirect environmental aspects as significant:

Significant indirect environmental aspects
Product design and development
Road transport (of products, materials and substances, of employees of Saras and of external companies)
Sea transport (of raw materials and products)
Environmental conduct of third-party firms

The environmental aspects identified as significant all refer to the Sarroch production site. Assessment of the significance of environmental aspects for the office in Milan has resulted in their being identified as negligible with regard to Saras's activities, and also with regard to the office's location (the city of Milan).

The table on the following page shows the correlation between the significant environmental aspects (direct and indirect) for the Sarroch site and the consequent environmental impacts.

Significant direct environmental aspects	Environmental impacts
Raw materials	
Consumption	Consumption of a non-renewable resource
Storage and use	Risk of accidents (fires, explosions, spills on soil and into the sea)
Consumption of energy in the form of	
Self-produced fuels	Atmospheric emissions from the site and consequent impacts
Electricity purchased	Indirect impacts in external sites producing electricity
Water consumption	
Seawater desalinated internally	Energy consumption and visual impact
Water from industrial aqueduct	Consumption of local natural resources
Atmospheric emissions	Influence on air quality on the local scale
	Contributions to large-scale effects (greenhouse effect, acid rain)
Waste	
On-site internal deposit and treatment	Indirect impacts in external sites for disposal and recovery
Treatment outside the site	Risk of spills on soil
Emissions into water	Influence on seawater quality
Spills on soil and subsoil	
Prior activities	Contamination of the soil, subsoil and underlying groundwater on the site
Preventive activities	Reduction of risk of contaminating the soil, subsoil and underlying groundwater
Noise	Influence on the acoustic climate outside the site (in the Sarroch area)
Odours	Perceived disturbance outside the site (in the Sarroch area)
Visual impact	Visibility of the site from outside

Significant indirect environmental aspects	Environmental impacts
Product design and development	Indirect impact on the quality of the air (fuel combustion)
Road transport of products, auxiliary materials, personnel	Atmospheric emissions
	Road traffic, risk of road accidents
Sea transport of raw materials	Atmospheric emissions
	Risks of accident and seawater contamination
Environmental conduct of third-party firms	
Internal management of waste	Risk of accidents and contamination of soil and subsoil
Road transport of personnel, materials, equipment	Road traffic, risk of road accidents

The tables on the following pages give a qualitative and quantitative review of the significant direct and indirect environmental aspects. For each environmental aspect specific numeric performance indicators have been defined.

The values of the indicators, calculated annually, are in the main provided for the last 4 years (2005-2008). Where appropriate, the values of the indicators are compared with the legal limits.

In keeping with Recommendation 2003/532/EC, the indicators are subdivided into:

- operational performance indicators;
- environmental section indicators;
- management performance indicators.

Direct environmental aspects

Operational performance indicators

Environmental aspect concerned	Applicability*	Indicator definition	Unit of measurement
Consumption of raw materials	Refinery	Quantity of raw materials processed	kt/year
	Refinery	Low-sulphur crude used/total raw materials processed	%
Energy consumption	Site	Efficiency of integrated cycle: energy output/energy input	% toe output/toe input
	Raffineria	Efficiency of refinery cycle: energy output/energy input	% toe output/toe input
	IGCC	Efficiency of IGCC cycle: energy output/energy input	% toe output/toe input
	Refinery	Specific energy consumption: energy consumed/raw materials input	toe/t refinery raw materials
	IGCC	Specific energy consumption: energy consumed/semi-processed products input	toe/t IGCC feedstock
Water consumption	Site	Site water demands	m^3/hour
		Site water demands - specific values	m^3/kt raw materials
		Use of recovered water/site water demands	%
		Use of fresh water/site water demands	%
		Use of water from refinery desalinator/site water demands	%
		Use of water from IGCC desalinators/site water demands	%
Atmospheric emissions	Refinery, IGCC, Site	Emissions of SO_2 in mass flow	t/year
	Site	Specific emissions of SO_2	t SO_2/kt raw materials
	Refinery	Sulphur content of fuels	% (by weight)
	Refinery	Concentration bubble of SO_2	mg/Nm^3
	IGCC	Concentration of SO_2	mg/Nm^3
	Refinery, IGCC, Site	Emissions of NO_x in mass flow	t/year
	Site	Specific emissions of NO_x	t NO_x/kt raw materials
	Refinery	Concentration bubble of NO_x	mg/Nm^3
	IGCC	Concentration of NO_x	mg/Nm^3
	Refinery, IGCC, Site	Emissions of CO in mass flow	t/year
	Site	Specific emissions of CO	t CO/kt raw materials
	Refinery	Concentration bubble of CO	mg/Nm^3
	IGCC	CO concentration	mg/Nm^3
	Refinery, IGCC, Site	Emissions of dust in mass flow	t/year
	Site	Specific emissions of dust	t dust/kt raw materials
	Refinery	Concentration bubble of dust	mg/Nm^3
	IGCC	Concentration of dust	mg/Nm^3
	Site	Diffuse emissions – Fugitive emissions	t/year
	Refinery, IGCC, Site	Emissions of CO_2 in mass flow	t/year
	Site	Specific emissions of CO_2	t CO_2/kt raw materials
Emissions into water	Site	Total flow of water discharged	m^3/hour
		Specific flow of water discharged	m^3/kt raw materials
		COD (Chemical Oxygen Demand) in mass flow	t/year
		Specific emissions of COD	t/Mt raw materials
		Average annual concentration of COD	mg/litre
		Total hydrocarbons in mass flow	t/year
		Specific emissions of hydrocarbons	t/Mt raw materials
		Average annual concentration of hydrocarbons	mg/litre
		Emissions of ammoniac/nitrous/nitric nitrogen in mass flow	t/year
		Specific emissions of ammoniac/nitrous/nitric nitrogen	t/Mt raw materials
		Average annual concentration of ammoniac/nitrous/nitric nitrogen	mg/litre
		Total flow of primary treatment unit for input water, desalinators, IGCC tower	m^3/hour
		Specific emissions of primary treatment unit for input water, desalinators, IGCC tower	m^3/kt raw materials

*The term “Site” means “Refinery + IGCC”

Environmental aspect concerned	Applicability*	Indicator definition	Unit of measurement
Emissions into water	Site	Emissions of suspended solids in discharges from primary treatment unit for input water, desalinators, IGCC tower in mass flow	t/year
		Specific emissions of suspended solids in discharges from primary treatment unit for input water, desalinators, IGCC tower	t/Mt raw materials
		Average annual concentration of suspended solids in discharges from primary treatment unit for input water, desalinators, IGCC tower	mg/litre
		Seawater temperature difference at 1 km from IGCC tower discharge point	T°C
Waste	Site	Total production of waste (hazardous and non-hazardous)	t/year
		Waste sent outside the site	t/year
		Waste sent to landfill	%
		Waste sent for incineration	%
		Waste sent for recovery	%
		Waste sent for preliminary storage	%
	Refinery	Specific production of typical waste from refining cycle	kg/t raw materials
Accidental spills on soil and subsoil – Previous activities	Site	Quantity of product recovered/Quantity of water pumped from wells in hydraulic barrier	%
Accidental spills on soil and subsoil – Activities for prevention of contamination	Site	Protection of soil in storage areas: paved containment reservoir surfaces/ total surface	%
		Protection of soil in storage areas: number of tanks equipped with double bottom	No.
		Protection of soil along pipeways	m^2
		Inspection and maintenance activities: spending on non-destructive checks	000 euro/year
Noise	Site	Equivalent level of sound pressure at the site boundary	dB(A)

*The term “Site” means “Refinery + IGCC”

Indicators of quality of the environmental sections

Environmental section concerned	Applicability	Indicator definition	Unit of measurement
Atmosphere	Sarroch area (measurements from the public air quality monitoring network)	SO_2 – Conformance to the three-hourly, hourly, and daily concentration thresholds	no. of times exceeded/ year
		SO_2 – Average annual concentration	Micrograms/m^3
		PM10 – Conformance to the hourly concentration threshold	no. of times exceeded/ year
		PM10 – Average annual concentration	Micrograms/m^3
		NO_2, NO_x – Average annual concentrations	Micrograms/m^3
		NO_2 – Conformance to the hourly and daily concentration thresholds	no. of times exceeded/ year
	Sarroch inland region (measurements with bioindicators)	Index of Atmospheric Purity (IAP)	no. pure, accompanied by a quality rating
Seawater	Stretch of sea in front of the site (chemical measurements)	Trophic Index (TRIX)	no. pure, accompanied by a quality rating
		CAM index	no. pure, accompanied by a quality rating
Noise	Sarroch area	L90 statistical indicator of sound pressure at points in the inhabited centre of Sarroch	dB(A)

Management performance indicators

Environmental section concerned	Applicability	Indicator definition	Unit of measurement
Training	Company employees	Training in environmental protection compared to total hours of training	%
		Training in emergency management compared to total hours of training	%
Audits	Integrated Environment, Safety, Quality audits	Hours taken for audits compared to total hours worked by auditors and personnel subjected to audit	%
	"Arrow" field inspections	Hours taken for field inspections compared to total hours worked by auditors and personnel subjected to audit	%
Product design and development	Planning and development	Product development hours/000 hours worked	hours/1,000 hours worked
Development and engineering of internal plants	Engineering	Plant engineering hours/thousands of hours worked	hours/1,000 hours worked
Investments	Protection of the environment and safety	Extent of investments	keuro/year

Indirect environmental aspects

Operational performance indicators

Environmental section concerned	Applicability	Indicator definition	Unit of measurement
Product characteristics	Oil products	Production of fuel oil compared to total of oil products	%
		Quantity of sulphur in products/Quantity of incoming sulphur with raw materials	%
	Sulphur produced	Quantity of sulphur produced/Quantity of incoming sulphur with raw materials	%
Transport	Sea traffic	Use of double-hulled ships compared to total no. of ships	%
		Use of segregated ballast ships compared to total no. of ships	%
	Road traffic	Total number of heavy transport vehicles compared to the quantity of processed raw materials	no. vehicles/kt raw materials

Management performance indicators

Environmental section concerned	Applicability	Indicator definition	Unit of measurement
Transport	Sea traffic	Checks on safety of ships: no. of ships checked compared to total no. of ships	%
	Road traffic	no. of company road transport vehicles checked/no. of authorised vehicles	%
External firms	Environmental conduct	Firms with ISO 9001 certification compared to total firms	%
		Firms with ISO 14001 certification compared to total firms	%
		Firms with OHSAS 18001 certification compared to total firms	%
		Training of external firm personnel compared to total hours worked	%

4.2 – Direct Environmental Aspects

4.2.1 – Consumption, storage and use of raw materials

Consumption

Raw materials input to the production cycle are mainly made up of crude oil and, in small quantities, fuel oils and other semi-processed hydrocarbons.

[Decree of the Ministry for Productive Activities no. 17086 of 7/07/2003]

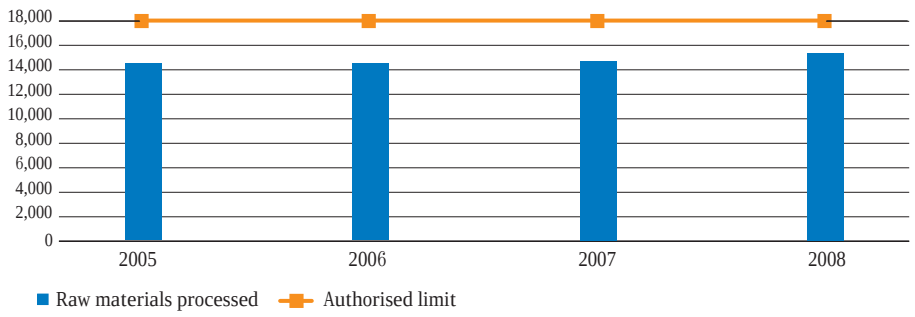
The refining of mineral oils (oil) is subject to specific authorisation, which in Saras's case establishes a maximum quantity of 18 million tons per year.

The consumption of raw materials is a significant environmental aspect of the activities carried out on the Sarroch site, because oil is a non-renewable natural resource and the quantities processed are significant, as shown in table 3 above which is repeated below for ease of reference.

TABLE 3 Processed raw materials (kt/year)

2005	2006	2007	2008
14,423	14,515	14,515	15,517

CHART T3 (kt/year)



The figures for the four-year period 2005-2008 show that on the Sarroch site the quantity of raw materials processed has grown constantly, reaching its highest value of 15.5 million tons in 2008.

As well as the quantity of materials processed, an important parameter for managing the refining processes and controlling the product characteristics is the content of sulphur in the crude.

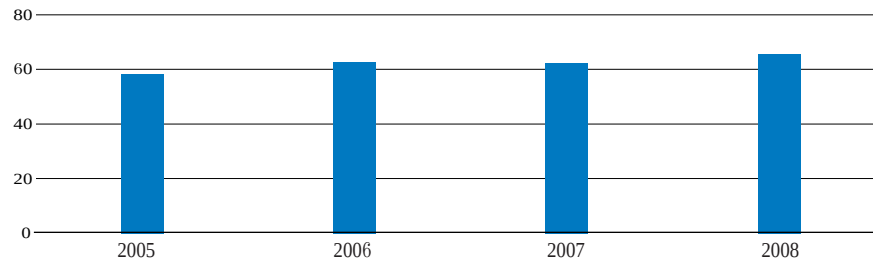
Table 7 and chart T7, below, show the values of the indicator in this area, calculated as the ratio between the quantity of low-sulphur crude oil and the total quantity of crude oil processed.

TABLE 7 Consumption of low-sulphur crudes *

Parameter	2005	2006	2007	2008
Quantity of low-sulphur crude/total quantity of raw materials processed (%)	58.4	62.9	62.4	65.7

*By analogy with the definition of low-sulphur fuel oils (Legislative Decree no. 152/06 Part V, Enclosure X) crudes are defined as "low-sulphur" if they have a sulphur content less than 1%

CHART T7 (%)



Quantity of crude with low sulphur content/Total quantity of raw materials processed

An examination of the figures given above shows an increase over time in the procurement of low-sulphur crude oil.

[auxiliary chemical substances]

In addition to oil, auxiliary chemical substances also enter the refining cycle and the IGCC plant. These can be grouped under the following principal categories:

- chemical reaction catalysers;
- treatment and process additives;
- additives for correct product formulation;
- oxygen, nitrogen, hydrogen.

The consumption of auxiliary substances is less significant than the consumption of raw materials, because the auxiliary substances are generally renewable resources and the quantities procured are globally much smaller.

Procurement of raw materials and auxiliary substances involves the need for transport via sea and land, as an indirect environmental aspect. This aspect is examined in paragraph 4.3.2 on page 113.

Storage and use

Under normal operating conditions, the use and storage of raw materials can involve diffuse and escaped atmospheric emissions of volatile organic substances, as an induced environmental aspect. This aspect is examined in paragraph 4.2.4.3, page 70.

Turning to abnormal and emergency conditions, the events that can involve hazardous substances present at the facility, whether raw materials, auxiliary substances or products, are analysed in the refinery's Safety Report (paragraph 3.3, page 38).

4.2.2. – Energy consumption

Consumption of energy resources, in the form of fuels and electricity, represents a significant environmental aspect for the Saras site as well as one of notable economic impact. Figure 11 is a diagram of the site's energy balance, and the table presents the 2008 data for external energy input to the site, divided into electricity, thermal energy and crude.

Energy input to the site (toe) 2008	
Electricity	182,501
Thermal energy (steam, fuel gas, H_2)	130,206
Crude	15,483,357

Energy output from the site (toe) 2008	
Oil products	13,901,890
Electricity	780,974

For the data on oil products: table 2, page 33

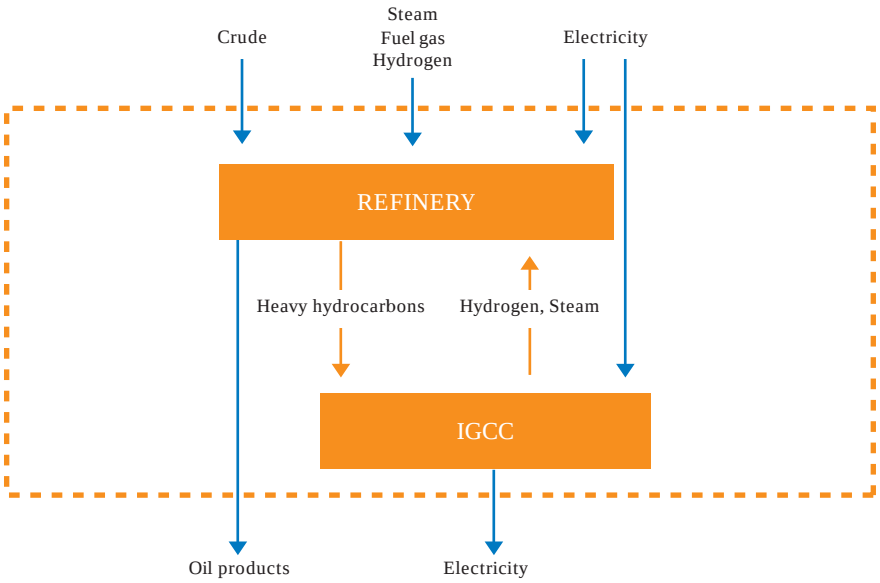


Figure 11 Energy balance diagram

Saras's commitment to improve energy efficiency was apparent as far back as the late 1970s and early 1980s, with major energy conservation investments to recover heat and energy.

[Law no. 10 of 9/01/1991]

In accordance with legislation, every year an Energy Manager is appointed, to monitor and promote actions for the conservation and the rational use of energy at the Sarroch site.

As already noted, the complex comprising the refinery and IGCC plant represents a grand integrated cycle of transformation of hydrocarbons into refined oil products and energy.

The tables and charts that follow give the indicators for consumption of energy resources. To compare the data for the different forms of energy with each other, a single unit of measurement, the ton of oil equivalent (toe), has been adopted: all quantities of incoming raw materials and outgoing products (fuels), and incoming/outgoing flows of electricity, have been converted to toe.

[energy efficiency of the integrated cycle]

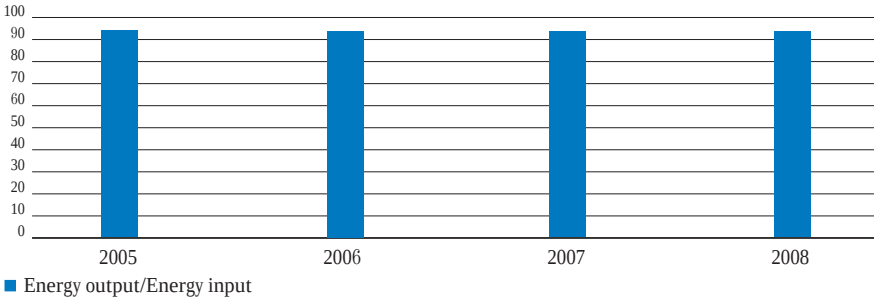
The energy efficiency of the integrated cycle (refinery and IGCC), given in table 8 and chart T8, is given by the ratio between:

- the energy leaving the integrated cycle, as the sum of the energy content of the oil products sold and energy sold;
- the energy entering the integrated cycle, as the sum of the energy content of the raw materials for the refining cycle and the energy procured from outside the site.

TABLE 8 Energy efficiency of the integrated cycle (refinery and IGCC)

Parameter	2005	2006	2007	2008
Energy output/Energy input (% toe Output/toe Input)	93.6	93.6	94.5	93.3

CHART T8 (% toe Output/toe Input)



An examination of the data given shows the high level of efficiency of the integrated cycle "Refinery + IGCC", with a consolidated value of higher than 93% in the last year. The difference between the energy input and the energy output is mainly due to the internal consumption of energy necessary for operating the production processes, and the portion lost in carrying out the activities.

[energy efficiency of the IGCC plant]

The IGCC plant, which produces electricity for sale and also steam and hydrogen for use in the refining cycle, converts the energy contained in heavy hydrocarbons (and not usable as such) to energy of value, and contributes to meeting the site's energy needs through the recovery of steam and hydrogen.

The energy efficiency indicator of the IGCC plant - given in table 9 and chart T9 - is given by the ratio between:

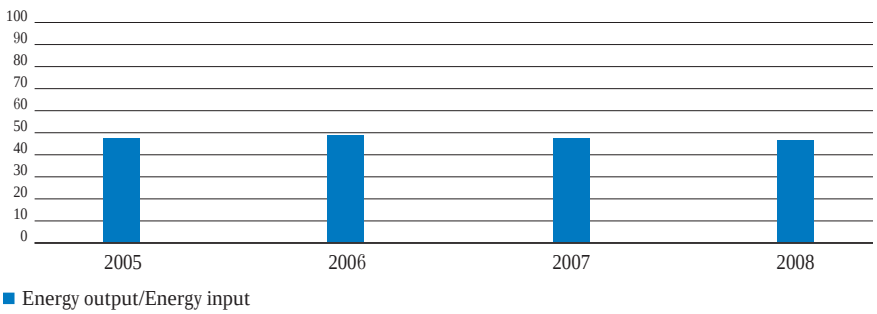
- energy leaving the IGCC, in the form of electricity, steam, hydrogen and sulphur;
- energy entering the IGCC, in the form of hydrocarbon feedstocks and electricity consumed.

The efficiency values of the IGCC are much higher than those obtainable in traditional thermoelectric power stations.

TABLE 9 Energy efficiency in the IGCC plant

Parameter	2005	2006	2007	2008
Energy output/Energy input (% toe Output/toe Input)	47.0	48.6	46.9	46.2

CHART T9 (% toe Output/toe Input)



[energy efficiency of the refining cycle]

For the refining cycle, the indicator shown is given by the ratio between:

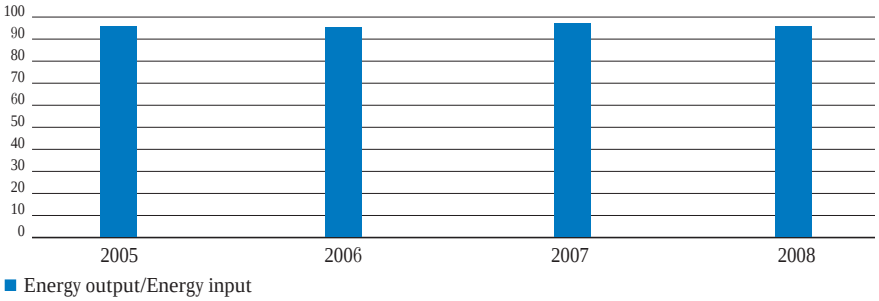
- the energy leaving the refining cycle, as the sum of the energy content of the oil products sold;
- the energy entering the refining cycle, as the sum of the energy content of the raw materials for the refining cycle and the energy procured from outside the site (mainly electricity).

In this case also, table 10 and chart T10 show higher values of energy efficiency.

TABLE **10** Energy efficiency in the refining cycle

Parameter	2005	2006	2007	2008
Energy output/Energy input (% toe Output/toe Input)	95.3	95.3	96.5	95.2

CHART **T10** (% toe Output/toe Input)



[energy consumption]

Internal energy consumption is due to the combustion of oil products and the use of electricity. Small amounts of thermal energy, in the form of steam, can be exchanged with the nearby petrochemical facility, especially when there are plant shutdowns or other unusual situations.

The fuels used in the refining cycle are made up of:

- fuel gas, i.e. a gas produced by the refining cycle and which is not saleable (because it is not condensable);
- low-sulphur fuel oil;
- coke, which is consumed directly within the FCC (Fluid Catalytic Cracking) production plant.

The fuels used in the IGCC cycle are made up of:

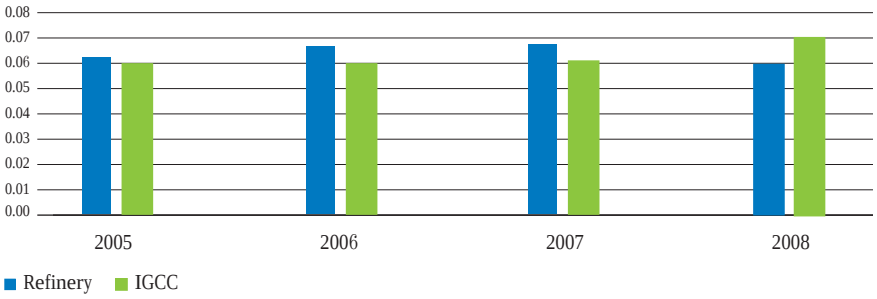
- syngas, i.e. the gas produced by the gasification section and used in the combined cycle section;
- diesel, which is used only as an emergency fuel.

Table 11 and chart T11 give the specific energy consumption indicator data for the raw materials processed in the refining cycle and the materials used as feedstock for the IGCC.

TABLE 11 Specific energy consumption

Parameter	2005	2006	2007	2008
Specific energy consumption of refinery (toe/t refinery raw materials)	0.062	0.066	0.067	0.059
Specific energy consumption of IGCC (toe/t IGCC feedstocks)	0.068	0.068	0.064	0.070

CHART T11 (toe/t raw materials)



In the main the values of the indicators are stable over the years. Objectives for the improvement of energy efficiency and energy recovery have been drawn up to make savings in energy consumption, with consequent reduction in fuel oil consumption.

[table of objectives and interventions objective no. 2, page 123]

4.2.3 – Use of water resources

In the Sarroch facility the water is mainly used for producing steam for technological use (steam stripping, heat exchangers and electricity generation), to supply the fire prevention system, to replace losses from the cooling cycle, and for civil use. Figure 12 shows a diagram of the water cycle in the facility.

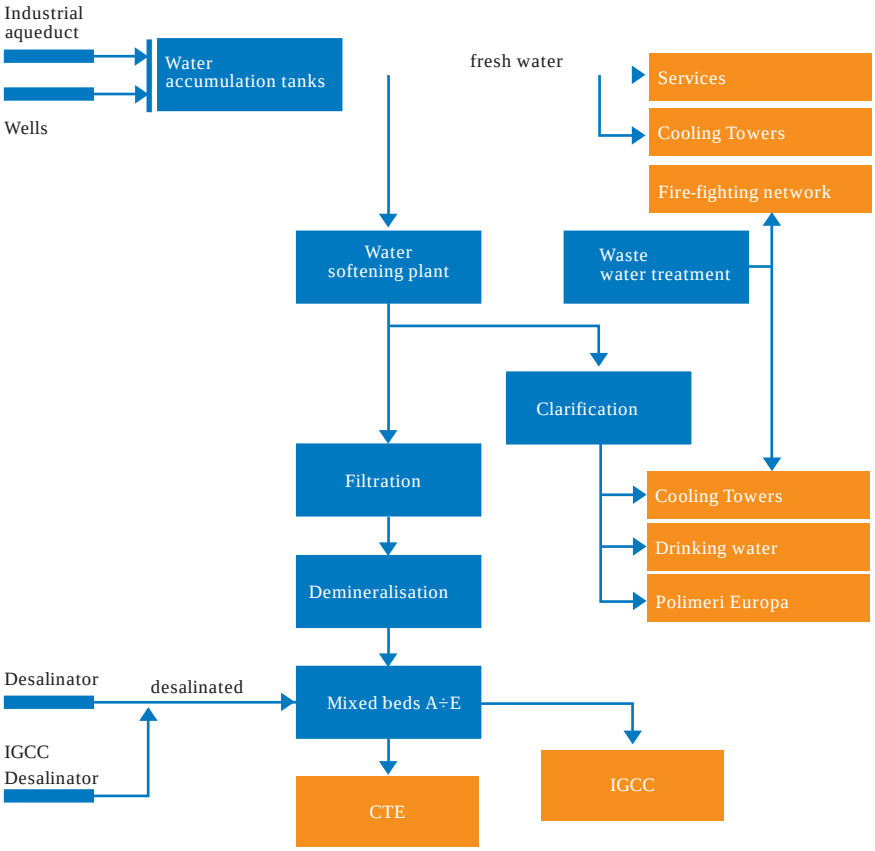


FIGURE 12 Water usage diagram

Aware of the problem of scarce water resources in the region, Saras has over the years adopted a policy of reducing the use of primary water sources originating in the locality. This has been achieved through:

- installing a first desalinator in 1994, with a capacity of 300 m^3/hr, followed by the installation of six more desalination modules for the IGCC in 1999, with a total capacity of approximately 600 m^3/hr;
- implementing measures to maximise the recycling of purified water from the refining process, following improvements to the treatment process and increased filtering capacity.

Currently the principal types of water resources used are the following:

- seawater, treated by dedicated desalination units;
- water supplied by the CASIC industrial aqueduct, which is fed by the available reservoirs in the area;
- water recovered by the wastewater purification system (after filtering).

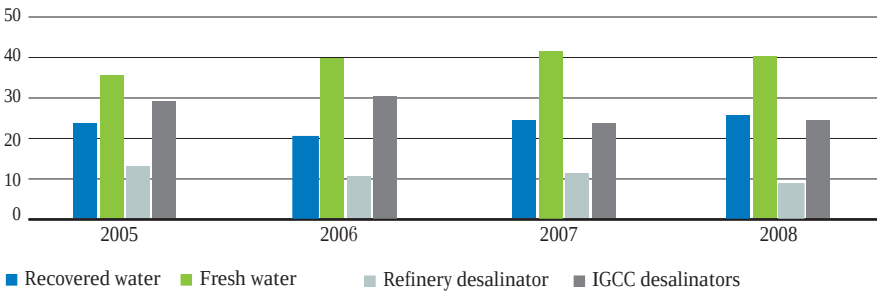
[concession decree Presidential Decree 250/49 Constitutional Law 3/48 of 05/06/98 and application for renewal of 12/06/2007 to the Civil Engineering Service of the Province of Cagliari]

A small portion of water (which was not used in 2008) can be taken from internal wells on site and be sent to the storage reservoir for incoming industrial freshwater, and a limited quantity of demineralised water can come from an exchange with the industrial site of Polimeri Europa (formerly Enichem), which was used in 2008.
Figures for the site's water consumption are presented in table 12 and chart T12 and are inclusive of the quantity used in the IGCC plant, which mainly uses water from its dedicated desalinators for its production. For cooling the IGCC equipment, a closed-circuit seawater system has been installed which is equipped with a cooling tower.

TABLE **12** Site water sources

Parameter	2005	2006	2007	2008
Recovered water/water demand (%)	23.3	19.9	24.1	25.1
Fresh water/water demand (%)	35.1	39.4	41.2	40.7
Water from refinery desalinator/water demand (%)	12.6	10.2	10.9	8.8
Water from IGCC desalinators/water demand (%)	29.1	30.5	23.8	24.5
Demineralised water from Polimeri Europa (%)				0.8

CHART **T12** (%)



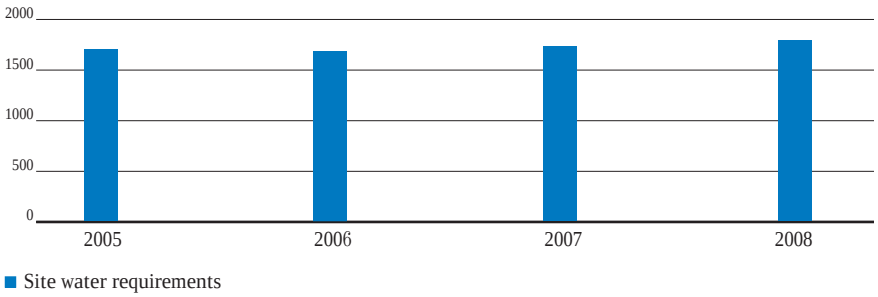
In the four-year period under review, internal recovery annually met approximately 20-25% of the total requirement, and desalination accounted for 30-40% of the total.
The percentage contribution in meeting the site's water demands, inclusive of desalinated water and recovered internal water, reached varying levels ranging from 60% to 65%..

The production from IGCC desalinators increased in 2008. This was due to actions to recover the production of IGCC desalinated water, resulting in an increase in the 2008 balance.
In absolute terms, the site's water consumption is shown in table 13 and chart T13.

TABLE 13 Site water demands – absolute values

Parameter	2005	2006	2007	2008
Site water demands - average flows (m^3/hour)	1,697	1,682	1,727	1,821

CHART T13 (m^3/hour)

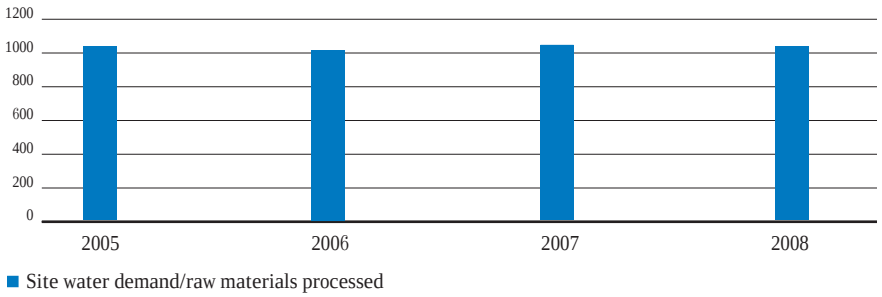


The site's water demand in 2008 grew by 5.2% over 2007, compared with a 5.9% increase in the processing of crude.
The increase in water demand in 2008 can be ascribed to the production of steam used in the distillation of crude, and the evaporation and flushing of the plant cooling towers, made necessary by the higher production.
The relation of specific water consumption to raw materials processed is shown by the indicator in table 14 and chart T14.

TABLE 14 Site water demands – specific values

Parameter	2005	2006	2007	2008
Site water demands/raw materials processed (m^3/kt raw materials)	1,031	1,015	1,037	1,031

CHART T14 (m^3/kt raw materials)



4.2.4 – Atmospheric emissions

4.2.4.1 – General

Atmospheric emissions represent a significant environmental aspect of the activities conducted at the Saras site, in normal conditions and in specific abnormal and/or emergency conditions.
In 2008 the Saras facility's authorisation references for atmospheric emissions consisted of the judgement of environmental compatibility of the IGCC design, no. DEC/EIA/2025 of 28/12/94 issued by the Ministry for the Environment, supplemented by letter ref. no. 854/05/SIAR of the Ministry for the Environment.
The above provisions contain the opinion in favour of building the IGCC and give specifications of the limits on emissions into the atmosphere from the IGCC and from the integrated complex comprising the refinery and the IGCC.

[Legislative Decree no. 152/06, Part V]

For the refining cycle in 2008, the concentration emission limits specified in Legislative Decree no. 152/06 Part V (Enclosure I, part IV, section 1) apply. These limits are for the concentration "bubble", i.e. the ratio of the total quantity of the mass of each pollutant to the total volume of the gaseous effluents of the entire refinery.
In accordance with legislation, atmospheric emissions can be subdivided as follows:

- emissions ducted to the smokestacks;
- emissions that are not ducted.

Ducted emissions

The emissions ducted to the smokestacks are principally due to:

- combustion processes that take place in the furnaces to provide the thermal energy necessary for the refining cycle;
- combustion processes necessary for the production of electricity and steam (thermal power plant and IGCC).

[table of objectives and interventions objectives no. 1, 2, 3, 4, 5, 7, page 123-124]

The principal pollutants present in these emissions are SO_2, NO_x, CO, dust and CO_2. Figure 13 shows the location of the emission points ducted from the refinery and from the IGCC plant. Numerous objectives and areas for improvement have been defined for atmospheric emissions from ducted emissions.

Non-ducted emissions

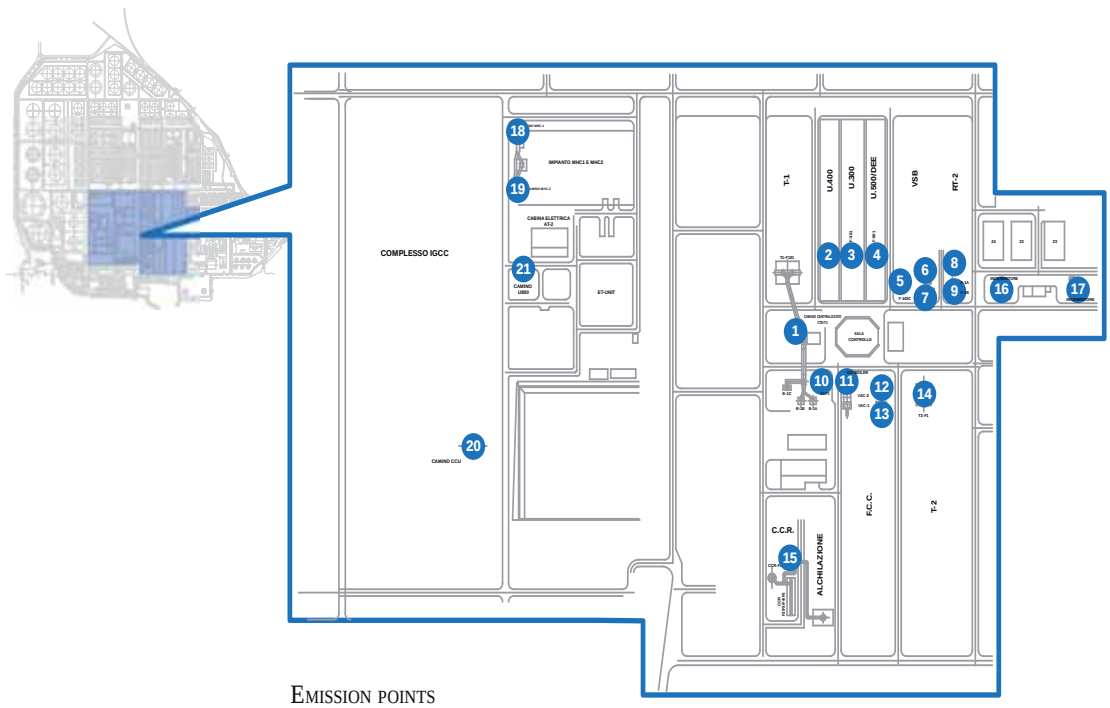
The emissions that are not ducted to the smokestacks are principally due to:

- storage and movement of raw materials and products, and wastewater treatment (diffuse emissions);
- small "physiological" emissions from sealing components, i.e. valves and flanges (diffuse emissions, also known as fugitive emissions).

Diffuse and fugitive emissions are technically not ductable. They can be contained by installing special sealing systems and through monitoring and maintenance.
The substances present in diffuse and fugitive emissions are Volatile Organic Compounds (VOCs), made up of light hydrocarbons that can evaporate in environmental conditions and in the process conditions present.
With reference to figure 7 (page 31) which shows the general plan of the facility, the areas from which diffuse emissions originate are those for storage, shipping, productive processes and wastewater treatment.

[table of objectives and interventions objective no. 6, page 124]

Numerous objectives and areas for improvement have also been defined for atmospheric emissions from diffuse and fugitive emissions.



EMISSION POINTS

1. Centralised smokestack
   Topping Plant 1
   Boiler Plant B1-A
   Boiler Plant B1-B
   Boiler Plant B1-C } CTE
2. U400-F461 Plant
3. U300-F301 Plant
4. U500-F501 Plant
5. U700-F701 Plant
6. VSB-F102B Plant
7. VSB-F102C Plant
8. RT2-F1A Plant
9. RT2-F1B Plant
10. FCC-K1 F3 Plant
11. ICO-Boiler Plant
12. Vacum F1-B Plant
13. Vacum F1-A Plant
14. Topping 2-F1 Plant
15. Alkylation plant CCR-F11
16. Z3-F2 Plant
17. Z4-F2 Plant
18. MHC1 (F101-F251) Plant
19. MHC2-F201 Plant
20. Centralised smokestack IGCC
    Line 701 / Line 702
    Line 703
21. U800-F801 Plant

FIGURE 13 Map with location of emission points at the facility

Determination of emissions values

Ducted emissions are determined in several ways. Specifically:

- emissions of SO_2, NO_x, PTS, CO and smoke load from the Saras centralised smokestack (which collects around 33% of emissions from the refining cycle) and from the IGCC smokestack (which collects 100% of that plant's emissions) are determined using continuous instrument analysis;
- emissions from the other smokestacks are determined through calculation, based on measurement of the consumption of fuels, on laboratory analytical determinations of their quality, and on the characteristics of the burners.

Alternative checks are also carried out annually on all the smokestacks on site, by taking samples and subsequently having them analysed by an external laboratory.
Non-ducted emissions are determined by estimates and calculations, using recognised formulas and validity models[1].
Diffuse and fugitive emissions for the four-year period 2005 – 2008 were determined using estimates based on recognised formulas and calculation methods (source: U.S.E.P.A., United States Environmental Protection Agency, for emissions from movement and storage of raw materials and products; A.P.I., American Petroleum Institute, for emissions from wastewater treatment; and Italian oil industry group Unione Petrolifera, for fugitive emissions).

[table of objectives and interventions objective no. 6, page 124]

For fugitive emissions, a monitoring campaign has been started using the LDAR[2] monitoring method, which is one of the best available techniques for the sector[3]. The results obtained using this technique have shown that the calculation methods adopted previously are very conservative.
Below are the figures for the four-year period 2005-2008, determined using the method described above, and subdivided as follows:

- ducted emissions of SO_2, NO_x, dust and CO (paragraph 4.2.4.2 below);
- non-ducted emissions of Volatile Organic Compounds (paragraph 4.2.4.3, page 70).

Since atmospheric emissions from the facility can influence the quality of the surrounding air, following the emissions data the collected by the public air quality monitoring network present in the Sarroch area is also provided, processed by the Province of Cagliari (paragraph 4.2.4.4, page 71).
Lastly, the data for the facility's CO_2 emissions are provided (paragraph 4.2.4.5, page 79). Although CO2 emissions are part of the ducted emissions, it is considered appropriate to give these emissions separately because any effect they have is not local but global, relating as it does to the greenhouse effect.

4.2.4.2 – Data on ducted emissions of SO_2, NO_x, dust and CO

The figures for ducted emissions of SO_2, NO_x, dust and CO are given using the following indicators:

- absolute mass flow values for the refinery, the IGCC and the site overall (refinery +IGCC);
- specific mass flow values, related to the raw materials input to the integrated production cycle and referring to the overall site;
- global concentration values for the refinery ("bubble" values);
- concentration values for the IGCC.

Of the above indicators, the following are subject to limit values:

- absolute mass flow values for the site overall;
- concentration values for the IGCC;
- concentration bubble values for the refinery.

All indicators are processed annually.

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[1] For diffuse emissions from storage tanks the "TANKS" model is used, source: U.S. Environmental Protection Agency; for diffuse emissions from shipping products and from wastewater treatment baths the specific formulae sourced from the E.P.A. and A.P.I. (American Petroleum Agency), respectively, are used.
For fugitive emissions, an algorithm sourced from Italian oil industry group Unione Petrolifera and CONCAWE is adopted. In 2008, this was supplemented by new monitoring technologies (variable optic IR video camera) and a new approach to monitoring (the Smart LDAR programme). The calculation algorithms take account, in particular, of: the quantity of raw materials processed for emissions from storage and for fugitive emissions, the quantity of products shipped for shipping emissions, the quantity of wastewater input to water treatment for emissions from that plant.
For emissions from storage, the technical characteristics of the tanks are also relevant.
[2] LDAR: Leak Detection And Repair.
[3] Guidelines on Best Available Techniques, refinery sector, Ministerial Decree 29/01/07.

Sulphur dioxide (SO_2)

The trend of reduction in emissions of SO_2, a regular feature for several years, continues for the entire site and particularly the refinery.

Specifically, in 2008 the best ever result was recorded for emissions of SO_2 for the site.

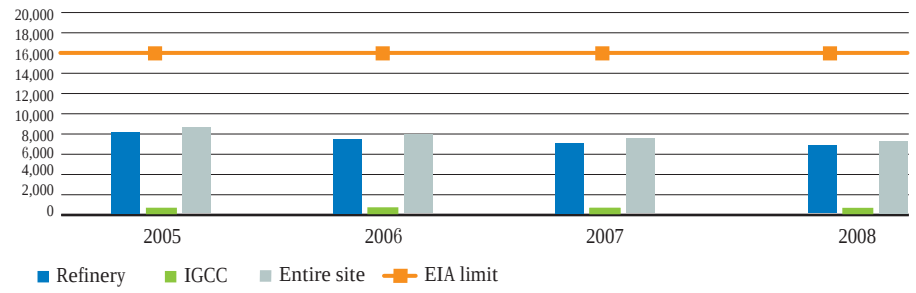
This result is all the more significant because it was obtained despite a major increase in the refinery's annual production, as shown by the data in table 3 on page 33. This is shown by the absolute figures for the refinery, the IGCC and for the entire site overall, as shown in table 15 and chart T15.

TABLE 15 Emissions of SO_2: absolute mass flow values

	2005	2006	2007	2008
Refinery (t/year)	8,065	7,327	6,970	6,733
IGCC (t/year)	432	467	423	406
Entire site (t/year)*	8,497	7,794	7,393	7,139

*Compared to limit value of 16,000 t/year, established by DEC/EIA/2025 of 28/12/94

CHART T15 (t/year)



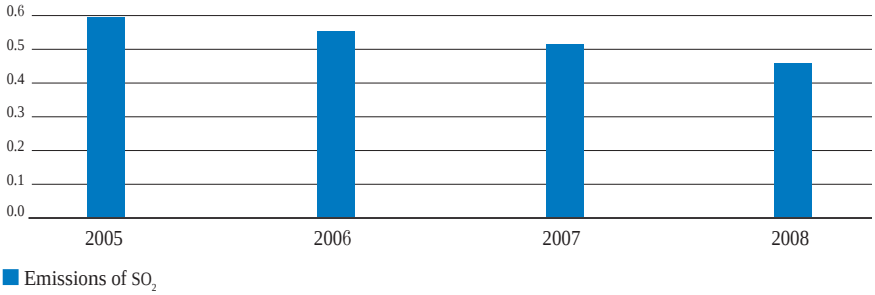
The values of all the mass flow indicators show a general tendency towards reduction over time, for the refinery, the IGCC, and the entire site. In particular the indicator for the site in its entirety has always been comfortably lower than the authorised limit value.

The site's specific emissions also confirm a trend towards reduction, shown in table 16 and chart T16.

TABLE 16 Emissions of SO_2: specific mass flow values

Parameter	2005	2006	2007	2008
Emissions (tSO_2/kt raw materials)	0.59	0.54	0.51	0.46

CHART T16 (t SO_2/kt raw materials)



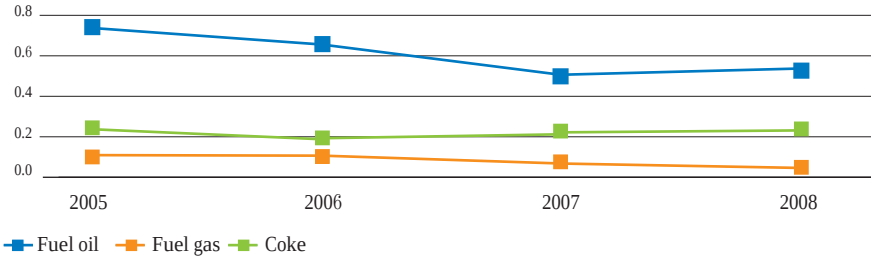
The reduction in SO_2 emissions is consistent with the progressive improvement in the quality of the fuels used, particularly for the gaseous fuels, in which the percentage of sulphur present has been constantly reduced, as shown in table 17 and chart T17.

TABLE 17 Sulphur content of fuels used in the refinery

Parameter	2005	2006	2007	2008
Sulphur content of fuel oil (%)	0.71	0.66	0.49	0.54
Sulphur content of Fuel gas (%)	0.12	0.12	0.08	0.05
Sulphur content of Coke * (%)	0.23	0.20	0.21	0.22

* A fuel produced and consumed directly within the FCC (Fluid Catalytic Cracking) production plant

CHART T17 (%)



The tendency towards reduction of SO_2 emissions over time is also confirmed by the concentration values given in the tables below, and which are significantly lower than their applicable limits.

TABLE 18 Emissions of SO_2: Concentration bubble values for the refinery

Parameter	2005	2006	2007	2008
Concentrations of SO_2 - refinery (mg/Nm^3)	817	734	672	639
Limit value for the refinery * (mg/Nm^3)	1,700	1,700	1,700	1,700

* Limit value specified by Italian Legislative Decree no. 152/2006 Part V, Enclosure I, part IV.

CHART T18 (mg/Nm^3)

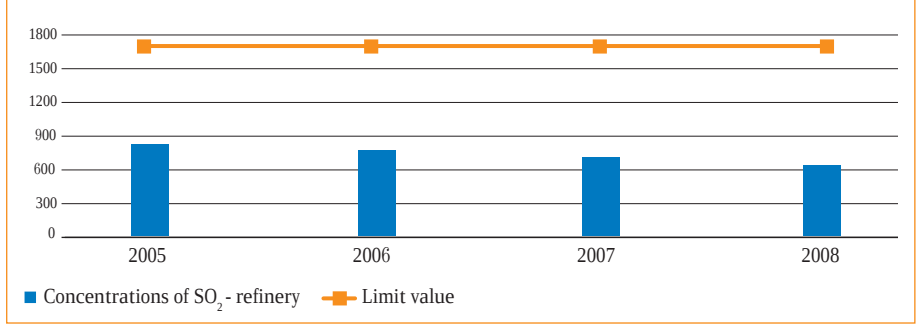
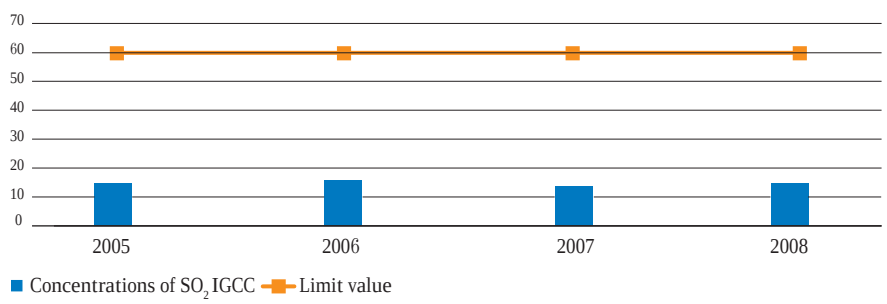


TABLE 19 Emissions of SO_2: Concentration values for the IGCC

Parameter	2005	2006	2007	2008
Concentrations of SO_2 - IGCC (mg/Nm^3)	15	16	14	15
Limit value for the IGCC * (mg/Nm^3)	60	60	60	60

* Limit value established at the conclusion of the Environmental Impact Assessment for the IGCC process (DEC/EIA/2025 of 28/12/94).

CHART T19 (mg/Nm^3)



Objectives and actions for reduction of SO_2 emissions are planned.

[table of objectives and interventions objectives no. 1, 2, 3, 4, page 123]

Nitrogen oxides (NO_X)

NO_x emissions are only marginally affected by fuel quality, and instead they depend highly on combustion techniques, which in turn are related to technological factors such as the burner type installed.

The installation of burners that produce lower NO_x, carried out in 2007 for the furnaces in the Topping RT2 and Visbreaking plants, have resulted in a perceptible reduction in emissions from the refinery, explaining the trends illustrated below.

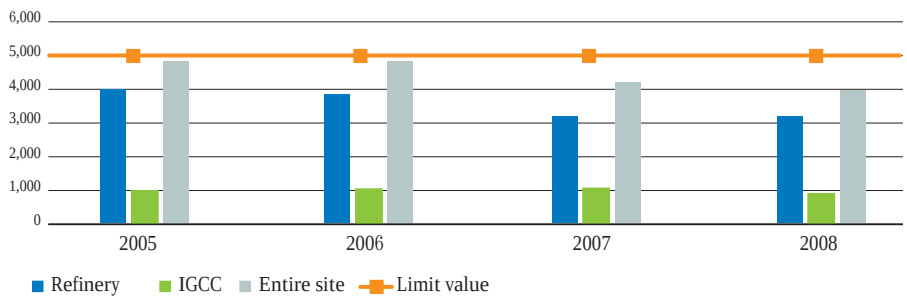
In 2008 this tendency was confirmed, despite a significant increase in annual production. Table 20 and chart T20 give the data for the absolute mass flow indicators.

TABLE 20 Emissions of NO_X: absolute mass flow values

	2005	2006	2007	2008
Refinery (t/year)	3,964	3,798	3,167	3,130
IGCC (t/year)	935	983	997	857
Entire site (t/year)*	4,899	4,781	4,164	3,987

*Compared to limit value of 5,000 t/year, established by DEC/EIA/2025 of 28/12/94

CHART T20 (t/year)



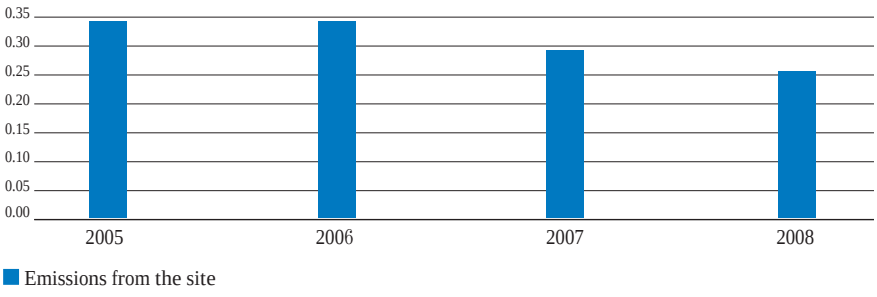
The indicator for the site has always been lower than the authorised limit value, and shows a reduction over time, which is mainly supported by the reduction in values of the indicator for the refinery. For the IGCC, the mass flow indicator values have remained substantially stable over time, with a tendency towards reduction in 2008, in line with energy production.

The specific mass flow indicator (data in table 21) has also been on a downward trend over the years, in line with the site's absolute mass flow indicator.

TABLE 21 Specific emissions of NO_X: specific mass flow values

Parameter	2005	2006	2007	2008
Emissions (tNO_x/kt raw materials)	0.34	0.33	0.29	0.26

CHART T21 (t NO_x / kt raw materials)



The concentration indicators are much lower than the applicable limits, as shown in the following tables and charts, and with an improvement trend.

TABLE 22 Emissions of NO_X: Concentration bubble values for the refinery

Parameter	2005	2006	2007	2008
Concentrations of NO_x – refinery (mg/Nm³)	402	305	381	297
Limit value for the refinery * (mg/Nm³)	500	500	500	500

* Limit value specified by Italian Legislative Decree no. 152/2006 Part V, Enclosure I, part IV.

CHART T22 (mg/Nm³)

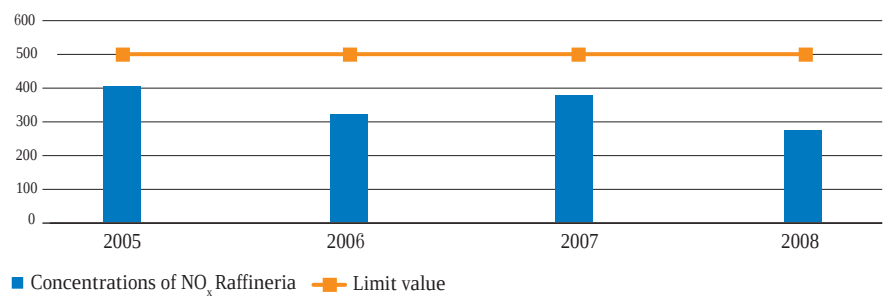
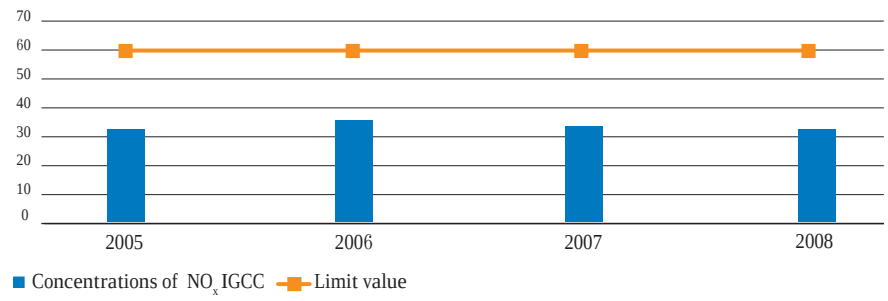


TABLE 23 NO_x: Concentration values for the IGCC

Parameter	2005	2006	2007	2008
Concentrations of NO_x – IGCC (mg/Nm³)	32	35	33	31
Limit value for the IGCC * (mg/Nm³)	60	60	60	60

* Limit value established in the conclusion of the Environmental Impact Assessment for the IGCC project (DEC/EIA/2025 of 28/12/94).

CHART T23 (mg/Nm³)



Objectives and actions for improving the monitoring of NO_x emissions are planned.

[table of objectives and interventions objectives no. 3, 4, page 123]

Dust

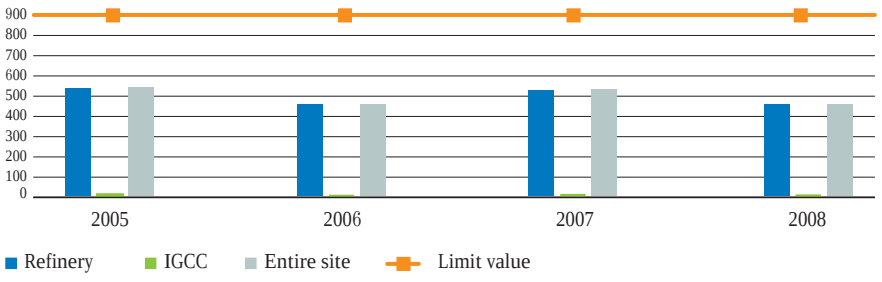
Table 24 gives the data for the absolute mass flow indicators for dust.

TABLE 24 Emissions of dust: absolute mass flow values

	2005	2006	2007	2008
Refinery (t/year)	526	453	524	452
IGCC (t/year)	7	3	5	4
Entire site* (t/year)	533	456	529	456

*Compared to limit value of 900 t/year, established by DEC/EIA/2025 of 28/12/94

CHART T24 (t/year)



The emission indicator for the site is still much lower than the authorised limit value, and this result is in line with the trend shown in previous years.
A stable trend is shown for the specific values (table 25). The concentration indicators, shown in the following charts and tables, are in line with previous years.

TABLE 25 Emissions of dust: specific mass flow values

Parameter	2005	2006	2007	2008
Site emissions, t dust/kt raw materials	0.04	0.03	0.04	0.03

CHART T25 (t dust/kt raw materials)

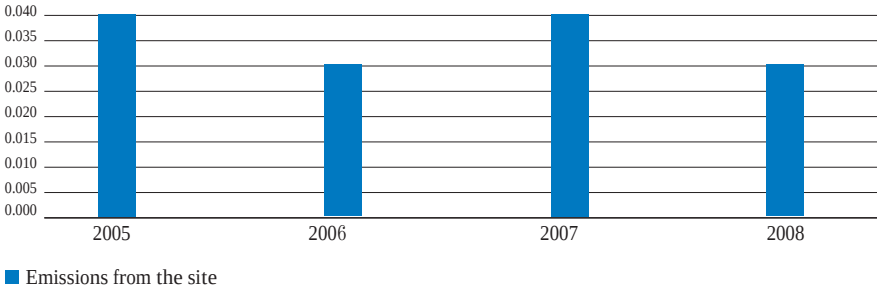


TABLE 26 Dust: Concentration bubble values for the refinery

Parameter	2005	2006	2007	2008
Concentrations of dust - refinery (mg/Nm^3)	53	45	45	43
Limit value for the refinery * (mg/Nm^3)	80	80	80	80

* Limit value specified by Italian Legislative Decree no. 152/2006 Part V, Enclosure I, part IV.

CHART T26 (mg/Nm^3)

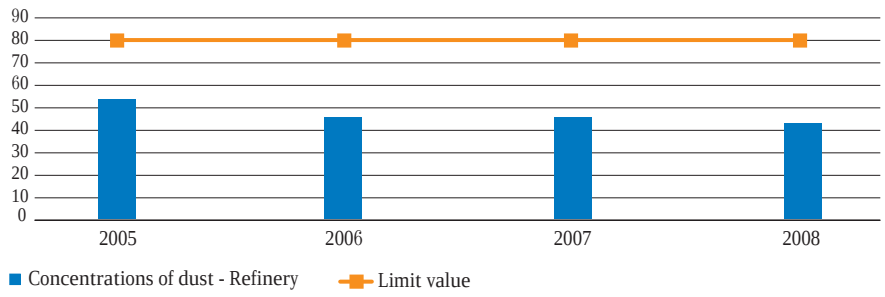
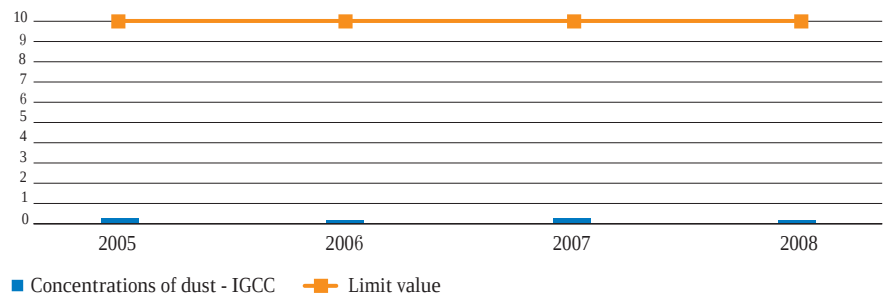


TABLE 27 Dust: Concentration values for the IGCC

Parameter	2005	2006	2007	2008
Concentrations of dust - IGCC (mg/Nm^3)	0.2	0.1	0.2	0.1
Limit value for the IGCC * (mg/Nm^3)	10	10	10	10

* Limit value established in the conclusion of the Environmental Impact Assessment for the IGCC project (DEC/EIA/2025 of 28/12/94).

CHART T27 (mg/Nm^3)



All values presented are much lower than the applicable limits. In addition, objectives and actions to reduce these emissions and to improve their monitoring are planned.

[table of objectives and interventions objectives no. 2, 3, 4, 5, page 123]

Carbon monoxide (CO)

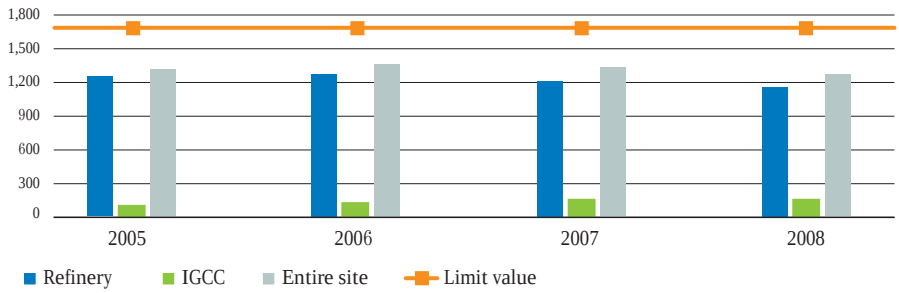
Table 28 and chart T28 give the absolute mass flow indicators.

TABLE 28 Emissions of CO: absolute mass flow values

	2005	2006	2007	2008
Refinery (t/year)	1,238	1,259	1,195	1,168
IGCC (t/year)	86	110	138	133
Entire site* (t/year)	1,324	1,369	1,333	1,301

*Compared to limit value of 1,700 t/year, established by DEC/EIA/2025 of 28/12/94

CHART T28 (t/year)

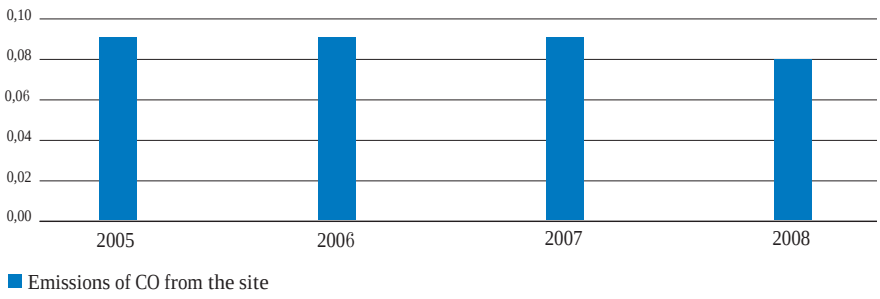


The emission indicator for the site has always been much lower than the authorised limit value, and over time it has shown a substantially stable trend. The indicator for the refinery shows a reduction over previous years, which is linked to the measures taken to optimise the combustion process in a number of furnaces. The values of the indicator for the IGCC are much lower than those for the refinery.
The specific mass flow indicator for the site given in table 29 and chart T29 is constant over time, even for the increased quantity of raw materials processed.

TABLE 29 Emissions of CO from the site: specific mass flow values

Parameter	2005	2006	2007	2008
Site emissions, t CO/kt raw materials	0.09	0.09	0.09	0.08

CHART T29 (t CO/kt raw materials)



The values of the concentration indicators shown in the following charts are much lower than the applicable limits.

TABLE 30 Emissions of CO: Concentration bubble values for the refinery

Parameter	2005	2006	2007	2008
Concentrations of CO - refinery (mg/Nm^3)	125	126	115	111
Limit value for the refinery * (mg/Nm^3)	250	250	250	250

* Limit value specified by Italian Legislative Decree no. 152/2006 Part V, Enclosure I, part IV.

CHART T30 (mg/Nm^3)

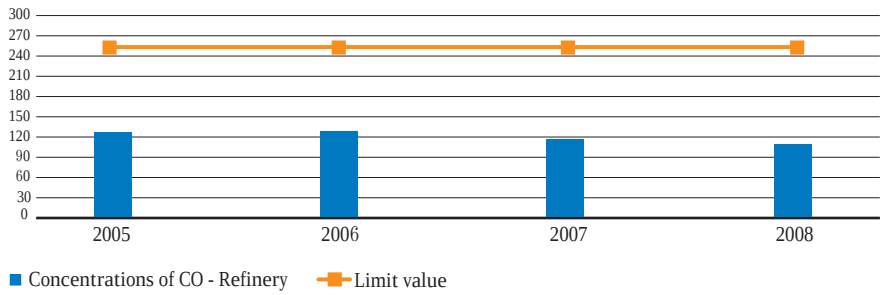
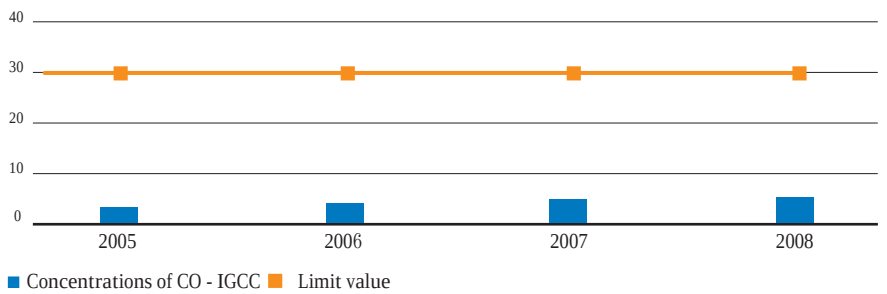


TABLE 31 Emissions of CO: Concentration values for the IGCC

Parameter	2005	2006	2007	2008
Concentrations of CO - IGCC (mg/Nm^3)	3.0	3.8	4.6	5.0
Limit value for the IGCC * (mg/Nm^3)	30	30	30	30

* Limit value established in the conclusion of the Environmental Impact Assessment for the IGCC project (DEC/EIA/2025 of 28/12/94).

CHART T31 (mg/Nm^3)



Objectives and actions for improving the monitoring of CO emissions are planned.

[table of objectives and interventions objectives no. 3, 4, page 123]

Abnormal and emergency situations

Analysis of abnormal and emergency situations that can affect the facility's atmospheric emissions has resulted in the following event being identified as significant:

- increase of SO_2 emissions and presence of dense smoke from the smokestack of the incinerator for the refinery's sulphur recovery plants.

[table of objectives and interventions objective no. 1, page 123]

The construction of the unit for treating tail gases coming from the refinery's sulphur recovery plants has reduced the probability and the consequences of this type of abnormal event.

Indeed, the tail gas treatment unit contributes to reducing the content of sulphur compounds in the tail gases, before they are sent to the incinerator. The reduction in SO_2 emissions also applies to conditions of normal operation. A reduction is expected of approximately 30% in total SO_2 emissions from the site, on an annual basis.

To prevent other types of emergency associated with the emissions from the refinery's centralised smokestack and from the IGCC's centralised smokestack, concentration alarm thresholds for the emissions have been defined for internal use: when these thresholds are reached, the appropriate corrective actions are rapidly activated on the plants responsible for the emissions, in order to prevent the ground level impact from increasing.

4.2.4.3 – Data on non-ducted emissions

The data for non-ducted emissions, comprising diffuse emissions and fugitive emissions, is summarised in table 32.

TABLE **32** Non-ducted emissions (diffuse and escaped) of Volatile Organic Compounds from the site

Total non-ducted emissions of VOCs	2005	2006	2007	2008
Diffuse (t/year)	518	484	449	442
Escaped (t/year)	1,442	1,426	1,459	776
Total (t/year)	1,960	1,910	1,908	1,218

Fugitive emissions tend to increase with the increase in incoming raw materials (table 3 on page 33). For 2008, based on the new monitoring technologies used (variable optic IR video camera) and on the new monitoring approach used (the Smart LDAR programme)*, it emerged that the emissions for past years had been overestimated by at least 50%.

Diffuse emissions are reducing, despite the increase in annual processing. This is due to a smaller quantity of wastewater being input to the water treatment plant.

* See note 2 on page 60.

4.2.4.4 – State of air quality in the Sarroch area

4.2.4.4.1 Monitoring of air quality monitoring stations

Currently there are three air quality monitoring networks in the Sarroch area: one owned by the Cagliari ARPAS (previously managed by the Province of Cagliari), one owned by Saras, and one owned by Polimeri Europa. The location of the measurement sensors on the public network are shown on the map in figure 14.

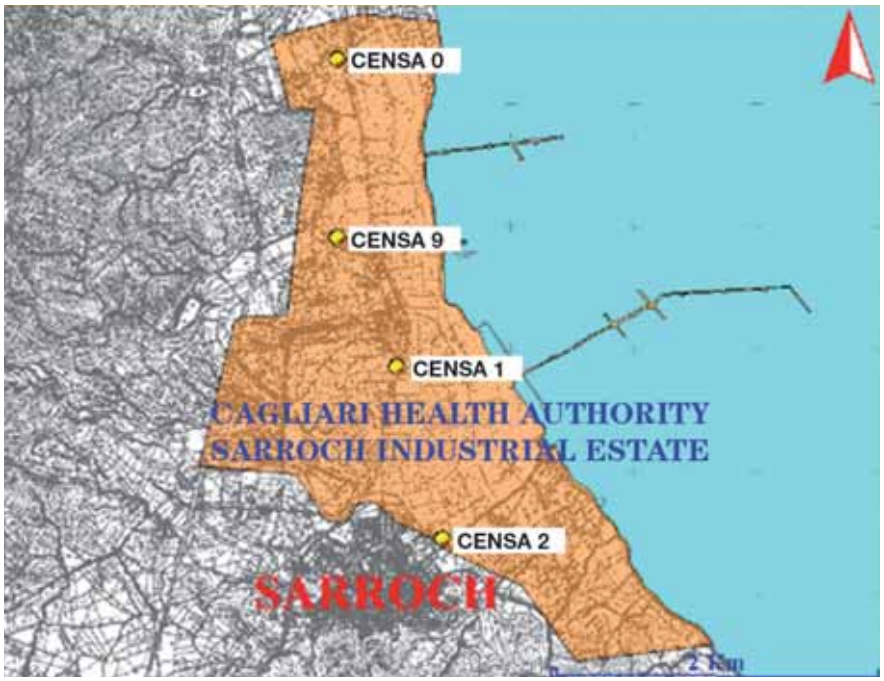


Figure 14 Map of the locations of the air quality monitoring sensors of the public network.

The sensors measure the ambient air concentrations of the following substances:

- SO_2;
- PM10;
- NO_x;
- CO;
- Ozone;
- H_2S (hydrogen sulphide);
- Benzene.

The data found by the sensors show contributions from all sources of emissions present in the area - industrial, urban, and originating from vehicle traffic.
The legislation for air quality monitoring methods and for limit values are as follows:

- ministerial Decree no. 60/2002 for SO_2, nitrogen oxides (NO_2 and NO_x), small dust particles (PM10), CO and benzene;
- legislative Decree no. 183/2004 for ozone;
- presidential Decree 15/04/1971 for hydrogen sulphide.

Below are the results obtained from the network managed by the public authorities, for the four-year period 2005 – 2008, for the pollutants monitored.
The data and the considerations shown are taken from the reports prepared annually by the Cagliari ARPAS.

Measurements from the provincial network for SO_2

Turning to the levels of SO_2, the report issued by the Cagliari ARPAS shows a trend in 2008 that confirms the improvement already recorded in 2007 over those of previous years, with no violation of the legal limits, as can be seen from the tables and charts presented here.

In more detail, before 2007, in one of the sensors (CENSA2), the three-hourly alarm threshold was exceeded a number of times, and the hourly and daily limits for the protection of human health were also exceeded regularly for a period, and the number was higher than the values allowed by Ministerial Decree no. 60/2002.

From 2007 onwards the situation measured by CENSA2 conformed to legal requirements, did not exceed the alarm thresholds, and the numbers of times the hourly and daily limits for protecting human health were exceeded were lower than those permitted by law. The trend described is shown in tables 33, 34, 35 and 36 and in the associated charts.

[table of objectives and interventions objective no. 7, page 124]

With regard to exceeding thresholds and limits on an hourly/daily basis, it should be noted that Saras does not have access to the hourly data taken by the public network in time to bring immediate and useful corrective action to bear. Upon receipt of a report from the control authorities regarding the exceeding of one of the above limits or thresholds, Saras has always promptly executed the necessary checks on the plants and on the sulphur content in the fuels used. If anomalies were found, the fact was notified to the Authority that made the original report, accompanied by a written description of the event and its causes. Even where anomalies were not found, a written reply has always been provided.

Lastly, table 37 shows the figures for the number of reports received by Saras of alarm thresholds for the SO_2 pollutant, detected by the sensors in the public air quality monitoring network.

From the table it can be seen that, despite the fact that in 2008 the hourly and daily limits were exceeded fewer times than in previous years, the number of reports arriving from the region has grown: clear evidence of how awareness of the environment has increased.

TABLE **33** SO_2: measurements of the provincial network – no. of days the alarm threshold was exceeded

Sensor	2005	2006	2007	2008
CENSA0	0	0	0	0
CENSA1	0	2	0	0
CENSA2	2	3	0	0
CENSA9	0	0	0	0
Limit value*	500 µg/m³, not to be exceeded more than 24 times in a calendar year			

*Limit value specified by Italian Ministerial Decree no. 60/2002

CHART **T33** (No. of times exceeded)

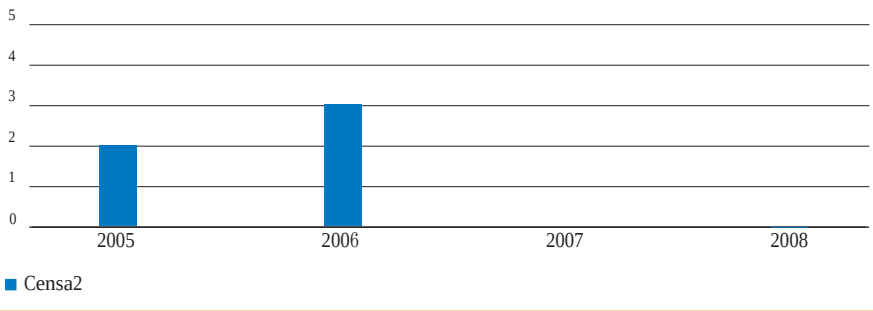


TABLE 34 SO_2: measurements of the provincial network - no. of times hourly limit for protecting human health was exceeded

Sensor	2005	2006	2007	2008
CENSA0	1	1	6	1
CENSA1	2	17	0	2
CENSA2	126	55	21	13
CENSA9	1	0	0	0
Limit value*	350 µg/m³, not to be exceeded more than 24 times in a calendar year			

** Limit value specified by Ministerial Decree no. 60/2002 from 2005 onwards. In 2004 the threshold not to be exceeded was 380 µg/m³

CHART T34 (No. of times exceeded)

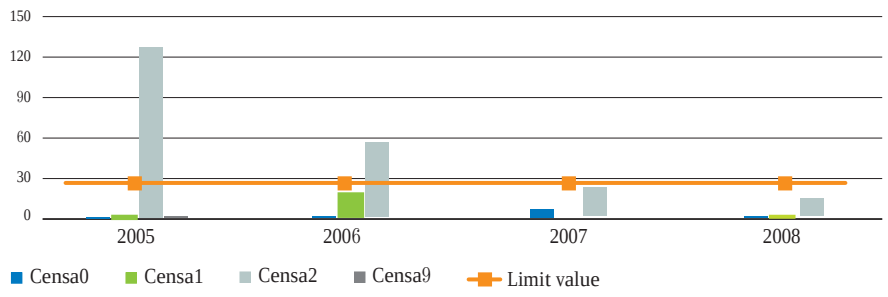


TABLE 35 SO_2: Concentration values measured by the provincial network - no. of times daily limit for protecting human health was exceeded

Sensor	2005	2006	2007	2008
CENSA0	0	0	1	0
CENSA1	0	2	0	0
CENSA2	11	7	2	0
CENSA9	0	0	0	0
Limit value*	125 µg/m³, not to be exceeded more than 3 times in a calendar year			

*Limit value specified by Italian Ministerial Decree no. 60/2002

CHART T35 (No. of times exceeded)

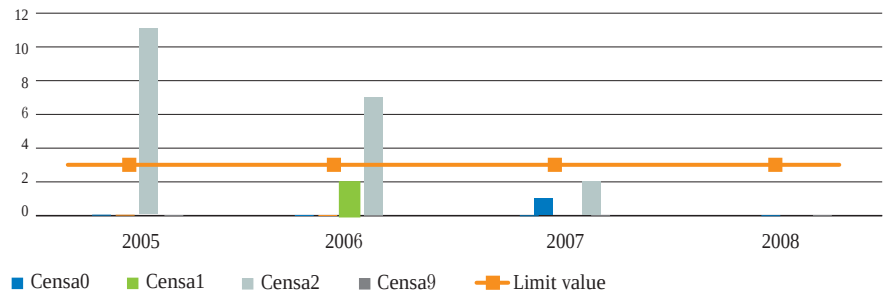


TABLE 36 SO_2: Concentration values measured by the provincial network – Average annual concentration

Sensor	2005	2006	2007	2008
CENSA0 (µg/m³)	6	7	7	n.d.
CENSA1 (µg/m³)	7	8	4	n.d.
CENSA2 (µg/m³)	26	15	12	n.d.
CENSA9 (µg/m³)	5	5	4	n.d.
Limit value*	20 µg/m³ limit for protection of ecosystems			

* Limit value specified by Italian Ministerial Decree no. 60/2002
n.a. data not available (not provided by ARPAS)

CHART T36 (µg/m³)

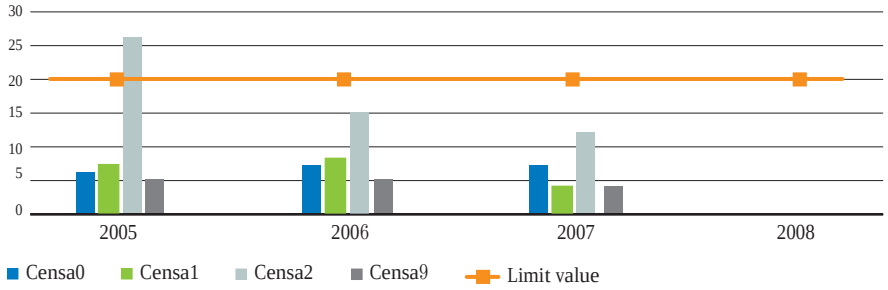


TABLE 37 Reports submitted to Saras regarding the exceeding of alarm thresholds pursuant to Ministerial Decree 60/2002 for SO_2

Parameter	2005	2006	2007	2008
no. of reports/year	4	4	6	13

Measurements from the provincial network for PM10

For PM10, no violation of the legal limits was found in the 2006 – 2008 period, except for the CENSA9 sensor, and that was limited to the year 2005.
The number of times the hourly limit value for protecting human health was exceeded and the annual average concentration values of PM10 are given in tables 38 and 39.

TABLE 38 PM10: Concentration values measured by the provincial network no. of times value of hourly limit for protecting human health was exceeded

Sensor	2005	2006	2007	2008
CENSA0	4	4	12	14
CENSA1	5	10	8	11
CENSA2	15	20	21	15
CENSA9	55	---	0	11
Limit value*	50 µg/m^3, not to be exceeded more than 35 times in a calendar year			

*Limit value specified by Italian Ministerial Decree no. 60/2002; --- : data not available

CHART T38 (No. of times exceeded)

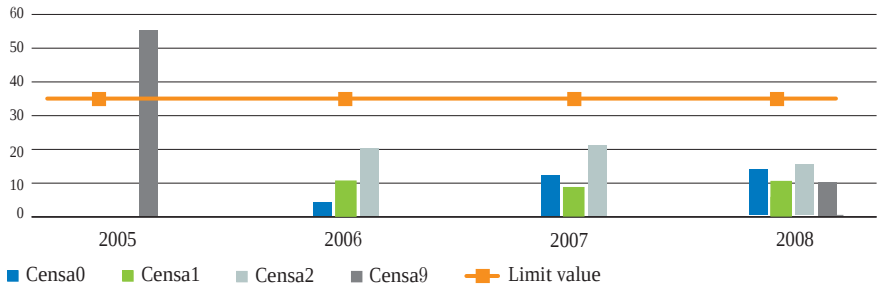
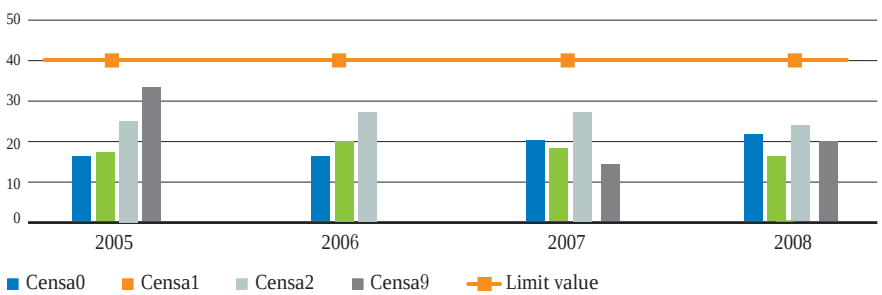


TABLE 39 PM10 : Concentration values measured by the provincial network – Average annual concentration

Sensor	2005	2006	2007	2008
CENSA0 (µg/m^3)	16	16	20	22
CENSA1 (µg/m^3)	17	20	18	17
CENSA2 (µg/m^3)	25	27	27	25
CENSA9 (µg/m^3)	33	---	14	20
Limit value*	40 µg/m^3 limit for protection of ecosystems			

*Limit value specified by Italian Ministerial Decree no. 60/2002; --- : data not available

CHART T39 (µg/m^3)



Measurements from the provincial network for NO_2 and NO_x

For NO_2, for all stations the figures indicate that the values are comfortably lower than the legal limits. In the 2005 – 2007 period, no exceeding of the alarm threshold was registered, nor of the hourly limit for the protection of human health. In 2008 a single exceeding of the hourly limit for the protection of human health was recorded, at the CENSA0 station, and the annual value was in any case lower than the limit value.
The average concentration values of NO_2 and NO_x are given in tables 40 and 41.

TABLE **40** NO_2: Measurements from the provincial network – Average annual concentration of NO_2

Sensor	2005	2006	2007	2008
CENSA0 (µg/m³)	7	8	7	9
CENSA1 (µg/m³)	9	11	13	10
CENSA2 (µg/m³)	11	18	12	11
CENSA9 (µg/m³)	11	12	12	12
Value limit for protection of human health (µg m³) *	50	48	46	44

*Limit value specified by Italian Ministerial Decree no. 60/2002; this will become 40 µg/m³in 2010

CHART **T40** (µg/m³)

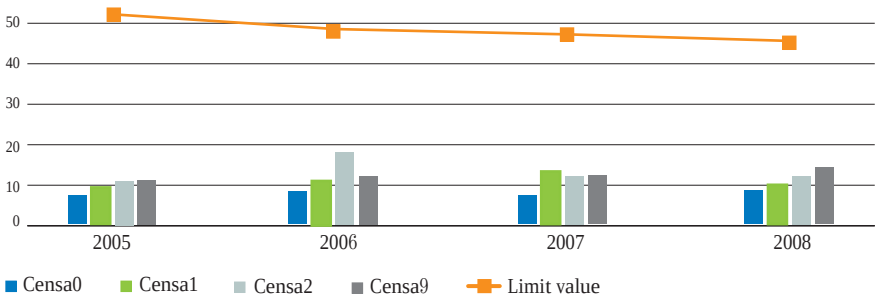
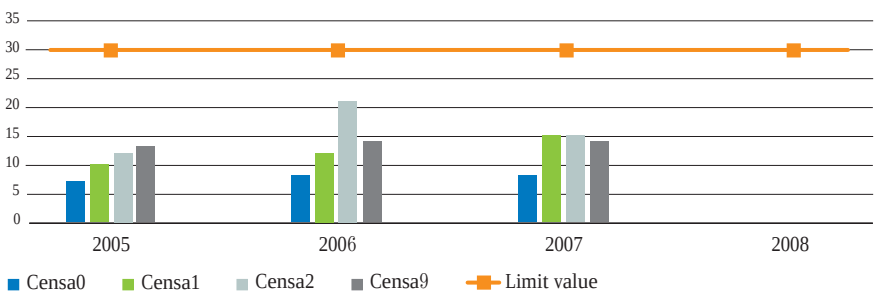


TABLE **41** NO_x: Measurements from the provincial network – Average annual concentration of NO_x

Sensor	2005	2006	2007	2008
CENSA0 (µg/m³)	7	8	8	n.d.
CENSA1 (µg/m³)	10	12	15	n.d.
CENSA2 (µg/m³)	12	21	15	n.d.
CENSA9 (µg/m³)	13	14	14	n.d.
Limit value*	30 µg/m³ limit for protection of vegetation			

*Limit value specified by Italian Ministerial Decree no. 60/2002
n.a. data not available (not provided by ARPAS)

CHART **T41** (µg/m³)



Measurements from the provincial network for other pollutants (H_2S, benzene, ozone, CO)

For the other pollutants monitored, the report from the Provincial Authority shows the following:

- for **CO** the values are much lower than the legal limits, and they are aligned with the values for the years prior to 2007. In 2008 the only data provided was for the CENSA2 station, and this data confirms that the legal limit was not exceeded; **[Ministerial Decree no. 60/2002]**
- for **benzene** the values are lower than the legal limit, except for the CENSA0 station, which in 2008 saw an annual average of 8.8 µg/m^3 compared with a legal limit of 7 µg/m^3 *. The other stations did not record the limit's being exceeded; **[Legislative Decree no. 183/2004]**
- for **ozone** in 2008, the information and alarm thresholds were not exceeded. Data for the limit for the protection of human health was not provided. The report draws attention to how the ozone problem can only be tackled on a vast scale, given the phenomenon of this pollutant's being transported over long distances; **[Presidential Decree 15/04/1971]**
- for **hydrogen sulphide** the concentration values in the 2005 - 2008 period are lower than the legal limits of 40 µg/m^3 (for average daily concentrations) and of 100 µg/m^3 (for average hourly concentrations) except for 2008, when the average daily limit was exceeded 2 times and the average hourly limit was exceeded 15 times. These incidents occurred on 13 and 14 February, when an electrical fault caused a number of systems to shut down, in accordance with the operational procedures in place and without anomalies in the systems themselves. **[Anomaly of 13-15 February 2008]**

  During the plant shutdown activities, the liquid products (partially treated hydrocarbons and water) were ducted to the ST 98 slops tank. Analysis of the critical events has established that the source of the abnormal emission of H_2S derived from this tank, due to the special temperatures that were recorded under those specific conditions. Therefore, as soon as the cause was identified, the situation was recovered and the concentration levels of H_2S were checked in the inhabited centre of the Municipality of Sarroch. This allowed risks to people's health to be ruled out.

  In addition the following corrective actions were put in place:

  1) Design and installation of a fixed H_2S detection system near the upper crown of the tank mantle so as to have a rapid indication of any anomalies;

  2) In situations where multiple plants are shut down with flows of differing quality towards the slops tank, in the presence of abnormal H_2S emissions, it will be immediately physically isolated in order to monitor the situation at the tank.

  Analysis of the event was communicated by Saras to the local and national authorities.

* An official assessment is available on the Sardinia ARPAS website.

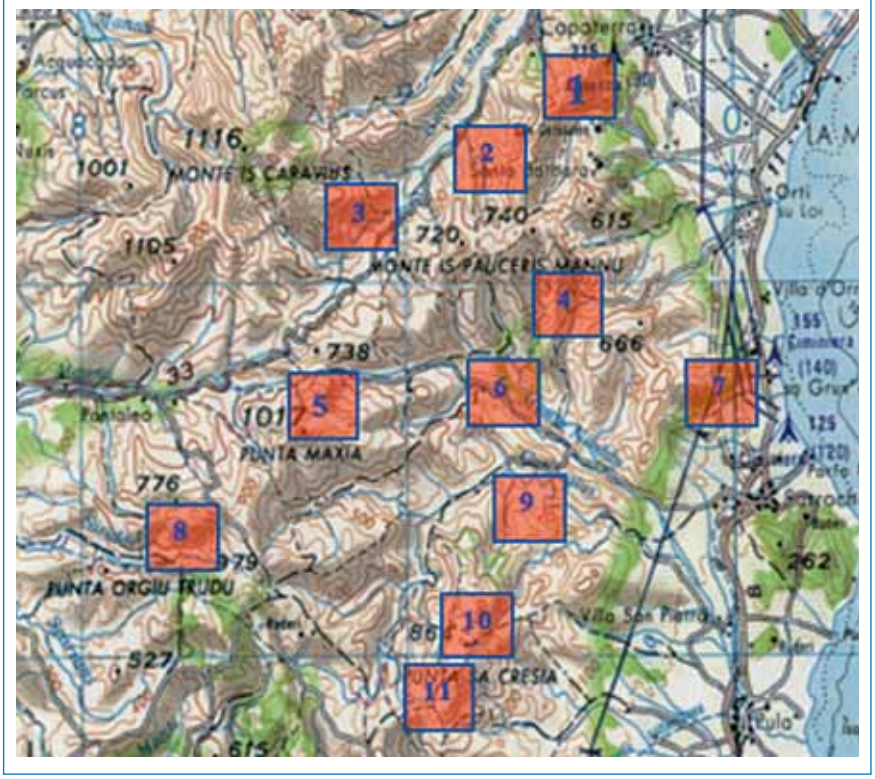


Figure 15 Location of air quality bio-monitoring stations.

4.2.4.4.2 Monitoring of air quality using bioindicators and biodiversity studies

As well as using chemical indicators, the state of air quality can also be monitored using biological indicators.

Epiphyte mosses, which are mosses that live on the trunks of trees, are the most-used bioindicators for monitoring air quality. The monitoring method is based on a measurement of biodiversity, i.e. on the abundance of different moss species. The presence of atmospheric pollutants (principally oxides of sulphur and nitrogen) can reduce the biodiversity values.

In a vast area that comprises the inland Sarroch region, shown in figure 15, for many years a study has been conducted by the Botanic Sciences Department of the Faculty of Mathematical, Physical and Natural Sciences at the University of Cagliari. This is a campaign of checks on the state of health of the vegetation, and it also adopts the "epiphyte mosses" method for air quality biomonitoring.

Table 42 shows the reference factors for interpreting the classes of air quality and environmental naturalness, with reference to the "Index of Atmospheric Purity" (I.A.P.)[1].

[1] The I.A.P. index was created by: P.L. Nimis, "Guidelines for bioindication of the effects of pollution through the biodiversity of epyphitic lichens", Department of Biology, University of Trieste, 1999, and has been adopted in several studies on air quality, including by the Italian ARPAs (Regional Agencies for the Protection of the Environment).

TABLE 42 Index of Atmospheric Purity (I.A.P.): classes of quality and environmental naturalness

A.P. classes	.A.P. values	Air quality rating	Naturalness/alteration
7	I.A.P. = 0	Very poor	Very high alteration
6	1 < I.A.P. < 10	Poor	High alteration
5	11 < I.A.P. < 20	Low	Medium alteration
4	21 < I.A.P. < 30	Mediocre	Low naturalness / low alteration
3	31 < I.A.P. < 40	Average	Average naturalness
2	41 < I.A.P. < 50	Fair	High naturalness
1	I.A.P. > 50	Good	Very high naturalness

Table 42 also highlights the classes which cover the index values taken in the stations monitored.

The air quality in the region under examination is in the “I.A.P. 3” class, with an “average” rating of both air quality and naturalness, for 8 monitoring stations out of 11; and in the “I.A.P. 4” class, with a “mediocre” rating of air quality, “low” naturalness and “low” alteration, for the remaining 3 stations.

These measurements include the station nearest to the industrial area.

Compared to the previous year, we can see an increase in the I.A.P. for 4 stations, and a modest reduction for just 2 stations.

The air quality is higher in the stations furthest in to the area examined, and not as high in the station nearest the Sarroch industrial area. This result was to be expected.

However, the picture that emerges from the analyses using bioindicators shows a state of quality that is located in the intermediate band between the extremes of the I.A.P. index assessment scale.

In the area under investigation, a control campaign is also conducted on the state of health of the vegetation. The investigation is conducted by verifying the state of health of the vegetation through visual checks of various different vegetable species, and through verifying the bio-accumulation of pollutant substances.

According to the results of the field measurements, there is no critical threat to the health of the vegetation in the area studied.

4.2.4.5 – Emissions of greenhouse gases

[implemented by Legislative Decree no. 216/06 and subsequent modifications]

Greenhouse gas (carbon dioxide, CO_2)

The activities carried out on the Sarroch site, i.e. refining and electricity generation, come under the scope of application of the European directive on Emission Trading.

The Directive was introduced across Europe to control and reduce carbon dioxide emissions, under the application of the Kyoto Protocol. The objective of this regulation is to reduce emissions of greenhouse gases, and particularly carbon dioxide, as these gases are considered responsible for the planet's progressive global warming. This is more commonly known as the greenhouse effect. The Emission Trading scheme was introduced from 2005 onwards, to help member states to observe the requirements of the Kyoto Protocol. It works by assigning each individual plant falling within the directives field of application an emissions allowance, established by the member state through a National Allocation Plan.

Surplus allowances may be traded and/or stockpiled, and any deficit must be covered by acquiring emissions allowances on the market.

Allocation is decided for each of the reference periods set by the Directive, and the first reference period covered the 2005-2007 three-year period.

In 2008 the second period of the Directive's application (2008-2012) began. The allowances in this period are more stringent, based on the objectives specified in the Kyoto Protocol.

Following the coming into operation of the U800, Saras, in accordance with to the "Regulations for New Entrants" (Decree of 28 February 2008), received additional CO_2 allowances (489 tCO_2 for 2008 and 22,313 tCO_2/year for the 2009-2012 period).

A new Emission Trading Directive is planned for the 2013-2020 period.

The objective of the new Directive is, by 2020, to reduce CO_2 emissions to 20 per cent lower than the levels recorded in 2005. The system for allocating additional CO_2 to companies will also change drastically. Calculation of CO_2 emissions in the Saras site is based on a special Monitoring Plan, defined in accordance with specific European and Italian guidelines[1]. The monitoring is based on measuring the consumption of fuels and on the application of specific emission factors for each fuel.

The requirements to be observed for the monitoring instrumentation are very stringent and must be checked and maintained over time. In addition, the laboratories that carry out analyses on the fuels must obtain special accreditation[2]. The internal laboratory at Saras was one of the first Italian laboratories operating in a refinery (the third in Italy) to obtain the necessary accreditation to carry out checks on some of the fuels used.

The National Emission Trading Register, which can be freely consulted, documents the assigned allowances and emissions, year by year, of CO_2 allowances in Italy. Saras has been assigned a single position, corresponding to the totality of the emissions deriving from the activities conducted at the Sarroch site.

The tables and charts on the following page give the data for the annual CO_2 emissions from the site, both in absolute and relative terms, relating to the quantity of raw materials processed in one year. The figures for 2008, like those for the 2005–2007 period, have been validated by LRQA Italy, a company on the list of bodies especially accredited for this purpose by the Ministry for the Environment.

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[1]The European guidelines for the 2005 – 2007 period are contained in Directive 2004/156/EC. They were implemented in Italy with the implementation provisions contained in DEC/RAS/854/05. For the subsequent five-year period, 2008 – 2012, new guidelines will have to be applied. These are contained in Decision 2007/589/EC, which will be followed by the implementation provisions (currently under discussion).

[2]The reference standard for laboratory accreditation is ISO 17025.

The emissions trend of the first period (2005 – 2007), which has also been confirmed by the data for 2008, was typical of the sites normal performance, with slight fluctuations caused by plant maintenance, for example (table 43 and the accompanying charts). The objective of controlling and reducing greenhouse emissions is closely linked to the rational use of energy and the adoption of efficient production systems, areas to which Saras devotes particular attention, and the company has defined objectives to improve energy efficiency.

TABLE 43 Emissions of CO_2: absolute values and allowances assigned

Parameter	2005	2006	2007	2008
Refinery emissions (t/year)	2,562,344	2,348,553	2,508,281	2,485,255
Allowances assigned to the refinery* (t/year)	2,615,246	2,615,246	2,615,246	2,137,872
IGCC emissions (t/year)	3,704,403	3,878,387	3,751,317	3,728,496
Allowances assigned to the IGCC (t/year)	3,544,794	3,544,794	3,544,794	444,404

*Annual allowances assigned for the 2005 – 2008 period

CHART T43A (t/year)

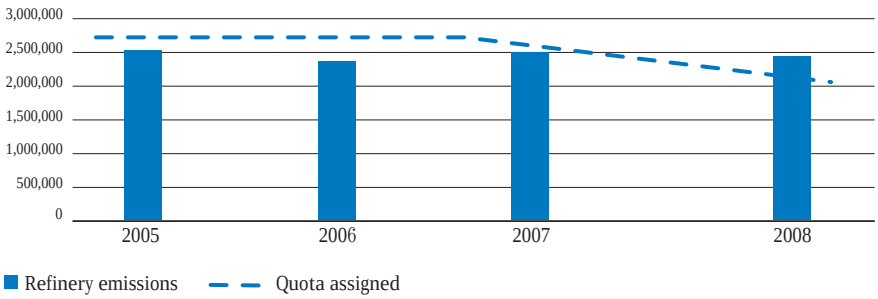


CHART T43B (t/year)

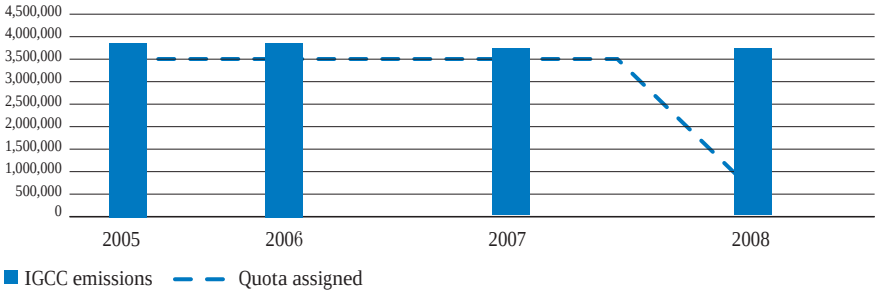
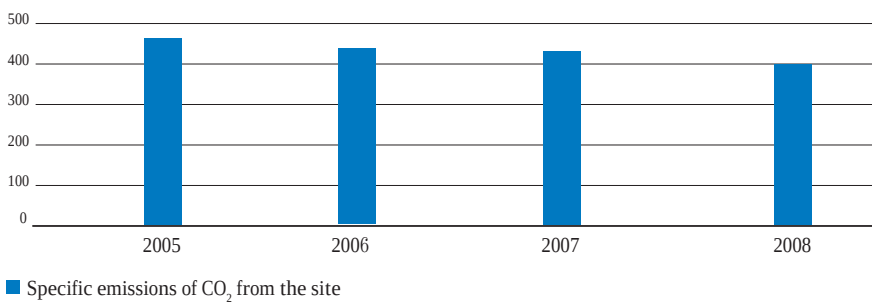


TABLE 44 Specific emissions of CO_2 from the site

Parameter	2005	2006	2007	2008
Specific emissions from the site, t CO_2/kt raw materials	434	429	429	400

CHART T44 (t CO_2/(kt raw materials)



4.2.5 – Emissions into water

4.2.5.1 – General

[Authorisation to discharge no. 445 of 22/11/2004]

Figure 16 shows the location of the Saras site's discharge points into water. In accordance with the authorisation of the Province of Cagliari, each discharge point is identified by a different code.

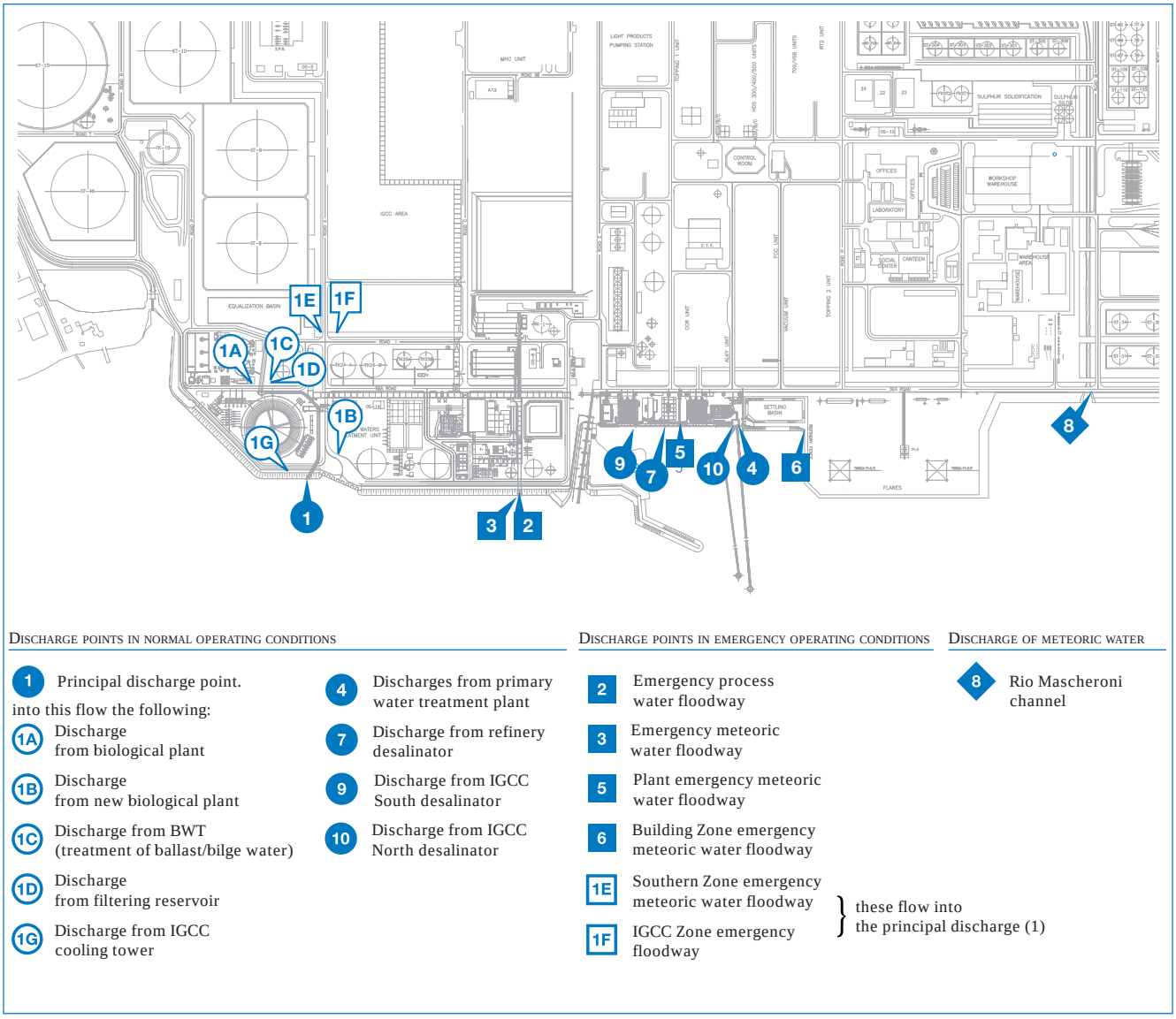


Figure 16 Map with location of site discharge points

Discharge points in normal conditions

The principal discharge point, no. 1, ducts the water coming from the following plants and units to the sea:

- the treatment plant for the facility's wastewater, with two discharge points (1a and 1b). The plant performs chemical, physical and biological treatments on the waters coming from the oily sewer network, to which are ducted wastewater and meteoric water from the plant areas, and sanitary water;
- the treatment plant for ballast water (slops and washing water) and bilge water (paragraph 4.2.6) coming, respectively, from tanker ships that moor at the marine terminal and from private ships; water pumped from the wells in the site's hydraulic barrier (paragraph 4.2.7); and meteoric waters, excluding those collected from the plants area. The treatment plant has one discharge point (1c);
- the filtering reservoir, which accumulates the water purified by the wastewater treatment plant, and equipped with a defined-level overflow discharge (discharge 1d);
- the discharge from the IGCC cooling tower (1g).

Discharges nos. 4, 7, 9 and 10 are also ducted to the sea. These discharges come from the following plants:

- primary treatment of water brought in to the site, taken from the industrial aqueduct (4);
- desalinators of the refinery and of the IGCC (7, 9, 10).

All of the above-mentioned discharges are active under normal conditions and are continuous, except for the discharges from the filtering reservoir and from the primary treatment of water from the aqueduct.

Since meteoric water is not subjected to pollution sources, this water (which comes from the roads and paved open areas in the northern zone of the refinery and from the basins of the LPG spheres) is ducted into the Rio Mascheroni channel and from there to the sea (discharge point no. 8).

CONTRIBUTIONS TO THE DISCHARGE FLOW (%) 2008

Main discharge point (excluding IGCC tower)	17.4
Discharge from desalinators	57.5
Discharge from IGCC tower	24.0
Discharge from treatment of incoming water	1.1

Discharge points in emergency conditions

In emergency conditions due to exceptional events (torrential rains), the meteoric water, including water from the roofs of the buildings in the IGCC zone and from the sea terracing of the IGCC, are discharged via the emergency process water floodways and the plant sewerage system (1e, 1f, 2, 3, 5, 6).

These discharges are normally closed and sealed by the controlling authorities. The integrity of the seal placed by the Authorities is periodically checked and any deterioration is reported.

If it becomes necessary to activate one or more of these discharges, an internal emergency procedure is followed by the facility, and the Provincial authority is notified (within the timescale required by the authorisation) of the reasons for removing the seals and the time required to restore normal conditions.

Determination of emissions values in water

In accordance with regulations established by the Province of Cagliari regarding the discharge of waste water into the sea, monthly samples are taken by an accredited external laboratory, and the results of the analysis are sent to the provincial authority each quarter.

Based on this data (for COD, for nitrogen and for suspended solids) and on information from the continuous hydrocarbon analysers, the annual figures have been arrived at, and these figures are presented below.

4.2.5.2 – Data on emissions into the sea

Discharges from wastewater treatment units

The significant quantitative parameters describing emissions into the water which are ducted to the principal discharge point (point 1) are the following:

- flow of water discharged;
- COD;
- total hydrocarbons;
- nitrogen in different forms (ammoniac nitrogen/nitrous nitrogen/nitric nitrogen).

Below are the figures for the above parameters for the four discharge points (points nos. 1a, 1b, 1c, 1d) taken together, ducted to the principal discharge point.

[flow]

Table 45 and charts T45A and T45B show the average hourly flow figures of discharged water, giving both absolute values and specific values in relation to the raw materials processed.

Analysing the data for the four-year period 2005 – 2008, for both the absolute indicator and the specific indicator we note a substantially constant trend, with a tendency towards improvement in 2008 when the greater quantity of raw materials processed is taken into account.

TABLE 45 Discharges from wastewater treatment units (points 1a, 1b, 1c, 1d) – Flow

Parameter	2005	2006	2007	2008
Total water discharged – average annual flow (m^3/hour)	776	767	750	703
Total water discharged/raw materials processed (m^3/kt raw materials)	471	463	450	398

CHART T45A (m^3/hour)

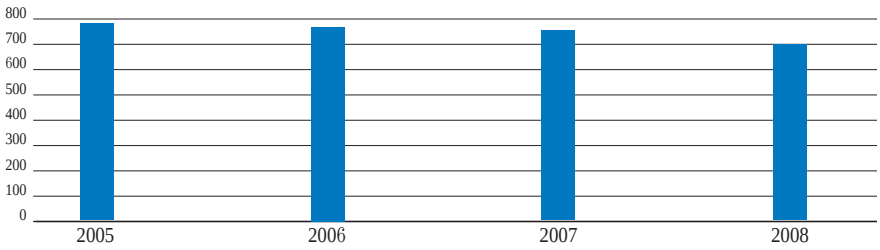
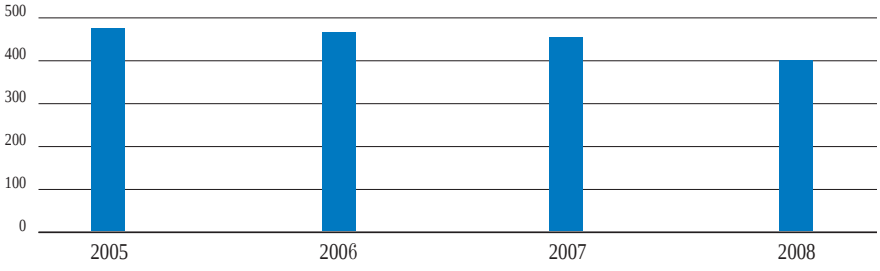


CHART T45B (m^3/kt raw materials)



[COD]

The figures for the COD indicators, expressed as absolute and specific mass flow values and as average annual concentration, are given in table 46. The COD trend shows fluctuations over the years, but always with average concentration values that are well below the legal limit value.

TABLE 46 Discharges from wastewater treatment units (points 1a, 1b, 1c, 1d) – COD

Parameter	2005	2006	2007	2008
Absolute values (t/year)	502	368	472	369
Specific values (t/millions of t of raw materials)	34.9	25.4	32.3	23.8
Average concentration values (mg/l)*	72.3	53.1	66.8	59.7

* Compared to the limit value of 160 mg/l, specified by Legislative Decree no. 152/2006 Part III, Enclosure 5.

CHART T46A (t/millions of t raw materials)

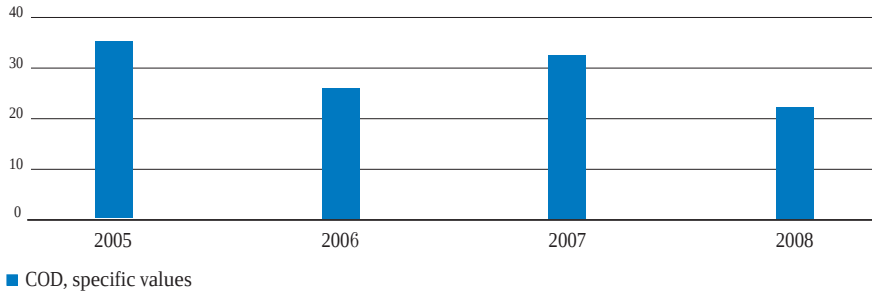
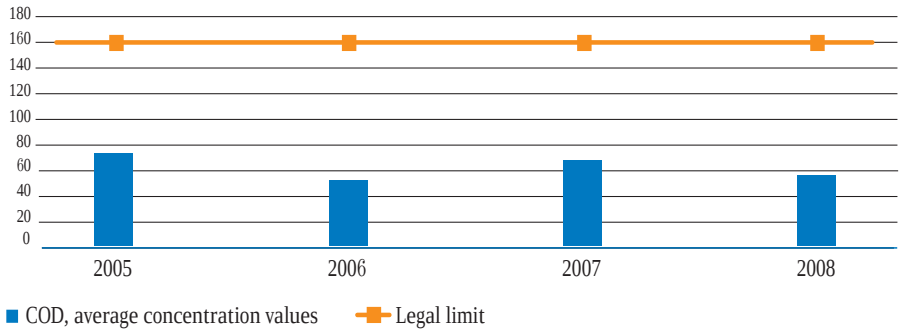


CHART T46B (mg/l)



[Total hydrocarbons]

Table 47 gives the figures for the indicators for total hydrocarbons, expressed as absolute and specific mass flow values and as average annual concentration.

TABLE 47 Discharges from wastewater treatment units (1a, 1b, 1c, 1d) – Total hydrocarbons

Parameter	2005	2006	2007	2008
Absolute values (t/year)	11,8	10,1	14,3	10,4
Specific values (t/millions of t of raw materials)	0,82	0,70	0,98	0,67
Average concentration values (mg/l)*	1,8	1,5	2,2	1,7

* Compared to the limit value of 5 mg/l, specified by Legislative Decree no. 152/2006 Part III, Enclosure 5.

CHART T47A (t/millions of t raw materials)

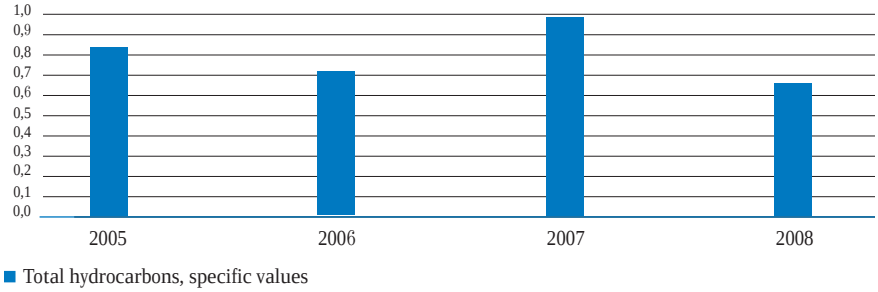
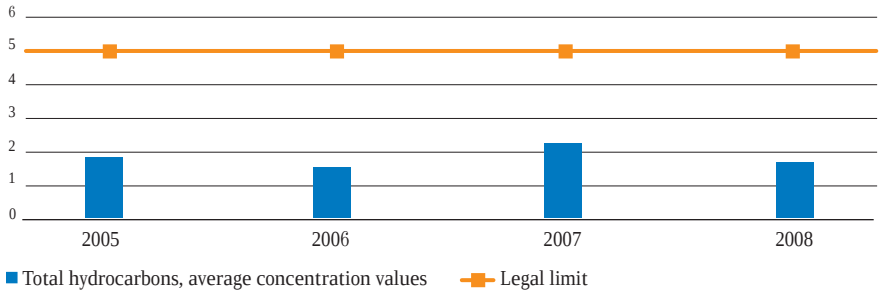


CHART T47B (mg/l)



The total hydrocarbons trend shows average concentration values that are much lower than the legal limit.
In the first half of 2007, due to the malfunctioning of flotation units and a prolonged maintenance period, an increase was recorded for this parameter.
The problem in the treatment system was solved in the second half of 2007, and values of the parameter then returned to typical levels.

[Nitrogen]

Tables 48 and 49 give the figures for the indicators for nitrogen, expressed as absolute mass flow values of total nitrogen and as average annual concentration of nitrogen in its individual forms (ammoniac nitrogen/nitrous nitrogen/nitric nitrogen). The trend in the indicators is substantially constant, except for a continuous overall total reduction in nitrogen, beginning in 2007 and also confirmed in 2008 (table 48).

TABELE **48** Discharges from wastewater treatment units (points 1a, 1b, 1c, 1d) – Total nitrogen (ammoniac, nitrous and nitric): mass flows

Parameter	2005	2006	2007	2008
Absolute values (t/year)	60.8	56.7	31.6	19.0
Specific values (t/millions of t of raw materials)	4.22	3.91	2.17	1.22

CHART **T48A** (t/year)

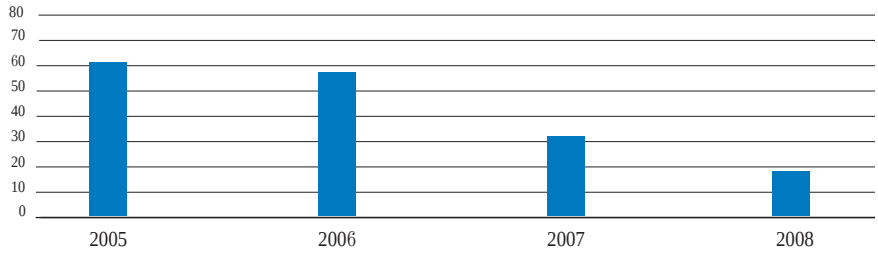


CHART **T48B** (t/millions of t raw materials)

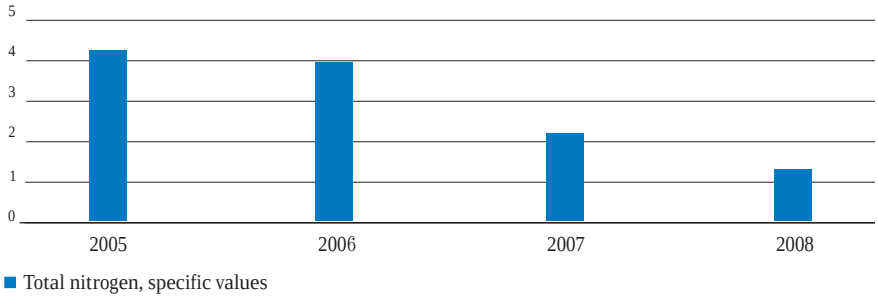


TABLE **49** Discharges from wastewater treatment units (points 1a, 1b, 1c, 1d) – Nitrogen (ammoniac, nitrous and nitric): average concentrations

Parameter	2005	2006	2007	2008	Valore limite*
Ammoniac nitrogen (mg/l)	0,91	1,12	2,09	2,09	15,00
Nitrous nitrogen (mg/l)	0,10	0,09	0,04	0,06	0,60
Nitric nitrogen (mg/l)	7,92	7,24	2,68	1,70	20

* Limit value specified by Italian Legislative Decree no. 152/2006 Part III, Enclosure 5.

Since 2007 an increase has been recorded for ammoniac nitrogen, with a simultaneous reduction in nitrous and nitric nitrogen, as can be seen from the concentration figures given in table 49.
This trend is due to a different management of the nitrification/denitrification section of the wastewater treatment plant, aimed at increasing the distance from the legal limit for nitrates.
The trend over the four years is shown in the charts on the following page.

CHART T49A (mg/l)

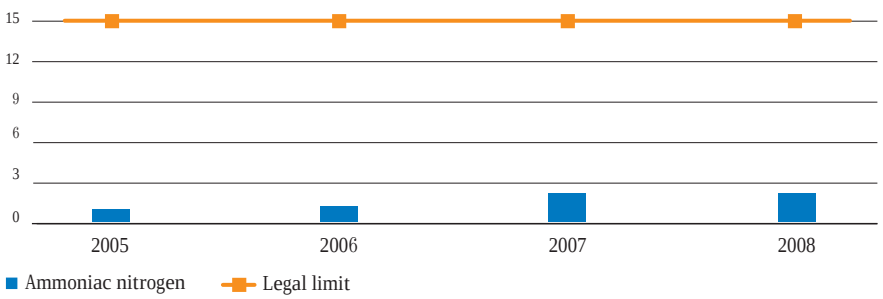


CHART T49B (mg/l)

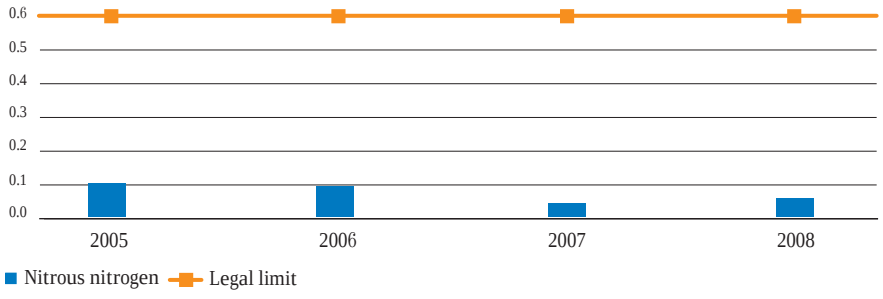
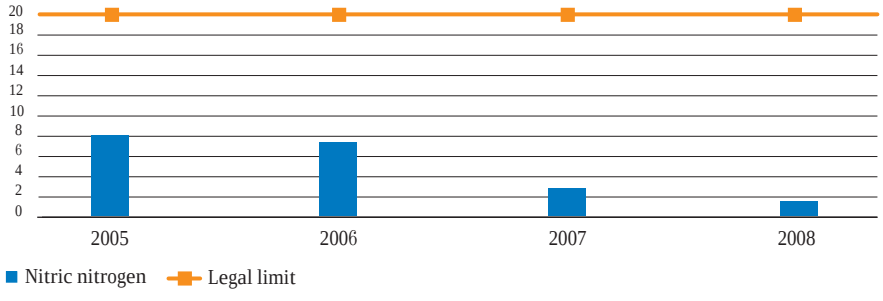


CHART T49C (mg/l)



Discharges from other units

Two principal parameters (discharge water flow and suspended solids) describe the discharges from the following units:

- primary treatment of incoming water (discharge point no. 4);
- desalinators (discharge points no. 7, 9, 10);
- IGCC tower (discharge point no. 1g).

The figures for these parameters for the three types of discharge listed above are given in the following tables and charts.

In particular, table 50 presents the figures for the average hourly flow of the discharged water, as absolute and specific values.

[flow]

The charts give the significant contributions to the overall flow (desalinators and IGCC tower).

TABLE **50** Discharges from the primary treatment units for input water (point no. 4), desalinators (points no. 7, 9, 10), IGCC tower (point no. 1g) – Flow

Parameter	2005	2006	2007	2008
Absolute values (m^3/hour)				
Treatment of incoming water	29.5	36.9	36.5	44.1
desalinators	2,716	2,893	2,778	2,323
IGCC Tower	918	928	977	972
Specific values (m^3/kt raw materials)				
Treatment of incoming water	17.9	22.3	21.9	25.0
desalinators	1,650	1,746	1,668	1,315
IGCC Tower	558	560	587	550

CHART **T50A** (m^3/hour)

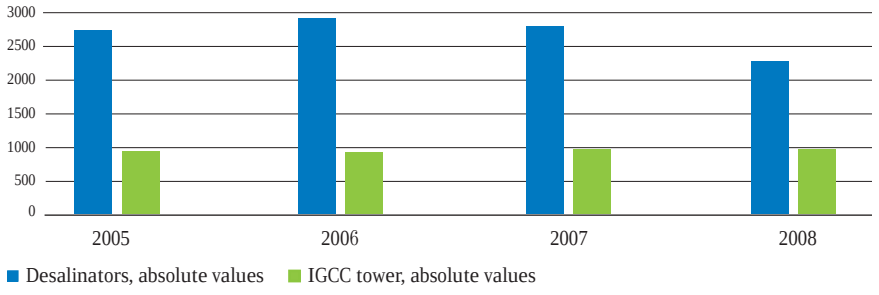
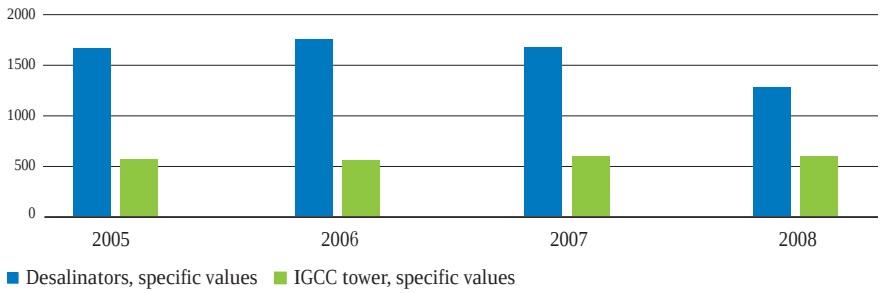


CHART **T50B** (m^3/kt raw materials)



[suspended solids – mass flows]

Table 51 gives the figures for the indicators for suspended solids, expressed as absolute and specific mass flow values. Here too, the charts give the significant contributions (desalinators and IGCC tower).
The average annual concentrations are shown in table 52 and its charts, on the facing page.
From the mass flow figures and the concentration figures for suspended solids in the discharges from the desalinators and from the IGCC tower, variations can be observed over the years. The variations in suspended solids are principally linked to the greater or lesser frequency of sea storms over the course of the year.

TABLE 51 Discharges from the primary treatment units for input water (point no. 4), desalinators (points no. 7, 9, 10), IGCC tower (point no. 1g) – Suspended solids: mass flows

Parameter	2005	2006	2007	2008
Absolute values (t/year)				
Treatment of incoming water	6	10	7	10
desalinators	621	528	536	507
IGCC Tower	340	288	287	289
Specific values (t/millions of t of raw materials)				
Treatment of incoming water	0.4	0.7	0.5	0.6
desalinators	43.0	36.4	36.7	32.7
IGCC Tower	23.6	19.9	19.7	18.6

CHART T51A (t/year)

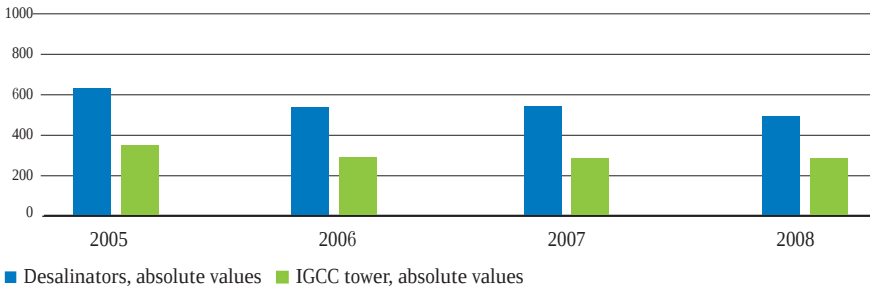
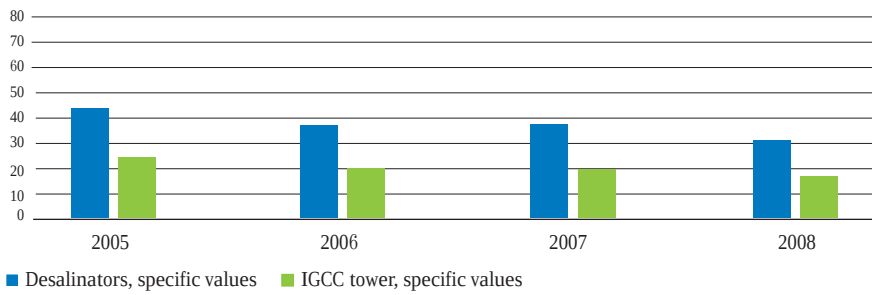


CHART T51B (t/millions of t raw materials)



[suspended solids – concentrations]

TABLE 52 Discharges from the primary treatment units for input water (point no. 4), desalinators (points no. 7, 9, 10), IGCC tower (point no. 1g) – Suspended solids: average concentrations

Parameter	2005	2006	2007	2008	Valore limite*
Treatment of primary water (mg/l)	23.8	29.9	21.2	25.1	80
Desalinators** (mg/l)	24.9 – 27.9	22.4 – 23.9	20.7 – 23.6	23.8 – 25.3	80
IGCC tower (mg/l)	41.5	34.8	33.0	33.8	80

* Limit value specified by Italian Legislative Decree no. 152/2006 Part III, Enclosure 5.
** The interval of minimum and maximum values for the three desalinators is shown.

CHART T52A (mg/l)

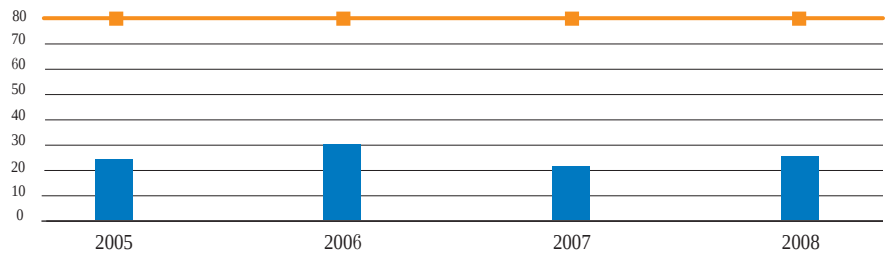


CHART T52B (mg/l)

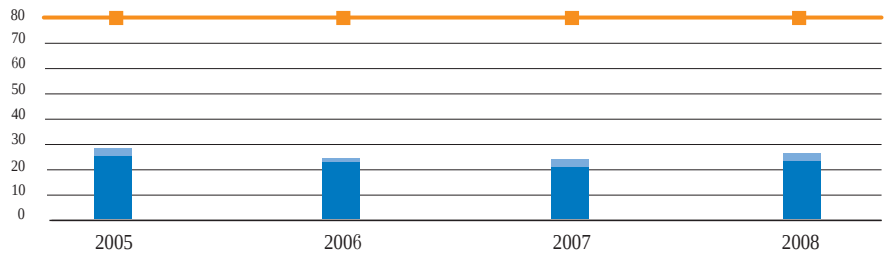
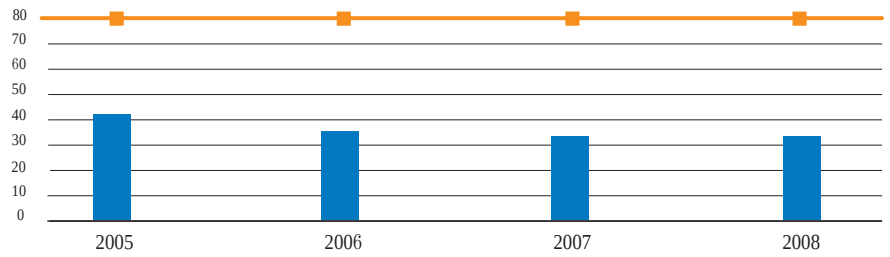


CHART T52C (mg/l)



Emergency situations following spills into the sea

The emergency situations that can affect seawater derive from the accidental spilling of hydrocarbons from the marine terminal. These situations are analysed and assessed in the Safety Report (paragraph 3.3, page 38).

Preventive measures against spills into the sea include a programme of inspections, carried out on board ships during the loading of products and unloading of raw materials. A high proportion of ships are checked (paragraph 4.3.2, page 113).

To handle emergencies at sea, the Marine Pollution Prevention Plan has been drawn up. This contains different intervention procedures according to the type of product spilled.

In the four-year period 2005 – 2008 there were no accidents with spills of hydrocarbons into the sea.

4.2.5.3 – State of seawater quality

For several years, marine biologists have conducted periodic studies of the stretch of sea in front of the area occupied by the Saras site, to check the state of quality of the marine water.

Specifically, the study includes detailed chemical/physical analyses at varying depths, at a series of points positioned along lines perpendicular to the coastline, shown in figure 17.

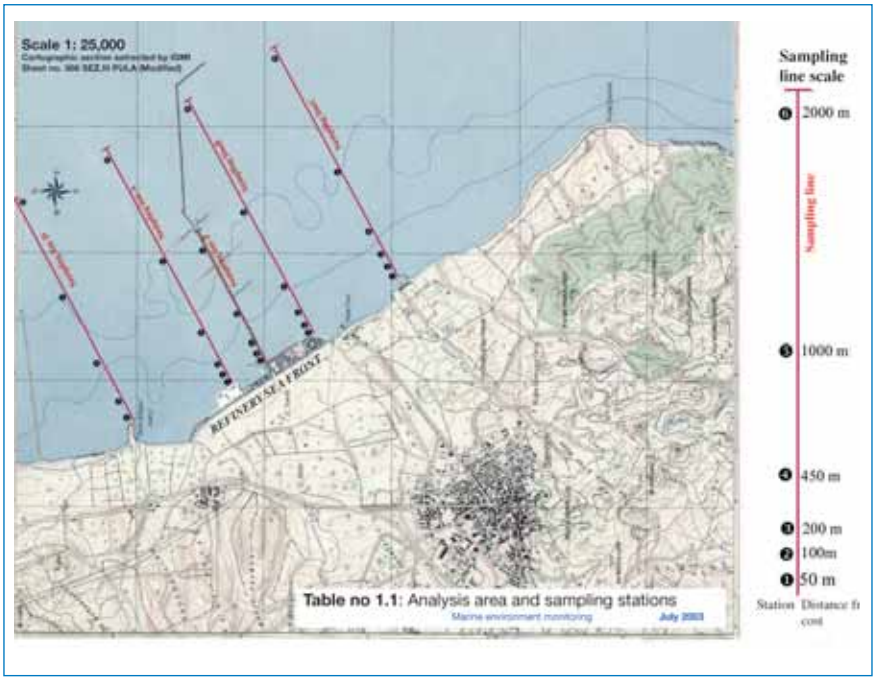


FIGURE 17 Area covered by the study of the seawater quality

["TRIX" indicator of seawater quality]

To describe the state of quality of the seawater, an indicator called the Trophic Index (TRIX[1] for short) is used. This expresses the state of quality of the seawater in a succinct form. The TRIX indicator is calculated using a mathematical formula that considers chemical values (percentage of dissolved oxygen, concentrations of phosphorous and nitrogen) and biological values (chlorophyll "a") found in the seawater.

On the facing page, table 53 shows the reference values for interpreting the classes of quality of seawater. The table also highlights the classes of quality which cover the indicator values taken at the points monitored in the study mentioned above.

The state of quality found in the seawater is in the high range of the classification ("high"/"good"), and this is confirmation of the state of quality found in 2007.

[1] The TRIX index – specified by Legislative Decree 152/99 for the characterisation of the state of quality of seawater – was not taken up by Legislative Decree 152/06, which abrogated the previous decree. However, while waiting for a complete implementation of the European directive on seawater, this index continues to be widely used, and is also used the controlling authorities (the ARPAs), partly because it allows comparison with data collected in previous years.

TABLE 53 Trophic Index (TRIX): classes of quality and condition of water

Trophic index	Trophic state	Water conditions
2 – 4	High	Good transparency of water; absence of coloration anomalies from the water; absence of undersaturation of dissolved oxygen in the benthic water.
4 – 5	Good	Occasional turbidity of the water; occasional coloration of the water; occasional hypoxia in the benthic water.
5 – 6	Mediocre	Insufficient transparency of the water; abnormal coloration of the water; hypoxia and occasional anoxia of the benthic water; states of suffering in the benthonic ecosystem.
6 – 8	Poor	High turbidity of the water; widespread and persistent anomalies in the coloration of the water; widespread and persistent hypoxia/anoxia in the benthic water; kills of benthonic organisms; alteration/simplification of the benthonic communities; economic damage to the tourism, fishing and aquaculture sectors.

In recent years, to formulate the rating of the trophic state of the water, a new parameter has been introduced: the CAM[1] index (Marine Waters Classification; the acronym reflects the Italian term). The CAM is based on algorithms specific to the sea of Sardinia. In general the CAM index has shown an "average" water quality across the whole area surveyed, with the exception of a number of cases where the low water quality can be attributed to the period of particularly heavy rainfall which determined the transport of sediment-forming nutrient substances (Table 53 b).

[new CAM Index parameter]

In any case, these indices are significant for wide time intervals and not on a single period.

TABLE 53 BIS CAM Index (specific to the seas of Sardinia)

		water at seafloor
January 2005	low	low
July 2005	average	average
January 2006	low	low
July 2006	average	average
January 2007	average	average
July 2007	average	average
January 2008	average	average
July 2008	average	average

The stretch of sea covered by the analysis is also affected by thermal discharges, i.e. discharges of water with higher temperatures than that of the ambient water.

The applicable legislation requires that the increase in temperature of the receiving body must not exceed 3° C over 1000 metres away from the immission point. Every 6 months, in accordance with the IRSA method (Manual of analytical methods for waters, Italian title Manuale dei metodi analitici per le acque, published in Quaderno Istituto Ricerca sulle Acque no. 100, 1995) specified by the Ministerial Decree of 16/04/1996, a check is conducted of the differences in temperature detectable at 1,000 metres from the discharge point from the IGCC seawater cooling circuit, along a semi-circumference with its centre at the point of discharge.

[Law no. 502 of 6/12/93]

The results of these checks show temperature difference values of around 1° C in the winter study, and not much higher than 1° C (1.0 – 1.4° C) in the summer study, as can be seen from the data in table 54.

[1]CAM Index (Marine Waters Classification): the index used in coastal marine environment monitoring. It converts the values read into a summary rating of the state of quality of the sea.

TABLE 54 Measurement at depth of 0.1 m along an arc of semicircumference of radius 1 km with its centre on the discharge point of the IGCC tower (point no. 1g)

	January 2005	July 2005	January 2006	July 2006	January 2007	July 2007	January 2008	July 2008
Minimum T°C	12.6	24.1	11.5	27.5	14.7	24.1	13.1	24.8
Maximum T°C	13.1	25.1	12.3	28.9	15.1	25.2	14.1	26.1
°C thermal increase	0.5	1.0	0.8	1.4	0.4	1.1	1.0	1.3

4.2.6 – WASTE

4.2.6.1 – General

Waste management at the Saras site is geared towards the twin primary objectives of minimising the quantities produced and progressively increasing the waste flows sent for recovery.

[waste management phases]

With reference to figure 18, the principal operational phases of managing waste at the site, before the waste is sent off-site for disposal or recovery, are described below:

- waste generated, appropriately divided into homogenous categories, is generally sent to the temporary deposit areas (point no. 2, in figure 18);
- filter cake coming from the IGCC plant can be stored in the temporary deposit area, or in a specially-authorised storage area[1] before being sent off-site for recovery of the metals contained in it (points nos. 3 and 4);
- ferrous scrap materials are subjected to recovery in a designated area, managed by an authorised external firm[2], which puts the scrap through a process of selection and reduction in volume, but without altering the type and mass quantity (point no. 1);
- part of the waste generated, mainly comprising waste polluted by hydrocarbons, is sent to a plant on-site that separates the oily phase and the watery phase contained in the waste, and then subjects it to an inertisation treatment. The treatments carried out considerably reduce the mass quantity of the waste and modify its type, by mixing it with an inert matrix. The recovered oily phase is sent to the refining cycle and the watery phase is collected by the sewerage network, which ducts it to the facility's wastewater treatment plant. Management of the separation and inertisation plant is assigned to an external firm with the appropriate authorisation[3] (point no. 6);
- exhausted oils are stored in special containers (point no. 7);
- waste comprising plastic, glass, aluminium and paper is collected separately and deposited in a designated area (point no. 5).

[Law no. 70 of 25/01/1994]

All the waste generated on site, including waste sent to the two firms mentioned above, is accounted for in the annual declaration (Environmental Declaration Unified Form or "Modello Unico/MUD") of waste produced by Saras. The two firms receive the waste sent to them, and they account for the waste that they send off-site (after the treatments have been carried out) in their annual declarations. These firms are selected and verified over time, including by means of specific audits (paragraph 4.3.3).

[1] Regional decision no. 739 of 01/06/2006
[2] Regional decision no. 163 of 23/06/2009
[3] Regional decision no. 2201/IV of 23/09/2004

FIGURE 18 Areas designated for the principal activities for managing waste on site.

The filter cake from the IGCC plant is shipped for recovery to plants located in Germany, and so every year authorisation is sought for cross-border movement of waste[1], in accordance with Directive EC/1013/2006.
Lastly, Saras is authorised[2] to receive and treat waste comprising bilge water, slops and ballast water from ships.

[bilge water treatment]

This service is provided completely free of charge for ships that moor at the marine terminal, and for ships that send Saras these types of waste from regional ports via tanker truck.
These types of aqueous waste are treated in the ballast water treatment plant, previously mentioned in paragraph 4.2.5.
This plant also treats the groundwater pumped by the wells in the hydraulic barrier (paragraph 4.2.7), and this waste is also classified and accounted for as part of the waste generated by Saras's site activities.

[1] Provincial decision no. 148 of 23/06/2009
[2] Regional decision no. 2520/IV of 04/11/2004 supplemented by Decision no. 964/IV of 31/05/2005

4.2.6.2 – Data on waste

Based on the management described, the waste figures and evaluations take account of both the waste generated by Saras's activities (figures declared in the Environmental Declaration Unified Form) and the waste leaving the site after treatment by the inertisation plant.

Table 55 gives the figures for the overall waste generated by Saras's activities, subdivided into hazardous waste and non-hazardous waste.

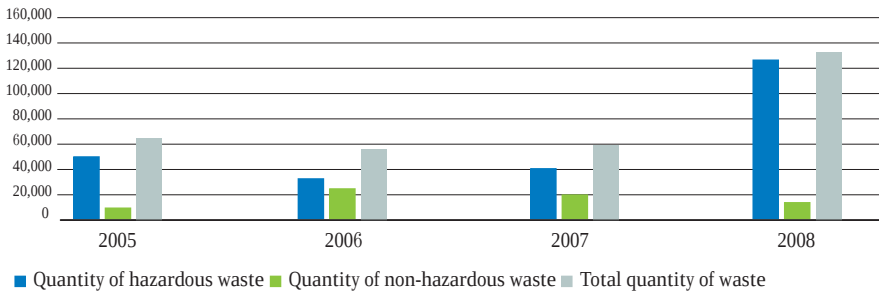
WASTE GENERATED ON SITE (%) 2008	
Waste to on-site inertisation plant	16.8
Water from wells in the hydraulic barrier to wastewater treatment plant	56.8
Filter cake sent for recovery off-site	0.9
Other types of waste	25.6

TABLE 55 Saras waste generated on-site (refinery and IGCC)*

Parameter	2005	2006	2007	2008
Quantity of hazardous waste (t/year)	52,795	36,731	40,735	126,671
Quantity of non-hazardous waste (t/year)	9,358	22,240	19,806	10,152
Total quantity of waste (t/year)	62,153	58,971	60,541	136,823

*Includes all types of waste generated by the refinery and by the IGCC plant and accounted for in the Environmental Declaration Unified Form ("Modello Unico") as shipped waste

CHART T55 (t/year)



The increase in hazardous waste in 2008 can be attributed principally to the site decontamination activity as shown in the table below, which shows a trend in hazardous waste produced by ordinary activities that is in line with previous years (see table 55 b, "Quantity of hazardous waste t/year").

TABLE 55 BIS Quantity of hazardous waste (t/year)

Parameter	2008
Water from decontamination activities (t/year)	77,705
Soil from decontamination activities (t/year)	13,803
Hazardous waste from ordinary activities (t/year)	35,162
Total (t/year)	126,671

Table 56 gives the data for outgoing waste from the Saras site: here, too, we can see an increase over previous years. Again, this is due to the decontamination activities conducted on-site.

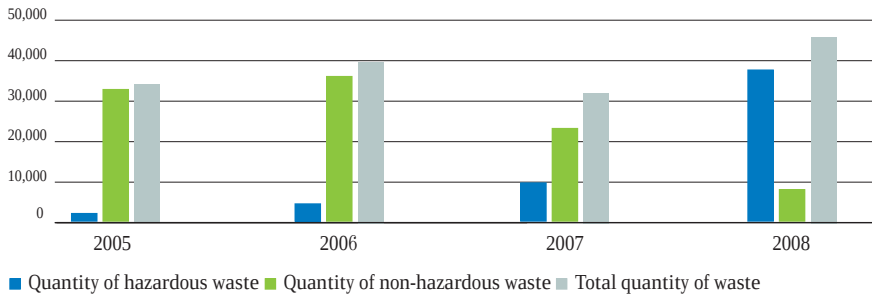
TABLE 56 Outgoing waste from the Saras site *

Parameter	2005	2006	2007	2008**
Quantity of hazardous waste (t/year)	1,834	4,209	9,365	38,498
Quantity of non-hazardous waste (t/year)	32,465	35,678	22,862	7,917
Total quantity of waste (t/year)	34,299	39,886	32,227	46,415

* Includes all types of waste generated by the refinery and by the IGCC, excluding the waste sent to the inertisation plant on the site and the water pumped from the wells in the hydraulic barrier, and includes the inertised waste generated by the internal plant.

** The increase in the quantity of hazardous waste in 2008 is principally due to the decontamination activities conducted on-site.

CHART **T56** (t/year)



The indicator, given in table 57, is calculated by taking account of the types of waste originating from the refining cycle, in relation to the quantity of raw materials processed. The values of the indicator are compared with the reference values (less than 2 kg of waste per ton of crude processed), which are contained in the Italian Guidelines on the best available techniques in the refining sector.

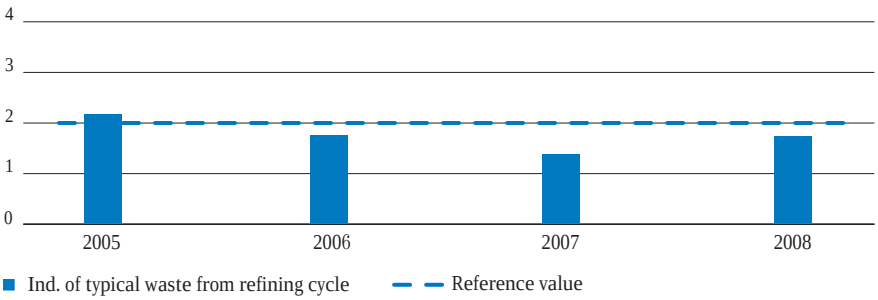
TABLE **57** Waste production from Saras activities

Parameter	2005	2006	2007	2008*	Reference Value**
Indicator of production of typical waste from refining cycle* (kg/t raw materials)	2.15	1.72	1.37	1.37	≤2

* Indicator calculated by subtracting the waste deriving from extraordinary activities and/or not pertaining to the refining cycle (e.g. excavated rocks and earth, materials resulting from cleaning the sea floor of the small harbour, vanadium concentrate from the IGCC plant etc.) from the total waste leaving the site

** Value indicated by the Guidelines on Best Available Techniques (Decree of Ministry for the Environment 29/01/2007)

CHART **T57** (kg/t raw materials)



In addition to waste of industrial origin, waste equivalent to urban solid waste is also generated on-site. This waste comes mainly from office and canteen activities. The separated waste collection of plastic, glass and paper, in place since 2006 with an overall collection quantity of 50 tons, doubled in 2007 and, in 2008, the amount reached 126.2 tons. This increase was achieved partly as a result of a site awareness-raising campaign and, in particular, as a result of the contribution of the entire site personnel. Since 2008 the collection of organic waste has also been in place in the company canteen.
Separated waste collection is the subject of a specific objective for improvement.
Table 58 shows, in percentage terms, the different types of final destination of the outgoing waste from the site.

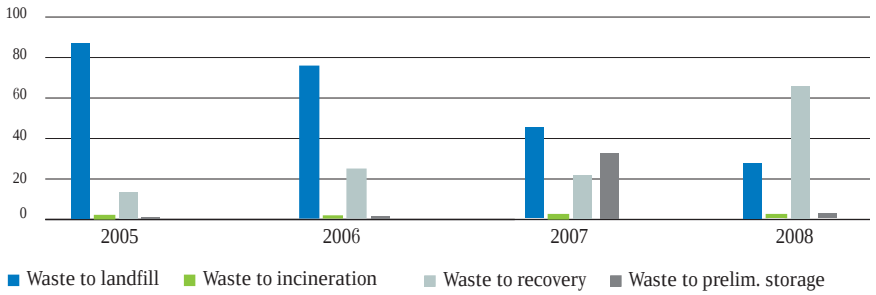
[table of objectives and interventions objective no. 11, page 125]

TABLE 58 Destination of outgoing waste from the Saras site

Destination of waste	2005	2006	2007	2008
Waste sent to landfill (% of total waste)	86.3	74.9	44.7	30.4
Waste sent for incineration (% of total waste)	1.09	0.94	1.31	0.97
Waste sent for recovery (% of total waste)	12.7	24.1	21.2	66.8
Waste sent for preliminary storage (% of total waste)	0.01	0.006	32.8*	1.85

*In 2007 this item included waste excavated soil, to be sent for subsequent recovery. In 2008 this type of waste was correctly included in the "Waste sent for recovery" entry.

CHART T58 (%)



In 2008 approximately 108,707 tons of waste was sent for recovery or recycling, with a notable increase over previous years. The increase in this figure is principally linked to site decontamination activities, (see table 55 b), as well as the sending of exhausted catalysers used in the desulphurisation process to companies specialising in the recovery of metals (Co, Mo, Ni).

[table of objectives and interventions objective no. 12, page 125]

We can see that in the second two-year period, 2006-2007, the overall quantity of waste sent for recovery was significantly greater, going from 12-15% in the 2004-2005 two-year period to 21-24% in the 2006-2007 two-year period. In 2008 this figure increased further, to around 67%. Consequently, the quantity of waste sent to landfill has been significantly reduced.

The good result achieved is due to the ability to send waste comprising excavated soil, from decontamination activities and from the tank containment reservoirs, for recovery instead of disposal. Recovery of the soil is carried out at an off-site plant, located in the Macchiareddu industrial area.

Increasing the quantity of waste sent for recovery is the subject of a specific objective for improvement. The percentage division between hazardous and non-hazardous waste in the waste sent for recovery is given in table 59. As can be seen, the proportion of non-hazardous waste in the waste sent for recovery dominates up until 2007, and in 2008, when Saras began sending soil for recovery, this trend is reversed.

TABLE 59 Outgoing waste sent for recovery from the Saras site: Hazardous and Non-Hazardous

Parameter	2005	2006	2007	2008
Amount of hazardous waste sent for recovery (% of total waste for recovery)	42.4	43.7	38.0	79.7*
Amount of non-hazardous waste sent for recovery (% of total waste for recovery)	57.5	56.3	62.0	20.3

* The increase is principally due to the decontamination activities conducted on-site.

4.2.7 – Accidental spills on soil and subsoil

Prior activities

[Ministerial Decree no. 471/99 replaced by Legislative Decree no. 152/06, Part IV, Title V]

In observance of the provisions of Italian Ministerial Decree of 25 October 1999, no. 471 (regulations containing the criteria, procedures and methods for the safety containment, reclamation and environmental restoration of polluted sites), Saras, having identified a contamination problem in the soil and subsoil and underlying groundwater at its production site in Sarroch, has submitted its proposed Characterisation Plan, for the state of the lands and groundwater underlying its site, to the environmental authorities, pursuant to article 9 of the Decree. The contamination derives from the presence, in concentrations higher than the limits specified for underlying groundwater, principally of the following substances or categories of substance: total hydrocarbons, benzene, lead, methyl tert-butyl ether, p-Xylene and toluene. In the soil and subsoil, few cases of exceeding the limits have been recorded, principally for heavy hydrocarbons (C>12).
Subsequently, pursuant to Ministerial Decree no. 468 of 18/09/2001 and the Ministerial Decree of 12/03/2003, the region of the Municipality of Sarroch was included, together with 33 other Municipalities, in the area named "Sulcis Iglesiente Guspinese", identified as a site of national interest for reclamation.
In 2004 Saras, in conjunction with the Ministry for the Environment, the Region of Sardinia, the Province of Cagliari, Local Health Authority (ASL) no. 8 and the Municipality of Sarroch, defined the procedures for implementing the Site Characterisation Plan, which set out a series of surveys to be carried out and proposed the measures that may be needed to protect the environment and safeguard public health.
In July 2004, characterisation activities were initiated at the site using the following techniques:

[site characterisation activities]

- surveys of the terrain by extracting "carrot" core samples from depths of from 5 to 10 metres to establish the subsoil stratigraphy, ascertain whether any contaminants are present and measure their concentrations;
- piezometry surveys, special surveys of the terrain conducted by extracting "carrot" core samples at depths of from 10 to 20 metres that can monitor the surface groundwater. This type of survey not only takes a stratigraphy of the subsoil and its quality (as in the surveys), but also allows examination of the condition of the water in the subsoil. Piezometry is carried out with a tube made of transparent glass inserted in the area where the water flows, which periodically takes samples of water to check its quality;
- gas surveys, a technique to verify the presence of hydrocarbon gas in the soil interstices.

The Site Characterisation Plan is currently in the completion phase. As of December 2008, 670 terrain surveys, 133 piezometry surveys and 500 gas survey control points have been made.
Based on the analyses, the following situations were found:

[Decisory Services Conference regarding the "Sulcis Iglesiente Guspinese" reclamation site of national interest, of 13/03/2008]

- soil analyses have shown only limited areas where hydrocarbon concentration value limits are exceeded (182 samples out of 3164 samples analysed), with a concentration in the West Tank Farm area and former ST1 tank area. In addition, limited exceeding of other parameters (Cd, Co, Cr, Cu, Ni, Pb, V, Zn and IPA) have been found for a total of 97 samples out of 3,164, in limited areas that are never adjoining, confirming that these are isolated cases and that the problem is not widespread;
- groundwater analyses have shown, in some cases, the presence of hydrocarbons over the concentration value limits. In addition, hydrocarbons were found in the

supernatant phase (LNAPL), and there was limited exceeding of other parameters (Cd, Ni, Pb, IPA, BTEX, MTBE, sulphates).

- gas survey analyses of surface soils showed all values to be within the normal range.

[the plan for intervention]

Based on the results of the characterisation activity, an emergency and operational groundwater safety containment project was defined, and this was approved in April 2007 by the Services Conference at the Ministry for the Environment.

The project involves building a hydraulic barrier with supernatant recovery systems, for emergency safety containment, and an integrated hydraulic barrier/physical barrier system, for operational safety containment. All 46 wells required for the hydraulic barrier have been dug: 26 wells already in operation on the median line, the function of which is to extract contaminated waters and recover the supernatant; 13 recharge wells on the seafront, of which one is outside the facility premises to the south, to prevent saline incursions, and 7 upstream hydrogeological extraction wells for controlling the groundwater level. The upstream hydrogeological wells and recharge wells are currently in the activation phase. The physical barrier will be 3,300m in length and will be constructed mainly using jet-grouting (concrete injection) techniques and waterproofing injections, and using plastic diaphragm for the south stretch.

[table of objectives and interventions objective no. 9, page 124]

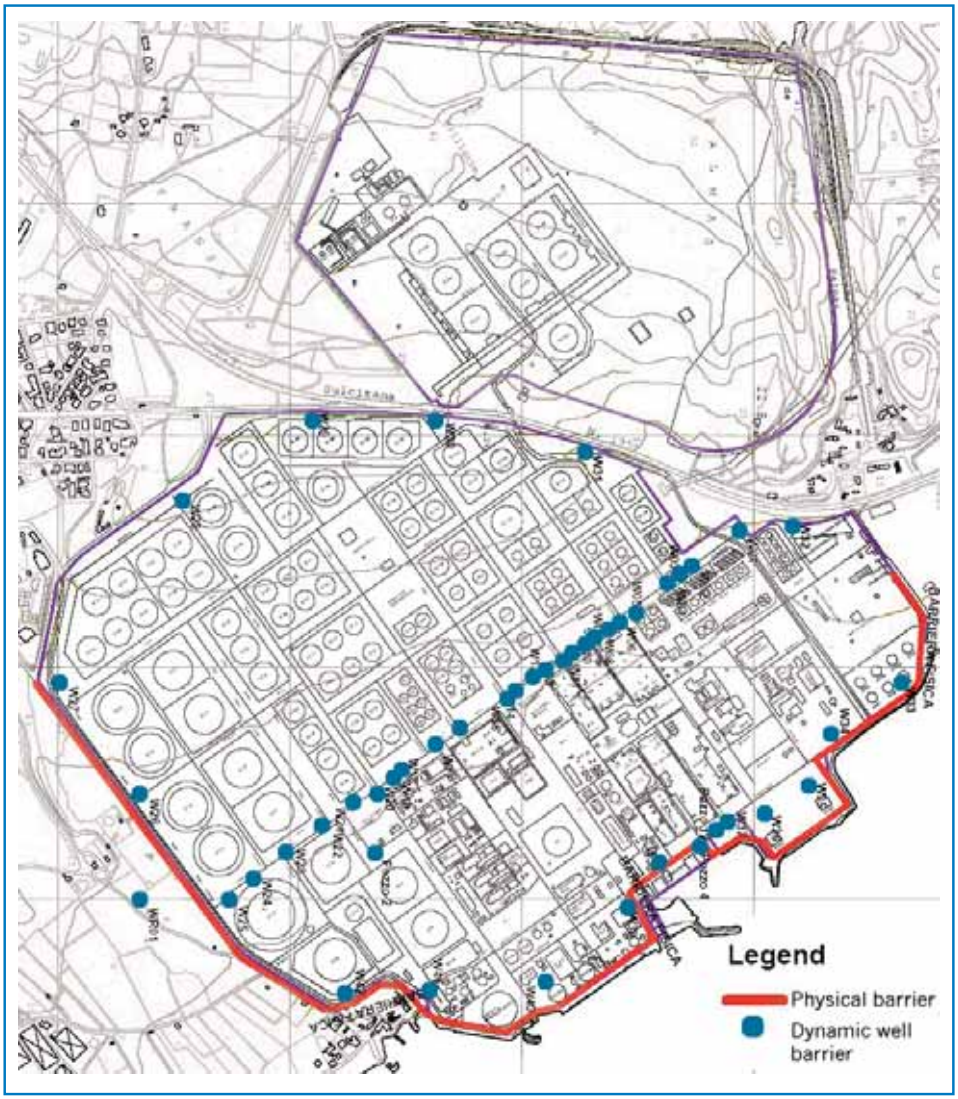


Figure 19 Location of the wells comprising the dynamic barrier, and planned location of the physical barrier

In 2008 field tests were conducted to test the site-specific operation and implementation conditions, for drawing up the executive project (Figure 19). Also in 2008, the decontamination project was drawn up for the hydrocarbon "hot spots" (C>12) in the soil in the West Tank Farm area, along with the project to make the soil safe in the former ST1 tank area. Excavation and decontamination activities were begun in the third quarter of the year. The soil in the West Tank Farm area will undergo excavation and soil washing treatment to remove hydrocarbons, following which the washed soil will be restored to its area of origin. In the former ST1 tank area, the contaminated soil will be sent for disposal.

TABLE 60 Prior activities

Parameter	2005	2006	2007	2008
Ratio of quantity of product recovered to water pumped* (%)	--	0.27	0.49	1.05

* The hydraulic barrier construction and product recovery activities entered operation in 2007.

Prevention of contamination of the soil and subsoil

In ordinary conditions, contamination of the soil and subsoil is not possible. Such an event can only occur following an accidental spill of liquid hydrocarbons (raw materials, semi-processed products and finished products).

This type of event can especially affect the storage areas and the routes under the pipes that connect the plants, tanks and wharf. The assessments of abnormal and emergency situations relating to the internal movement and storage of hazardous substances are examined and documented in the Safety Report (paragraph 3.3, page 38).

In terms of indicators, table 61 shows how the measures to prevent contamination of the soil and subsoil are being constantly increased.

In 2008 the costs of non-destructive checks were lower than in 2007.

This trend can be ascribed to less activity being made necessary in the period under examination.

To measure the reliability of the inspection activities, the sum of the costs sustained is not important. Rather, what is essential is observing the planning of the activities themselves, since the necessity of such activities can differ in quantity, and substantially so depending on the assessment of the risk.

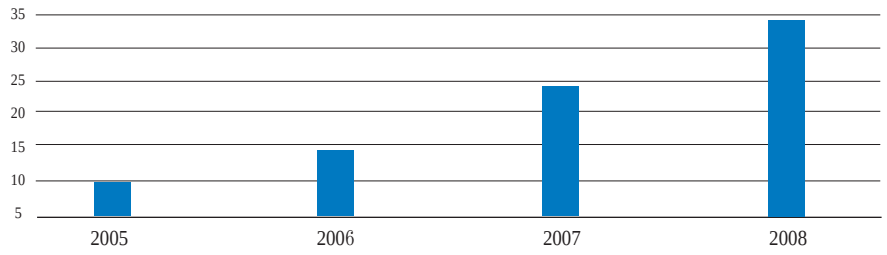
In addition to what has already been done, further progress is underway on the activities to improve measures to prevent contamination of the soil and subsoil.

[table of objectives and interventions objective no. 9, page 124]

TABLE 61 Activities to prevent contamination

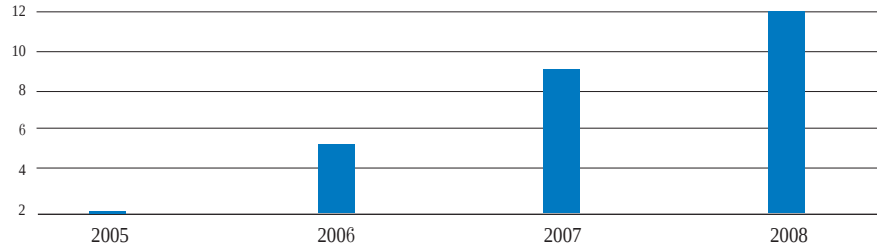
Parameter	2005	2006	2007	2008
Paving of containment reservoirs for crude/product tanks: paved surface/total surface (cumulative figure) (%)	9.9	14.5	24.4	34.5
Protection of soil in storage areas: number of tanks equipped with double bottom (cumulative figure)	2	5	9	12
Protection of soil along pipeways: paving of paved surface (cumulative figure) (m^2)	17.107	18.207	18.207	22.719
Inspection and maintenance activities: spending on non-destructive checks (000 €/year)	1.257	2.155	2.933	1.640

CHART T61A



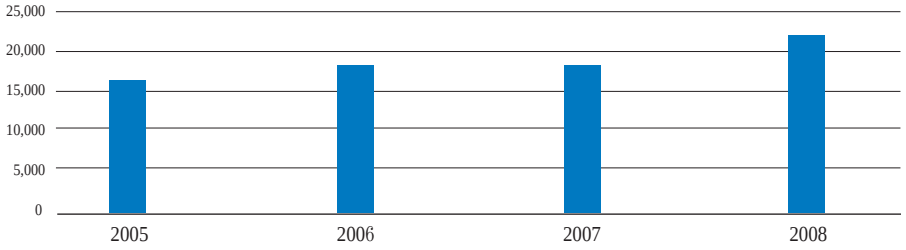
■ Paving of reservoirs for crude/product tanks

CHART T61B



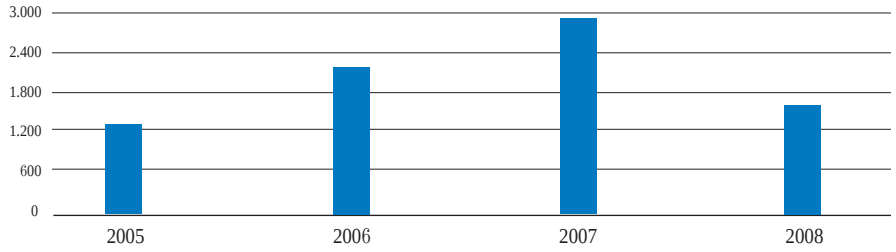
■ No. of tanks with double bottom

CHART T61C



■ Paving along pipeways

CHART T61D (000 euro)



■ Costs of inspection and maintenance activities

4.2.8 – Noise

To control noise pollution, since 1999 Saras has drawn up and implemented annual periodic controls of noise levels emitted into the surrounding environment, using phonometric measurements to establish the acoustic characteristics of the surrounding environment.
These measurements have been repeated over the years at the same measurement points, some of which are located within the premises and on the roads running along the perimeter of the Saras site, while others are located on the access roads and within the inhabited centre of Sarroch.
The location of the measurement points can be seen in the map shown in figure 20. The map base is taken from the municipal town plan.

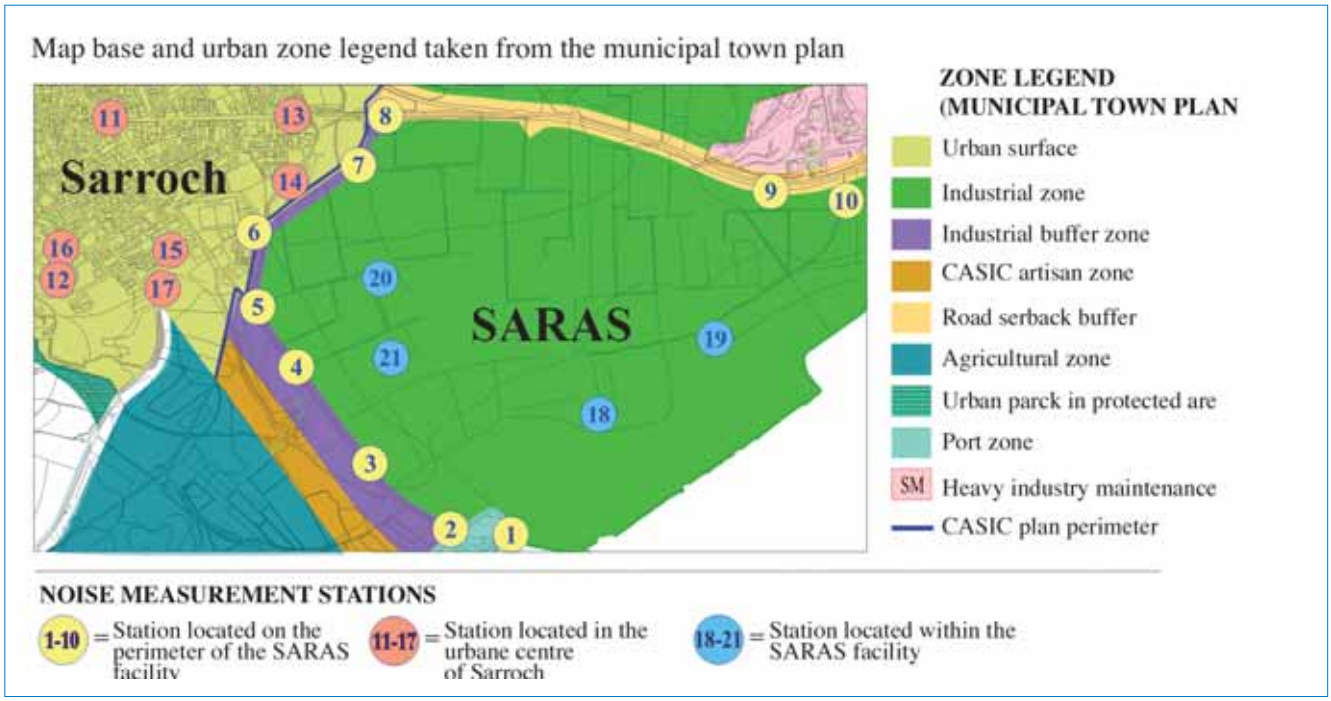


Figure 20 Location of noise measurement stations

In the absence of an acoustic classification for the municipal territory, the limit values for noise in outdoor environments, specified by the Prime Ministerial Decree of 1/03/1991, apply. These are presented in the following table.

[Prime Ministerial Decree 1/03/1991]

table 62 Limit values for noise in the outside environment – Prime Ministerial Decree **01/03/1991**

Classes of use destination of the territory	Zones corresponding to the area of interest	Daytime limits*** Laeq [dB(A)]	Night-time limits*** Laeq [dB(A)]
All of the national territory	External zones bordering with the Saras production site	70	60
Zona A*	---	65	55
Zona B**	Inhabited centre of Sarroch	60	50
Exclusively industrial zone	Saras production sites	70	70

* These are parts of the region that contain urban conglomerations with historic or artistic value or which are of particular environmental value
** These are parts of the region, entirely or partially built up, other than the A zones
*** Daytime runs from 06:00 to 22:00. Night-time runs from 22:00 to 06:00.

Tables 63A and 63B show, for some of the points investigated, the trend in noise levels measured in the last three years.
In particular, table 63A shows the emissions values measured at some of the stations located at the facility boundary, at no. 3 and no. 6.

TABLE **63A** Noise (emission) levels at the representative points near the boundaries of the Saras site

Acoustic classification, Prime Ministerial Decree 1/03/91	Measurement point	Values measured [dB(A)] (L90 values)			Emission limit (applicable near sources of emissions)	
		Year	Daytime*	Night-time*	Daytime*	Night-time*
All of the national territory (External zones bordering with the Saras site)	3	2008	45.2	46.6	65	55
		2007	44.5	51.5		
		2006	49.7	51.7		
	6	2008	38.7	51.9**		
		2007	37.2	47.0		
		2006	42.3	43.4		

* Daytime runs from 06:00 to 22:00. Night-time runs from 22:00 to 06:00.
** From values taken from 2008 annual monitoring, with reference to the significant measurements to verify the session limit values.

Table 63B gives the immission values measures in the outdoor environment, at two stations located in the inhabited centre of Sarroch, near the boundary of the industrial site, at no. 14 and no. 15. These values refer to the statistical parameter L90, i.e. the noise level exceeded for 90% of the time measured. This parameter can be considered inclusive of industrial noise, which is continuous and for the most part stationary over time, in the sense that the value measured excludes accidental acoustic events and includes the noise generated by the Saras site, by other industrial sites and by acoustic events of significant duration.

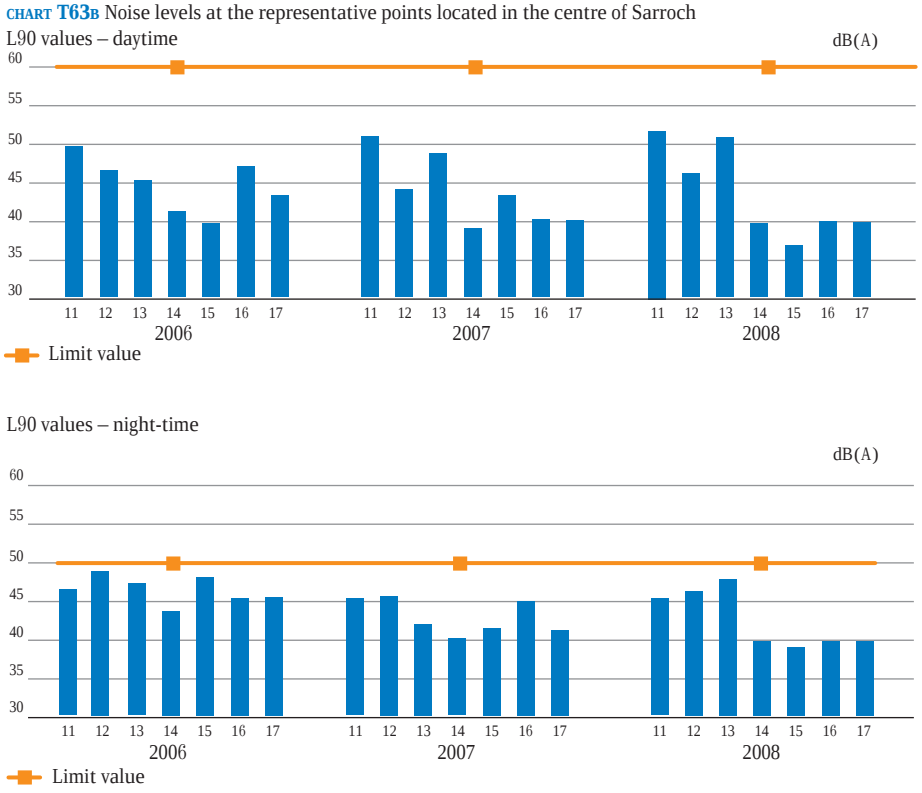
TABLE **63B** Noise levels (immissions) at the representative points located in the centre of Sarroch

Acoustic classification, Prime Ministerial Decree 1/03/91	Measurement point	Values measured [dB(A)] (L90 values)			Immission limit (applicable in the outdoor environment)	
		Year	Daytime*	Night-time*	Daytime*	Night-time*
Zone B (Inhabited centre of Sarroch)	14	2008	40.5	44.3	60	50
		2007	39.6	43.0		
		2006	41.4	43.8		
	15	2008	37.4	43.7		
		2007	45.0	43.0		
		2006	39.8	48.3		

* Daytime runs from 06:00 to 22:00. Night-time runs from 22:00 to 06:00.

Chart T63B gives the complete data series taken in all the measurement points located in the inhabited centre of Sarroch, and compares them with the applicable legal limits. Each bar in the histogram is labelled with the identification number of the corresponding noise measurement station, shown in figure 20 on page 103.

CHART T63B Noise levels at the representative points located in the centre of Sarroch



The differential criterion is not applicable to the existing continuous production cycle plants, or plants already authorised, at the time the decree came into force, as is the case with the refining plants and the IGCC on the Sarroch site, pursuant to article 31 of the Ministerial Decree of 11/12/1996.

[Framework Law 447/95, article 22]

Following a specific request put forward by the investigating commission for issuing the Environmental Integrated Authorisation, on an anticipatory basis and while awaiting the municipal acoustic classification, in April 2008 Saras submitted an acoustic classification referring to the measurement stations being studied. Developed by an acoustic engineer, the anticipatory classification is based on the subdivision into zones contained in the municipal town plan, and applying the acoustic class definition criteria specified by the Ministerial Decree of 14/11/1997.

Specifically:

- for the stations located on the facility's boundaries (points from no. 1 to no. 10), class V has been identified as appropriate: “Predominantly industrial zone”, with limit values of 70 dB(A) in the daytime and 60 dB(A) at night;
- for most of the stations located in the inhabited centre of Sarroch (points from no. 11 to no. 17), class II has been identified as appropriate: “Predominantly residential zone”, with limit values of 55 dB(A) in the daytime and 45 dB(A) at night.

Forthcoming studies – if the municipal Acoustic Classification Plan has not been approved – will refer to the legal limits in force.

4.2.9 – Visual impact

The company is also committed, with intensified activity in the years from 2000 onwards, to improving the visual impact of the facility. Improvement measures have covered structures and spaces that constitute areas of direct contact with the world outside Saras: these consisted of naturalisation measures, to create continuity areas between the facility and the surrounding region. In particular, the junction on S.S. 195 road was rebuilt, and the green areas in the parking area were improved.

In 2007 and in 2008, in the IGCC plant (boiler U701, U702, U703), the new condensation circuit was put into service to reduce the emission of steam plumes into the atmosphere.

[table of objectives and interventions objective no. 8, page 124]

For 2009 it is planned to complete the mechanical installations of the condensation circuit to eliminate the steam plume emissions into the atmosphere from the U950 deaerator.

4.2.10 – Odours

In the past, reports were submitted from outside Saras of the presence of unpleasant odours, following which an initial instrumental investigation was conducted in 2004 with the objective of identifying the sources of the odours perceived outside the site.

The study did not show any particular connection between the measurements taken outside and those taken inside the facility.

Over the following years the analysis and assessment methodologies were widened and improved to include more advanced methods that were more appropriate to the case under examination. This led to the definition of a methodology founded on a combination of analytic techniques and simulations using an atmospheric dispersion model (AERMOD), recommended by USEPA[1], together with evaluations by a group of qualified assessors. The methodology is illustrated in detail in the documentation submitted in response to the request for more information, following Saras's application for Environmental Integrated Authorisation submitted in April 2008.

In 2008 the experimental phase began and the new monitoring campaign for identifying odours was begun. The sampling points have been identified, by acting on the results of interviews with personnel and also by taking account of specific aspects of the processing phases (the substances present and their characteristics). Air samples have been taken from the pre-established points, and subsequently subjected to analysis. The results of the analysis have led to the identification of around twenty hydrocarbon substances, belonging to the sulphurous and oxygenated classes.

[table of objectives and interventions objective no. 14, page 125]

The experimentation phase that was continued up until the end of 2008 has enabled the perfecting of a monitoring methodology via combinations of analysis, modelling, and expert assessment techniques. The end objective of this work is to arrive at a preventive assessment of possible events that could generate an olfactory impact on the area outside the facility.

[1]United States Environmental Protection Agency

4.2.11 – Environmental aspects of low significance

PCBs

Polychlorinated biphenyls (PCBs) are chlorinated organic compounds that are very stable, both chemically and thermally. For this reason, in the past PCBs were widely used as dielectric (insulating) fluids in electrical devices (e.g. industrial transformers). This was before the dangers of PCBs were recognised, leading to prohibitions on their use.

Today the sale and use of PCBs in new applications is banned but, given the recognised difficulties of disposing of these substances, the law has different provisions for existing equipment depending on the quantity and concentration of PCBs present.

Following an inventory and periodic analytic controls, the 130 oil-insulated transformers present are decontaminated from PCBs. Periodic checks are conducted to verify the state of conservation of the transformers and maintain the PCB content below the minimum threshold specified by law to consider an appliance decontaminated.

[Ministerial Decree 11/10/2001]

Asbestos

Asbestos was for many years used for a variety of applications, in both the industrial and civil sectors, before its use was prohibited because of the associated dangers.

Over the years Saras has implemented the sector legal requirements: it has drawn up an inventory of materials containing asbestos, it has sent all necessary notifications to the supervisory authorities and carried out decontamination during plant maintenance operations.

Over the years cement-asbestos roofs have been progressively eliminated, going from a surface area of 10,800 m^2 in 2004 to 250 m^2 at the time of writing, and this final portion is currently being removed.

[Law no. 257/1992 and subsequent modifications and supplements]

The asbestos still present (as an insulator inside layers of insulation on pipes), is protected from the action of atmospheric agents that could alter its integrity, and it is removed during maintenance operations with the assistance of specialist firms, whenever it is discovered.

Ozone depleting substances (ODS)

The law imposes specific management procedures on this type of substance, in order to avoid its dispersal into the atmosphere and to favour its progressive elimination from the production process.

All the devices present in the facility are kept under control by means of periodic maintenance carried out by specialist personnel.

[Directive EC/2037/00 and Presidential Decree no. 147/2006]

In recent years Saras has been progressively replacing substances that are damaging to the ozone layer with other substances that do not have such an impact.

Currently the only substance of this type is Freon R22, of which overall the quantity is 1,203 kg. The use of this type of substance in existing air conditioning plants in operation will be prohibited from 1/01/2010 onwards.

Non-ionising radiation sources (electromagnetic fields)

The principal sources of electromagnetic fields in the facility can be classified into two general types:

- point sources, such as pumps, electrical switchboards, motors;
- linear sources, i.e. the conductor cables for transporting electricity. There is a buried cable operating at a voltage of 380 kV and which transports electricity from the IGCC plant to the ENEL electrical substation located along the western boundary of the facility.

A survey of the presence of electromagnetic fields, extended to the entire site and including external measurement points near the boundary, was carried out in 2004 and was repeated in 2007, using the same methods but increasing the number of measurement points.

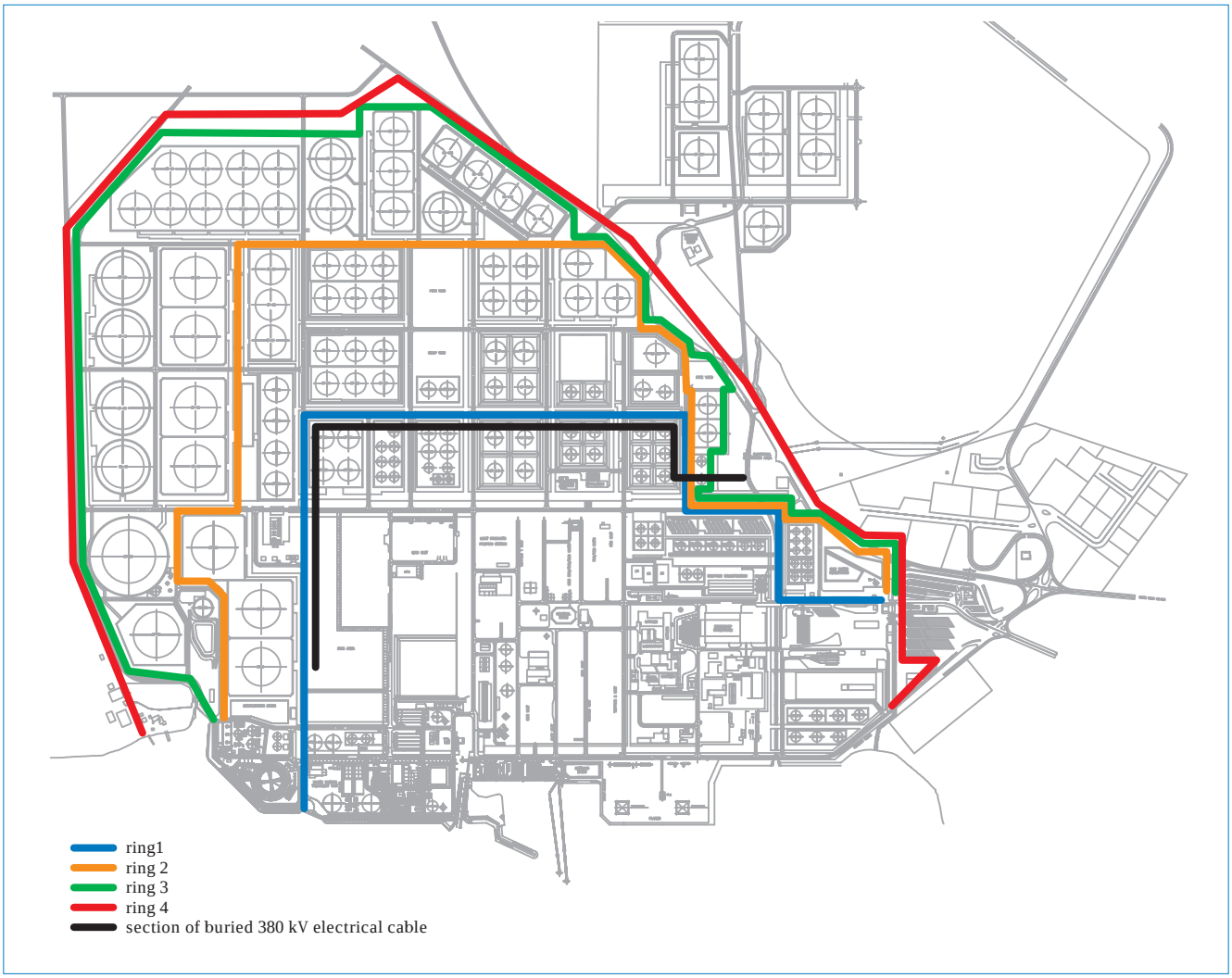


Figura 21 Map of sampling lines for investigation of electromagnetic fields

As can be seen from figure 21, the measurements were taken along four main lines:

- the first mainly follows the path of the 380 kV buried cable, which is the main source of electromagnetic fields in the facility;
- the second follows the path of the buried cable, but at a distance of approximately 200 metres;
- the third and the fourth follow the boundary of the facility, from the inside and from the outside respectively.

The results obtained for both the electrical and magnetic fields are much lower than the legal limits for exposure to the general public.
The values for the electrical field decrease very rapidly as the distance from the buried cable increases, and are undetectable at distances of a few metres.
The magnetic field values measured along the external perimeter do not exceed the value of 1.5 µTesla, compared with an limit value for exposure to the population of 100 µTesla and a quality objective of 3 µTesla. The maximum values were taken, as was to be expected, along the path of the buried cable and near the Enel electrical substation, with maximum values of 20 µTesla and 10 µTesla respectively.

[Prime Ministerial Decree 8/07/2003]

Ionising radiation sources

The sources of ionising radiation present in the facility are made up of small radiogenic sources in level gauges and from analysis equipment located in the internal laboratory. All radiogenic sources are adequately confined and are checked annually by an expert, qualified in accordance with Legislative Decree no. 230/95 and subsequent modifications and supplements.

[Legislative Decree no. 230/95]

4.3 – Indirect Environmental Aspects

4.3.1 – Product design and development

4.3.1.1 – General

Saras conducts research and development activities, which are aimed at the development of products to meet the needs of the market and the requirements set down by environmental laws. The practical implementation of design modifications to products generally also requires upgrades to the existing plants. Saras internally carries out the design and engineering of plant modifications to be implemented in its facility, with the assistance of specialist engineering firms.

The product design and development activities are mainly conducted in the Milan office, while the design and engineering of plants are conducted in close cooperation between the Sarroch facility and the Milan office.

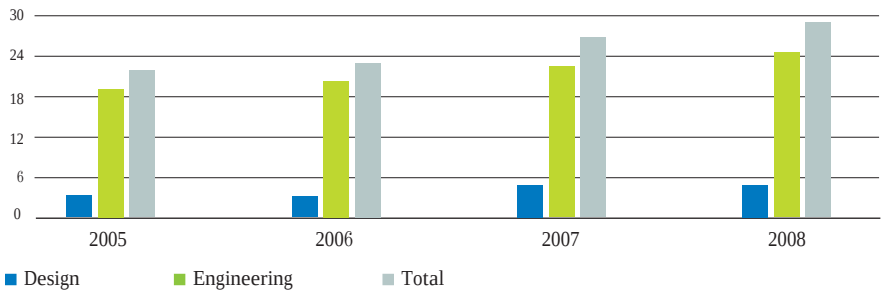
Design and development activities, both for product innovations and the engineering of plant modifications, have seen a considerable boost in recent years, as can be seen from the indicators shown below.

The increase in the indicators is linked to the large investments that have been made in recent years, and which are currently being implemented or are scheduled to be implemented.

TABLE **64** Design, development and engineering activities

Parameter	2005	2006	2007	2008
Product development hours/000 hours worked	3.1	3.0	4.7	4.6
Plant engineering hours/thousands of hours worked	18.9	20.1	22.2	24.7
Total product development and plant engineering hours/thousands of hours worked	22.0	23.1	26.9	29.3

CHART **T64** (hours/000 hours worked)



4.3.1.2 – Low-sulphur fuels

[directive 98/70/EC, "Autoil", modified by directive 2003/17/EC]

In recent years the production of motor-vehicle fuels has been guided by legislation towards the drastic reduction of sulphur content, described as follows:

Since 1 January 2005	- sulphur content of petrol and diesel fuel compulsorily lower than 50 ppm - Sale of petrol and diesel fuel with sulphur content lower than 10 ppm
Since 1 January 2009	- sulphur content of petrol and diesel fuel compulsorily lower than 10 ppm

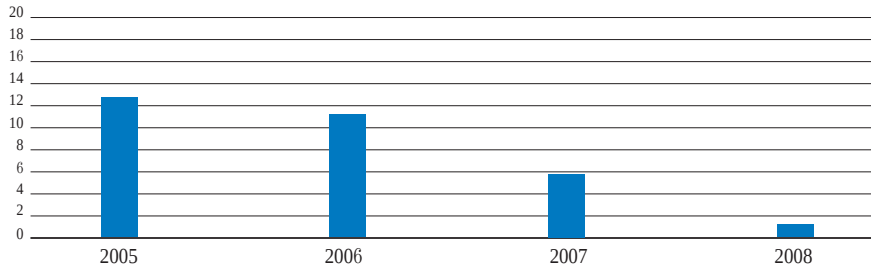
For Saras to achieve the 2009 objective for petrol desulphurisation, it was necessary to upgrade the FCC plant. The new U800 desulphurisation section has now been installed. It is actually interesting to note how, from 2005 to 2008, but particularly in 2008, the

quantity of sulphur present in finished products placed on the market decreased significantly, causing an increase in the quantity of sulphur sold as a product.
This result can be ascribed to the continual investment made in the desulphurisation capacity of the production plants, which in 2008 led to the completion of the petrol desulphurisation plant, in the process allowing the refinery to meet the new European specifications specifying a sulphur content in petrol of 10 ppm, which came into force on 1 January 2009. In addition, during the year work was completed on construction of the tail gas treatment and sulphur recovery unit, significantly reducing the content of sulphurous emissions.
For the performance figures for the four-year period 2005 – 2008, table 65 shows the trend of the indicator of the level of sulphur in the products compared to the quantity of sulphur input to the production cycle with the raw materials.
There is a major reduction over time in the values of the indicator. The trend to reduction is even more interesting when it is considered that the comparison value, i.e. the sulphur input with the raw materials, is also progressively reducing over time, due to increasing procurement of low-sulphur crude oil (paragraph 4.2, page 50).

TABLE 65 Sulphur content of products

Parameter	2005	2006	2007	2008
Quantity of sulphur in products/Quantity of incoming sulphur with raw materials (%)	12.6	11.2	5.8	1.3

CHART T65 (%)



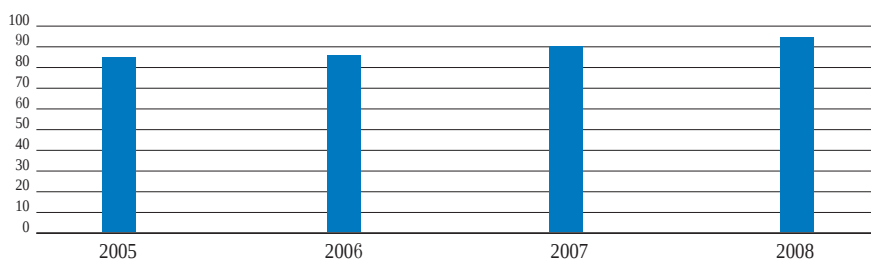
■ Quantity of sulphur in products/Quantity of incoming sulphur with raw materials

As a consequence of the above factors, increases have been recorded in the quantity of sulphur recovered in the production cycle, compared to the quantity of incoming sulphur, as can be seen from table 66.

TABLE 66 Quantity of sulphur recovered in the production cycle

Parameter	2005	2006	2007	2008
Quantity of sulphur produced/Quantity of incoming sulphur with raw materials (%)	84.1	85.9	91.0	95.5

CHART T66 (%)



■ Quantity of sulphur produced/Quantity of incoming sulphur with raw materials

Range of oil products

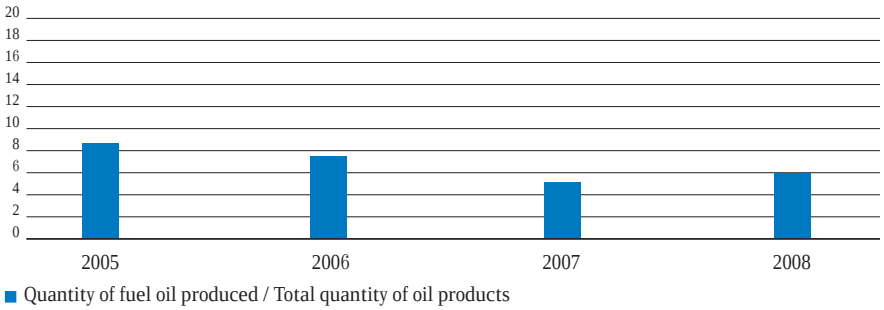
In recent years, the production and sale of oil products has increasingly leaned towards the fraction of "light" products, while the production of heavy petroleum distillates from refining has for the most part been destined for conversion into synthesis gas ("syngas") for producing electricity in the IGCC.

Table 67 below gives the figures for the fraction of fuel oil produced compared to all oil products, which since 2007 has experienced a slight increase because of the increase in demand.

TABLE **67** Fraction of fuel oil of total oil products

Parameter	2005	2006	2007	2008
Quantity of fuel oil produced / Total quantity of oil products (%)	8.5	7.5	5.7	6.1

CHART **T67** (%)



As already discussed in chapter 3, the production cycle in the IGCC eliminates the pollutants contained in the heavy hydrocarbons sent as feedstock to the plant, and particularly sulphur, which is recovered and sold, so contributing to the positive figures shown in table 66 on the previous page.

Summary of considerations of the indirect aspects of product design and development

Based on the above discussion, the following can be observed:

- lower sulphur content in the fuels for sale means a reduction in emissions of SO_2 from vehicle traffic;
- the production of energy from syngas obtained from the gasification of heavy hydrocarbons maximises the use of the incoming raw materials and the recovery of the sulphur contained in them;
- at the same time, the attention paid to reducing the sale of fuel oils reduces atmospheric emissions of SO_2, dust and other pollutants following their combustion, for example, in thermoelectric power plants;
- the sulphur recovered from the production cycle is to all intents and purposes a product, which is sold and used as a raw material in other production cycles (e.g. to produce sulphuric acid). This avoids resorting to natural raw materials (minerals) which would need to be refined, and which would therefore require further consumption of energy and other resources.

4.3.2. – Transport

Sea traffic

All raw materials entering the site and a significant portion of the oil products leaving the site are transported by sea. Because of the large number of ships (around 750 – 800 ships per year), for many years Saras has implemented a policy of selection and control of the ships used, with the aim of preventing accidents and spills at sea of dangerous substances. Saras has already met the deadline for European regulations banning the use of single-hulled vessels.

[International convention for prevention of pollution caused by ships MARPOL 73/78, and Regulation 417/2002/EC modified by Regulation 1726/2003/EC]

By 2006 Saras had already met the directive's 2010 deadline for eliminating single-hulled ships, and the company is considerably reducing the use of ships with segregated ballast tanks (SBT), which are to be eliminated by 2015.

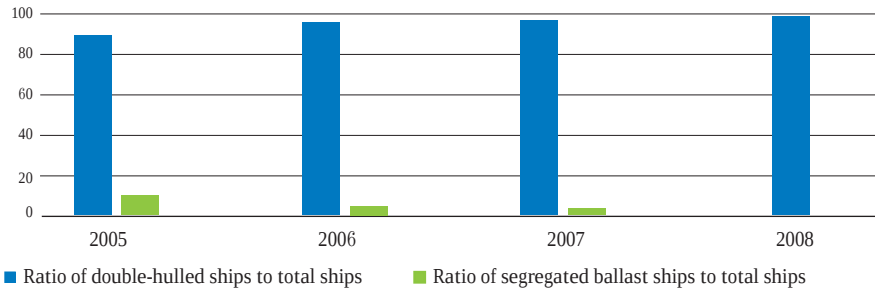
[table of objectives and interventions objective no. 16, page 125]

Table 68 gives the figures for the number of ships equipped with double hulls, and the number of ships out of the total number of ships calling to the Sarroch site: As can be seen, the percentage of double-hulled ships has increased notably in the space of a few years, while the percentage of SBT ships is falling sharply.

TABLE **68** Double-hulled ships

Parameter	2005	2006	2007	2008
Ratio of no. of double-hulled ships to total no. of ships (%)	88.6	95.0	95.0	99.0
Ratio of no. of segregated ballast ships to total no. of ships (%)	9.0	5.0	5.0	1

CHART **T68** (%)



Given the potential seriousness of an accident at sea, Saras selects ships by consulting international databases (e.g. SIRE) containing the results of inspections conducted on transport ships, and the company also has a programme of direct controls (both technical and management) on arriving ships.

[table of objectives and interventions objective no. 17, page 125]

The reference specification for controls is the “Minimum Safety Criteria” document, adopted by Saras in accordance with the ship inspection protocols drawn up by the OCIMF (Oil Companies International Marine Forum), an organisation that promotes the improvement of safety and of responsible environmental management in the transport of oil and its derivatives and in the management of marine terminals.

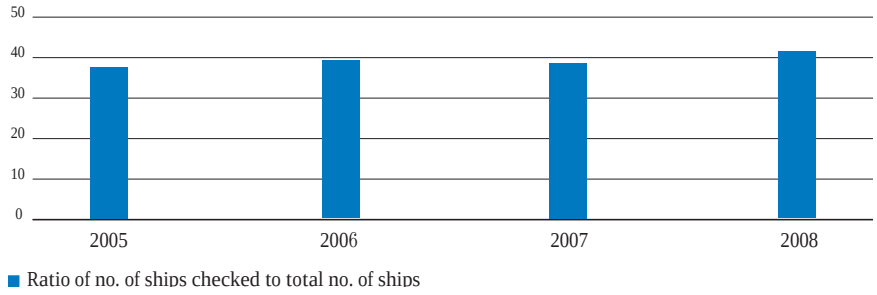
The number of ships checked is very high and has increased over the years, as can be seen from table 69.

Accurate checks on the ships expected at the site are conducted on behalf of Saras by specialist firms before the ships even set sail, at their port of departure.

TABLE 69 Checks on safety of ships

Parameter	2005	2006	2007	2008
Ratio of no. of ships checked to total no. of ships (%)	37.3	39.1	38.3	41.0

CHART T69 (%)



Road traffic

The road traffic induced by the activities carried out at Saras's site is due principally to:

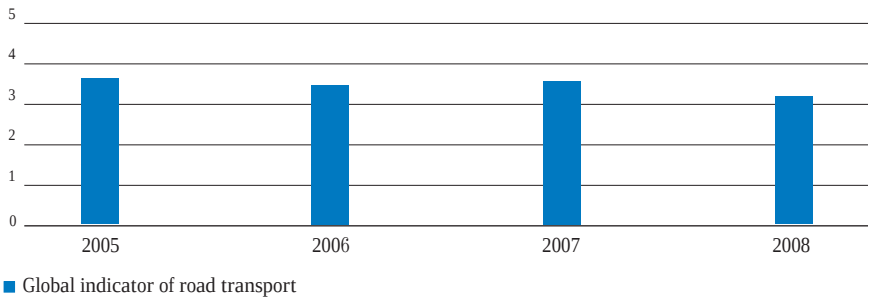
- transport of refined oil products via tanker trucks (around 47,000 vehicles/year);
- transport of sulphur via articulated lorry (around 3,900 vehicles/year);
- transport of materials and substances that are auxiliary to production (around 400 vehicles/month);
- transport of employees of the company and of external firms working at the site (around 800 cars/day and 60 buses/day).

The following table gives the indicator for heavy vehicle traffic, which mostly comprises tanker trucks for transporting products. A small proportion is made up of articulated lorries for transporting sulphur.

TABLE 70 Road traffic

Parameter	2005	2006	2007	2008
no. heavy vehicles/kt raw materials (no. vehicles/kt raw materials)	3.60	3.44	3.54	3.25

CHART T70 (%)



[table of objectives and interventions objective no. 17, page 125z

Since 2007 a programme of checks has been in place, which aims to verify the conformance of the tanker trucks used for transporting products. The number of tanker trucks checked compared to the number of tanker trucks authorised for entry was 18.8%, an improvement on 2007 (17%).

In addition, there is a continuous rise in the percentage of ships inspected with the Safety on Board service, i.e. with specialist personnel who make safety checks of all operations involving the unloading of crude and the loading of products (fuel oil, heavy diesel) at the Marine Terminal.

4.3.3 – Environmental conduct of third-party firms

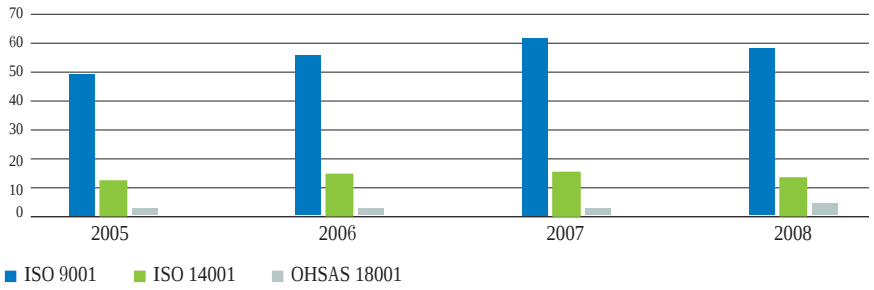
Saras has drawn up adequate procedures for governing relations with external firms that interact with the activities of the facility, to ensure that the conduct applied by personnel belonging to third-party firms conforms to the company's policies for the protection of safety, health and the environment.

Saras accords a positive assessment to the commitment of external firms to obtain and maintain certifications of quality/environmental/safety management systems. 2008 saw confirmation of the increase in the number of firms with a certified environmental management system (see Table 71). The figure, measured against the increased total number of suppliers, is 14%. Other firms have projects underway to obtain certification.

TABLE 71 Percentage of external firms with certified management systems

Parameter	2005	2006	2007	2008
Subcontracting companies with ISO 9001 certification (quality management system) (%)	48.8	55.2	61.2	58.5
Subcontracting companies with ISO 14001 certification (environmental management system) (%)	11.6	13.9	14.5	14.0
Subcontracting companies with OHSAS 18001 certification (management system for health and safety in the workplace (%)	2.3	2.3	2.3	3.9

CHART T71 (%)



Before being able to conduct any type of activity at the facility, each company must be qualified by demonstrating that they meet the basic requirements laid down in the administrative regulations.

Before entering the facility, personnel belonging to external companies must receive basic training, which varies according to the areas of the facility where they are to work.

Saras plays an active role in the training of external firms' personnel in safety and in environmental protection.

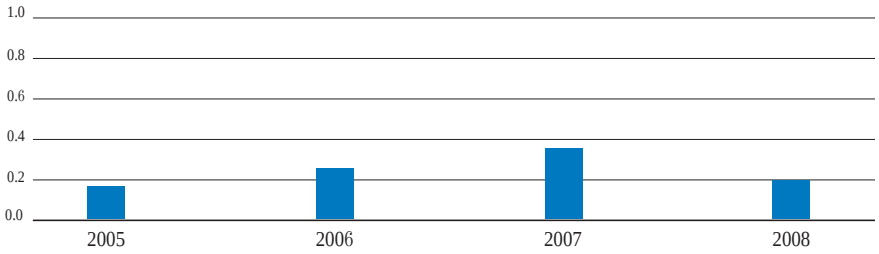
The 2008 figure is lower than for the previous years, because a new computer system was introduced to calculate external firms' working hours, which gives a more precise and accurate number. Hence the 2008 figure cannot be compared with the values for the previous years.

(Table 72, page 116).

TABLE 72 Training activities for third-party firms

Parameter	2005	2006	2007	2008
Training of external firms: no. training hours conducted by Saras on environment and safety/ no. hours worked by external firms (%)	0.16	0.25	0.35	0.20

CHART T72 (%)



In environmental management, one of the principal impacts associated with the activities of external firms is the result of the production and management of waste.
Two specialist waste-treatment firms operate at the Saras site, as discussed in paragraph 4.2.6, on page 94.
Specific procedures govern how waste is managed at the facility, including the sending of waste to treatment plants and to areas for waste storage.
The work of the third-party firms that manage the waste treatment plants is subject to regular checks and audits, which are carried out by personnel from Saras's Prevention and Protection Service in accordance with the waste management procedure. More generally, the conduct of personnel belonging to third-party firms is one of the activities being controlled through field inspections in the "Arrow" programme (paragraph 4.4.2, page 118).
Most waste produced during the activities that external firms carry out on-site is received and accounted for by Saras.
This consideration applies particularly in general shutdowns and plant maintenance operations, during which a larger quantity of waste is produced.

4.4 – Management performance indicators

As well as the specific indicators of the various different environmental aspects and of the environmental matrices concerned, or potentially concerned, by the impacts of their environmental aspects, Saras has defined other types of indicator to monitor a number of activities that are essential to the improvement of the environmental management system.
These are indicators of activity in training, audits and engineering to develop technological and plant-related improvements.

4.4.1 – Training in environmental protection and safety

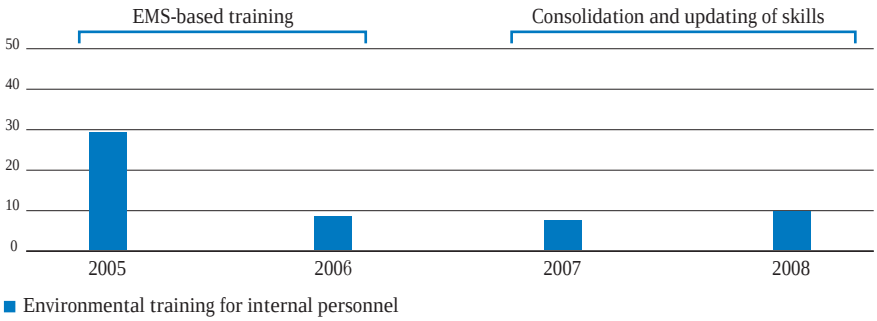
Training of personnel in environmental protection has seen a considerable boost in 2005, with the implementation of awareness-raising initiatives and the dissemination of information about the environmental management system.
Sessions exploring specific topics have been conducted in the training of operational personnel, with a particular focus on handling emissions into the atmosphere and into

bodies of water. The group of auditors has taken part in specific training modules, to prepare them for conducting internal audits.
The trend in the indicator for the environmental training of internal personnel therefore shows a peak in 2005, which was due to the programme of aligning all personnel to the objectives of the environmental management system and training on the new concepts introduced. For the following years, the indicator displays a high incidence compared to the global figure for training activities, mainly oriented to updating and maintaining the skills.

TABLE 73 Environmental training activities for internal personnel

Parameter	2005	2006	2007	2008
Environmental training of company personnel: no. hours environmental training/ total no. hours of training (%)	28.95	8.28	7.39	10.30

CHART T73 (%)

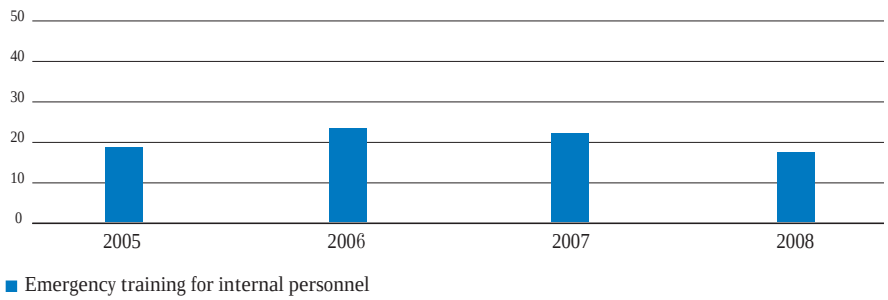


An activity complementing environmental training is training on safety and the protection of health. Training in this area, which consists of both theory and practical sessions, begins when the employee joins the company and progresses throughout his or her time at Saras. Personnel assigned to firefighting teams take part in a series of special drills for handling emergencies.
The commitment to training and drills for handling emergencies, which can affect both the safety of persons and the protection of the environment, is shown by the figures in table 74.

TABLE 74 Emergency management training activities for internal personnel

Parameter	2005	2006	2007	2008
Emergency training: no. hours of training for emergencies/total no. hours of training (%)	18,29	23,06	21,76	17,73

CHART T74 (%)



4.4.2 – Audit activities

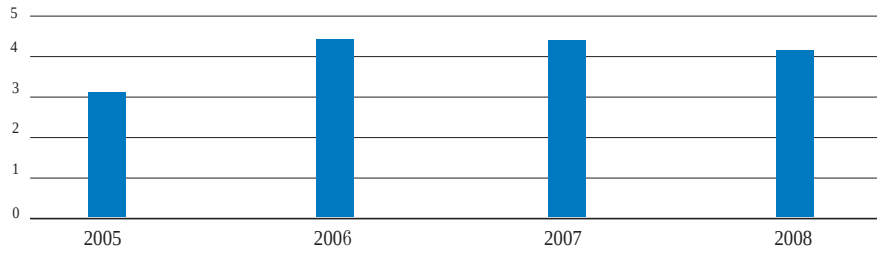
Saras pays particular attention to internal audits, as an instrument for verification, training and improvement. The company has a group of auditors who are trained to conduct quality, environment and safety audits, comprising around 55 persons, or approximately 4% of the total Saras workforce.

Internal audits are planned annually, in such a way as to address all activities having an influence, direct or indirect, on environmental, safety and/or quality management. The audits are conducted in an integrated fashion, i.e. for each activity subjected to an audit, the aspects of interest to all three audit areas are examined. During an audit, areas for improvement or elements not conforming to the management system procedures may emerge. "Non-conformities" are formally reported to the persons responsible for the activities in which they were found, in order to identify actions to restore conformity and avoid a repetition of the non-conformity. The indicator is slightly lower in 2008 because the number of auditors remained unchanged (55) while the number of process managers audited increased considerably (from 64 to 95).

TABLE **75** Internal audit activities (integrated for Environment, Safety and Quality)

Parameter	2005	2006	2007	2008
Time spent on internal audit activities: no. hours taken per audit/no. hours worked by auditors and personnel subjected to audit (%)	3.08	4.38	4.37	4.15

CHART **T75** (%)



Other verification activities on field activity management methods are regularly carried out, with the implementation of the "Arrow" programme.

The programme is an organic project of field inspection visits (audits), covering the entire facility, the associated National Deposit, and the wharf. The purpose of the project is to develop the spirit of accident prevention and environmental protection, both in the persons who are subject to audit and in the persons who conduct the audit.

To achieve this goal, the "Arrow Project" conducts an extended programme of inspections in the 22 operational and administrative areas into which the facility has been divided. The Arrow inspections are conducted by groups comprising, as a rule, an executive or manager as group leader, 3 or 4 technical and/or administration personnel, and staff safety representatives. There are 22 audit groups, their composition varies monthly and, each month, the area that each group is tasked with inspecting changes.

The Arrow programme has been in operation for many years and it is regularly put into practice, as shown by the trend in the indicators given in table 76.

TABLE 76 "Arrow" programme activities (field inspections)

Parameter	2005	2006	2007	2008
Hours taken (no.)	1,848	1,774	1,966	1,942
Hours taken/Hours worked by auditors and personnel subjected to audit (%)	012	0.12	0.12	0.12

4.4.3 – Investments in protecting the environment and safety

Saras has implemented major projects to improve environmental performance, site safety and employee protection, and for this reason global investments in safety and the environment have increased. Below are the figures on investments in safety and the environment.

Investments show a notable increase from 2005 to 2008, and in particular in 2008, in line with the industrial plan for 2008-2011.

Investments that have concerned the environment address the following:

- continuing construction of the dynamic barrier for groundwater control;
- implementation of FCC thermal recovery operation;
- continuing activities to pave the pipeways and tank retaining reservoirs;
- continuing the installation of double bottoms in the tanks;
- the project to implement the CCR-alkylation smoke stack monitoring system.

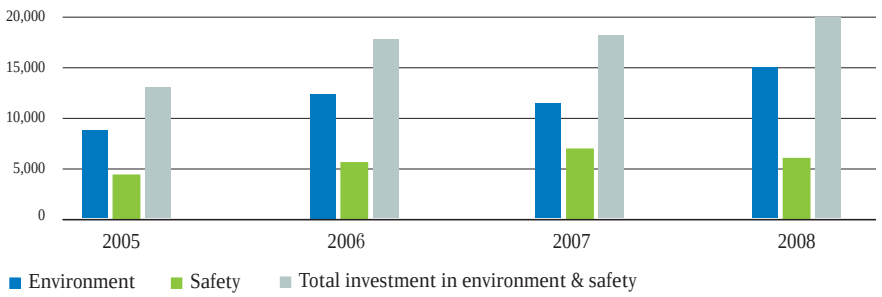
The safety investments that have addressed both the improvement of existing safety equipment and modifications to plant systems and product movement systems are described below:

- addition of extra shut-off valves for product volumes in the Alkylation plant;
- replacement of glass level control systems with magnetic systems in the process plants;
- continuation of upgrading of the fire prevention system and new equipment;
- continuation of upgrading of the fire detection and hydrocarbon detection system;
- in the completion phase of upgrading the fire protection systems for structures (T2/ V2 / V1);
- safety upgrading of the interior of the tank containment reservoirs;
- preparation of fire protection systems for structures in the alkylation and T1 plants.

TABLE 77 Investments to improve safety and the protection of the environment

Parameter	2005	2006	2007	2008
Investments in environmental protection (000 €/year)	8,682	12,250	11,320	15,160
Investments in safety protection (000 €/year)	4,170	5,395	6,740	6,345
Total investments in safety and the environment (000 €/year)	12,852	17,645	18,060	21,505

CHART T77 (000 euro/year)



5.
Environmental objectives and programmes

Completeness, correctness and transparency of information are the principal basis for any dialogue.

In this chapter, Saras presents its environmental improvement objectives for the 2009-2013 period and the activities it carried out in 2008.

This information and these figures show the areas in which Saras is working towards further improvements expected in the years to come: these are the fruit of technology and management choices that have always aimed at making simultaneous progress in safety, health and the environment.

This is an investment in clarity and completeness that will, over time, allow us to continue to conduct dialogue that is clear and definite, to give the local population the answers they expect.

5. Environmental objectives and programmes

5.1 – Scheduled objectives for environmental improvement for the 2009-2013 period

Before discussing the objectives presented in this paragraph, it is necessary to declare beforehand that early in 2009 there was a rescheduling of the environmental objectives for the 2009-2013 period, principally because of the current international market scenario and the recent global economic/financial crisis that has necessitated a review of the investments planned for the 2008-2012 period (see objectives 2B, 2C, 2D, 4A, 6B, 13B).
The rescheduling of investments, which are presented in the table on the following page, has caused a postponement of the period of implementation of activities for up to a maximum of 2 years.
In the table of Environmental Declaration objectives to be completed in 2010, two new objectives have been added as per the EIA plan. Both concern the continuous monitoring of atmospheric emissions from the Co-Boiler and Topping2 smokestack (see objectives 3C and 3D). One of the most important investments scheduled to be completed by the end of 2009 involves a number of measures on the FCC which will lead to a reduction in the use of fuel oil by around 40,000 t/year, which will result in the estimated reduction of 127,000 t/year of CO_2 emissions.

For each EMAS objective, one or more **actions** have been defined, and **indicators** have been identified to control the state of progress for the objective and its **implementation period**.
This year a new column has been added to the table of objectives, showing the **final balance for 2008**.
The principal objectives that concern significant direct environmental aspects are:

- **atmospheric emissions**, with measures to reduce the quantity of pollutants and extend continuous monitoring;
- **energy consumption**, with measures to recover energy and consequent reduction of fuel consumption;
- **prevention of potential spills of hydrocarbons onto soil**, with the extension of the paved surfaces in the storage areas and, in parallel, oil recovery activities using the dynamic barrier.

The objectives associated with significant indirect environmental aspects specifically concern:

- **sea traffic** and **road traffic**, with an increase in controls on ships for transporting raw materials and road vehicles for transporting products.

No.	Objective	Actions	Indicator	Implementation period	Final balance 2008
	Significant environmental aspect: Atmospheric emissions (SO_2)				
1	Environmental aspect: Energy consumption – Atmospheric emissions (SO2, dust)	**A -** Increase the yield of the Sulphur Recovery Plant and the abatement of SO2 emissions, via the entry into service of the new Tail Gas Treatment Unit (TGTU).	Annual % reduction of SO_2 emissions	2009	Work completed on installing the tail gas treatment unit (TGTU) section
	Environmental aspect: Energy consumption – Atmospheric emissions (SO_2, dust)				
2	Energy recovery and reduction of consumption of fuel oil by approximately 30% over current levels	**A -** Execution of energy recovery interventions in the FCC plant	Annual % reduction of fuel oil emissions	2009	Detailed engineering completed and materials procured for energy recovery intervention in the FCC plant
		B - Energy recovery intervention in the U500 and U700 desulphurisation units		2012	
		C - Installation of a boiler for energy recovery of the sensitive heat from fumes from Topping Plant 1		2012	
		D - Installation of the boiler for energy recovery of the sensitive heat from fumes from the following plants: Topping2, RT2, VSB, Vacuum1 and Vacuum2, which will be ducted to the new centralised smoke stack		2013	Activities to install analysers completed
	Environmental aspect: Atmospheric emissions (SO_2, NO_x, dust, CO)				
3	Extension of continuous monitoring methods to: – 65% of SO2 emissions – 50% of NOX emissions – 65% of dust emissions – 60% of CO emissions	**A -** Entry into service of continuous monitoring* system of emissions of SO_2, NO_x, PTS and CO on the smoke stacks of the following plants: Z3-F2 and Z4-F2	% of emissions continuously monitored	2009	
		B - Installation of continuous monitoring system of SO2, NOX, PTS and CO on the smoke stack of the CCR/Alky plant. Monitoring by 2010		2009 - 2010	
		C - Installation of continuous monitoring system of SO2, NOX, and CO on the smoke stack of the Co-Boiler plant.		2010	
		D - Installation of continuous monitoring system of SO2, NOX, PTS and CO on the smoke stack of the Topping2 plant.		2010	
4	Verification of feasibility of a new centralised smoke stack and further extension of continuous monitoring methods to: – 85% of SO_2 emissions – 70% of NO_x emissions – 99% of dust emissions – 85% of CO emissions	**A -** Implementation of continuous monitoring system	% of emissions continuously monitored	2013	Feasibility study completed
	Environmental aspect: Atmospheric emissions (dust)				
5	Confirmed use of fuel oil with carbon residue by weight lower than 9.5%.	**A -** Preparation of fuel oil with the required characteristics.	Annual average % carbon residue in fuel oil	2009	Reached 9.5%

No.	Objective	Actions	Indicator	Implementation period	Final balance 2008
	Environmental aspect: Atmospheric emissions (Volatile Organic Compounds)				
6	Reduction of diffuse and fugitive emissions of volatile hydrocarbons	**A -** Completed installation of double seals on pumps for moving petrol	% replacements made (cumulative figure)	87% in 2009 100% in 2010	78% complete**
		B - Installation of a system for sealing the calming pipes and support pipes in the tanks with floating roofs in refinery perimeter*** (55.5% in 2009)	No. of tanks subject to intervention / total no. of tanks in refinery perimeter (cumulative figure)	2009 -2012	33.3% complete
		C - Application of SmartLDAR methodology to all plant Units of the site, proceeding in accordance with the monitoring and intervention timeframes specified by the EIA (Environmental Integrated Authorisation)	- IR 100% - PID**** or FID****100% for leaking components from IR - Statistical sampling for non-leaking components from IR 100% plants	2009-2010	T1 and FCC***** plants monitored - IR 100% - PID 100% for leaking components from IR - Statistical sampling for non-leaking components from IR
	Environmental aspect: Atmospheric emissions – State of air quality				
7	Prompt identification of possible increases in concentrations of pollutants in emissions, to prevent the exceeding of alarm thresholds for the concentrations found at ground level by the public air quality monitoring network	**A -** Development of the ISC/AERMOD simulation model of the ground level impact of atmospheric emissions from the SARAS site, based on the climate conditions and the contours of the area, and on the concentrations measured by the air quality monitoring network in the external environment.	100% according to EIA Monitoring Plan	2009	Developed a simulation model of ground level impact of atmospheric emissions from the Saras site: - 100% with ISC/AERMOD model - 90% with CALMET-CALPUFF model
		B - Completion of development of CALMET-CALPUFF model Application of same	100% with CALMET-CALPUFF model 100% according to EIA Monitoring Plan	first half 2010	
	Environmental aspect: Energy consumption – Visual impact				
8	Completion of mechanical installations for the new circuit to eliminate steam plume emissions into the atmosphere from the U950 deaerator.	**A -** Modification of circuit and addition of special steam condenser: 100% completion of mechanical/equipment installations	% progress in activity	2009 -2010	Work completed on abatement of steam plumes emitted into the atmosphere, coming from the combined cycle section boilers of the IGCC
	Environmental aspect: Prevention of hydrocarbon spills on soil				
9	Reduction of risk of contaminating the soil and subsoil	**A -** Continuation of work on paving the retaining reservoirs for the crude oil and oil product tanks, paving 17,107 m2 of surface area (in accordance with the EIA/CTR recommendations)	% of surface paved out of the total planned in the 2009-2010 period	2009-2010	Achieved 34.5%, in line with planned levels
		B - Completion to 100% of concrete paving of the Rio Mascheroni channel	% progress in activity	2009	40% complete
		C - Execution of instrumental checks on the integrity of the pipes for transporting crude oil from the maritime terminal to the tanks, and the pipes for transporting hydrocarbons internally/externally	% controls conducted/ controls planned progress in activity	2009	Conducted 100% of controls planned for 2008

No.	Objective	Actions	Indicatore	Implementation period	Final balance 2008
	Environmental aspect: Prevention of hydrocarbon spills on soil				
10	Confinement of contamination from prior activities	**A -** Construction of the physical barrier outlined in the site reclamation project. Draw up the executive project by 2009	% progress in activity	2009-2012	Test areas set up for the physical barrier
	Environmental aspect: Waste				
11	Raise awareness of employees to differentiated collection of USW to contribute to maintenance of 20%	**A -** Execution of an awareness-raising campaign for personnel on differentiated refuse collection for plastic, aluminium, glass, and paper	% USW differentiated	2009	Achieved 20% compared to 15% planned for 2008
12	Increase to 50% of the quantity of industrial waste sent for recovery	**A -** Increase in excavated soil being sent for recovery	% waste leaving the site being sent for recovery	2009	66.8% achieved, far in excess of the planned objective, which was 25%. This was due to the extraordinary site decontamination activities, which are not reproducible in 2009
	Environmental aspect: Noise				
13	Containment of noise emissions at source	**A -** Installation of sound-absorbent panels in the MHC-2 plant	% progress in activity	2009	60% complete
		B - Study and design of soundproofing of sheds 109 and 110, which contain the compressors for the hydrogen network		2009 - 2010	10% complete
	Environmental aspect: Odours				
14	Assessments of the principal sources of odorous emissions for the prevention/attenuation of the olfactive impact in the area outside the facility	**A -** Identification of the chemicals responsible for the olfactory disturbance, at their source of emission from the refinery. Preparation of artificial mixes of these odour-generating substances in order to correlate the olfactory disturbance to the concentration of the substances	% progress in activity	2009	Developed a monitoring methodology using a combination of analytical, modelling and assessment techniques by experts, and monitoring was implemented
	Environmental aspect: Transport – Sea traffic: emergency prevention at sea				
15 16 in 2008 17 in 2008	100% use of double-hulled ships for loading/unloading operations	**A -** Continuation of selection of double-hulled ships	% double-hulled ships over total no. of ships	2009	100% double-hulled ships for procurement of light crude and 98% double-hulled ships for transporting products
16 18 in 2008	Execution of on-board controls during loading and unloading on at least 42% of ships	**A -** Continuation of inspections in accordance with the criteria adopted by Saras for safety and for protecting the environment (Minimum Safety Criteria)	% ships checked	2009	Reached 41%
	Environmental aspect: Transport – Road traffic: Accident prevention				
17 19 in 2008	Execution of checks on at least 20% of the tanker trucks used to transport products	**A -** Continuation of controls in accordance with Saras's internal procedures	% tanker trucks checked	2009	Reached 18.8%

* Monitoring of emissions of SO2, NOX, PTS and CO on the smokestacks of the Z3-F2 and Z4-F2 plants is planned to be in full operation by 2009. The change from 2008 to 2009 in the schedules is due to technical problems.

** The state of progress in 2008 is 78% of the total, against a planned 88%. This is due to the impossibility of carrying out maintenance activities on a number of pumps that are necessary to ensure the operational running of some of the plants. The installation of the new seals for these pumps is therefore rescheduled for the 2009/2010 two-year period.

*** Limited to 18 tanks in the refinery perimeter, against the planned number of 65. This activity is also carried out on all tanks with floating roofs that are out of service for maintenance; currently 4 have been done in addition to those in the refinery perimeter.

**** The quantification of losses of VOCs (volatile organic compounds) from process components was conducted using protocol method 21 - DETERMINATION OF VOLATILE ORGANIC COMPOUND LEAKS - EPA using a PID (Photo Ionization Detector) instead of an FID (Flame Ionization Detector) for safety reasons.

***** Due to delays in procuring the instrumentation required by the SmartLDAR methodology, the objective has been revised as shown in the table.

16 in 2008, 17 in 2008, 18 in 2008, 19 in 2008 Numbering is equivalent to the objectives of the 2008 Environmental Declaration, see page 124.

Objective 15A of the 2008 Environmental Declaration has been reached (see paragraph 5.2, page 126 of the 2009 Environmental Declaration).

5.2 – Improvement activities carried out in 2008

In 2008 most of the environmental objectives defined in the 2008 Environmental Declaration were reached.
Investments principally addressed the reduction of atmospheric emissions, the reduction of energy consumption, the prevention of potential spills of hydrocarbons onto soil and monitoring of air quality.

[Significant environmental aspect: atmospheric emissions of SO_2]

For several years a large part of investments have been directed to safety and the environment, and part of this includes constant control of the state of air quality. To address the issue of atmospheric emissions, activities concerning several different aspects have been conducted. One of the most important is the installation of the Tail Gas Treatment Unit (TGTU), which will increase the percentage of sulphur recovered and therefore enable a consequent abatement of emissions of SO_2 by around 30%.

[Environmental aspect: Development of product design]

In the programme for reducing emissions and meeting international specifications, of note is the completion and commissioning of the U800 plant (Ref. Objective 15A of the 2008 Environmental Declaration), which produces low-sulphur petrol (10 ppm), directly to the European market.

[Environmental aspect: Air quality state]

In 2008 major steps forward were achieved in installing instruments that allow the rapid identification of possible increases in concentrations of pollutants in emissions, to prevent the exceeding of alarm thresholds for the concentrations found at ground level by the public air quality monitoring network. In particular, the ISC/AERMOD model has been implemented (100%) and the CALMET-CALPUFF model has almost been completed (90%).

[Environmental aspect: Odours]

For odours, a monitoring methodology has been developed using a combination of analytical, modelling and assessment techniques by experts.

[Environmental aspect: Prevention of hydrocarbon spills on soil]

For soil and subsoil protection, activities have continued to reduce the risk of contamination. The percentage of containment basins that have been paved for tanks containing crudes and products has reached 34.5%, in line with the schedule. In addition, execution of the instrumental checks (planned for 2008) on the integrity of the pipes for transporting crude oil from the maritime terminal to the tanks, and the pipes for transporting hydrocarbons internally/externally, has been completed.

[Environmental aspect: Energy consumption, visual impact]

In line with the 2008-2012 investment plan, activities have been completed on the plan to achieve greater energy efficiency, involving the recovery of energy from the boilers of the combined cycle section of the IGCC, for two of the three boilers belonging to the plant (the operation on the third boiler was carried out previously, in 2007). The reduction of energy losses and the reduction of the plume of vapours coming from the boilers of the IGCC has been achieved, via the recovery of heat and condensed water destined for the internal network for distributing demineralised water.
The feasibility study has been completed for the boiler for energy recovery of the sensitive heat from fumes from the Topping 2, RT2, VSB, Vacuum1 and Vacuum2 plants, which will be ducted to the new centralised smoke stack. This objective had been planned for completion in 2009.

The figures on transporting products by sea have improved: we have achieved the objective of using 100% ships with double hulls for procurement of light crude and 98% for sending products, out of the total number of ships transiting the Saras terminal. In addition, we have reached the objective (41%) for the number of checks on board ships during the loading and unloading phases.

[Environmental aspect: Transport – Sea traffic]

Lastly, turning to road transport and traffic, to help prevent accidents checks have been carried out on 18.8% of the tanker trucks used for transporting products, in line with the objectives.

[Environmental aspect: Transport – Road traffic]

Last but not least (in terms of importance) are the activities to contain emissions of noise from the MHC-2 plant, which in 2008 reached 60% completion of the installation of sound-absorbent panels.
And the study has begun on soundproofing sheds 109 and 110, containing the compressors for the hydrogen network, reaching 10% of the pre-established objective.

[Environmental aspect: Noise]

6.
Summary of reference legislation

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6. Summary of reference legislation

Below is a (non-exhaustive) list of the principal environmental laws that are applicable to the activities carried out on the Saras site.

Atmosphere

- Deliberation no. 14 of 10 April 2009 of the National Committee for Managing and Implementing the 2003/87/EC directive. Implementation provisions of decision 2007/589/EC of the European Commission of 18 July 2007 which establishes the guidelines for monitoring and notifying emissions of greenhouse-effect gases.
- Deliberation no. 20 of 27 November 2008 of the National Committee for Managing and Implementing the 2003/87/EC directive. Execution of the decision to assign the CO_2 allowances for the 2008-2012 period.
- Deliberation no. 14 of 6 August 2008 of the National Committee for Managing and Implementing the 2003/87/EC directive. Updating of the authorisations to emit greenhouse-effect gases.
- Legislative Decree no. 152 of 03/04/2006, Environmental legislation. Part V: Laws governing the protection of air quality and reduction of atmospheric emissions.
- Presidential Decree no. 216 of 4 April 2006 and subsequent modifications and supplements. Implementation of directives 2003/87 and 2004/101/EC governing the exchange of emissions additional CO_2 of greenhouse gases in the European Community, with reference to the project mechanisms of the Kyoto Protocol.
- Deliberation no. 001/2008 of the National Committee for Managing and Implementing the 2003/87/EC directive. Recognition of authorisations to emit greenhouse gases released in the period 2005-2007, in order to issue authorisations for the period 2008-2012 pursuant to the legislative decree of 4 April 2006.
- Decisions of the European Commission of 29/01/2004 and of 18/07/2007 These institute guidelines for monitoring and notification of emissions of greenhouse gases pursuant to directive 2003/87/EC of the European Parliament and Council.
- Ministerial Decree 02/04/2002 no. 60 Implementation of directive 1999/30/EC of the Council of 22 April 1999 concerning the limit values of ambient air quality for sulphur dioxide, nitrogen dioxide, nitrogen oxides, particles and lead, and of directive 2000/69/EC for the limit values for the ambient air quality for benzene and carbon monoxide.
- Legislative Decree no. 183 of 21/05/2004. Implementation of Directive 2002/3/EC on ozone in the atmosphere.
- Presidential Decree no. 322 of 15/04/1971. Directive for the execution of Law no. 615 of 13 July 1966, containing provisions against atmospheric pollution, limited to the industrial sector.

Water environment

- Legislative Decree no. 152 of 03/04/2006, Environmental legislation. Part III, specifically: Laws governing the protection of water from pollution and the management of water resources.
- Regulation no. 417/2002 of 18/02/2002, modified by Regulations no. 1726/2003 of 22/07/2003 and no. 2172/2004 of 17/12/2004. Accelerated introduction of the laws governing double-hulls or equivalent technology for single-hulled oil tankers and which abrogates (EC) directive no. 2978/94 of the Council.

Waste, soil and subsoil

- Legislative Decree no. 152 of 03/04/2006, Environmental legislation. Part IV: Laws governing the management of waste and the reclamation of polluted sites.
- EC Regulation no. 259 of 1/02/1993. Surveillance and control of shipments of waste in the European Community, as well as entering and exiting its territory.

Noise

- Prime Ministerial Decree of 1/03/1991 and subsequent modifications and supplements. Maximum limits of exposure to noise in inhabited environments and in the outside environment.
- Law no. 447 of 26/10/1995 Framework law on acoustic pollution.
- Prime Ministerial Decree of 14/11/1997 Determination of limit values of noise sources.

Asbestos

- Ministerial Decree no. 248 of 29 July 2004.
  Directive on the determination and discipline of activities to recover products and goods made of asbestos and/or containing asbestos.
- Ministerial Decree of 14 December 2004.
  Prohibition of installation of materials containing asbestos that has been intentionally added.

PCBs

- Legislative Decree no. 209 of 22/05/1999.
  Implementation of Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls.
- Ministerial Decree of 11/10/2001.
  Conditions for use of transformers containing PCBs awaiting decontamination or disposal.
- Law of 18 April 2005 no. 62, European Community Law 2004, article 18.
  Obligations of holders of equipment containing PCBs and PCTs.

Substances damaging to the ozone layer

- Presidential Decree no. 147 of 15/02/2006.
  Methods for control and recovery of leaks of substances damaging to the ozone layer in the stratosphere by refrigeration and air conditioning equipment and heat pumps, pursuant to EC Directive no. 2037/2000.
- Regulation 2037/2000/EC of 29/06/2000 on substances that reduce the ozone layer.

Electromagnetic fields

- Law no. 36 of 22/02/2001.
  Framework law on protection from exposure to electrical, magnetic and electromagnetic fields.
- Prime Ministerial Decree of 8/07/2003.
  Establishment of exposure limits, attention values and quality objectives for protecting the general public from exposure to electrical and magnetic fields at mains frequency (50 Hz) generated by power lines.

Ionising radiation sources

- Legislative Decree no. 230 of 17/03/1995 integrated and corrected by Legislative Decree no. 241 of 26/05/2000 and by Legislative Decree no. 257 of 09/05/2001.
  Implementation of directives 89/618/Euratom, 90/641/Euratom, 92/3/Euratom and 96/29/Euratom governing ionising radiation sources.

Environmental Integrated Authorisation

- Interministerial Decree of 24 April 2008.
  Methods, including accounting methods, and tariffs to apply for proceedings and controls specified by Legislative Decree of 18 February 2005, no. 59.
- Legislative Decree no. 59/2005 and subsequent modifications and supplements.
  Full implementation of Directive 96/61/EC on the combined prevention and reduction of pollution.
  Additionally, the following laws are applicable for health and safety in the workplace and for the prevention and control of major-accident hazards.

Health and safety in the workplace

- Legislative Decree no. 81 of 09/04/2008.
  Implementation of article 1 of law no. 123 of 3 August 2007 governing the protection of health and safety in the workplace.

Prevention and control of major-accident hazards

- Legislative Decree no. 334 of 17/08/1999 and subsequent modifications and supplements.
  Implementation of EC directive no. 82/501, governing the major-accident hazards associated with determined industrial activities, pursuant to law no. 183 of 16 April 1987.
- Ministerial Decree 09/08/2000 Guidelines for Implementing the Safety Management System.
- Ministerial Decree 19/03/2001 Procedures for fire prevention for major risk activities.


MARE TIRRENUM

7.
Glossary

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7. Glossary

Ballast water: Water deriving from the ballasting of empty ships with sea water.

Reliability: The reliability of a piece of equipment is defined as the probability that it will function correctly, for a specific period of time, under certain conditions.

EIA: (Environmental Integrated Authorisation) is the provision that authorises the operation of a plant by imposing measures intended to avoid or reduce emissions into the air, water and soil, in order to achieve a high level of protection of the environment in its entirety. To all intents and purposes the EIA replaces every other environmental authorisation, approval, clearance or opinion specified by law and implementation regulations.

ARPA: Agenzie Regionali per la Protezione Ambientale (or regional environmental protection agencies). In April 1993 a referendum resulted in the removal of powers from Italys national and local health services in the area of environmental control and protection. That left a gap which was filled by parliament with Law 61 of 1994 (introduced to enact Decree Law 496/93), which gave these powers to special regional agencies responsible for monitoring and protecting the environment at local level. Law 61/94 also set up ANPA, the national environmental protection agency, today known as APAT, or the agency for environmental protection and technical services. APAT has the task of setting guidelines and co-ordinating the regional agencies and those based in Italys autonomous provinces. In the years that followed, all of Italys regions and autonomous provinces set up their own agencies. ARPA Sardinia was created under Regional Law no. 6 of 18 May 2006.

Audit: A word used in various contexts to mean “check” or “review”. In the environmental management field it refers to a systematic, documented check to objectively assess an organisations compliance with set environmental management criteria.

CO (carbon monoxide): A gas produced by the incomplete combustion of fossil fuels. The main source is petrol engines not equipped with catalytic converters.

CO_2 (carbon dioxide): An odourless, colourless, flavourless gas produced from the combustion, respiration and decomposition of organic material. Its characteristics include the ability to absorb infrared radiation emitted by the earths surface, thereby contributing to the greenhouse effect.

COD (Chemical Oxygen Demand): The quantity of oxygen needed to oxidise the organic content of waste, including nonbiodegradable matter.

Cogeneration: Process by which two different energy products, such as electricity and heat, can be generated together by a single plant designed specifically for the purpose, resulting in high environmental efficiency.

Desulphurisation: Process for treating oil fractions in order to reduce the sulphur content in refined products.

dB(A): Unit of measurement of sound, expressed in logarithmic units (deciBels) and weighting-filtered to take account of the sensitivity of the human ear to different sound frequencies (“A” filter).

Greenhouse effect: Gradual increase in average atmospheric temperature due to the increased concentration of gases in the atmosphere. Substances that contribute significantly to the greenhouse effect (greenhouse gases) include chlorofluorocarbons (CFC), carbon dioxide (CO_2), methane (CH_4), nitrogen oxides (NO_x) and sulphur hexafluoride (SF_6).

EMAS (EcoManagement and Audit Scheme): Established by EC regulation 1836/93, updated by EC regulation 761/2001 (EMAS II), this is a voluntary scheme intended to promote continuous improvement in the environmental efficiency of industrial activities. Under the regulations, participating companies must adopt environmental management systems at their production sites based on policies, programmes, procedures and objectives aimed at improving the environment, and must publish an environmental declaration. Before a site can be added to the register set up by the European Commission, this declaration must be approved by an inspector accredited by an authorised national body. In Italy this body, operational since 1997, is the Ecolabel and Ecoaudit committee, which works with the technical support of APAT.

Emission Trading: On 13 October 2003 the European Commission published the European directive on emissions trading (Directive 2003/87/EC), better known as the emissions trading system. The key points established by the directive are as follows: From 1 January 2005 no plants falling within the scope of the directive may emit CO_2 (i.e. continue to operate) without appropriate authorisation; each year the operators of these plants must return CO_2 allowances equal to those released into the atmosphere to the competent national authority; maximum CO_2 allowances have been set for every plant regulated by the directive; CO_2 emissions effectively released into the atmosphere are monitored in accordance with the requirements of the competent national authority and certified by an accredited inspector.

Emission: The discharge of any solid, liquid or gaseous substance into the ecosystem from a plant or any other source, which can have a direct or indirect effect on the environment. Emissions are measured at the point of exit.

EPER (European Pollutant Emission Register): The European Pollutant Emission Register was set up by the European Commission with its decision of 17 July 2000 (2000/479/EC) in accordance with Article 15 of European Council Directive 96/61/EC on integrated pollution prevention and control. It is Europes first and most wide-ranging record of emissions into the air and water from industrial plants.

Wholesale: The channel for selling oil products to wholesale customers, such as industries, consortia and public bodies.

Filter Cake: The solid product formed by the filter presses and so named because of its physical, cake-like consistency, filter cake is the result of the process of gasification of heavy refinery products. It contains high percentages of metals such as iron, carbon vanadium and nickel.

GSE (Gestore dei Servizi Elettrici): Set up by article 3 of Legislative Decree no. 79/1999, GSE is the publicly-traded company with shares held by the Ministry for the Treasury. GSE provides incentives for the generation of electricity from renewable and assimilated sources, and it also takes care of the qualification of plants using renewable sources and their electricity production.

Immission: The release of a pollutant into the atmosphere or water, thus polluting the environment. The concentration of the pollutant is measured at a distance from the point from which it was emitted.

CAM Index (Marine Waters Classification): This is the index used in coastal marine environment monitoring (CAM refers to the Italian acronym, “Classificazione Acque Marine”). The index converts the values read into a summary rating of the state of the quality of the sea under three types, interpreted and referred a three classes of quality, where by quality we mean that associated with the state of eutrophication of the coastal systems and with the potential incidence of hygienic/health risks:
High quality - uncontaminated waters;
Medium quality - waters with different degrees of eutrophication, but which are ecologically integral;
Low quality - eutrophicated waters with evidence of environmental alterations including alterations of anthropic origin.

Frequency index: Together with the severity rate, this is a commonly-used performance indicator for health and safety in the workplace. With reference to a given period of time, it expresses the ratio of the number of accidents occurring to the number of hours worked (calculated using the formula: number of accidents x 106/hours worked).

INAIL frequency index: Calculated using the number of accidents reported by the company to the work accident compensation authority (INAIL) and the number of hours worked (number of accidents reported to INAIL x 1,000,000/no. hours worked).

Severity index: Expresses, with reference to a given period of time, the ratio of the number of days sick leave due to accidents to the number of hours worked (calculated using the formula: number of working days lost x 1,000/no. hours worked).

INES (Inventario Nazionale delle Emissioni e loro Sorgenti, or national inventory of emissions and their sources): National register of emissions set up pursuant to Legislative Decree no. 372 of 4 August 1999 (implementing Directive 96/61/EC) and to Decrees issued by the Ministry for the Environment on 23 November 2001 and 26 April 2002. It consists of information on emissions from industrial sites in Italy which are subject to IPPC regulations. The regulations state that such companies must submit qualitative and quantitative data to APAT each year in relation to a set list of pollutants present in gaseous and aqueous waste from their plants. This information is then submitted to the environment ministry for forwarding to the European Commission and inclusion in the EPER register.

IPPC (Integrated Pollution Prevention and Control): European directive of 1996 relating to the reduction of pollution from the various places where it is emitted throughout the European Union, implemented in Italy by Legislative Decree 59/2005.

ISO (International Organization for Standardization): An international non-governmental organisation based in Geneva, to which the standard-setting bodies of around 140 countries belong. It is responsible for examining, drafting and distributing to the international community standards relating mainly to environmental management (ISO 14000) and quality assurance (ISO 9000) for companies in all sectors.

L90: Level of sound pressure exceeded for 90% of the length of time for which noise is measured. A statistical value frequently used to describe the background noise caused by continuous sources over time, as is the case with many continuous-cycle industrial sources.

kt (kilotons): Unit of measurement of mass, equal to 1,000 tons.

kWh (kilowatt-hour): unit of measurement of electricity produced or consumed, equivalent to the power produced by 1 kW in one hour.

MW (Megawatt): A multiple of kW (kilowatt), the unit of measurement of a power stations power, i.e. its energy-generating capacity. It also measures the power consumed by an item of electrical equipment. For example, a light bulb may use 0.1 kW (100 watts). 1 MW = 1,000 kW.

MWh (megawatt-hour): unit of measurement of electricity produced or consumed, equal to the power produced by 1 MW in one hour and equivalent to 1,000 kWh.

NO_x (nitrogen oxides): Gaseous compounds consisting of nitrogen and oxygen (NO, NO_2 etc.), normally released during the combustion of fossil fuels when free nitrogen (N2) is oxidised. In the atmosphere they are the main agents responsible for photochemical smog and, after SO_2, the biggest cause of acid rain.

OHSAS (Occupational Health and Safety Assessment Series): Regulations developed to replace the previous British Standard 8800 in order to meet the growing demand for a recognised standard on the organisation needed to manage health and safety. OHSAS 18001 certification was developed to be compatible with ISO 14001 and ISO 9001 and allow for the adoption of an integrated management system. Although it does not yet represent an international standard, the OHSAS 18001 certification can be obtained by following a path similar to that for the ISO standards.

Piezometer: Small-diameter tube or well inserted into a body of water and used to measure, by means of the water level reached inside the tube, the level of piezometry (the line where points with a height equal to that of the body of water are located) at a set point.

ppm (parts per million): Unit of measurement of the concentration of a substance present in small quantities in a liquid or gas.

Kyoto Protocol: Executive agreement approved by the Conference of the Parties in Kyoto, 1-10 December 1997, containing the initial decisions on the implementation of some commitments (the most urgent and highest priority, relating to certain sectors of national economies) of the United Nations Framework Convention on Climate Change (UN-FCCC), which was approved in 1992 and ratified by Italy in 1994. The Kyoto Protocol requires industrialised countries and countries whose economies are in a transition phase (eastern European countries) to reduce overall emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrated fluorocarbons, perfluorocarbons, and sulphur hexafluoride) by 5% by 2010.

TSPs (Total Suspended Particulates): These are tiny solid particulates suspended in the air. They mostly comprise carbonaceous material able to absorb various types of compound onto its surface. Particulates with a diameter of less than 10 µ (1 µ = 1 millionth of a metre) can pass through the airways and penetrate the lungs, becoming a potential health hazard depending on the substances involved.

Major hazard: Probability that an event linked to uncontrolled development of an industrial activity could give rise to serious danger, either immediate or in the future, for people and the environment.

Yield: the yield of a machine is defined as the ratio between the power distributed (or energy generated) and the power absorbed (or energy consumed) at a given time. The greater the yield, the more efficient the machine; the lower the yield, the more energy wasted.

Management system: The organisational structure, planning activities, responsibilities, procedures, practices, processes and resources to formulate, implement, obtain, re-examine and maintain control, where possible, over all the internal and external variables of an organisation.

SO_2 (sulphur dioxide): It is a colourless, pungent gas that is released during the combustion of fossil fuels containing sulphur. High concentrations of SO_2 in the atmosphere are the principal cause of the formation of acid rain.

TOE (Ton of Oil Equivalent): Unit of measurement conventionally used to determine the energy contained in various sources taking into account their calorific potential.

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