Saras S.p.A.
Environmental Declaration
2010

Saras SpA
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2010

Updated on 12 July 2010

(performance data updated to 31 December 2009)

prepared according to the requirements of EC Regulation 1221/2009

Saras SpA

Registered office and production plant: Sarroch (CA)
S.S. 195 Sulcitana, km 19

Head office: Milan
Galleria de Cristoforis, 1

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

Revised version from 12 July 2010 (updated performance data as at 31 December 2009) of the Saras SpA Environmental Declaration
EMAS registration no.: IT – 000995 on 20 October 2008

The accredited environmental inspector that validated the Saras Environmental Declaration pursuant to EC Regulation 1221/2009 is Lloyd's Register Quality Assurance Italy Srl

EMAS accreditation no.: IT-V-0010 on 19 September 2008

This document describes for the public and all stakeholders:
- the activities carried out by Saras
- the direct and indirect environmental aspects associated with these activities
- the objectives that the company has set itself in order to improve its environmental performance

The document is aimed at the company's internal and external community, and is intended to establish a transparent relationship with all its stakeholders, particularly the local population, local authorities and employees, which represents a key component in the proper management of the company's activities.

The Environmental Declaration will be updated on an annual basis and a complete version will be re-issued in 2011.

The Environmental Declaration was produced and managed by:
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Foreword

In 2009, we achieved a number of important environmental goals. Among the most significant was securing the integrated environmental authorisation permit (Autorizzazione Integrata Ambientale - AIA) relating to the prevention and reduction of pollution for the refinery and IGCC plant, which is valid from 9 April 2009. The majority of the environmental objectives defined in the 2009 Environmental Declaration were achieved during the course of the year, primarily in the areas of reducing atmospheric emissions, mitigating the odour impact on the region and preventing hydrocarbons from being discharged into the soil.

With regard to atmospheric emissions, the construction of the tail gas treatment unit (TGTU) was of particular importance. With the TGTU in regular operation during 2009, we were able to increase the percentage of sulphur recovered, reducing SO_2 emissions by more than 30%.

A lot of work has also been done on the odour side. During 2009, a number of different sampling and analysis activities were carried out both inside the refinery and in the parts of the Municipality of Sarroch most at risk, using a combination of analytical techniques, modelling and expert evaluation. The results obtained by applying these methodologies will enable us to make an accurate assessment of the main sources of odour emissions in order to prevent and mitigate the odour impact these have on the wider region.

Despite the company's disappointing financial results, a significant portion of the budget was allocated to the refining division (EUR 244.4 million, a 34% increase on 2008) with the aim of improving the division's performance and at the same strengthening protection of the surrounding area and safeguarding the immediate environment of the people who work on the site and live in nearby communities. This offers tangible proof of Saras' long-standing commitment to the site and the area in which it is located.

In this context, it is impossible not to think back to the fatal accident on 26 May 2009 involving three employees of a subcontractor, a tragedy that shook the Saras Group and the local industry, leaving a deep impression and opening up new avenues for reflection.In particular, those events have led the company to redouble its commitment and attention to the training received by direct and indirect staff, continuing to raise awareness of and engagement with safety and environmental issues.

Sarroch, 9 July 2010

General Manager
Dario Scaffardi

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Note to the Reader

This document, which provides a detailed description of Saras' activities and the company's interaction with the environment and the region in which it operates, has been structured in such a way as to make it easy to read and quick to understand.
The features that have been adopted are described below.

At the start of each section, a brief summary is provided of the main information contained in the following pages, in order to identify in a few sentences the concepts that recur most frequently within the text.

In each section, the headings in blue in the margin of the text provide an extract of the most important information discussed in more detail on that page.

Similarly, in Section 4, which provides information on the main environmental aspects, the reference legislation governing authorisation mentioned in the text is specified in the margin of the text.

Where relevant, reference is also made to the table "Environmental objectives and programmes" (Section 5, page 121), which summarises the objectives and improvement measures that will be the company's particular focus over the next few years, as well as the improvement measures implemented in 2009.

The charts in the document that have an orange border show the measurement of a parameter in comparison to an applicable legal or permit limit.

Finally, the text boxes with a blue background contain information that, while it does not relate directly to Saras or its activities, will help the reader to gain a better and fuller understanding of the company and the context within which it operates.


SARAS

1.
The Company

Saras' heart is in Sardinia.

Since it was founded in 1962, Saras has grown into a Group that operates in the energy sector within Italy and abroad in a number of different areas, including the production, distribution and sale of oil products, energy generation from renewable sources or other eligible sources, IT services, research and environmental services.
The Sarroch refinery in Sardinia, in the heart of the Mediterranean, has been the company's primary operation for over 45 years.

Today, the site's production complexity, capacity and quality make it one of the most important in Italy and Europe. This is an industrial organisation where respect for the environment, health and safety inform all of the company's decisions, as part of an ongoing dialogue with the surrounding area, and it is against this backdrop that Saras achieved EMAS registration in October 2008.

1. The Company

1.1 – The Saras Group

[2,000 employees, 7,000 employed in related industries]

The Saras Group operates in the energy sector and is among the leading independent oil refiners in Europe. At the end of 2009, the Group had around 2,000 employees, of which 1,278 were employed by the parent company Saras SpA, which has EMAS registration. With its registered offices and production site in Sarroch (1,113 employees) and its administrative and financial head office in Milan (163 employees), Saras represents the most important employment hub in Sardinia, with more than 7,000 people employed in related industries. In recent years, the company has broadened its operations beyond oil refining to encompass other activities in the energy sector, particularly the generation of electricity:
- by building an IGCC (Integrated Gasification Combined Cycle[1]) plant that is highly integrated with the refining cycle and produces 4.4 billion kWh of electricity each year, representing over 30% of the region's requirements
- by building a 72 MW capacity wind farm in Ulassai, again in Sardinia

[Group investments]

Saras SpA has been listed on the Borsa Italiana stock market since May 2006. With sales at end-2009 of over EUR 5.3 billion and a comparable[2] gross operating margin of EUR 142.2 million, the Saras Group operates in the energy sector and is among the leading independent oil refiners in Europe. In 2009, the Group made investments of EUR 317 million, an increase of 23% compared to 2008 (EUR 257 million). A significant portion of this investment was allocated to the refining division (EUR 244.4 million, up 34% on the previous year) not only to improve refinery performance, but also to strengthen protection of the surrounding area and safeguard the health and safety of the people who work on the site and live in nearby communities (investment of around EUR 50 million in health, safety and the environment in 2009).

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[1] **Gasification Combined Cycle**: the IGCC plant enables heavy hydrocarbons produced as a processing by-product from the refinery to be converted into electrical energy.
[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

The Saras production site in Sarroch, around 20 km south-west of the Sardinian capital Cagliari, is the location for one of the largest refineries in the Mediterranean region by production capacity and its complexity makes it one of six "super sites" in Western Europe (source: Wood Mackenzie, February 2007). With production capacity of 15 million tons per year (or 300,000 barrels per day), the Saras refinery accounts for about 15% of Italy's total refining capacity. The refining cycle is integrated with the IGCC plant, which generates electricity. The excellent geographical position of the Sarroch plant has proved strategic for trade with central-western Mediterranean countries, both in Europe and North Africa, while its proximity to the plants of Polimeri Europa and Sasol Italy 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, a subsidiary of Angelo Moratti Sapa is the parent company, established in 1962 to carry out refining activities. Today, it owns the Sarroch production plant. Saras operates in the energy sector, and is one of the leading operators in oil refining in Italy and Europe.

Arcola Petrolifera sells oil products on the domestic wholesale market, in Sardinia, North and Central Italy. In addition to its sales activities, which constitute its core business, the company also provides leading operators with reception, storage and land or sea redelivery services for oil products for the fuel distribution network and maritime bunkering at its storage facility in Arcola.

Sarlux, a wholly-owned Saras subsidiary, owns the IGCC plant. The company manages all commercial activities relating to the energy generated by the IGCC plant, while Saras is wholly responsible for the plant's operational management (see section 3.1.3, page 34).

Saras Energia SA distributes oil products on the Spanish retail and wholesale market, via a sales structure endowed with a high degree of expertise, professionalism and market knowledge.

Sardeolica manages the wind farm located in the municipality of Ulassai (Province of Ogliastra), and is one of the most important wind farms in Sardinia, with authorisation for 48 wind turbines, of which 42 are already in place, offering an output capacity of 72 MW. At full capacity, the wind farm produces 165 GWh/year, meeting the needs of 60,000 families.

Akhela is an IT company with long-standing experience gained from managing the IT systems of the Sarroch refinery; the company develops high-tech tools and applications for the automotive, audio processing and avionics sectors.

Sartec (Saras Ricerche e Tecnologie) provides engineering and research technology for industry and the environment. Sartec's services of environmental consultancy and monitoring, design, and production-process and industrial-automation optimisation are aimed at supporting innovation and sustainable industrial development both within Italy and internationally. Sartec also designs, builds and rolls out modular plants to monitor 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. Construction of the refinery facilities began in 1963, and refining activity began in 1965. 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, following a significant downturn in demand for high-sulphur fuel oil, Saras launched a major industrial project to build a plant for the gasification of heavy distillates from the refining process and the subsequent combined-cycle cogeneration of electricity and thermal power (IGCC plant).

[the IGCC project]

With the IGCC plant on stream, the oil production cycle was closely integrated with the electricity generation cycle, thereby maximising the conversion of raw materials into finished oil products and energy. Meanwhile, the company continued to invest in updating the technology of its existing plants and improving the environmental impact of fuels, partly to comply with increasingly stringent quality standards defined by European law. These investments have led to a progressive reduction in the percentage of sulphur in the oil products and to an improvement in the quality of middle

[continuous technological development]

FIGURE 2. The Saras production site and the surrounding region

The Sarroch industrial hub

The production hub that built up around Sarroch in the 1960s has helped generate employment and wealth in the region. Over the years, numerous small and medium-sized companies have sprung up around the large industrial companies present in the region – such as Saras, Polimeri Europa, Sasol Italy, Air Liquide, Liquigas and Eni RM. These companies build and maintain the plants of the larger firms, and therefore represent a significant satellite industry. Saras maintains mutually beneficial industrial relations with all these production companies. The site shared by Polimeri Europa and Sasol Italy was built in the early 1970s, under the name Saras Chimica (in which Saras also had a stake). The name then went through various changes over the years, until it took on the current names of Polimeri Europa and Sasol Italy. The Polimeri Europa plants receive the raw materials from Saras and use them for production destined for the plastics industry, while those of Sasol Italy produce detergents and the bases for synthetic lubricants, again from raw materials received from Saras (mainly gasoil and kerosene). Air Liquide produces liquid oxygen, which is used in the Saras plants (IGCC plant). Finally, the Liquigas site stores and sells the LPG from Saras (Figure 10, page 36).

distillates and gasoline. Since 1 January 2009, thanks to the start-up of the gasoline desulphurisation plant (unit 800) built in 2008, Saras is able to meet new European requirements that gasoline should have a sulphur content of 10 ppm, allowing the company to produce gasoline in accordance with the new restrictions and helping to reduce the indirect environmental impact linked to the sulphur content of motor fuels.

[new facilities]

In addition to the desulphurisation unit, a new hydrogen plant (unit 600) was completed and put into service within the IGCC plant, increasing the nominal hydrogen production capacity of the IGCC, which the refinery now uses on a permanent basis for the desulphurisation processes for middle and light products. The tail-gas treatment and sulphur recovery unit (TGTU)[2] was also completed in 2008, significantly reducing sulphur emissions: this system provides the basis for the formal commitment, made by Saras as part of its environmental improvement objectives for 2009 and fully achieved, to reduce its SO_2 emissions by around 30% (see section 5, page 123).

[competent authorities informed of the start-up of the Auto Oil and MTD plants on 23 December 2008[1]]

1.3 – Company organisation

The organisation chart on the next page shows the internal structure of Saras SpA. The diagram includes all the functions that could have an impact on the management of the Sarroch site.

Most of these report to the General Manager, while the Purchasing and Tenders department reports to the Chief Financial Officer. The two roles that head up the organisation, the General Manager and Chief Financial Officer, report directly to the company's Board of Directors. The General Manager is responsible for a number of organisational units, including the Group's Health, Safety and Environment (HSE) department, based in Sarroch, and the Industrial Operations department, which manages and co-ordinates Saras' operational activities through two main areas, both based in Sarroch:

- Site Facility Management
- Engineering and Construction

[operating activities]

The operating activities at the Sarroch site are managed by Site Facility Management, which, through the Production function, co-ordinates the production areas listed below, which have a direct influence on the management of environmental aspects (see definition on page 44):

- the Movement, Shipping and Wharf production area, which is responsible for the receipt of raw materials, and the internal movement and shipping of products
- the Distillation and Desulphurisation production area, which is responsible for the refining systems
- the Conversion production area, which is responsible for the conversion systems
- the Targas and Utilities production area, which is responsible for the IGCC plant and auxiliary services

[other services on-site]

Also within the Production function, the Service Engineer in particular plays an important role in managing environmental aspects, atmospheric emissions and wastewater.

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

- the Maintenance service, which is responsible for maintenance activities
- the Materials Warehouse, which is responsible for the temporary storage of materials and auxiliary substances

[1] **Relevant legislation**: Directive 98/70/EC, amended by Directive 2003/17/EC and within Italy, the following provisions: Prime Ministerial Decree no. 434 of 23 November 2000, Prime Ministerial Decree 29/2002, Law no. 306 of 31 October 2003.
[2] **TGTU**: tail gas treatment unit.

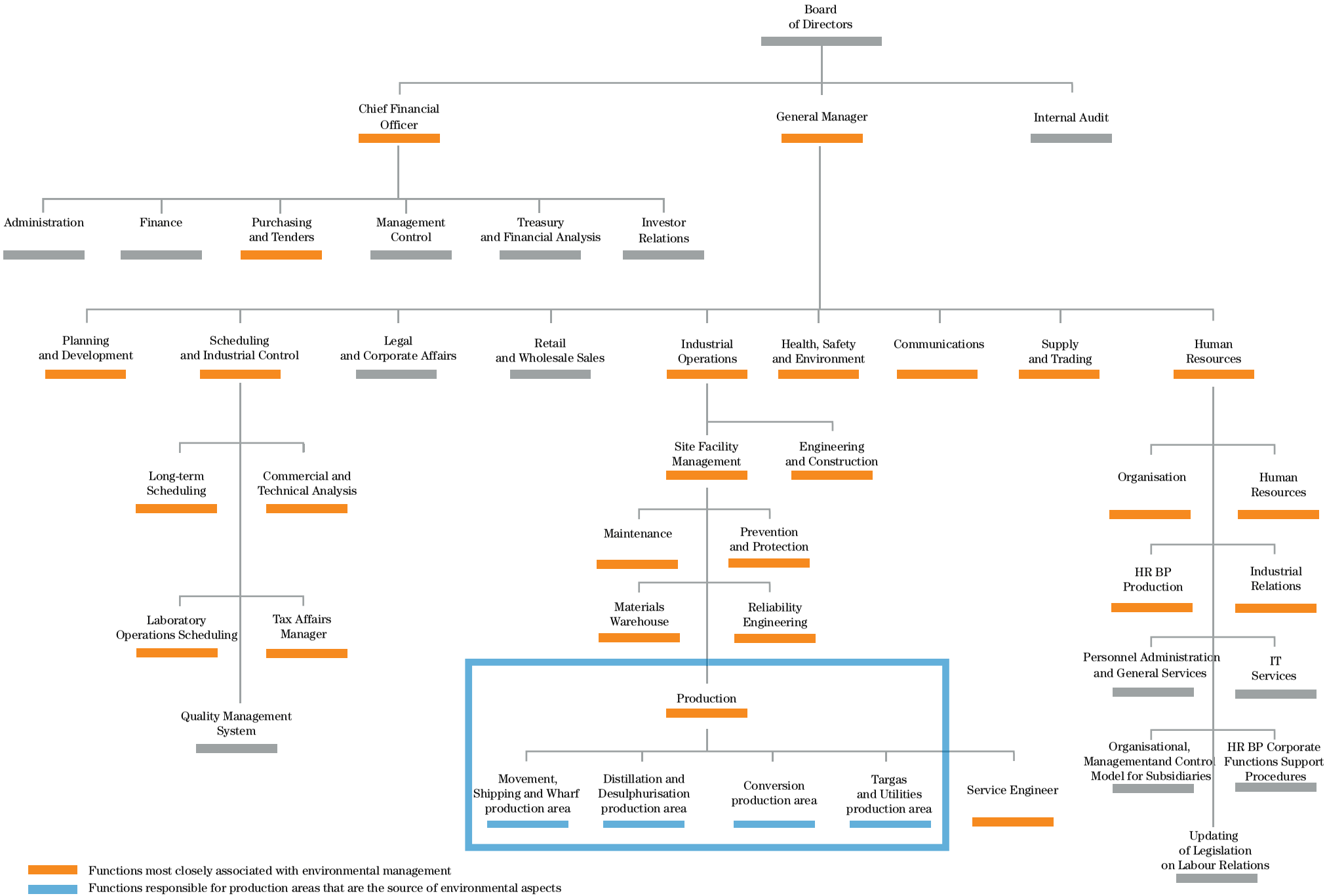

FIGURE 3. Saras' organisation chart

- the Reliability Engineering service, which is responsible for promoting and ensuring the continuous improvement of the operational reliability and safety of plants and equipment
- the Prevention and Protection service

[the Prevention and Protection service]

The site's Prevention and Protection service (PPS), as well as carrying out the tasks required under health and safety legislation (Legislative Decree 81/2008, Art. 33), also assists the management and other functions at the refinery to comply with environmental legislation and to implement the safety and environmental management systems that have been introduced at the site. The PPS is also in charge of the organisation for handling emergencies, which consists of both dedicated staff and officially designated and suitably trained employees within the operational organisation of the various areas. Internal and external communication is divided into separate functions. Internal communication is handled by the Organisation service, which reports to the Human Resources department, whereas external communication is managed directly by the Communication department. Although there is no direct organisational link between these two communication functions, they work in close contact and collaborate well.

[communication]

1.4 – Subject of EMAS registration

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

On 20 October 2008, the Ecolabel and Ecoaudit committee, which is the body responsible for EMAS in Italy, approved the registration of Saras SpA under no. IT-000995. The EMAS registration[1] relates to Saras SpA in its entirety, including both the Sarroch site and the Milan office.

Following the EMAS registration that was completed on 20 October 2008, the Environmental Management System was brought into line with EC Regulation 761/2001. The validation was updated to EC Regulation 1221/2009 during the course of third-party verification on 12-15 July 2010. In 2004, the company achieved environmental certification in accordance with the ISO 14001[2] standard, issued by Lloyd's Register Quality Assurance Italy.

Saras has its registered offices at the Sarroch site and it is here that it conducts all its production activities (the area of the site is indicated by the white boundary in Figure 2 on page 13).

The activities covered by the certification relate to both the Sarroch site and the Milan office, specifically:

a) at the Sarroch site, the processes for "producing products from oil refining, scheduling, preparing and shipping finished products, and the generation of electricity, and managing the design, engineering and construction of internal plants"
b) at the Milan office, the activities for "managing the design and engineering of internal plants"

All the processes and activities that have a direct or indirect influence on the company's environmental management are monitored as part of the certified Environmental Management System. It is worth noting that Saras' activities with a direct link to significant environmental aspects all take place at the Sarroch site, whereas the environmental aspects linked to the Milan office are not significant, as shown by the environmental analysis set out in section 4.1 on page 44.

The main areas involved in the environmental aspects of Saras' activities are therefore located in Sarroch and in the Province of Cagliari.

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[1] **EMAS registration certificate** issued on 20 October 2008 by Ecolabel-Ecoaudit, in line with EC Regulation 761/2001, which expires on 25 July 2011.

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

2.
Commitment to protect the environment, health and safety

Saras' commitment to environmental sustainability and safety is growing every day.

The process was set in motion many years ago, combining compliance with the law with the search for technological and management solutions that would go beyond statutory requirements in order to translate the company's respect for the region in which it is based into action.

Crucial steps in this journey have included the adoption of an environmental management system, certified according the standard ISO 14001 in 2004, and of a safety management system, certified according the standard OHSAS 18001 in 2007, and the strengthening of initiatives to promote openness and collaboration with local communities, which enabled Saras to obtain EMAS registration in October 2008.

2. Commitment to protecting the environment, health and safety

2.1 – Environmental management

The Environmental Management System

[the commitment to continuous improvement]

Preparing the Environmental Declaration and distributing it to the public forms part of the continuous improvement process for environmental management that Saras has had in place for a number of years:

- in May 2002, the company's Environmental Policy, containing Saras' guiding principles and environmental management commitments, was issued to all employees
- the subsequent production of the Environmental Management System (EMS) manual and the associated implementation procedures established a code of conduct for all of the company's employees
- objectives for improvement have been set and approved by the Management Committee; these are then checked and updated annually
- internal audit activities have thus been put in place to periodically check that the EMS is being applied correctly

[ISO 14001 certification]

- in June 2004, Saras' EMS achieved IS0 14001:1996 certification, and in May 2006, ISO 14001:2004 certification
- in June 2007 and June 2010, the three-yearly checks on the EMS were carried out for the renewal of the environmental certification; the certifying body, Lloyd's Register Quality Assurance, also conducts six-monthly inspections as part of its planned assessment activities
- the revised version of the Environmental Policy (Figure 4) was issued in May 2008 and distributed to the company's direct employees and to subcontractors working on site.

In October 2008, the process of developing the EMS was completed, enabling the Saras site to register in accordance with the Eco-Management and Audit Scheme (EMAS) Regulation (EC Regulation 761/2001). Registration then led to the public dissemination of the first Environmental Declaration in 2008.

[EMAS registration]

For a company, deciding to undergo EMAS registration means setting out on a course of continuous improvement, and subjecting itself to annual monitoring and checks not just by external, local and national public bodies, but also by partners in the region, such as residents, public administrative bodies and the other social groups involved.
EMAS is currently the most advanced voluntary tool available to demonstrate a company's commitment to environmental sustainability. For Saras, the decision to join this scheme, which was taken several years ago, has meant following a course of continuous improvement that takes a structured approach to the company's relationship with the environment and the local area.

SARAS' 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' 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 in application of Directive 61/96/EC, the Integrated Pollution Prevention and Control (IPPC) Directive), the utmost transparency and co-operation with the general public and with the authorities, and the involvement and accountability of its personnel and of all those who access the site as far as environmental protection is concerned.

Through the introduction and maintenance of the Environmental Management System applied to the refining and electricity generation activities at the Sarroch Refinery, Saras aims to ensure 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 wastewater treatment system
- Minimise the use of fresh water from external sources
- Improve the waste management cycle, by encouraging recovery
- Develop its own monitoring system for emissions and for environmental quality
- Improve the accessibility and usability of the data found and of the studies conducted
- Mitigate the impact of company activities that can be perceived by the surrounding communities

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

Everyone at 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 at 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 in relation to environmental aspects of the above-mentioned 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 fully implement and maintain the environmental policy at the Sarroch site.

Saras SpA
The General Manager

Sarroch, 23 May 2008

FIGURE 4. Saras Environmental Policy

2.2 – Health and safety management

The Healty and Safety Management System

[health and safety are key priorities]

The company introduced its first Safety Policy in 1996, and since then has achieved positive results in continuously protecting its workers: "Saras will treat safety as being equally as important as production, quality and costs."

Since 2008, the company has had a specific Major Accident Prevention Policy (Figure 5, page 23), created for the Sarroch site following the enactment of the ministerial decree of 9 August 2000, which set out the legislative framework for implementing a management system for the prevention of major accidents.

The subsequent introduction of specific legislation on the protection of workers' health and safety (formerly Legislative Decree 626/94, now Legislative Decree 81/2008, the Consolidated Law on Occupational Health and Safety) suggested the need to do something above and beyond simply complying with the law. Saras considers the protection of health and the prevention of any form of accident or injury (either to its own employees or workers of subcontractors) as core values, as stated in the Occupational Health and Safety Policy (Figure 6, page 24), as defined by the General Manager in July 2007. The

[OHSAS 18001 certification]

implementation of an Occupational Health and Safety System has seen the introduction of performance measures and the definition of improvement targets and objectives lacking in sector-specific legislation. The Safety Management System (SMS) has now become an integrated system (Major Accidents, Occupational Health and Safety) that shares components to generate synergies. Following a similar process to that undertaken for the EMS, in December 2007 Saras obtained certification for its Safety Management System in accordance with the OHSAS 18001:2007 standard, issued by Lloyd's Register Quality Assurance Italy. Saras has set itself the objective of integrating the Safety Management System with the Environmental Management System in the future.

Accidents

The main indicators contained in the Health and Safety Management System are those relating to accidents. The policy of continuous improvement that Saras has adopted in a number of areas, such as the environment, technology and training, can also be applied to safety. For this reason, the company continued its collaboration with Du Pont, the world leader for occupational safety, in the "Safety Project".

The indicators recorded in 2009 for Saras and compiled in Table 1 do not yet show the improvement expected from the "Safety Project".

The reason behind this development, which is largely due to behavioural factors, underlines the need to continue involving employees in the issues relating to "safe working", including through more intensive training and communication.

TABLE 1 Accidents

Parameter	2006	2007	2008	2009
INAIL frequency index* (no. accidents x 1,000,000/total no. hours worked)	5.7	7.4	6.4	7.5
Severity index** (no. days lost x 1,000/total no. hours worked)	0.120	0.120	0.172	0.376
Average duration (days)***	21.3	16.5	26.7	49.9

* Accidents lasting more than 1 day

** Calculated using the number of days lost to accidents

*** Calculated as the ratio (accident days per year + accident days continuing from the previous year) / no. of accidents in the calendar year

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

Saras SpA

MAJOR ACCIDENT PREVENTION POLICY

In the broader context of its policy on safety, health and the environment, the Operator of the Saras SpA site in Sarroch commits to:

- Pursue the utmost levels of safety for its employees and for every person present on the site
- Implement every action and initiative that will help to prevent major accidents and reduce to a minimum the possible consequences for people, the environment and property
- Observe Italian legislation governing control of the risk of major accidents
- Ensure observance of its internal safety regulations, standards and procedures, which are periodically checked, updated and amended whenever deemed necessary to improve the prevention of major accidents
- Promote continuous improvement through the use of new and more stringent safety standards
- Ensure that all its employees and those of subcontractors, with respect to their skills and responsibilities, have received sufficient training and information to be fully aware of the potential risks associated with their activities, both under ordinary and abnormal operating conditions and in the event of an emergency
- Distribute the policy to suppliers, subcontractors and any other third party who accesses the site for work reasons
- Distribute the policy to all employees and actively involve the entire site organisation (executives, managers, employees and their safety representatives, within the scope of their skills and responsibilities) in Safety Management
- Periodically assess the major-accident risks associated with the company's activity, identifying safety objectives and defining appropriate programmes for continuous improvement
- Ensure that any emergencies can be controlled by implementing specific internal plans in close co-ordination with the respective authorities, including as regards the need to keep the general public informed and the activation of the External Emergency Plan
- Implement the Safety Management System and periodically assess its effectiveness and efficiency, and make any necessary changes and updates
- Maintain a relationship of full co-operation and transparency with the general public and public institutions

The above goals can only be achieved with the active involvement of all Saras employees, and the implementation of the policy is one of the objectives at both an individual and group level.

The Operator

Sarroch, 31 March 2008

Figure 5 Policy for prevention of major-accident hazards

OCCUPATIONAL HEALTH AND SAFETY POLICY

Saras considers health and safety at work to be of primary importance, and ensures the protection of its staff in the execution of its production activities.

In addition to complying with legal obligations, Saras has set itself the objective of continuous improvement, and for this reason, is committed to adopting best practice principles, standards and solutions in the sector.

Saras commits to manage its operations with the aim of preventing occupational accidents, injuries and illness, and in particular to:

- Ensure that the design, implementation and maintenance of plant, machinery and equipment for its site protect the health and safety of workers
- Implement increasingly effective working methods and organisational structures to protect the health and safety of workers, third parties who access the site and members of the local community
- Inform staff and employee representatives about industrial hygiene monitoring programmes and the results obtained
- Provide all staff with information and training on the specific risks associated with their roles and ensure that this is updated if they change position
- Provide third parties who access the site with information and training on the specific risks associated with the activities carried out on the premises
- Involve and empower employees and personnel from subcontractors so that they participate in the pursuit of health and safety objectives
- Develop a relationship of constructive co-operation, based on the utmost transparency and trust, both within the company and with the general public, regarding health and safety issues

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

The company puts in place and actively promotes measures to make employees 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's activities can have on health and safety.

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

Saras commits to distribute this policy to employees, suppliers, subcontractors and anyone who accesses the site, and to provide all the necessary resources (human, instrumental and financial) to put the policy into practice.
Implementation of the aforementioned principles, through the Health and Safety Management System, and conduct that complies with it, is the goal and the responsibility of all employees within the organisation, each according to his or her role and responsibilities.

Sarroch, 19 July 2007

The General Manager

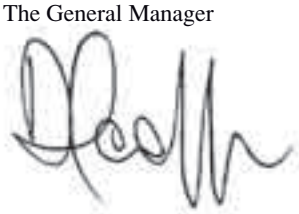


Figure 6 Saras's health and safety policy in working places

2.3 – Environmental communication

Saras dedicates particular care and attention to communication, whether it be to internal employees and subcontractors or its external partners.

2.3.1 – Internal communication

[involving employees]

The aim of internal communication activities is to increase the involvement in and contribution to improving environmental management at the site by the employees of Saras and subcontractors operating on site. To encourage this, the suggestion box system is still in place, allowing employees of Saras and subcontractors to submit questions and comments, either via email or on paper, to which the company responds publicly on notice boards and in the EMAS section of the company Intranet. There are also regular campaigns to raise awareness and meetings to look in greater depth at health and safety and environmental issues for both Saras employees and the workers of subcontractors, with the objective of encouraging and fuelling dialogue and internal discussion.

2.3.2 – External communication

[the Environmental and Safety Report]

For some time Saras has been engaged in a series of activities to provide more information to all its stakeholders (residents, the local community, authorities, schools, universities, clients and suppliers) about the measures implemented as part of its environmental commitment. Foremost among these initiatives is the preparation of the site's Environmental and Safety Report, which since 2003 has been distributed externally to institutional stakeholders. Anyone wishing to view the Report can find it at www.saras.it, in the "Our Responsibilities" section. Two further means of communicating with external stakeholders are the company's Annual Report and the Environmental Declaration, which are also available on the company website.

2.3.2.1 – Communication with the region

Even more so than in the past, environment, health and safety for Saras mean engaging more with the local community, represented by an approach to communication and dialogue designed to ensure maximum transparency.

The confirmation of EMAS registration represents an important tool for the sustainable development of the region, in the spirit of sharing and participation.

[meetings with the local community and local authorities]

In 2009, the main communication initiatives aimed at the region included:

- the publication of information on the achievement of EMAS registration in local newspapers and trade journals (January 2009)
- the filming of an ongoing TV programme explaining Saras' safety and environmental policies, broadcast on a regional TV station (March 2009)
- the distribution of the 2008 Safety and Environmental Report to the main regional stakeholders and the province of Cagliari (July 2009)
- a meeting with the Environmental Commission and the Municipality of Sarroch to present the new Environmental Declaration and the environmental limits set by the AIA (November 2009).

To continue the dialogue and the exchange of ideas between Saras and the local community, there are plans to hold meetings with the Sarroch Environmental Committee and later with the region's environmental, cultural, humanitarian and sports associations to discuss the main issues surrounding the sustainable development of the region.

These meetings will offer an insight into the progress that has been made on the objectives set in the 2009 Environmental Declaration, as well as the updated objectives for environmental improvement in 2010. The 2009 Environmental and Safety Report will also be distributed.

[meetings with the local community and local authorities for a continuous exchange of ideas]

Finally, to encourage and facilitate communication between Saras and the wider region, it is possible for anyone, including individual residents, to contact the company with questions or to request information by writing to the postal addresses or the email address on the front page of this Environmental Declaration.
Further contact details for specific areas of interest can be found on the "Contact Us" page of the Saras website (www.saras.it).

2.3.2.2 – The School Project

[collaboration with schools and events for children and families]

In 2009, Saras celebrated the eleventh year of the School Project, a tradition that forms part of the company's wider choice to embrace transparency in its relations with the outside world.
The project was launched in 1999 in association with the Municipalities of Sarroch, Villa San Pietro, Capoterra and Pula, the Italian National Olympic Committee (CONI) and UNICEF, with the aim of promoting energy awareness among children in their final year of primary school.

[around 300 pupils involved]

This is an initiative that accompanies the activities of around 300 children from nearby primary schools throughout the school year, raising awareness of the responsible use of natural resources and the importance of saving energy, starting with the calculation of their own school's ecological footprint. This is a widely used and accepted sustainability indicator that measures the natural resources we use to sustain our lifestyle.

During the project, external teachers work with the pupils to reflect on the problem and to draw up 10 eco-tips to help their school reduce its footprint.
The project ends in June with a concluding party, when a prize is awarded for the best work, judged on the originality of the eco-tips suggested during the school year.
Part of the project consists of a trip to the Sarroch refinery and the Ulassai wind farm, which represents another important opportunity to interact with the region, especially within the context of transparency and openness towards our external stakeholders.
The School Project has its own dedicated website, www.sarasperlascuola.it, which is a useful tool for communicating with pupils and all those wishing to learn more about one of the most important industrial companies.

3.
Information about the Sarroch production site

Oil products and electricity from clean technology.

These are the activities that Saras carries out at its site in Sarroch, which produces products for daily domestic use (vehicle fuels, other fuels and electricity) and for industrial applications.

It is a facility where more than 1,000 employees operate plants and equipment for the receipt of raw materials, crude oil processing, electricity generation, internal transport and the storage of raw materials and products, before finally shipping the finished products and co-ordinating the supporting activities performed by external subcontractors.

It is a complex system, safely managed using an intricate network of systems and equipment, where constant attention is paid to compliance with all authorisations and statutory provisions governing activities at the site.

3. Information about the Sarroch production site

3.1 – Activities performed at the site

The activities conducted at the Sarroch site can be broken down into the following functions:

- receipt of raw materials and shipping of products through the marine terminal
- production of oil products
- electricity generation in the IGCC
- storage of raw materials, liquid products and liquified gas
- shipping of products by land
- auxiliary services (power generation in the thermoelectric plant, incoming water treatment, wastewater treatment)
- offices, workshops and warehouses
- activities of subcontractors

Figure 7 shows the areas used for the different types of activity performed within the facility, with a brief description provided in the paragraphs below.

3.1.1 – Receipt of raw materials and shipping of products through the marine terminal

The marine terminal linked to the refinery has a 1,600m-long wharf and fixed platforms connected to it by a 1,200m piling.

[receipt and shipping by sea]

All raw materials are delivered here, and the bulk of the oil products are shipped from here. In 2006-2009, 80% of oil products were shipped by sea.

The terminal has 11 independent docking berths, nine of which are for shipping finished oil products and the receipt of semi-finished products, docking oil tankers of up to 65,000 tons of deadweight capacity.

In addition to these docking berths, there are also two platforms which enable ships of up to 300,000 tons of deadweight capacity to dock for the receipt of crude oils.

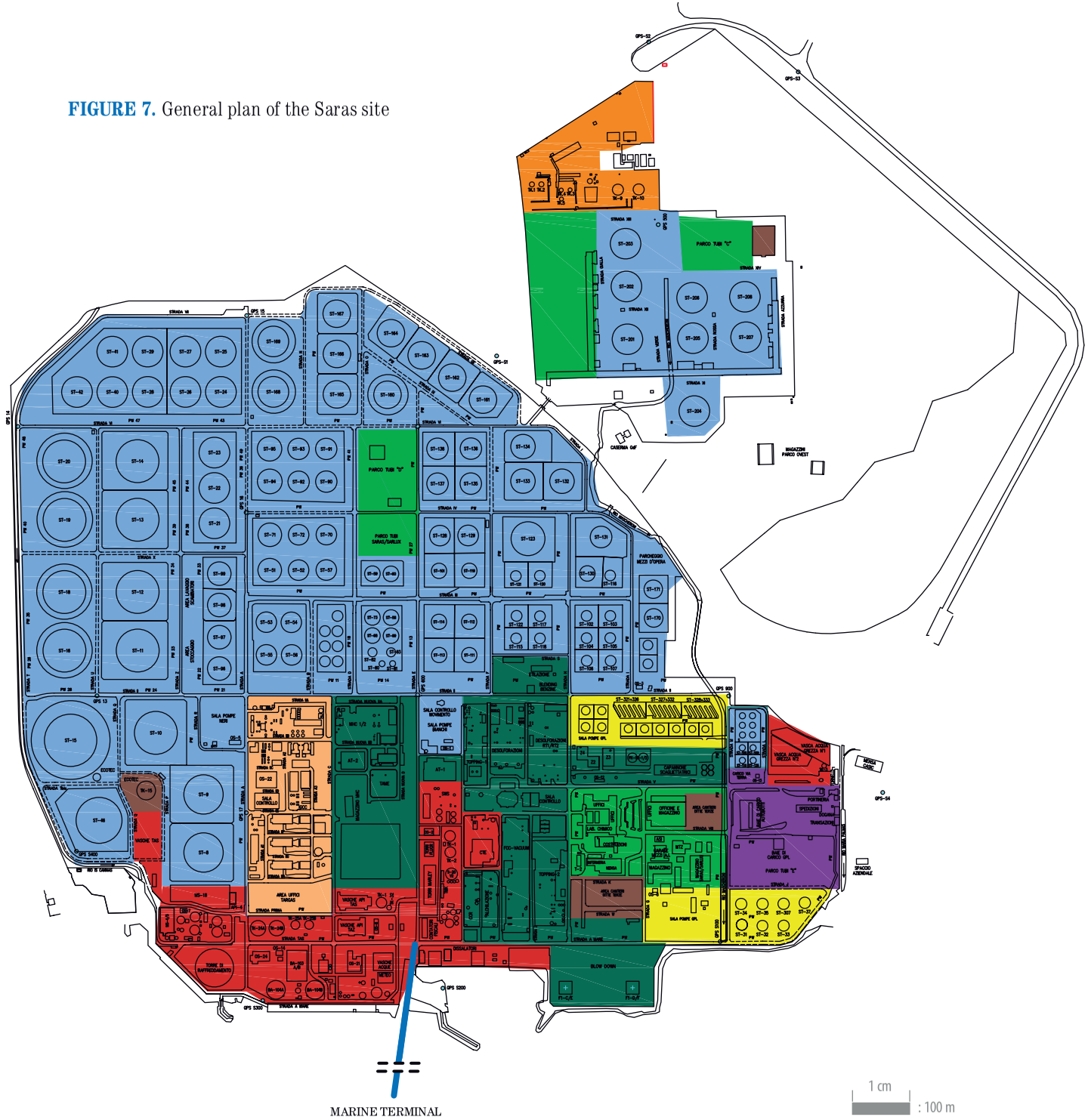
[continuous monitoring of operations and ships]

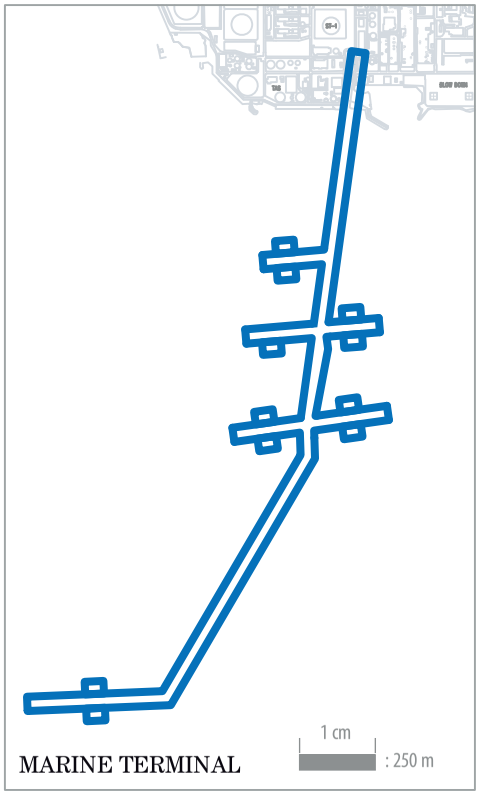
The various docking berths can operate simultaneously, thus reducing waiting times for anchored ships. Advanced monitoring systems ensure that all receipt and shipping operations take place under conditions of the utmost safety: the phases relating to the docking and mooring of ships and the connection between the ship and the loading arms transferring raw materials to the shore and finished products to the ship are carried out under continuous surveillance.

In order to be admitted to the Saras marine terminal, all incoming ships must comply with rigorous safety standards that conform to internationally-recognised criteria as well as additional requirements laid down by Saras (section 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.

FIGURE 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 illustrated in the simplified diagram shown in Figure 8, and involves the following units:

- atmospheric distillation plants (topping) and vacuum distillation plants for raw materials, which produce the primary fractions
- conversion plants (visbreaking, mild hydrocracking 1 and 2, fluid catalytic cracking – FCC), where heavy hydrocarbons and distillates are converted into medium-light fractions; heavy hydrocarbons are sent from the visbreaking plant to the IGCC plant
- catalytic reforming (CCR) plant, where light distillates (naphtha) are converted into high-octane components; hydrogen, which is used in the desulphurisation treatment, is produced at the same time
- alkalisation and TAME (Tertiary-Amyl-Methyl-Ether) plants for improving the technical characteristics of gasoline
- desulphurisation plants, where middle distillates (kerosene and diesel) are subjected to catalytic hydrogenation processes to remove sulphur and improve product quality
- hydrodesulphurisation plant (U800) to remove sulphur from certain gasolines (MCN and isopentane)
- plants to recover and convert sulphur into a solid for subsequent sale
- non-condensable fuel gas treatment plant for the removal of sulphur compounds and subsequent internal re-use of gas

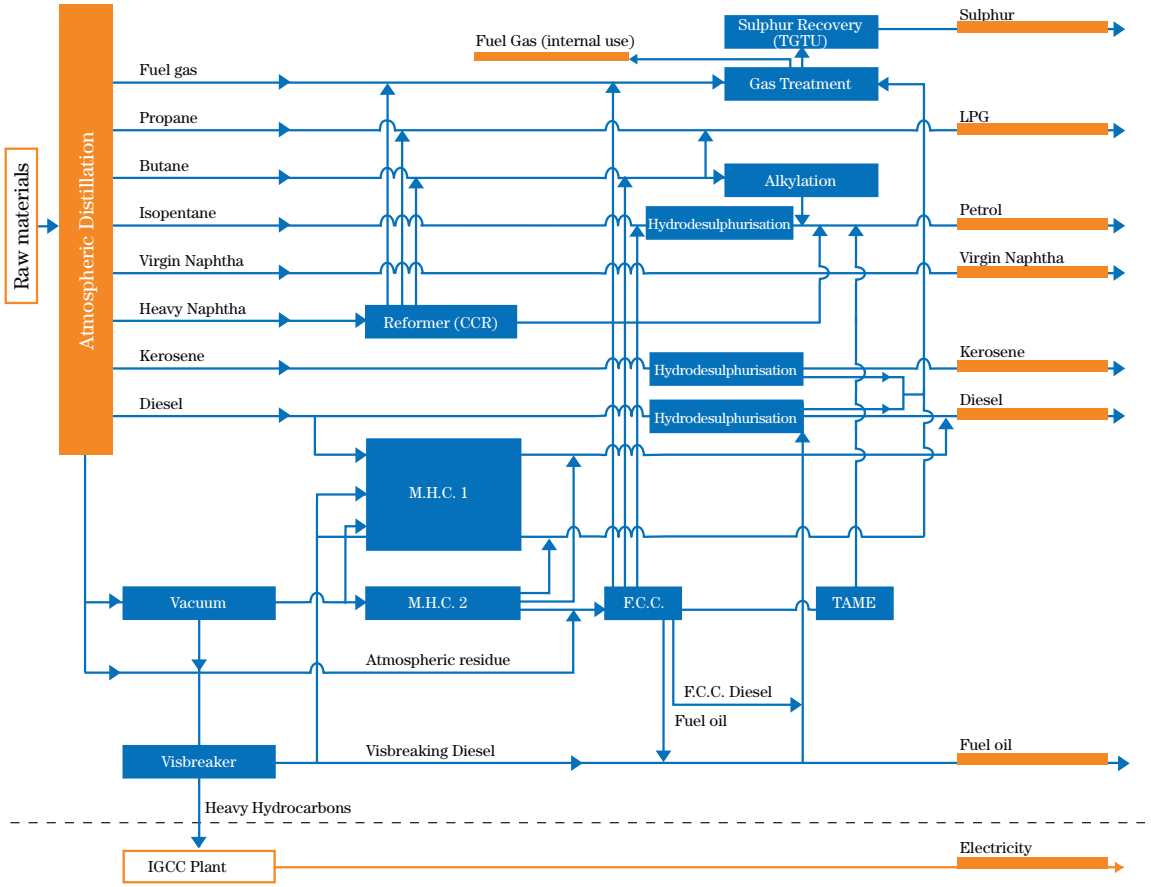


Figure 8 Production cycle at the Saras site: oil products and production of electricity

The Sarroch plant has a high output of medium oil products (diesel) and light oil products (LPG, naphtha and gasoline), which in 2009 accounted for around 80% of total production, as shown in Table 2, which contains production data relating to the period 2006–2009.

[oil products]

The increase in the production of fuel oil seen in 2009 is largely due to the planned maintenance work carried out at the site that prevented the products from being fully upgraded.

TABLE 2 Oil products (tons/year)

	2006	2007	2008	2009
LPG	341,000	323,000	359,000	242,000
Gasoline	2,945,000	3,110,000	3,184,000	2,532,000
Virgin naphtha	936,000	916,000	862,000	799,000
Kerosene	388,000	467,000	544,000	358,000
Diesel	6,713,000	6,813,000	7,498,000	6,205,000
Fuel oil	1,033,000	788,000	896,000	1,155,000
Sulphur*	111,000	112,000	110,000	110,000
Heavy hydrocarbons to IGCC	1,217,391	1,190,195	1,179,604	1,076,783

* Includes sulphur recovered both from refining and the IGCC.

[Saras at the heart of the Mediterranean]

Raw materials mainly come from the Mediterranean area (North Africa and the Middle East), the former Soviet Union and North Europe.

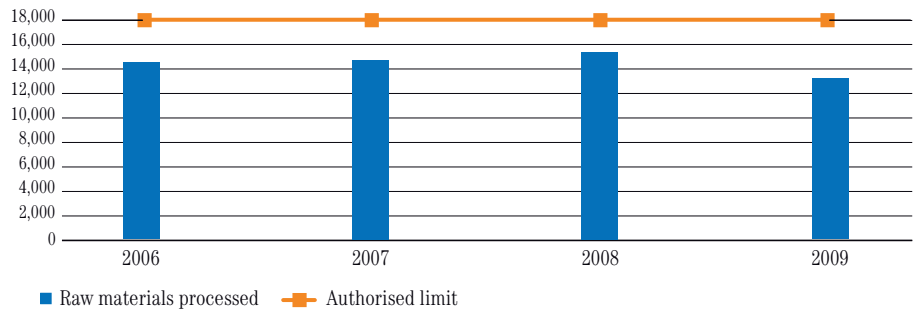
The main destination for refinery products is the central and western Mediterranean region. In the period 2007-2009, almost a quarter of total production was absorbed by the local Sardinian market.

To show the changes in processing over the period 2006-2009, Chart T3 represents the change in the level of raw materials processed in comparison with the maximum authorised quantity (18 million tons/year) specified by the refinery's Concession to Process Mineral Oils (Decree of the Italian Ministry for Productive Activities no. 17086 of 7 July 2003). Following the peak in processing levels reached in 2008, 2009 saw a drop caused by the major planned maintenance programme carried out at the site and the slump in the oil market.

TABLE 3 Raw materials processed (kt/year)

2006	2007	2008	2009
14,515	14,593	15,517	13,305

CHART T3 (kt/anno)



3.1.3 – Power generation

[electricity, hydrogen, steam]

The IGCC (Integrated Gasification Combined Cycle) plant generates electricity, hydrogen and steam from the heavy hydrocarbons resulting from the refining process. Taken as a whole, it is recognised as one of the best techniques available for the refining sector.

As shown in Figure 9, the plant is divided into two main sections:

- gasification
- combined cycle

In the gasification section, oxygen supplied by the Air Liquide plant is used to convert heavy hydrocarbons from the visbreaking plant into a synthesis gas (shortened to "syngas"), which, once purified of the sulphur and metals it contains, is burned in the combined cycle section.

[electricity to the external distribution grid]

Electricity is produced in three identical lines, each comprising a gas turbine, a steam recovery boiler and a steam turbine, with an overall net rated power of 551 MW, and is sold to GSE (Gestore Servizi Elettrici, the operator of the Italian national grid). Part of the steam produced and not used to generate electricity is sent to the refinery for use in refining processes, along with the hydrogen produced by the gasification section, further increased by the recently built U600 unit.

As with the sulphur recovered from the refining cycle, the sulphur recovered through the removal of sulphuric acid from the syngas is also destined for sale (figures shown in Table 4).

[recovery of metals]

The metals removed from the syngas are used to form a solid panel called "vanadium concentrate" or "filter cake", which is sent to external plants to recover the metals.

The IGCC plant therefore enables the Saras production site to maximise the conversion of raw materials into value-added products and to minimise the generation of waste.

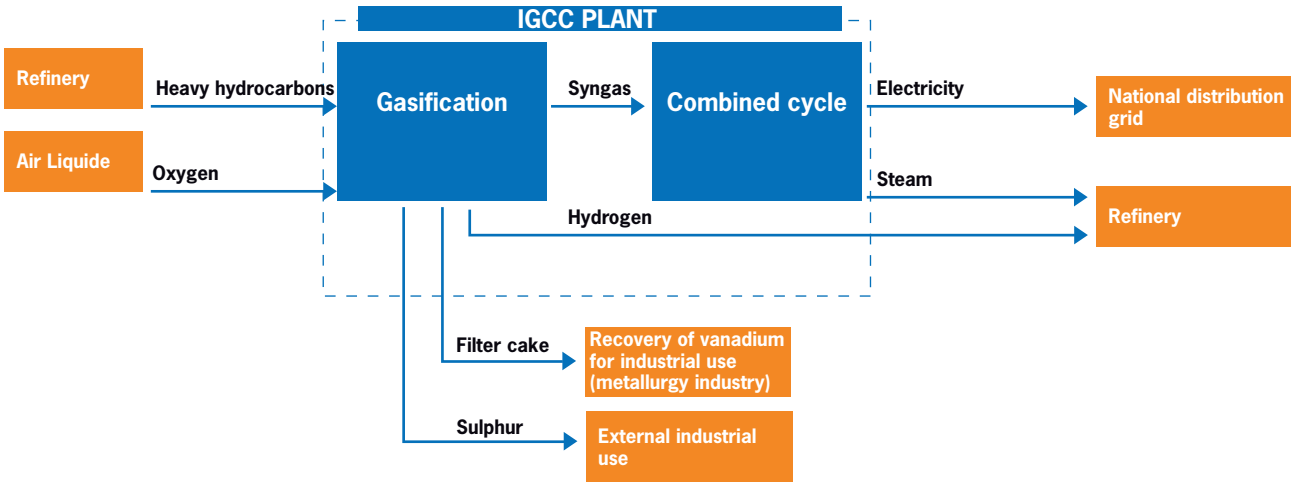


Figure 9 The IGCC plant: flow chart

Table 4 shows the production figures for the IGCC for the past four years

TABLE 4 IGCC products

	2006	2007	2008	2009
Electricity (kWh)	4,473,702,675	4,432,135,634	4,251,352,752	4,086,438,699
Low-pressure steam (t/year)	608,042	556,828	539,680	437,003
Medium-pressure steam (t/year)	677,703	568,650	667,763	570,754
Hydrogen (kNm^3)	360,220	307,083	322,226	359,108
Sulphur* (t/year)	48,184	42,589	49,752	48,405

* The quantity shown here is already included in the figure in Table 2 on page 33, "Oil products"

[IGCC efficiency and reliability]

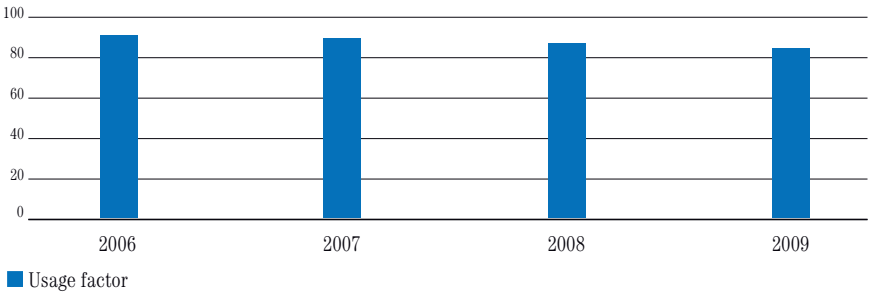
The three-line configuration of the IGCC plant ensures continuity in electricity generation and the production of hydrogen and steam for internal use on the site. The figures recorded to date confirm the effectiveness of the plant processes and technology. The plant is extremely reliable, as shown in Table 5 and Chart T5.

TABLE 5 The IGCC plant usage factor

Indicator	2006	2007	2008	2009
Energy produced/potential energy* (%)	92,7	91,5	87,8	84,7

* Potential energy is calculated by multiplying the available power by the maximum number of hours in one year.

CHART T5 (%)



3.1.4 – STORAGE OF RAW MATERIALS AND PRODUCTS

The storage facilities on the site break down into:

- storage of raw materials and products in the tank farm
- storage of products for which excise duties have been paid in the national storage facility, located outside the bonded area, further along the S.S. 195
- storage of liquefied gases in special pressurised containers ("spheres", "bullets" and "horton spheres").

In total, there are 161 tanks with an overall capacity of around 3.5 million cubic metres.

All tanks are fitted with permanent fire-prevention systems and containment basins of reinforced concrete (37 tanks), or earthworks (124 tanks).

[extensive and widespread safety systems]

The fire-prevention system in the LPG storage areas 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 accidents, the LPG tanks are equipped with instruments that monitor and protect against unexpected pressure surges.

Raw materials and products are moved within the site between plants and storage and shipping areas using the following systems and equipment:

- pumping lines and systems, including pipelines connecting to the national storage facility and 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 by land

Products are shipped by land using special loading gantries for tanker trucks:

- a gantry with three loading points for LPG and 12 loading bays for liquid products (kerosene, diesel and fuel oil), located near the facility's manned entrance
- ten loading bays for diesel and fuel oil, located in the national storage facility

[synergies between companies in the Sarroch petrochemical industrial hub]

The Saras site is linked via the Agipgas and Liquigas gas pipelines and two oil pipelines to the neighbouring petrochemical plant (for the commercial exchange of semi-finished products and services), as well as to the national storage facility (Figure 10).

3.1.6 – Auxiliary services

The site is equipped with the following units, which provide services necessary for the production cycle:

- thermoelectric power plant for the refining cycle, which produces part of the electricity and steam necessary for the processes
- air compression system, comprising six compressors and two distribution networks, one for instruments and one for services
- treatment unit for water coming into the site from the industrial water supply
- treatment plant for wastewater generated by site activities (process-water purification plant).

Internal infrastructure enables the distribution of water, steam, electricity, fuel and nitrogen, and the collection of wastewater to be sent to the treatment plant before it is discharged into the sea.

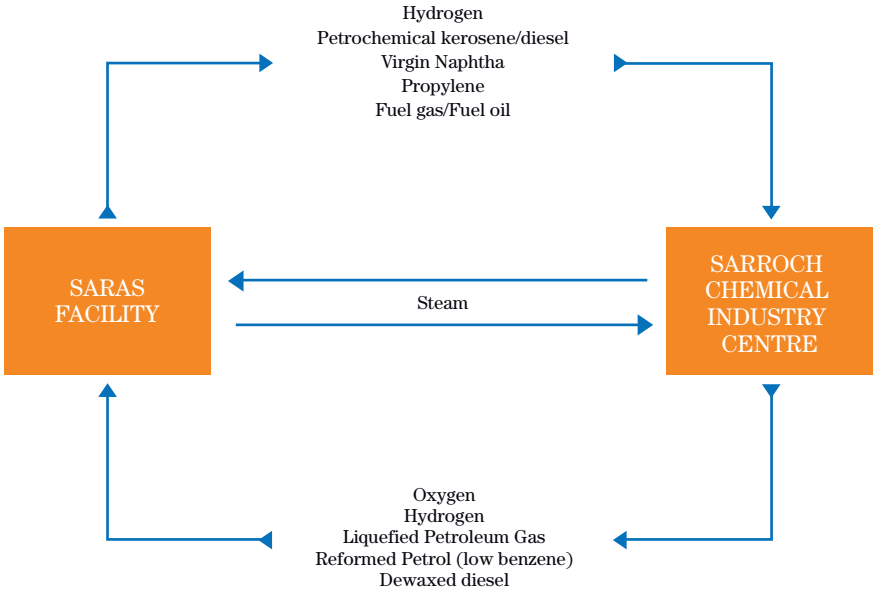


Figure 10 Synergy between the Saras facility and the adjacent centre of chemical industry

3.1.7 – Offices, workshops, warehouses and other services

The office buildings are located next to the production area; opposite these are the mechanical workshop, the electrical workshop and part of the warehouse space, where auxiliary substances and consumables are stored before being sent to the areas in which they will be used. Other areas used for materials storage (pipe yard) are located in the centre of the tank farm and at the national storage facility. Other general services, such as the canteen and the medical centre, are also located in the offices area.

3.1.8 – Activities conducted by subcontractors

Subcontractors operating continuously within the Saras site (maintenance, construction, mechanical and instrument checks, etc.) have a logistics base in dedicated areas on the site, which enables them to perform their work to the highest possible standard and reduces the need to leave the site. Specifically, two external companies work permanently on the site in waste management: one to manage the waste inertisation plant and one to manage an area in which mainly ferrous and electrical materials are sorted and recovered (section 4.2.6).

3.2 – Authorisation status of the Sarroch site

3.2.1 – Integrated environmental authorisation (AIA)

[AIA permit DSA-DEC-2009-0000230]

On 24 March 2009, the integrated environmental authorisation (AIA) permit for the combined operations of the refinery and the IGCC was issued, pursuant to Legislative Decree 59/05, which implements Directive 91/61/EC, more commonly known as the IPPC Directive on integrated pollution prevention and control.

The authorisation process was conducted by the assessment committee, which comprised representatives from the Italian Ministry for the Environment, the Region of Sardinia, the Province of Cagliari, the Municipality of Sarroch, and engineers from ISPRA (formerly APAT) and ARPAS. The AIA permit, which applies from 9 April 2009, replaces all the existing authorisations and fundamentally changes the way in which environmental issues are managed. The permit consists of two sections: the preliminary assessment and the monitoring and control plan. The preliminary assessment contains both limits on air and water emissions and a number of requirements imposed on Saras by the competent authority, along with the relevant deadlines for implementation. The monitoring and control plan sets out the methods for managing, checking and disclosing the environmental variables, as well as indicating how abnormal situations should be communicated and outlining the type of report that must be submitted to the authorities.

All the technical and environmental improvement measures presented by Saras were approved by the assessment committee and have been timed in such a way that they "represent, both as a whole and at every point in time, an improved environmental situation".

The AIA permit (DSA-DEC-2009-0000230 of 24 March 2009), published in the Italian Official Journal on 9 April 2009, replaced and combined the main environmental permits, i.e. those relating to atmospheric emissions, wastewater and the treatment of waste.

[new emissions limits]

The main features introduced by the permit are:

1. New limits on atmospheric emissions for the refinery
2. New limits on atmospheric emissions for the IGCC plant
3. Limits for the refinery flares
4. New control parameters and limits on wastewater
5. New waste management criteria.

[monitoring and control plan]

The monitoring and control plan is perhaps the one true innovation brought in by the AIA. It gradually became fully operational over the course of 2009: the first effective report required under the plan, relating to the second half of 2009, was sent by 31 March 2010. As well as changing the outlook on the management of environmental issues, the implementation of the plan allows Saras to pursue continuous improvement.

3.2.2 – Existing authorisations

The refining activities at the site are performed in accordance with the "Concession to Process Mineral Oils", which was last updated by the Decree of the Italian Ministry for Productive Activities issued on 7 July 2003. Until 9 April 2009, the date when the AIA permit came into force, the existing environmental authorisation permits were as follows:

- Authorisation permit 445 of 22 November 2004, issued to Saras by the Province of Cagliari. The permit relates to the discharge of water from the facility into the sea and the Rio Mascheroni channel.
- Ruling on the environmental compatibility of the IGCC project, ref. DEC/VIA/2025 of 28 December 1994 issued by the Italian Ministry for the Environment, supplemented by letter ref. 854/05/SIAR from the Ministry for the Environment.
  The documents contain the authorisation for the construction of the IGCC and specify requirements for, in particular, atmospheric emissions from the IGCC and the facility as a whole.
- Decision 2510/IV of 4 November 2004 and decision 964/IV of 31 May 2005 (supplementing the previous decision), issued to Saras by the Region of Sardinia.
  The documents authorise the treatment of water contaminated with hydrocarbons, to be performed in the ballast water treatment plant (BWT).
  The BWT can treat the bilge water that has collected in the ships' hulls, the ballast water, the water used to wash oil tankers and the water drained from the wells of the hydraulic barrier for securing Saras' site.

As of 9 April 2009, all of the environmental authorisation permits listed above were combined and replaced by AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

3.3 – Plans and procedures for handling emergencies

The site's Safety Report

The activities performed at the site involve the presence of substances with hazardous properties or that are hazardous when used at certain levels.

[1989: the first Safety Report]

In 1989, following the entry into force of the Italian law implementing the first European Directive on establishments where there are major-accident hazards, Saras prepared the first Safety Report on its activities at the Sarroch site. In drawing up the Safety Report for the site, the company conducted a precise and in-depth analysis of its activities and the risks associated with them on the basis of the processes and substances used.

[an in-depth risk analysis]

[Legislative Decree 334/99]

Since then, the document has been continually updated in accordance with the applicable legislation (currently Legislative Decree 334/99, as subsequently amended, which requires the report to be updated every five years) and in order to include all the changes that have been made to the plants over the years.

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

The Safety Report looks at all the different types of hazardous substance, broken down by degree of flammability (e.g. crude oil, gasoline, LPG), toxicity (e.g. hydrogen sulphide) and risk to the environment (e.g. diesel, kerosene).

On the basis of the quantity and type of substance present on site and the processes in which they are used, possible events and accident scenarios have been identified, such as fires, explosions, toxic gas clouds and the discharge of hazardous substances into the soil or sea. The potential consequences of the accident scenarios identified have been studied in order to determine their impact on the safety of individuals on and off the site and on the environment.
The analysis of potential accident scenarios has ruled out any significant consequences outside the site for the time being. The only external area that could potentially be affected is an uninhabited area in the direction of SS 195. As far as the marine terminal is concerned, any potential cases of discharge into the sea involve limited quantities of hydrocarbons.
Internal rapid response vehicles and equipment are available to efficiently counteract the effects of any discharge into the sea. A brief overview of these is provided on page 41.

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

In October 2005, Saras SpA presented the five-year update of the Safety Report, in compliance with the provisions of Art. 8 of Legislative Decree 334/99, and sent the Municipality the information sheet intended for the general public.
The 2005 Safety Report contained the risk analysis for the new plants (TGTU and U800) that became operational at the end of 2008, for which the declarations that there would be no increase in risk were submitted on 5 September 2005.

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

In fulfilment of the provision of Art. 23 of Legislative Decree 238/05, which amended and supplemented Legislative Decree 334/99, in December 2006 Saras submitted the update to its Safety Report, including the progress made on the recommendations of the Sardinia Regional Technical Committee for Fire Prevention (CTR) during the assessment stage for the site's Safety Report (October 2000 edition), and sent the Municipality of Sarroch the updated information sheet for the general public.

[the assessment of the Regional Technical Committee]

Upon completion of the assessment stage, the Sardinia CTR issued its Final Technical Evaluations on the above-mentioned Safety Report (October 2005 edition, as amended), as per the report ref. 4921/P12 of the session on 18 July 2007. The conclusions state:

[omissis]
In acknowledging the measures executed, those currently being executed and those planned, we consider that the company has taken positive steps to follow up on the recommendations made by the CTR upon conclusion of the assessment of the Safety Report (2000 edition) and has, on its own initiative, put in place plant and procedural solutions that, taken as a whole, have contributed or will contribute to enhancing the level of safety. However, as on previous occasions, a number of issues need to be addressed further and some of the measures executed or planned could be further improved. This being so, it is in the company's interest to verify the information detailed above based on the priority assigned according to the urgency of the individual measures, and to provide prompt notification of said verification, in whole or in part.
[omissis]

[May 2008 – October 2010: a plan of action]

In June 2008, the CTR was notified of the measures implemented between October 2006 and May 2008, in relation to the recommendations received, and the measures planned for the period May 2008 to October 2010. Upon completion of the planned activities, in accordance with the Ministerial Decree of 19 March 2001 regarding fire prevention procedures for activities involving major-accident hazards, on 26 November 2008 Saras submitted an application to the Sardinia regional fire service for a Fire Prevention Certificate. Inspections by the commission appointed by the Sardinia CTR

are currently ongoing, as part of the checks required before the certificate is issued. An initial inspection report was released on 20 April 2009, which stated that a number of issues had already been dealt with (final assessment of the Sardinia CTR in relation to the 2005 Safety Report, see above), and that other issues, relating only to the Topping1 and Topping2 plants, the chemical laboratory, the office buildings and the wharf, must be resolved before the inspections are complete. During 2009, a start was made on preliminary activities for updated the Safety Report, which will conclude with the publication of the new edition in October 2010. At the end of 2009, an inspection was begun by the Italian Ministry for the Environment and the Conservation of Land and Sea in order to assess the programmes and measures in place to prevent major accidents, with specific reference to the suitability of management procedures and plant solutions adopted. The inspection was completed in early April 2010.

Internal Emergency Plan (IEP)

[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 personnel and vehicles. At the same time as updating the Safety Report, the company is also updating its Internal Emergency Plan.

[prevention and control]

The objective of the IEP is to ensure the company reacts as effectively as possible to accidents by:

- preventing and minimising injury and providing assistance to any casualties
- 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, which was drawn up to deal with emergencies resulting from spills into the sea from the refinery or critical events that could occur at the site's marine facilities.

[classification of emergencies]

Based on the content of the refinery's Safety Report, the IEP defines the criteria for reportable accidents, and distinguishes between two types (i.e. levels) of emergency:

- limited emergency: an accident limited to a well-defined area
- general emergency: an accident with the potential to spread to other areas inside or outside the site

Table 6 shows the data on emergencies for the four years between 2006 and 2009.

Table 6 Emergencies

Parameter	2006	2007	2008	2009
No. of general emergencies	4	6	7	3
No. of limited emergencies	27	21	18	32

[extensive internal communication system]

In 2009, there were three general emergencies, all of which were handled in accordance with the site's Internal Emergency Plan and involved only the internal organisation, without the need for outside assistance. In all cases, the emergencies affected limited areas of the site and none of them caused direct or indirect injuries and/or significant environmental impacts. Communication and reporting systems (fire alarm buttons, telephones, fixed and portable radio receivers/transmitters) are widely available throughout the whole refinery area, which enables an immediate response to be made by personnel reporting to the Emergency Co-ordination Centre. The centre also

keeps the necessary external bodies (fire service, prefecture, neighbouring industrial sites, the Municipality of Sarroch, the carabinieri in Sarroch, the Italian state police and the port authority) constantly up to date with any developments in the situation until the emergency is fully resolved. The effectiveness of the plan and its implementation is monitored using regular drills involving all those working on the production site (evacuation drills).

External Emergency Plan (EEP)

The External Emergency Plan (EEP) is closely related to the Internal Emergency Plan. 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. The plan concerns the Sarroch industrial complex as a whole, and considers hypothetical accidents concerning sites belonging to the various companies located there (Saras, Polimeri Europa, Sasol Italy, ENI RM, Liquigas, Air Liquide) 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 the intervention of all company and external personnel responsible for particular action in accordance with the various roles assigned to them, including direct management of accidents at the site, monitoring of the surrounding area, dissemination of information to the relevant external bodies and provision of assistance to local residents (road management, health services, information media, etc.). The effectiveness of the EEP and its implementation is monitored via regular drills involving the companies and all other organisations responsible. The EEP currently in place was last reviewed in September 2005.

[a plan for the entire Sarroch industrial complex]

[un programma di esercitazioni periodiche]

Safety systems at the site

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

The fire protection water distribution system comprises an extensive network that covers the whole plant.

[fire prevention system]

All the storage tanks are protected by cooling systems; the most important 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. The site 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 installed systems.

[cooling systems on tanks]

Safety equipment and systems are regularly checked, and carefully and routinely maintained. In the event of a spill at sea, vessels and equipment are available to respond quickly to the problem, following procedures laid down in the Internal Emergency Plan which, as mentioned above, includes the Marine Pollution Prevention Plan.

[seven fire trucks]

The site has four seagoing vessels that operate 24 hours a day and a wide range of equipment (skimmers, floating booms, etc.) all of which ensure that the site is fully capable of responding quickly to contain and collect any product spills.

[rapid-response seagoing vessels]

4.
Enviromental aspects

Complete, accurate and transparent information forms the solid basis of any dialogue.

In this section Saras sets out all the information necessary for understanding how its production plant interacts with the environment and the surrounding area. The facts and figures show how the plant has improved over time and its commitments to new environmental objectives expected in the next few years: the result of technological and managerial decisions always made with an eye to achieving simultaneous progress on health and safety, the environment and production quality.

Saras is committed to the clarity and completeness of information, which will allow it to engage in clear, concrete and ongoing dialogue with stakeholders, in order to give the surrounding area the answers that it expects.

4. Environmental aspects

4.1 – General information

[environmental analysis]

In accordance with the requirements of the European Parliament and Council Regulation (EC) 1221/2009 (EMAS), Saras submitted its activities under normal, abnormal and emergency conditions to a thorough environmental assessment. The results of this environmental assessment are set out in a specific document held at the Prevention and Protection department, where it may be consulted. It is updated periodically and when changes are made.

Definitions contained in EC Regulation 1221/2009
Environmental aspect: *an aspect of an organisation's activities, products or services that has or can have an impact on 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, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.*

[environmental aspects]

The direct and indirect environmental aspects of Saras' activities have been identified with reference to Annex 1 of the EMAS Regulation. The aspects deemed to be "significant" have also been determined.
The direct environmental aspects are those over which the organisation has direct management control. Examples of direct aspects are atmospheric emissions and wastewater discharges.
Indirect environmental aspects are those over which the organisation can exert an influence but does not have direct control.
Examples of indirect aspects are the transport of raw materials and products.

The significance of each direct environmental aspect under normal operating conditions is assessed using the following criteria:
- the extent of the impact on the environment
- the existence of legislation, authorisation and other regulations to be followed
- the sensitivity of the issue to the local community

Abnormal events or emergencies that may give rise to major accidents such as fires, explosions and discharges into the sea were analysed and assessed as part of the Safety Report (described in section 3.3, page 38).
Other types of abnormal or emergency events not likely to generate major accidents

were identified as part of the environmental analysis and assessed using estimates of their probability of occurrence and their potential consequences.

As regards the company's past record, no accidents have been sustained or environmental responsibilities incurred such as to determine significant impacts at the present time, with the exception of accidental spills into the soil and subsoil, as described in section 4.2.7, page 99.

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

Significant direct environmental aspects
Consumption of raw materials
Energy consumption (fuels, electricity)
Water consumption
Atmospheric emissions
Waste
Discharges into water
Discharges into the soil and subsoil (past activities, prevention activities)
Noise
Odours
Visual impact
Legislative obligations and limits prescribed by the relevant permits

The legislative obligations and limits prescribed the relevant permits are included in the descriptions and tables relating to the specific aspects listed above. For indirect environmental aspects, the degree of influence that Saras can indirectly exert over their control was assessed. The assessment led to the identification of the following indirect environmental aspects as significant:

Significant indirect environmental aspects
Product design
Road transport (of products, materials and substances, of internal and external employees)
Sea transport (of raw materials and products)
Environmental conduct of external companies

The significant indirect environmental aspects all relate to the Sarroch production facility. The significance of the environmental aspects relating to the offices in Milan was assessed and deemed to be negligible in the context of Saras' activities and the surrounding area (city of Milan).

The correlation between the various significant environmental aspects (both direct and indirect) identified for the Sarroch site and the resulting environmental impacts is shown in the table on the next page.

Significant direct environmental aspects	Environmental impacts
Raw materials	
Consumption	Consumption of a non-renewable resource
Storage and use	Risk of accidents (fires, explosions, discharges into the soil and sea)
Consumption of energy in the form of	
Fuels produced by the refinery	Atmospheric emissions from the site and resulting impacts
Electricity purchased	Indirect impacts on external electricity production sites
Water consumption	
Sea water desalinated internally	Energy consumption and resulting impacts
Water from industrial water supply	Consumption of natural resource in the local area
Atmospheric emissions	Effect on air quality at local level
	Contribution to large-scale effects (greenhouse effect, acid rain)
Waste	
Storage and internal treatment on site	Indirect impacts on external disposal and recovery sites
Off-site treatment	Risk of discharges into the soil
Discharges into water	Effect on seawater quality
Discharges into the soil and subsoil	
Past activities	Contamination of soil, subsoil and underground water on the site
Prevention activities	Reduction of the risk of contamination of the soil, subsoil and underground water
Noise	Effect on the acoustic environment outside the site (Sarroch area)
Odours	Nuisance caused outside the site (Sarroch area)
Visual impact	Visibility of the site in the area

Significant indirect environmental aspects	Environmentals impacts
Product design	Indirect impact on air quality (fuel combustion)
Transport of products, auxiliary materials and employees by land	Atmospheric emissions
	Road traffic, risk of traffic accidents
Transport of raw materials by sea	Atmospheric emissions
	Risk of accidents and contamination of seawater
Environmental conduct of external companies	
Internal waste management	Risk of accidents and contamination of soil and subsoil
Road transport of employees, materials and equipment	Road traffic, risk of traffic accidents

A qualitative and quantitative description of the significant direct and indirect environmental aspects is set out in the tables on the following pages. Specific numerical performance indicators are given for each environmental aspect.
The indicator values, calculated on an annual basis, are generally provided for the last four years (2006-2009). Where relevant, the indicator values are compared with legal thresholds.
The indicators are divided into:

- operating performance indicators
- environmental sector indicators
- management performance indicators

Direct environmental aspects

Operating performance indicators

Relevant environmental aspect	Applicability	Definition of indicator	Unit of measurement
Consumption of raw materials	Refinery	Quantity of raw materials processed	kt/year
	Refinery	Low-sulphur crude oil used/total raw materials processed	%
Energy consumption	Site*	Energy input to the site	TOE/year GJ/year
	Site	Energy output from the site	TOE/year GJ/year
	Site	Efficiency of integrated cycle: output/input energy	%
	Refinery	Efficiency of refinery cycle: output/input energy	%
	IGCC	Efficiency of IGCC cycle: output/input energy	%
	Refinery	Specific energy consumption: energy consumed/semi-processed goods input	TOE/t refinery raw materials - GJ/t refinery raw materials
	IGCC	Specific energy consumption: energy consumed/semi-processed goods input	TOE/t IGCC load GJ/t IGCC load
Water consumption	Site	Site water requirement[2]	m^3/hour - m^3/year
		Site water requirement – specific values	m^3/kt raw materials
		Use of recovered water/site water requirement	%
		Use of freshwater/site water requirement	%
		Use of water from refinery desalinator/site water requirement	%
		Use of water from IGCC desalinators/site water requirement	%
Atmospheric emissions	Refinery, IGCC, Site	SO_2 emissions in mass flow	t/year
	Site	Specific SO_2 emissions	t SO_2/kt raw materials
	Refinery	Sulphur content in fuels	% (in weight)
	Refinery	SO_2 concentration bubble	mg/Nm^3
	IGCC	SO_2 concentration	mg/Nm^3
	Refinery, IGCC, Site	NO_x emissions in mass flow	t/year
	Site	Specific NO_x emissions	t NO_x/kt raw materials
	Refinery	NO_x concentration bubble	mg/Nm^3
	IGCC	NO_x concentration	mg/Nm^3
	Refinery, IGCC, Site	CO emissions in mass flow	t/year
	Site	Specific CO emissions	t CO/kt raw materials
	Refinery	CO concentration bubble	mg/Nm^3
	IGCC	CO concentration	mg/Nm^3
	Refinery, IGCC, Site	Dust emissions in mass flow	t/year
	Site	Specific dust emissions	t Polveri/kt raw materials
	Refinery	Dust concentration bubble	mg/Nm^3
	IGCC	Dust concentration	mg/Nm^3
	Refinery	PM10 emissions in mass inflow	t/anno
	Refinery	Specific PM10 emissions	t PM10/kt raw materials
	Refinery	PM10 concentration bubble	mg/Nm^3
	Site	Diffuse emissions – fugitive emissions	t/year
	Refinery, IGCC, Site	CO_2 emissions in mass flow	t/year
	Site	Specific CO_2 emissions	t CO_2/kt raw materials
Discharges into water	Site	Total capacity of discharged water[2]	m^3/hour
		Specific capacity of discharged water	m^3/kt raw materials
		COD (chemical oxygen demand) in mass flow	t/year
		Specific COD emission	t/Mt raw materials
		Annual average COD concentration	mg/litre
		Total hydrocarbons in mass flow	t/year
		Specific hydrocarbon emission	t/Mt raw materials
		Annual average concentration of hydrocarbons	mg/litre
		Emission of nitrogen (ammoniacal, nitrous or nitric) in mass flow	t/year
		Specific emission of nitrogen (ammoniacal, nitrous or nitric)	t/Mt raw materials
		Annual average concentration of nitrogen (ammoniacal, nitrous or nitric)	mg/litre
		Total capacity of primary treatment units for incoming water, desalinators, IGCC towers[2]	m^3/hour
		Specific emissions of primary treatment units for incoming water, desalinators, IGCC towers[2]	m^3/kt raw materials

Relevant environmental aspect	Applicability	Definition of indicator	Unit of measurement
Discharges into water	Site*	Emissions of suspended solids in discharges from primary treatment units for incoming water, desalinators and IGCC towers in mass flow	t/year
		Specific emission of suspended solids in discharges from primary treatment units for incoming water, desalinators and IGCC towers	t/Mt raw materials
		Annual average concentration of suspended solids in discharges frompri-mary treatment units for incoming water, desalinators and IGCC[2] towers	mg/litre
		Difference in the temperature of the seawater 1 km from the point of discharge from the IGCC tower	Temperature in °C
Waste	Site	Total waste production (split into hazardous and non-hazardous)	t/year
	Site	Waste disposed of externally	t/year
		Waste sent to landfill	%
		Waste sent for incineration	%
		Waste sent for recovery	%
		Waste sent for preliminary storage	%
	Refinery	Specific production of typical refining waste	kg/t raw materials
	Site	Vanadium concentrate (filter cake) produced by the site	t/year
Accidental spills into the soil and subsoil – past activity	Site	Quantity of product recovered/quantity of water drained from the wells of the hydraulic barrier	%
Accidental spills into the soil and subsoil – contamination prevention activities	Site	Protection of the soil in storage areas: paved surfaces of basins/total surface	%
		Protection of the soil in storage areas: number of double bottom tanks	no.
		Protection of the soil along pipeways	m^2
		Inspection and maintenance: non-destructive testing expenses	EUR thousands/year
Noise	Site	Equivalent sound pressure level at site limits	dB(A)

*The term "Site" means "Refinery + IGCC"

Quality indicators for specific environmental sectors

Relevant environmental sector	Applicability	Definition of indicator	Unit of measurement
Atmosphere	Sarroch area (surveys by the public air quality monitoring network)	SO_2 – Compliance with the three-hourly, hourly and daily concentration limits	no. of times threshold exceeded/year
		SO_2 – Annual average concentration	Micrograms/m^3
		PM10 – Compliance with hourly concentration limits	no. of times threshold exceeded/year
		PM10 – Annual average concentration	Micrograms/m^3
		NO_2, NO_x – Annual average concentration	Micrograms/m^3
		NO_2 – Compliance with hourly and daily concentration limits	no. of times threshold exceeded/year
	Sarroch hinterland (surveys using bio-indicators)	Index of Atmospheric Purity (IAP)	pure no. plus a quality assessment
Seawater	Stretch of sea surroun-ding the site (chemical surveys)	Trophic index (TRIX)	pure no. plus a quality assessment
		Seawater classification index (CAM, Classificazione delle Acque Marine)	pure no. plus a quality assessment
Noise	Sarroch area	L90 statistical indicator of sound pressure at points located in the town of Sarroch	dB(A)

*The term "Site" means "Refinery + IGCC"
(1) Con riferimento al Regolamento CE 1221/2009, Allegato IV, si precisa come per Saras non sia significativa la produzione totale annua, quanto invece la lavorazione totale annua di petrolio grezzo.
(2) Con riferimento al Regolamento CE 1221/2009, Allegato IV, si precisa come Saras, ritenendo più intuitivo il dato orario, esprima il consumo idrico anche in (m^3/ora) e non solo in (m^3/anno) per una più immediata comprensione del dato.

Management performance indicators

Relevant environmental sector	Applicability	Definition of indicator	Unit of measurement
Training	Employees	Environmental protection training/total training hours	%
		Emergency management training/total training hours	%
Audit	Combined audit of environment, safety and quality	Hours spent on audits/total hours worked by auditors and employees audited	%
	"Arrow" field inspections	Hours spent on inspections/total hours worked by auditors and employees audited	%
Product design	Design and development	Product design hours/thousands of hours worked	hours/thousands of hours worked
Design and engineering of internal plant & equipment	Engineering	Plant & equipment engineering hours/thousands of hours worked	hours/thousands of hours worked
Investments	Environmental protection and safety	Total investment	EUR thousands/year

Indirect environmental aspects

Operating performance indicators

Relevant environmental sector	Applicability	Definition of indicator	Unit of measurement
Product characteristics	Oil products	Production of fuel oil/total oil products	%
		Quantity of sulphur in products/quantity of sulphur entering the site with raw materials	%
	Sulphur produced	Quantity of sulphur produced/quantity of sulphur entering the site with raw materials	%
Transport	Maritime traffic	Use of double-hulled ships/total ships	%
		Use of ships with segregated ballast tanks/total ships	%
	Road traffic	Total number of heavy transport vehicles/quantity of raw materials processed	no. of vehicles/kt raw materials

Management performance indicators

Relevant environmental sector	Applicability	Definition of indicator	Unit of measurement
Transport	Maritime traffic	Ship safety checks: no. of ships checked/ total ships	%
	Road traffic	No. of in-house company vehicles checked/no. of authorised vehicles	%
External companies	Environmental conduct	Companies that have ISO 9001 certification/total companies	%
		Companies that have ISO 14001 certification/total companies	%
		Companies that have OHSAS 18001 certification/total companies	%
		Training provided to employees of external companies/total hours worked	%

4.2 – Direct environmental aspects

4.2.1 – Consumption, storage and use of raw materials

Consumption

The raw materials entering the production cycle mainly comprise crude oil and small quantities of fuel oils and other semi-processed hydrocarbons.

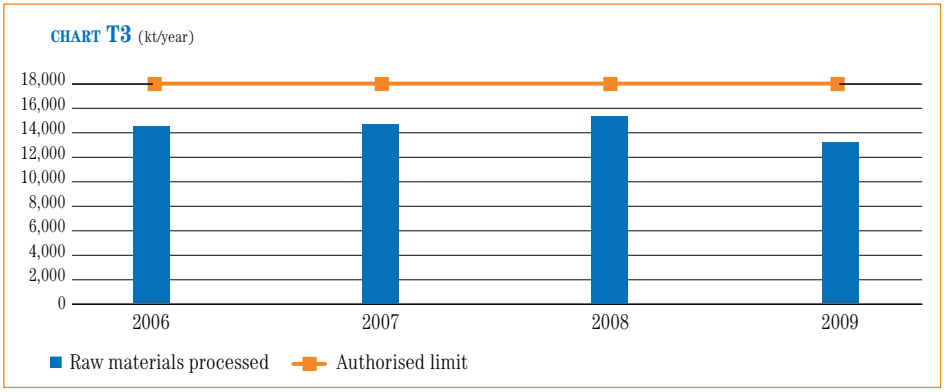
[Decree 17086 of 7 July 2003, issued by the Ministry of Productive Activities]

The refining of mineral oils (oil) is subject to specific authorisation. In Saras' case, an upper limit of 18 million tons a year has been set.

The consumption of raw materials is a significant environmental aspect of the activities carried out at the Sarroch site, since oil is a natural, non-renewable resource and the quantities processed are considerable, as shown in Table 3 above. For ease of reference, the table is reproduced below.

TABLE 3 Raw materials processed (kt/year)

2006	2007	2008	2009
14,515	14,593	15,517	13,305



The figures for the four-year period 2006-2009 show that the quantity of raw materials processed at the Sarroch site rose continuously until 2008, when it reached its peak of 15.5 million tons. It then fell back in 2009 due to the intensive planned maintenance work carried out that year, which affected the whole site. In addition to the quantity of materials processed, the sulphur content in crude oil is another important parameter for managing the refining processes and controlling product characteristics.

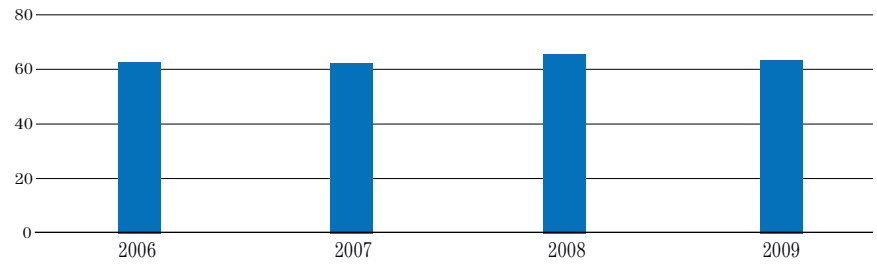
Table 7 and Chart T7 below show the values of the key indicator, which is calculated as the quantity of low-sulphur crude oil used as a proportion of the total quantity of crude oil processed.

TABLE 7 Consumption of low-sulphur crude oils*

Parameter	2006	2007	2008	2009
Low-sulphur crude oil used/total raw materials processed (%)	62.9	62.4	65.7	62.0

*Using the same criterion as that set out in Legislative Decree 152/06, Part V, Appendix X, for fuel oils, low-sulphur crude oils are defined as those with a sulphur content of less than 1%.

CHART T7 (%)



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

An examination of the above-mentioned figures shows that the supply of low-sulphur crude oil was broadly similar over the four-year period 2006-2009.

[auxiliary chemical substances]

In addition to oil, other chemical substances are used in refining and the IGCC. These auxiliary substances can be classified under the following main categories:

- catalysts of chemical reactions
- treatment and process additives
- additives for correct product formulation
- oxygen, nitrogen, hydrogen

The consumption of auxiliary substances is less significant than that of raw materials as they are generally renewable resources and the total quantities supplied are much lower.

However, the supply of raw materials and auxiliary substances involves the need for sea and road transport, which is an indirect environmental aspect. This aspect is examined in section 4.3.2 on page 113.

Storage and use

Under normal operating conditions, the use and storage of raw materials may involve, as an induced environmental aspect, diffuse and fugitive emissions of volatile organic substances into the atmosphere. This aspect is discussed in section 4.2.4.3 on page 70.

In abnormal or emergency conditions, any events that may involve hazardous substances on the premises, such as raw materials, auxiliary substances or products, are analysed in the plant's Safety Report (section 3.3, page 38).

4.2.2 – Energy consumption

The consumption of energy resources in the form of electricity and fuels represents a significant environmental aspect for the Saras site, and has a considerable economic impact on the business. Figure 11 show a diagram of the site's energy balance and a table with the 2009 figures for external energy coming into the site, broken down into electricity, thermal energy and crude oil.

ENERGY INPUT TO THE SITE 2009	(GJ)	(TOE)
Electricity	6.739.458	160.969
Thermal energy (steam, fuel gas, H_2)	4.427.74	105.756
Crude	555.896.964	13.277.371
Total energy input in the Site	567.064.196	13.544.096

ENERGY OUTPUT FROM THE SITE 2009	(GJ)	(TOE)
Oil products	490.152.179	11.707.084
Electricity	31.429.420	750.679
Fuel gas	1.801.033	43.017
Total energy output from the Site	521.581.599	12.500.779

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

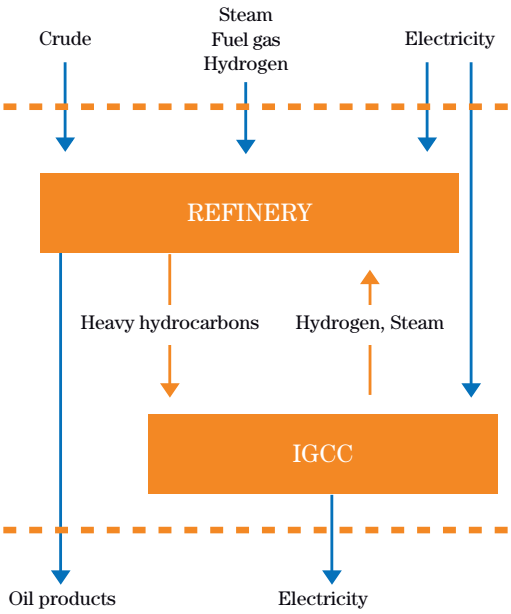


Figure 11 Energy balance diagram

Saras' commitment to improving energy efficiency dates back to the end of the 1970s/ early 1980s, when it began to invest heavily in energy and heat conservation.

In accordance with legislation, an Energy Manager is appointed each year to monitor and promote energy conservation activities and efficient energy use on the Sarroch site.

[Law 10 of 9 January 1991]

As mentioned earlier, the combined operations of the refinery and the IGCC plant effectively represent a large integrated cycle that transforms hydrocarbon inputs into refined oil products and energy.

The tables and charts below show the indicators relating to the consumption of energy. To enable comparisons to be made between figures relating to different types of energy, "tons of oil equivalent" (TOE) has been adopted as a unit of measurement: total quantities of raw materials input into the process and fuels produced as outputs, and electricity flows into and out of the process are converted into TOE. In compliance with EC Regulation 1221/2009, these are also expressed in gigajoules (GJ).

[energy efficiency of the integrated cycle]

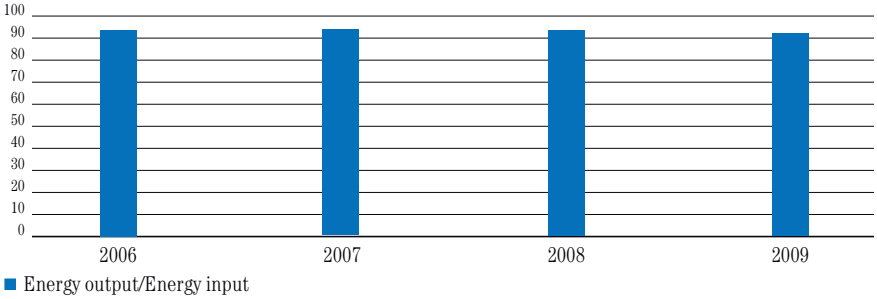
The energy efficiency of the integrated cycle (refinery and IGCC), shown in Table 8 and Chart T8, is calculated as the ratio of:

- the outgoing energy from the integrated cycle (the sum of the energy content of oil products sold and of energy sold); to
- the energy input to the integrated cycle (the sum of the energy content of the raw materials used in the refining process and energy purchased externally).

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

Parameter	2006	2007	2008	2009
Energy input (GJ)	608,849,126	621,538,403	661,349,608	567,064,196
Energy output (GJ)	569,981,218	589,449,315	617,267,780	523,382,631
Energy output/energy input (%)	93.6	94.5	93.3	92.3

CHART T8 (% toe output/toe input)



It can be seen from the figures that the integrated cycle (refinery and IGCC) is extremely efficient, with a total value of over 92% in the last four years.
The difference between energy input and energy output is mainly due to the internal consumption of energy necessary for the operation of the manufacturing processes and to an amount lost during operations.
The IGCC, as producer of electricity for sale and of steam and hydrogen to be used in the refining process, converts the energy in the heavy hydrocarbons (that cannot be used in its present state) into valuable energy. This helps to meet the site's energy requirement through the recovery of steam and hydrogen.

[energy efficiency of the IGCC plant]

The energy efficiency indicator for the IGCC, shown in Table 9 and Chart T9, is calculated as the ratio of:

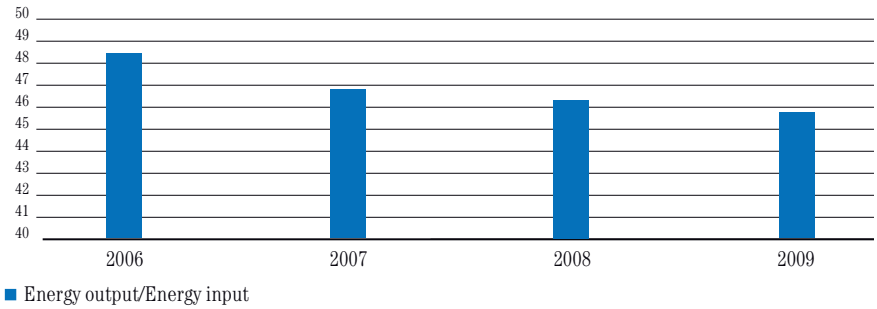
- energy output from the IGCC, in the form of electricity, steam, hydrogen or sulphur; to
- energy input to the IGCC, in the form of hydrocarbon feedstocks and electricity consumed

The efficiency values obtained by the IGCC are much higher than those of traditional thermoelectric plants.

TABLE 9 Energy efficiency of the IGCC

Parameter	2006	2007	2008	2009
Energy output/energy input (% TOE output/TOE input)	48.6	46.9	46.2	45.8

CHART T9 (% toe output/toe input)



[energy efficiency of the refining process]

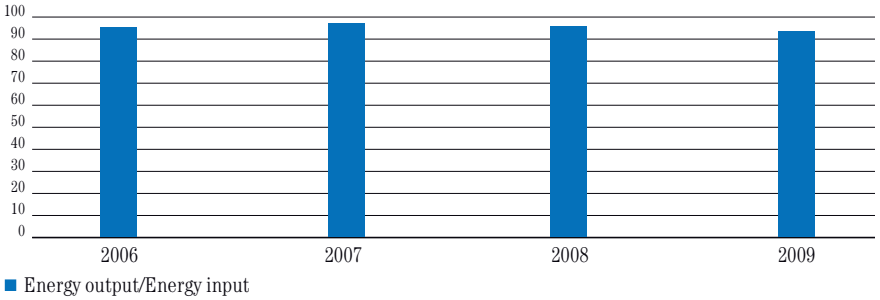
The indicator for the refining process is given as the ratio of:
- energy output from the refining process (the sum of the energy content in the oil products sold);
- to energy input to the refining process (the sum of the energy content in the raw materials used in the refining process and the energy purchased externally, mainly electricity).

Here too, Table 10 and Chart T10 show high energy efficiency values.

TABLE 10 Energy efficiency of the refining process

Parameter	2006	2007	2008	2009
Energy output/energy input (% TOE output/TOE input)	95.3	96.5	95.2	94.6

CHART T10 (% toe output/toe input)



[energy consumption]

Internal energy consumption comprises the combustion of oil products and electricity used. Small quantities of thermal energy, in the form of steam, can be exchanged with the neighbouring petrochemical plant, especially during plant shutdowns or on other specific occasions.
Fuels used in the refining process comprise:
- fuel gas generated automatically from the refining process, which is not saleable as it is non-condensible
- low-sulphur fuel oil
- coke consumed directly in the fluid catalytic cracking (FCC) process

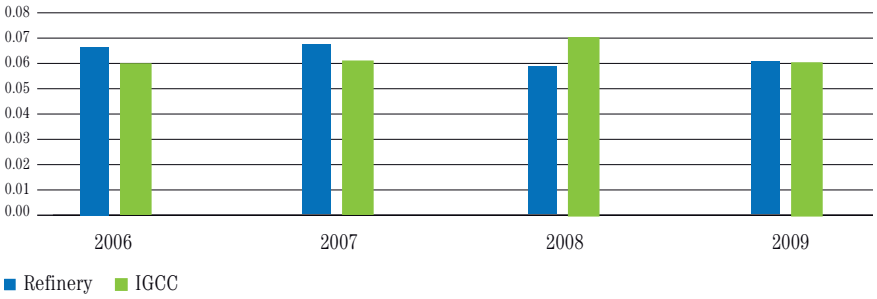
Fuels used in the IGCC cycle comprise:
- syngas generated automatically from gasification and used in the combined cycle
- diesel, used only as an emergency fuel.

Table 11 and Chart T11 show the values of the specific energy consumption indicators relating to the raw materials processed in refining and used as feedstock for the IGCC.

TABLE 11 Specific energy consumption

Parameter	2006	2007	2008	2009
Specific energy consumption: refinery (TOE/t raw materials used in refining)	0.066	0.067	0.059	0.061
Specific energy consumption: IGCC (TOE/t IGCC feedstock)	0.068	0.064	0.070	0.060
Specific energy consumption: refinery (GJ/t raw materials used in refining)	2.763	2.805	2.470	2.554
Specific energy consumption: IGCC (GJ/t IGCC feedstock)	2.847	2.680	2.931	2.512

CHART T11 (toe/t raw materials)



The indicator values have remained broadly stable in the last few years. In order to save energy, the company is committed to achieving efficiency improvement and energy conservation objectives, resulting in a reduction in the consumption of fuel oil.

[table of objectives and measures objective 2, page 123]

4.2.3 – Use of water resources

At the Sarroch site, water is mainly used to generate steam for technological use (steam stripping, heat exchangers and power generation), to supply the fire prevention system, to replace cooling cycle losses and for civil use. Figure 12 shows a diagram of the site's water cycle.

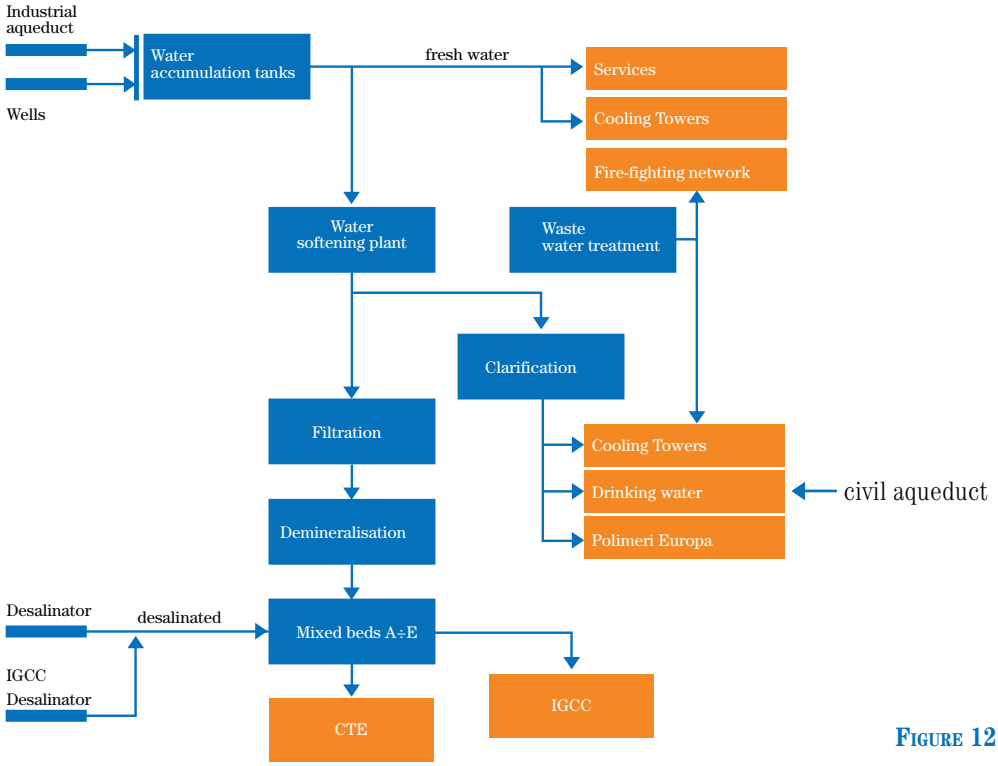


FIGURE 12 Water usage diagram

Aware of the problem of scarce water resources in the region, Saras has adopted a policy, over the years, to reduce its dependence on primary water sources from the surrounding region, by:

- installing a first desalinator in 1994 with a capacity of 300 m^3/hr, followed by the installation of six 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 purification process, following improvements to the treatment process and increased filtering capacity

Currently, the main types of water resources used are:

- seawater that has been treated using dedicated desalination units
- water supplied by the CASIC industrial water system, which is fed by reservoirs in the area
- water recovered by the wastewater purification system (after filtering)

[Concession decree pursuant to Presidential Decree 250/49, Constitutional Law 3/48 of 5 June 1998 and application for renewal dated 12 June 2007 to the Civil Engineering Department of the Cagliari Provincial Authority]

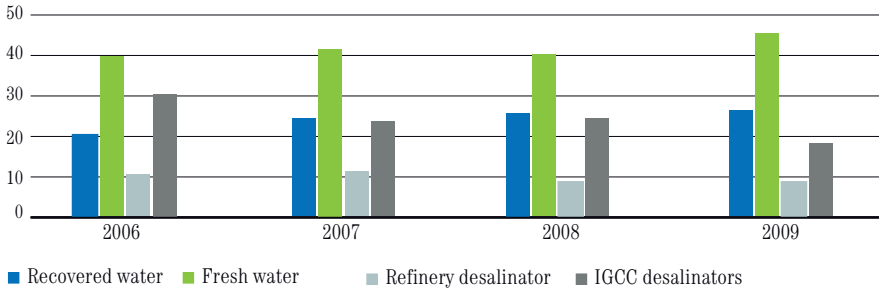
A small quantity of water (not used in 2009) may come from internal wells on the site and be sent to the industrial freshwater reservoir, while a limited quantity of demineralised water may come through an exchange with the Polimeri Europa (formerly Enichem) industrial site, which was used in 2009.

The figures on the site's water consumption are shown in Table 12 and Chart T12. These also include quantities relating to the IGCC, which mainly uses water from the dedicated desalinators for its production. A closed-circuit seawater system with a cooling tower has been installed for cooling the IGCC equipment.

TABLE 12 Water sources for the site

Parameter	2006	2007	2008	2009
Recovered water/water demand (%)	19.9	24.1	25.1	26.5
Freshwater/water demand (%)	39.4	41.2	40.7	45.7
Water from refinery desalinator/water demand (%)	10.2	10.9	8.8	8.7
Water from IGCC desalinators/water demand (%)	30.5	23.8	24.5	18.4
Demineralised water from Polimeri Europa (%)			0.8	0.8

CHART T12 (%)



In the four years under review, around 20-25% of the total requirement came from internal recovery while desalination accounted for 28-40% of the total.

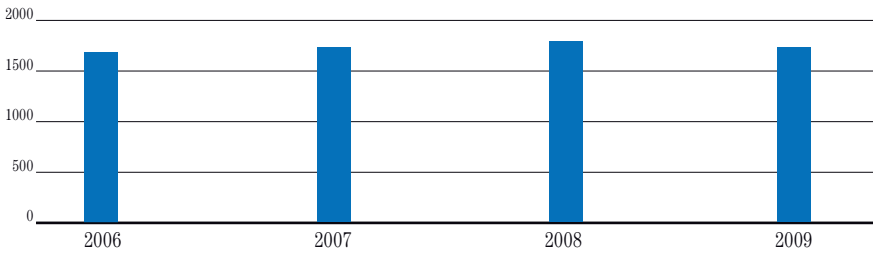
Desalinated water and water recovered internally together accounted for between 55% and 65% of the total requirement over the period.

In 2009, production from the IGCC desalinators increased thanks to measures to recover the production of desalinated water from the IGCC, which allowed it to increase its total for 2008. The site's water consumption in absolute terms is shown in Table 13 and Chart T13.

TABLE 13 Site's water demand – absolute values

Parameter	2006	2007	2008	2009
Site's water demand - average flow rate (m^3/hour)	1,682	1,727	1,821	1,687
Site's water demand (m^3/year)	14,734,320	15,128,520	15,951,960	14,778,120

CHART T13 (m^3/hour)

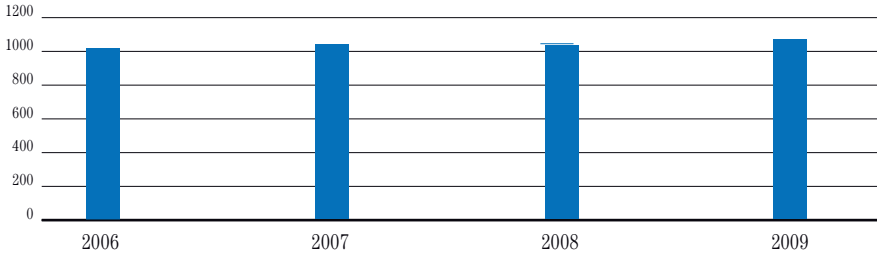


The water demand decreased in 2009 due to the lower volumes of crude oil processed. This occurred as a result of reduced steam generation used in the distillation of crudes and the fact that the evaporation and flushing of the plant cooling towers had less of an impact.
The ratio of specific water consumption to raw materials processed is shown by the indicator in Table 14 and the related chart.

TABLE 14 Site's water demand – specific values

Parameter	2006	2007	2008	2009
Site's water demand/raw materials processed (m^3/kt raw materials)	1,015	1,037	1,031	1,116

CHART T14 (m^3/kt raw materials)



4.2.4 – Atmospheric emissions

4.2.4.1 – General

Atmospheric emissions represent a significant environmental impact of the activities carried out at the Saras site under normal, abnormal and emergency conditions. In 2009, the authorisations governing atmospheric emissions by the Saras plant consisted of the "Ruling on the environmental compatibility of the IGCC Project, ref. DEC/VIA/2025 of 28 December 1994", issued by the Italian Ministry for the Environment, supplemented by letter ref. 854/05/SIAR from the Ministry for the Environment, for the period 1 January – 8 April, and the AIA permit (DSA-DEC-2009-0000230 of 24 March 2009, which entered into force on 9 April 2009) for the period 9 April – 31 December. The first two of the above-mentioned provisions contain the authorisation to build the IGCC and set out regulations on the limits for atmospheric emissions by the IGCC and by the integrated system comprising the refinery and the IGCC.

The AIA permit contains the regulations on the limits for atmospheric emissions from the refinery and the IGCC. As regards the refining process, the limits on emission concentrations relate to 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 refinery as a whole.
In accordance with legislation, atmospheric emissions can be divided into:

- emissions ducted to smokestacks
- non-ducted emissions

Ducted emissions

Emissions ducted to smokestacks are mainly due to:

- combustion processes carried out in furnaces to guarantee the thermal energy necessary for refining
- combustion processes necessary for producing electricity and steam (thermoelectric plant and IGCC)

[table of objectives and measures objectives 1, 2, 3, 4, 5, 7, pages 123-124]

The main pollutants 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 the IGCC. Numerous objectives and improvement measures have been defined for ducted emissions into the atmosphere.

Non-ducted emissions

Non-ducted emissions are mainly due to:

- the storage and transportation of raw materials and products, and the treatment of wastewater (diffuse emissions)
- minor systemic emissions from sealing components, such as valves and flanges (diffuse emissions, also known as fugitive emissions)

Diffuse and fugitive emissions are technically not ductable. These may be contained by installing appropriate sealing systems and through monitoring and maintenance.
The substances present in diffuse and fugitive emissions are volatile organic compounds (VOCs), which contain light hydrocarbons and can evaporate in the environment and in processing conditions.
As can be seen from the plan of the facility in figure 7 (page 31), the areas in which diffuse emissions can arise relate to storage, shipment, the production processes and wastewater treatment.

[table of objectives and measures objective 6, page 124]

Objectives and improvement measures have also been defined for diffuse and fugitive emissions into the atmosphere.

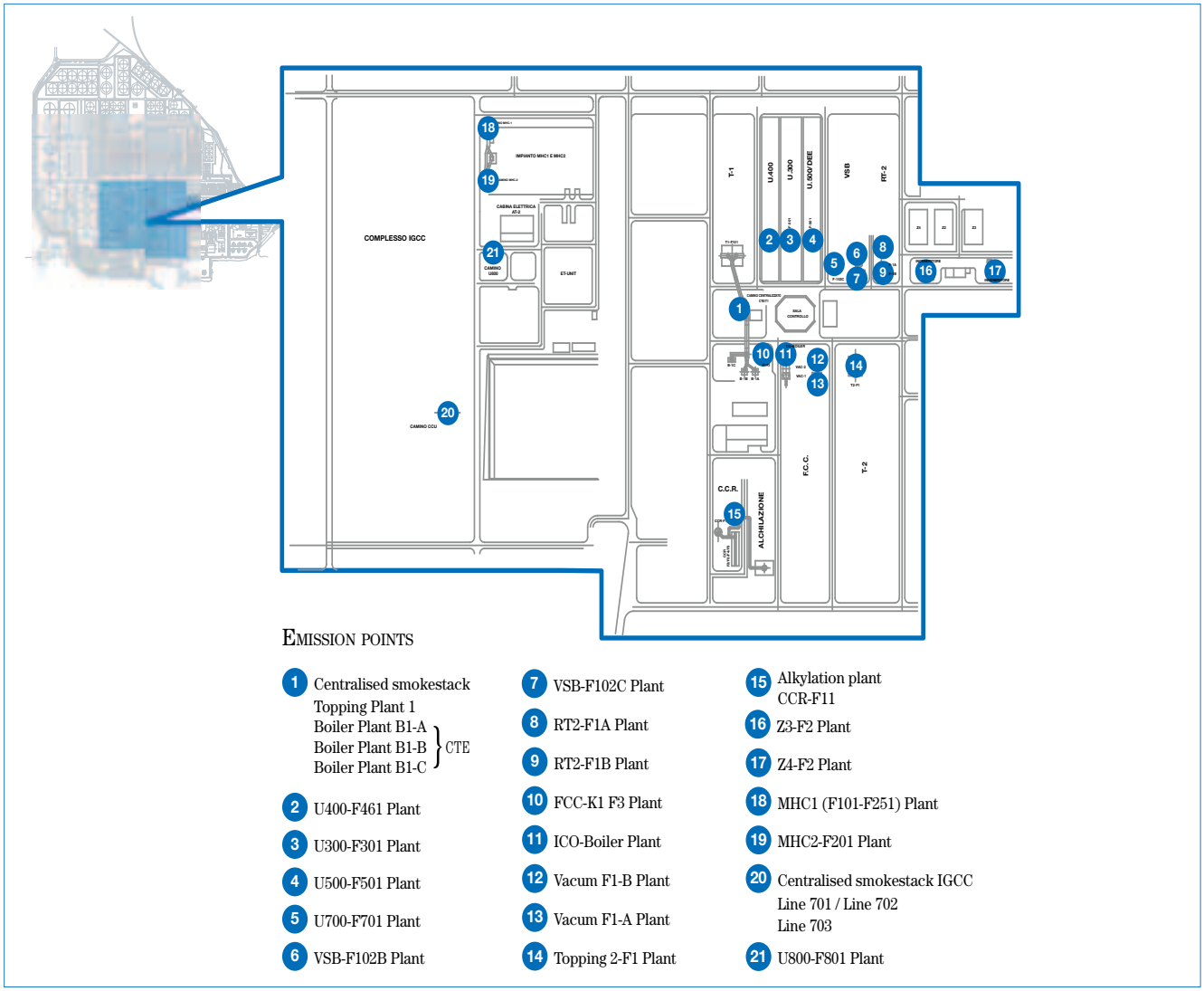


Figure 13 Map with location of emission points at the facility

Calculation of emissions values

Ducted emissions may be calculated in various ways. Specifically:

- emissions of SO_2, NO_x, TSP, CO and the flue gas flow rate from Saras' centralised smokestack (which collects approximately 33% of the emissions from the refining process) and the IGCC smokestack (which collects 100% of the emissions from the plant) are calculated using continuous instrument analysis
- emissions from the other smokestacks are calculated based on the measurement of fuels consumed, laboratory analysis of their quality and the characteristics of the burners

The calculation methods used for 2009 were updated to take account of the new parameters (H_2S, VOCs and NH_3+chlorine compounds) and to follow the instructions contained in new European and international guidelines[1].

[1] CONCAWE – Air pollutant emission estimation methods for E-PRTR reporting by refineries – 2009 edition
RTI International - Emission Estimation Protocol for Petroleum Refineries – December 2009
European Environment Agency - Air pollutant emission inventory guidebook – 2009

From 2009, alternative checks will also be made on all smokestacks in the site every six months. This will involve taking a sample and sending it for analysis by an external laboratory. Non-ducted emissions are determined based on estimates and calculations using formulae and widely accepted models[1].

[table of objectives and measures objective 6, page 124]

Diffuse and fugitive emissions for 2006–2009 were determined using estimates based on formulae and accepted calculation methods (source: United States Environmental Protection Agency (USEPA) for emissions from the transportation and storage of raw materials and products; American Petroleum Institute (API) for emissions from wastewater treatment; and Unione Petrolifera for fugitive emissions).

A monitoring campaign is currently under way for fugitive emissions using the LDAR[2] monitoring methodology, which is considered one of the best techniques available in the sector[3]. The results obtained with this technique show that the calculation methods adopted previously were very conservative.

The next few sections set out the figures for 2006-2009, calculated according to the above-mentioned methodologies and broken down into the following categories:

- ducted emissions of SO_2, NO_x, dust, PM10 and CO (section 4.2.4.2 below)
- non-ducted emissions of volatile organic compounds (section 4.2.4.3, page 70)

Since atmospheric emissions from the facility may affect the air quality in the locality, the data collected by the public monitoring network on the air quality in the Sarroch area and processed by the Cagliari provincial authority are also presented after the figures on emissions (section 4.2.4.4, page 71).

Lastly, the data on CO_2 emissions from the facility are also provided (section 4.2.4.5, page 79). Although these emissions fall into the category of ducted emissions, it was considered appropriate to show them separately as their impact is global rather than local, given that they contribute to the “greenhouse effect”.

4.2.4.2 – Data on ducted emissions of SO_2, NO_x, dust, PM10 and CO

Data on ducted emissions of SO_2, NO_x, dust, PM10 and CO are provided using the following indicators:

- absolute mass flow values for the refinery, the IGCC and the whole site (refinery + IGCC)
- specific mass flow values, given as ratios to the raw materials input to the integrated production cycle, relating to the whole site
- total concentration values for the refinery (“bubble” values)
- concentration values for the IGCC

Of the indicators given above, the following are subject to limits:

- absolute mass flow values for the first quarter of 2009 relating to the whole site
- absolute mass flow values for April-December 2009 relating to the refinery
- concentration values for the IGCC
- concentration “bubble” values for the refinery

All indicators are determined 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)

Sulphur dioxide emissions from the whole site and, in particular, from the refinery continue to fall, as they have done for several years.

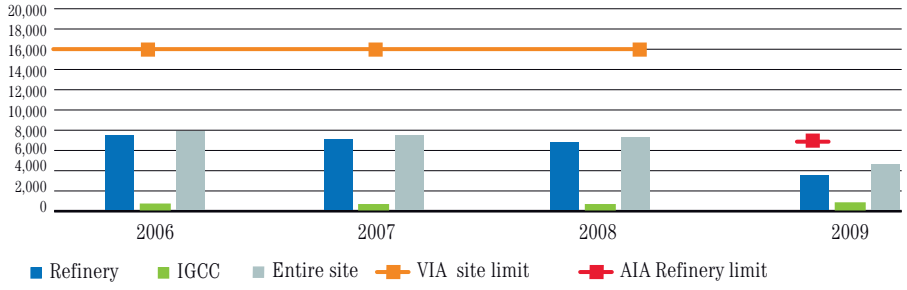
In fact, the best result for SO_2 emissions from the site was recorded in 2009. This result is due to the ongoing improvement in the quality of fuels used, which have seen a progressive decrease in sulphur content (Chart 17), and to the start-up of the TGTU plant. This can be clearly seen from the absolute values relating to the refinery and to the whole site, as shown in Table 15 and Chart T15.

TABLE 15 SO_2 emissions: absolute mass flow values

	2006	2007	2008	2009
Refinery (t/year)**	7,327	6,970	6,733	3.896
IGCC (t/year)	467	423	406	514
Whole site (t/year)*	7,794	7,393	7,139	4.410

* Compared to the limit of 16,000 t/year, established by DEC/VIA/2025 of 28 December 1994, in force until 8 April 2009.
** Compared to the limit of 6,700 t/year applicable (for the refinery only) from 9 April 2009, in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T15 (t/year)

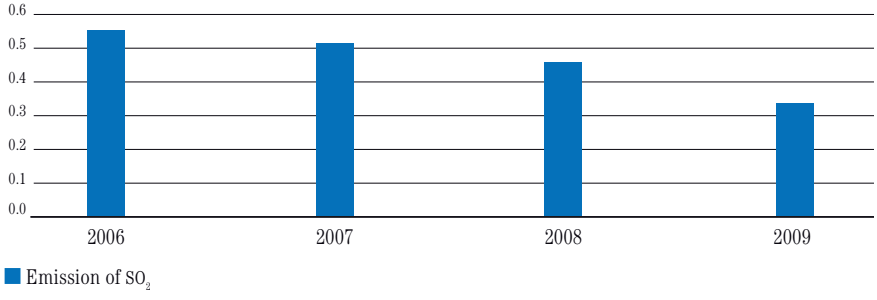


The values of all the mass flow indicators show a general reduction over time and, in any case, the indicators are always well within the limits. Specific emissions from the site are also gradually decreasing, as shown in Table 16 and Chart T16.

TABLE 16 SO_2 emissions: specific mass flow values

Parameter	2006	2007	2008	2009
Emissioni (tSO_2/kt raw materials)	0.54	0.51	0.46	0.33

CHART T16 (t SO_2/kt raw materials)



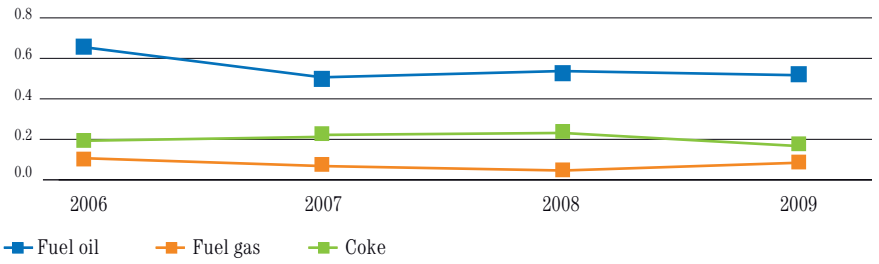
As mentioned earlier, the reduction in SO_2 emissions is consistent with the steady improvement in the quality of fuels used, which have seen a gradual reduction in the percentage of sulphur content, as shown in Table 17 and Chart T17.

TABLE 17 Sulphur content in fuels used in the refinery

Parameter	2006	2007	2008	2009
Sulphur content in fuel oil (%)	0.66	0.49	0.54	0.53
Sulphur content in fuel gas (%)	0.12	0.08	0.05	0.07
Sulphur content in coke * (%)	0.20	0.21	0.22	0.19

*Fuel generated automatically and consumed in the Fluid Catalytic Cracking (FCC) plant

CHART T17 (%)



The general reduction of SO_2 emissions over time is also borne out by the concentration values reported in the following tables, which are, moreover, much lower than the applicable limits even though these have been reduced.

TABLE 18 SO_2 emissions concentration "bubble" values for the refinery

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
SO_2 concentrations - refinery (mg/Nm^3)	734	672	639	613	365
Limit for the refinery * (mg/Nm^3)	1,700	1,700	1,700	1,700	650

* Limit of 1,700 mg/Nm^3 stipulated by Legislative Decree 152/06 Part V, Appendix I, Part IV in force until 8 April 2009; from 9 April 2009, limit of 650 mg/Nm^3 in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T18 (mg/Nm^3)

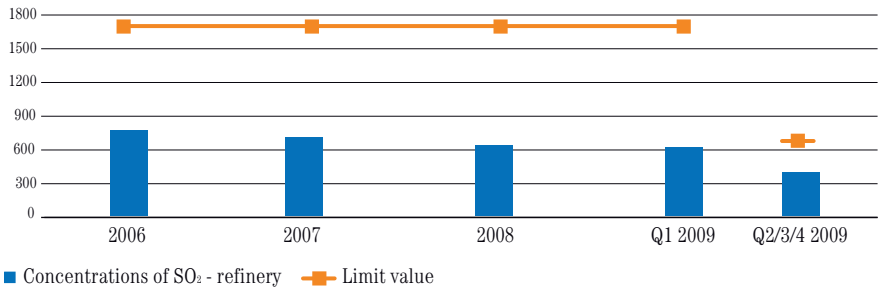
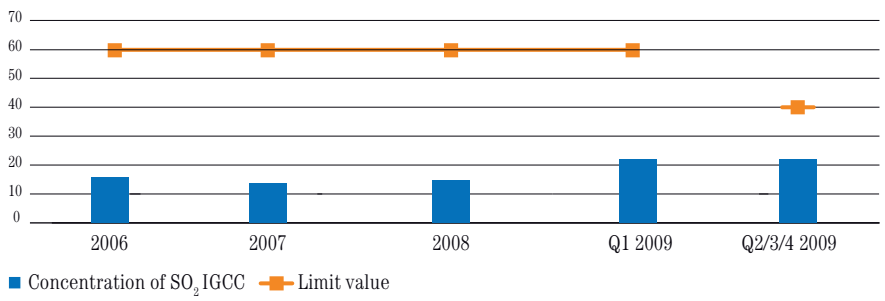


TABLE 19 Emission di SO_2: concentrazioni values for the IGCC

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
Concentration of SO_2 – IGCC (mg/Nm^3)	16	14	15	23	23
Limit value for the IGCC * (mg/Nm^3)	60	60	60	60	40

* * Limit of 60 mg/Nm^3 established at the conclusion of the environmental impact assessment procedure for the IGCC project (DEC/VIA/2025 of 28 December 1994), in force until 8 April 2009; from 9 April 2009, the limit is 40 mg/Nm3 in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T19 (mg/Nm^3)



Objectives and actions for reduction of SO_2 emissions are planned.

[table of objectives and measures objectives 1, 2, 3, 4, page 123]

Nitrogen oxides (NO_x)

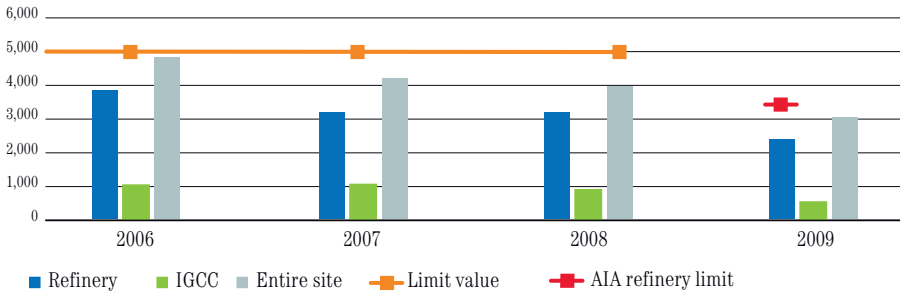
NO_x emissions are only marginally affected by fuel quality, and largely depend on combustion techniques, which in turn are related to technological factors such as burner type. The installation in 2007 of burners that produce low levels of NO_x for the furnaces of the Topping RT2 and Visbreaking plants led to a significant reduction in emissions from the refinery. This performance, shown below, was repeated in subsequent years. The figures for the absolute mass flow indicators are shown in Table 20 and Chart T20.

TABLE 20 NO_x emissions: absolute mass flow values

	2006	2007	2008	2009
Refinery (t/year)**	3,798	3,167	3,130	2,426
IGCC (t/year)	983	997	857	578
Whole site (t/year)*	4,781	4,164	3,987	3,004

* Compared to the limit of 5,000 t/year, established by DEC/VIA/2025 of 28 December 1994, in force until 8 April 2009.
** Compared to the limit of 3,400 t/year applicable (for the refinery only) from 9 April 2009, in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009

CHART T20 (t/year)



The indicators relating to the site and the refinery have always been lower than the authorised limits, and have decreased over time, assisted by the reduction in the indicator values relating to the refinery and by the start-up of the IGCC. The specific mass flow indicator (figures in Table 21) has also come down over the years, in keeping with the absolute mass flow indicator for the site.

TABLE 21 NO_x emissions: specific mass flow values

Parameter	2006	2007	2008	2009
Emissions (t NO_x/kt raw materials)	0.33	0.29	0.26	0.23

The concentration indicators are also lower than the applicable limits and are improving all the time, as shown in the tables and charts below.

CHART T21 (t NO_x / kt raw materials)

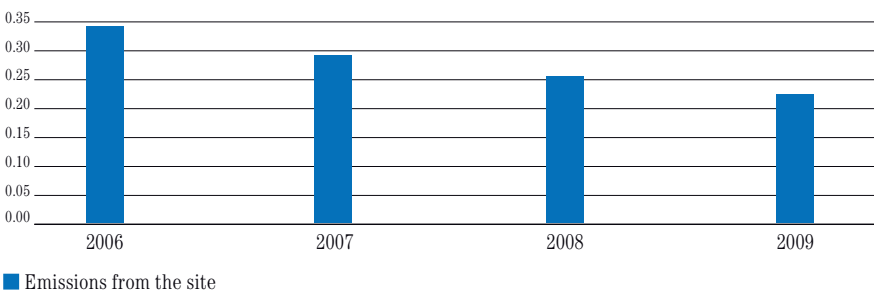


TABLE 22 NO_x emissions: concentration "bubble" values for the refinery

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
NO_x concentrations - refinery (mg/Nm³)	305	381	297	290	266
Limit for the refinery * (mg/Nm³)	500	500	500	500	300

* Limit of 500 mg/Nm³ stipulated by Legislative Decree 152/06 Part V, Appendix I, Part IV in force until 8 April 2009; from 9 April 2009 limit of 300 mg/Nm³ in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T22 (mg/Nm³)

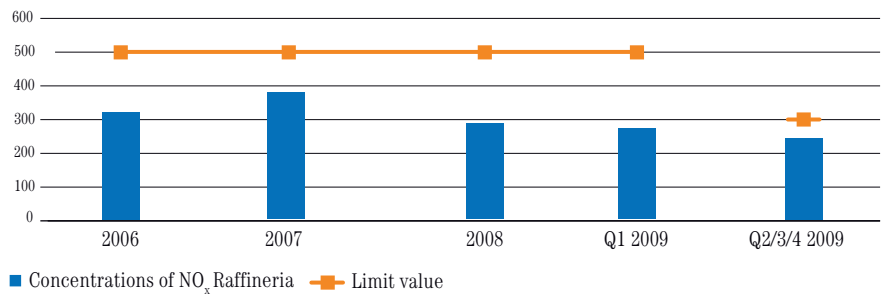
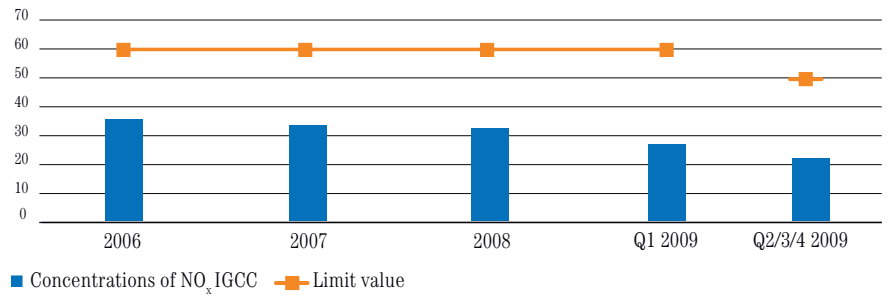


TABLE 23 NO_x: concentration values for the IGCC

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
NO_x concentrations - IGCC (mg/Nm³)	35	33	31	27	22
Limit for the IGCC * (mg/Nm³)	60	60	60	60	50

* Limit of 60 mg/Nm³ established at the conclusion of the environmental impact assessment procedure for the IGCC project (DEC/VIA/2025 of 28 December 1994), in force until 8 April 2009; from 9 April 2009, the limit is 50 mg/Nm³ in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T23 (mg/Nm³)



Objectives and measures to improve the monitoring of NO_X emissions are planned.

[table of objectives and measures objectives 3 and 4, page 123]

Dust

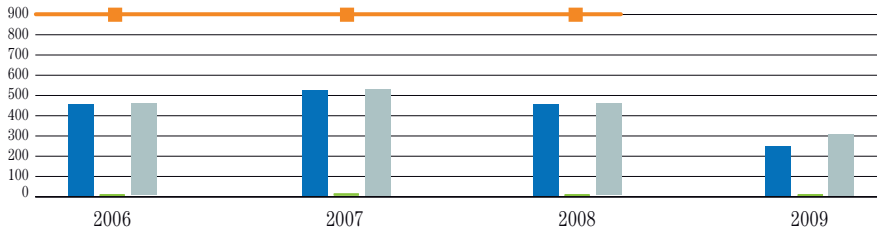
The figures relating to the absolute mass flow indicators for dust are shown in Table 24.
TABLE 24 Dust emissions: absolute mass flow values

TABLE 24 Emission of dust: absolute mass flow values

	2006	2007	2008	2009
Refinery (t/year)	453	524	452	277
IGCC (t/year)	3	5	4	26
Whole site* (t/year)	456	529	456	303

* Compared to the limit of 900 t/year stipulated by the DEC/VIA/2025 of 28 December 1994, in force until 8 April 2009. The AIA permit DSA-DEC-2009-0000230 of 24 March 2009, in force from 9 April 2009, stipulates mass flow limits only for the PM10, which are reported in Table 24 bis. The dust emissions figure for 2009 is also provided for comparison purposes.

CHART T24 (t/year)



The refinery's exclusive use of fuel oil with a low sulphur content (BTZ) in the past few years has kept dust emissions at low levels. The emissions indicator for the site has always been much lower than the authorised limit.
Specific values have remained broadly stable (Table 25). The concentration indicators, shown in the tables and charts below, are in line with previous years

TABLE 25 Dust emissions: specific mass flow values

Parameter	2006	2007	2008	2009
Emissions from the site: t dust/kt raw materials	0.03	0.04	0.03	0.02

CHART T25 (t dust / kt raw materials)

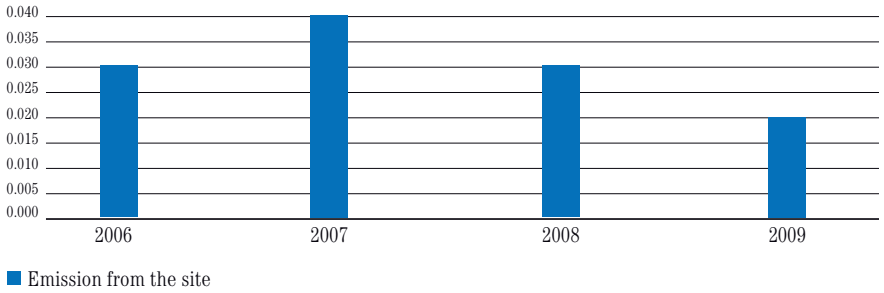


TABLE 26 Dust: concentration bubble values for the refinery

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
Concentration of dust - refinery (mg/Nm^3)	45	45	43	33	30
Limit value for the refinery* (mg/Nm^3)	80	80	80	80	50

* Valore limite di 80 mg/Nm^3 previsto dal D. Lgs 152/06 Parte V, Allegato I, Parte IV in vigore fino al 08/04/09; dal 09/04/09 valore limite di 50 mg/Nm^3 in accordo all'Autorizzazione Integrata Ambientale (DSA-DEC-2009-0000230 del 24/03/09).

CHART T26 (mg/Nm^3)

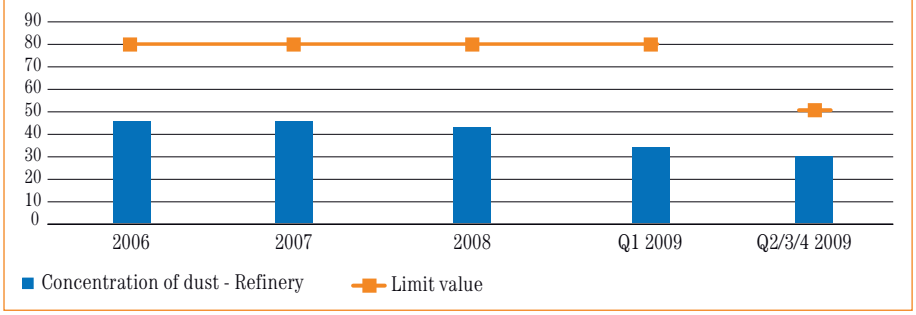
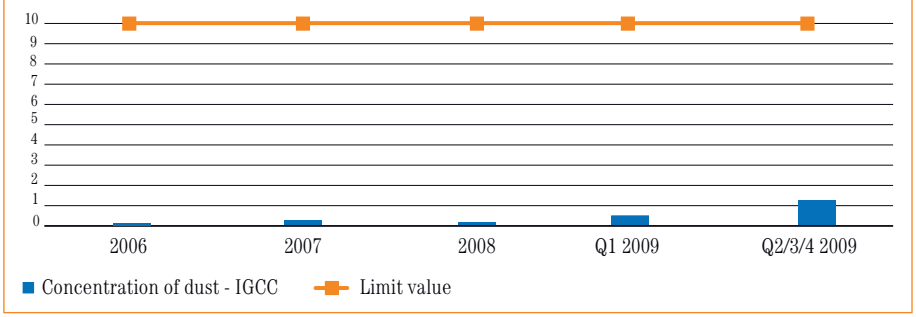


TABLE 27 Dust: concentration values for the IGCC

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
Concentrations of dust - IGCC (mg/Nm^3)	0.1	0.2	0.1	0.5	1.3
Limit value for the l'IGCC* (mg/Nm^3)	10	10	10	10	10

* Valore limite di 10 mg/Nm^3 stabilito a conclusione dell'iter di Valutazione di Impatto Ambientale per il progetto IGCC (DEC/VIA/2025 del 28/12/94) in vigore fino al 08/04/09; dal 09/04/09 valore limite di 10 mg/Nm^3 in accordo all'Autorizzazione Integrata Ambientale (DSA-DEC-2009-0000230 del 24/03/09).

CHART T27 (mg/Nm^3)



All the values shown are much lower than the applicable limits. Objectives and measures to reduce these emissions and improve monitoring are planned.

[table of objectives and measures objectives 2, 3, 4 and 5, page 123]

PM10

Table 24 bis shows the figures relating to the absolute mass flow indicator for the PM10 parameter. The authorised limits, which were introduced on 9 April 2009 by the AIA permit, relate only to the refinery.

[PM10]

TABLE 24 BIS PM10 emissions: absolute mass flow values

	2006	2007	2008	2009
Refinery (t/year)*	266	219	186	229

* Compared to the limit for the refinery only of 330 t/year in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009 in force from 9 April 2009. Previous legislation did not stipulate limits for this parameter.

As previous legislation did not stipulate limits for this parameter, the figures shown in the three tables below for 2006-2008 are estimates for information purposes and are not comparable with the 2009 data, which was calculated using the US-EPA 1998 method.

In 2009, the absolute mass flow value of PM10 was lower than the limit. Table 25 bis below shows the specific values. The concentration indicator values given in the next table (Table 26 bis) show that the new legal limits have been complied with.

TABLE 25 BIS PM10 emissions: specific mass flow values

	2006	2007	2008	2009
Emissions from the site: t PM10/kt raw materials	0.018	0.015	0.012	0.017

TABLE 26 BIS PM10 emissions: concentration "bubble" values for the refinery

	2006	2007	2008	Q1 2009	Q2/3/4 2009
PM10 concentrations - refinery (mg/Nm^3)	27	21	18	28	25
Limit for the refinery * (mg/Nm^3)	-	-	-	-	30

* Limit of 30 mg/Nm^3 in accordance with the AIA permit in force from 9 April 2009. Previous legislation did not stipulate limits for this parameter.

All the values shown are lower than the applicable limits. Objectives and measures to reduce these emissions and improve monitoring are planned.

Carbon monoxide (CO)

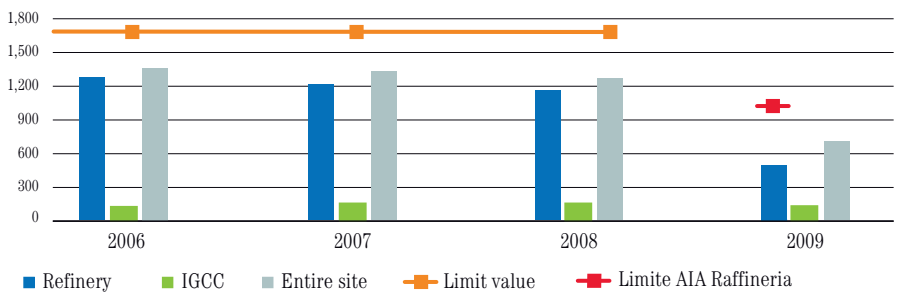
The figures for the absolute mass flow indicators are shown in Table 28 and Chart T28.

TABLE 28 CO emissions: absolute mass flow values

	2006	2007	2008	2009
Refinery (t/year)**	1,259	1,195	1,168	542
IGCC (t/year)	110	138	133	123
Whole site* (t/year)	1,369	1,333	1,301	665

* Compared to the limit of 1,700 t/year, established by DEC/VIA/2025 of 28 December 1994, in force until 8 April 2009.
** Compared to the limit of 1,000 t/year applicable (for the refinery only) from 9 April 2009, in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T28 (t/year)

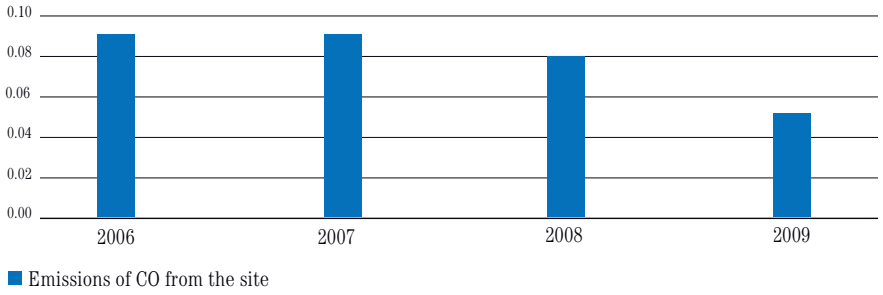


The emissions indicator for the site has always been lower than the limit and reveals a broadly positive trend over time: the IGCC figure has been relatively stable, while the figure for the refining plants has fallen, due to the optimisation of the combustion process in certain furnaces, and especially to the new contribution made by the TGTU in this area in 2009. The figure relating to the specific mass flow indicator for the site shown in Table 29 and Chart T29 is also positive and recorded its lowest value in the period in question.

TABLE 29 CO emissions from the site: specific mass flow values

Parameter	2006	2007	2008	2009
Emissions from the site: t CO/kt raw materials	0.09	0.09	0.08	0.05

CHART T29 (t CO / kt raw materials)



The values of the concentration indicators shown in the tables below are much lower than the applicable limits.

TABLE 30 CO emissions: concentration "bubble" values for the refinery

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
CO concentrations - refinery (mg/Nm^3)	126	115	111	110	41
Limit for the refinery * (mg/Nm^3)	250	250	250	250	50

* Limit of 250 mg/Nm^3 stipulated by Legislative Decree 152/06 Part V, Appendix I, Part IV in force until 8 April 2009; from 9 April 2009 limit of 50 mg/Nm^3 in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T30 (mg/Nm^3)

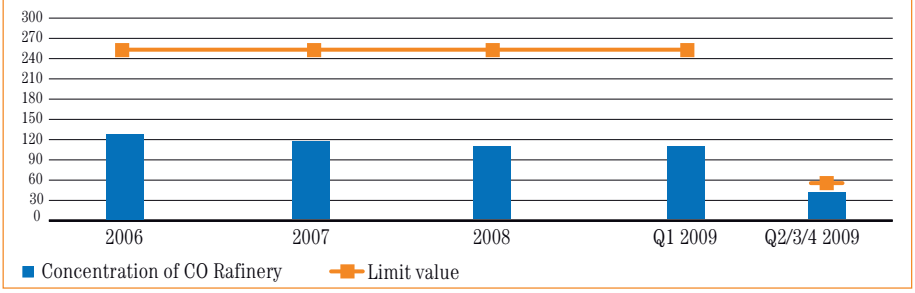
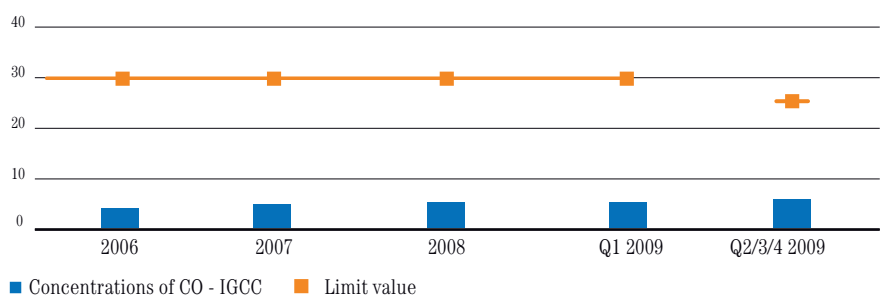


TABLE 31 CO emissions: concentration values for the IGCC

Parameter	2006	2007	2008	Q1 2009	Q2/3/4 2009
CO concentrations - IGCC (mg/Nm^3)	3.8	4.6	5.0	5.1	5.5
Limit for the IGCC * (mg/Nm^3)	30	30	30	30	25

* Limit of 30 mg/Nm^3 established at the conclusion of the environmental impact assessment procedure for the IGCC project (DEC/VIA/2025 of 28 December 1994) in force until 8 April 2009; from 9 April 2009 limit of 25 mg/Nm^3 in accordance with the AIA permit DSA-DEC-2009-0000230 of 24 March 2009.

CHART T31 (mg/Nm^3)



Objectives and measures to improve the monitoring of CO emissions are planned.

[table of objectives and measures objectives 3 and 4, page 123]

Lastly, the AIA permit stipulates new limits for the refinery in terms of concentrations for VOCs (volatile organic compounds), H_2S and NH_3, and chlorine-based compounds. These limits were fully complied with in 2009.

Abnormal and emergency situations

An analysis of abnormal and emergency situations that can affect the plant's atmospheric emissions led the company to identify the following event as significant:

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

[table of objectives and measures objective 1, page 123]

The installation of the treatment unit for tail gases coming from the refinery's sulphur recovery plants has reduced the probability of this type of event and its consequences. In effect, the tail gas treatment unit helps reduce the sulphur compound content in tail gases before they are sent to the incinerator. SO_2 emissions have also been reduced under normal operating conditions, generating a total reduction of over 30% in such emissions from the site per year.

To prevent other types of emergency relating to emissions from the centralised smokestacks of the refinery and the IGCC, warning thresholds for emission concentrations have been defined for internal use: as soon as such thresholds are reached, the appropriate corrective measures are rapidly activated in the plants responsible for the emissions in order to prevent the spread of the ground-level effects of the pollutants.

4.2.4.3 – Data on non-ducted emissions

The data on non-ducted emissions, comprising diffuse and fugitive emissions, are summarised in Table 32.

TABLE 32 Non-ducted (diffuse and fugitive) emissions of volatile organic compounds from the site

Total non-ducted VOC emissions COV	2006	2007	2008	2009
Diffuse (t/year)	484	449	442	434
Fugitive (t/year)	1,426	1,459	776	457
Total (t/year)	1,910	1,908	1,218	891

Fugitive emissions tend to increase as raw material inputs increase (Table 3 on page 33). In 2008, based on the new monitoring technology (varifocal infrared video camera) and new monitoring approach (Smart LDAR programme)* used, it was found that these emissions had been overestimated by at least 50% in the past few years and by a total of 35% in 2009.

*See note 2 on page 60

4.2.4.4 – Air quality in the Sarroch area

4.2.4.4.1 Air quality monitoring stations

There are currently three air quality monitoring networks in the Sarroch area, operated respectively by ARPAS in Cagliari (and previously by the Cagliari provincial authority), Saras and Polimeri Europa. The location of the measurement sensors of the public network is shown in Figure 14.

Figure 14 Map showing the location of the air quality monitoring stations of the public network.

The sensors show the concentrations of the substances listed below in the ambient air:
The sensors show the concentrations of the substances listed below in the ambient air:

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

The data measured by the sensors includes emissions from all sources in the area, including industrial, urban and non-urban emissions, such as those from vehicle traffic. The reference legislation for air quality monitoring methodology and limits are as follows:

- Ministerial Decree 60/2002 for SO_2, nitrogen oxides (NO_2 and NO_x), small dust particles (PM10), CO and benzene
- Legislative Decree 183/2004 for ozone
- Presidential Decree of 15 April 1971 for hydrogen sulphide

The results obtained by the public network for the pollutants monitored in 2006-2009 are shown below. The figures and comments are taken from reports prepared annually by ARPAS in Cagliari.

[table of objectives and measures objective 7, page 124]

SO_2: measurements recorded by the provincial network

As regards SO_2, the report issued by ARPAS in Cagliari shows that the improvement on previous years recorded in 2007 continued in 2009, and that no legal limits were breached. These results are shown in the tables and charts below. More specifically, it can be seen that before 2007, the three-hourly warning threshold was exceeded several times in one of the sensors (CENSA2), and the hourly and daily limits for the protection of human health were also exceeded more times than allowed by Ministerial Decree 60/2002. From 2007 onwards, the situation recorded by CENSA2 has complied with legal provisions. The warning threshold has not been exceeded and the number of times that the hourly and daily limits have been exceeded was lower than that stipulated by law for the protection of human health. In 2009, a further improvement in the effects of SO_2 emissions was recorded. This coincides with the start-up of the TGTU. This trend is shown in Tables 33, 34, 35, 36 and associated charts. Note that Saras does not have access to the hourly data measured by the public network in sufficient time to allow it to implement immediate corrective action when the hourly/daily thresholds are exceeded. Following receipt of a report by the monitoring authorities that one of the above-mentioned limits or thresholds has been exceeded, Saras always promptly instituted the necessary checks of the plants' systems and the sulphur content in the fuels used. If anomalies were found, details were provided to the authority that notified the company of the breach, with a written summary of the event and its causes. Even if no anomalies were found, a written reply was always provided. Lastly, Table 37 shows the number of reports submitted to Saras of warning thresholds reached in respect of the pollutant SO_2, measured by the sensors of the public air quality monitoring network. The table shows that although the number of times the hourly and daily limits were exceeded was lower in 2008 than in previous years, there were more reports from the region, showing how awareness of environmental issues has increased. No reports were submitted in 2009, as a result of the clear improvement recorded in the impact of emissions, particularly of SO_2.

TABLE 33 SO_2: measurements recorded by the provincial network - no. of days the warning threshold was exceeded

Sensor	2006	2007	2008	2009
CENSA0**	0	0	0	0
CENSA1	2	0	0	0
CENSA2	3	0	0	0
CENSA9	0	0	0	0
CENSA3**	-	-	-	0
Limit	500 µg/m³ not to be exceeded for 3 consecutive hours			

*Limit stipulated by Ministerial Decree 60/2002

**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T33 (No.of times exceeded)

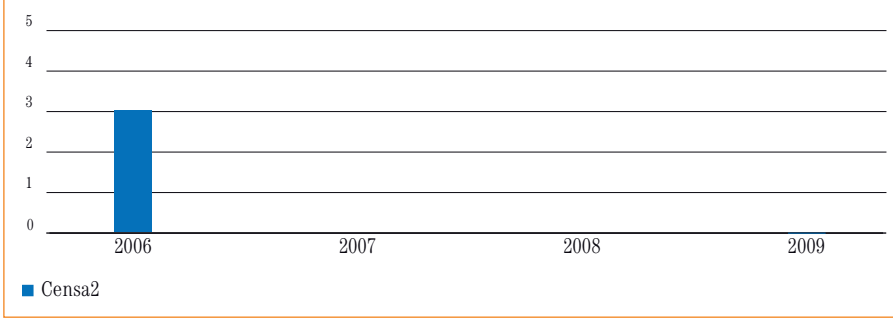


TABLE 34 SO_2: measurements recorded by the provincial network - no. of times the hourly limit for the protection of human health was exceeded

Sensor	2006	2007	2008	2009
CENSA0**	1	6	1	0
CENSA1	17	0	2	0
CENSA2	55	21	13	1
CENSA9	0	0	0	0
CENSA3**	-	-	-	0
Limit	350 µg/m³ not to be exceeded more than 24 times per calendar year			

* Limit stipulated by Ministerial Decree 60/2002 from 2005. In 2004 the threshold not to be exceeded was 380 µg/m³
**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T34 (No. of times exceeded)

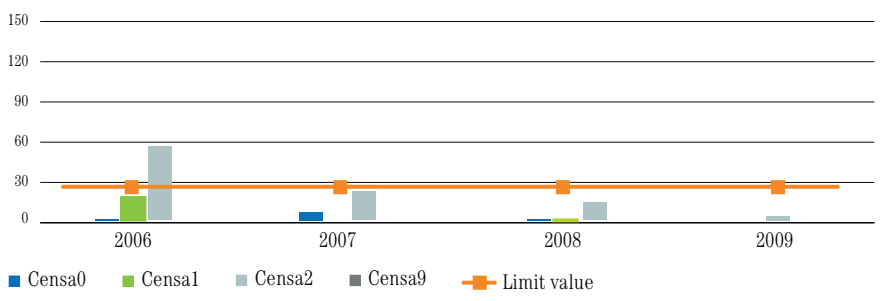


TABLE 35 SO_2: concentration values measured by the provincial network - no. of times daily limit for the protection of human health was exceeded

Sensor	2006	2007	2008	2009
CENSA0**	0	1	0	0
CENSA1	2	0	0	0
CENSA2	7	2	0	0
CENSA9	0	0	0	0
CENSA3**	-	-	-	0
Limit *	125 µg/m3 not to be exceeded more than 3 times per calendar year			

*Limit stipulated by Ministerial Decree 60/2002
**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T35 (No. of times exceeded)

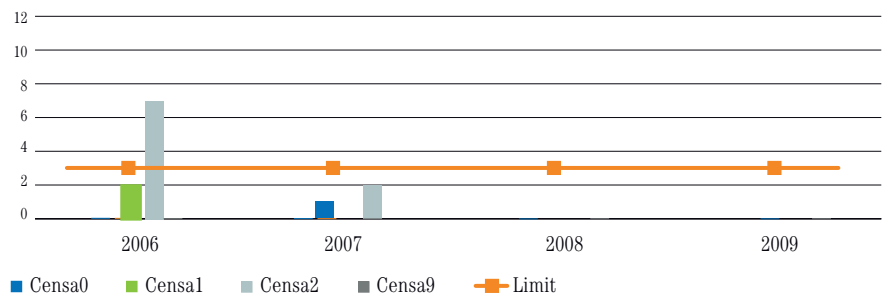


TABLE 36 SO_2: CONCENTRATION VALUES MEASURED BY THE PROVINCIAL NETWORK - AVERAGE ANNUAL CONCENTRATION

Sensor	2006	2007	2008	2009
CENSA0 (µg/m³)**	7	7	n.a.	n.a.
CENSA1 (µg/m³)	8	4	n.a.	n.a.
CENSA2 (µg/m³)	15	12	n.a.	n.a.
CENSA9 (µg/m³)	5	4	n.a.	n.a.
CENSA3 (µg/m³)**	-	-	-	n.a.
Limit*	20 µg/m³ limit for the protection of ecosystems			

*Limit stipulated by Ministerial Decree 60/2002
n.a. figure not available as not supplied by ARPAS
**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T36 (µg/m³)

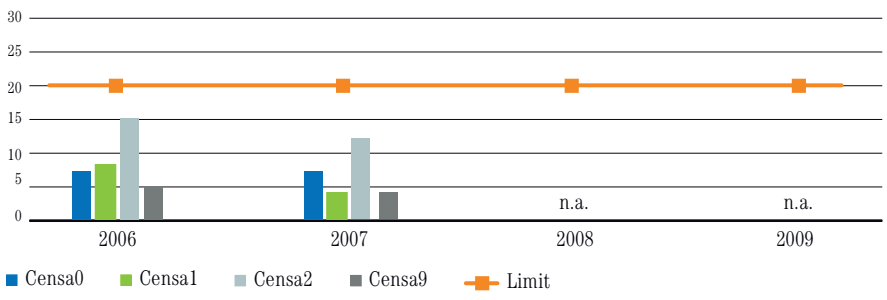


TABLE 37 Reports received by Saras on breaches of warning thresholds for SO_2 stipulated in Ministerial Decree 60/2002

Parameter	2006	2007	2008	2009
No. of reports/year	4	6	13	0

PM10: measurements recorded by the provincial network

There were no breaches of legal limits for PM10 in 2006–2009. The number of times that the hourly limit for the protection of human health was exceeded and annual average concentration values of PM10 are shown in Tables 38 and 39.

TABLE 38 PM10: concentration values measured by the provincial network - no. of times the hourly limit for the protection of human health was exceeded

Sensor	2006	2007	2008	2009
CENSA0**	4	12	14	2
CENSA1	10	8	11	5
CENSA2	20	21	15	10
CENSA9	-	0	11	10
CENSA3**	-	-	-	22
Limit*	50 µg/m³ not to be exceeded more than 35 times per calendar year			

*Limit stipulated by Ministerial Decree 60/2002; - = data not available
**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T38 (No. of times exceeded)

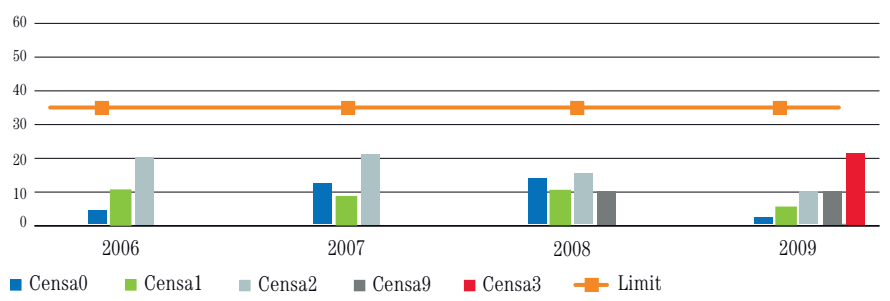
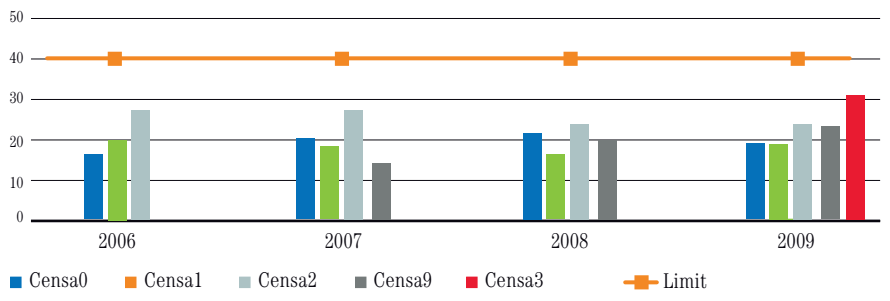


TABLE 39 PM10: concentration values measured by the provincial network - average annual concentration annua.

Centralina	2006	2007	2008	2009
CENSA0 (µg/m³)**	16	20	22	19
CENSA1 (µg/m³)	20	18	17	19
CENSA2 (µg/m³)	27	27	25	25
CENSA9 (µg/m³)	-	14	20	23
CENSA3 (µg/m³)**	-	-	-	32
Valore limite*	40 µg/m³ limit for the protection of ecosystems			

*Limit stipulated by Ministerial Decree 60/2002; - = data not available
**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T39 (µg/m³)



NO_2 and NO_x: measures recorded by the provincial network

The indicators at all stations show that the values for NO_2 are well below the legal limits. No breaches of the warning threshold or the hourly limit for the protection of human health were recorded in the period 2006-2009 apart from in 2008 when the CENSA0 station measured one breach of the hourly limit for the protection of human health. The annual value did not, however, exceed the limit. The average concentration values of NO_2 and NO_x are shown in Tables 40 and 41.

TABLE 40 NO_2: measurements recorded by the provincial network - annual average concentration of NO_2

Sensor	2006	2007	2008	2009
CENSA0 (µg/m³)**	8	7	9	6
CENSA1 (µg/m³)	11	13	10	10
CENSA2 (µg/m³)	18	12	11	10
CENSA9 (µg/m³)	12	12	12	11
CENSA3 (µg/m³)**	-	-	-	14
Limit for the protection of human health (µg/m³) *	48	46	44	42

*Limit stipulated by Ministerial Decree 60/2002; it will become 40 µg/m³ in 2010 - n.a. figure not available as not supplied by ARPAS

**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T40 (µg/m³)

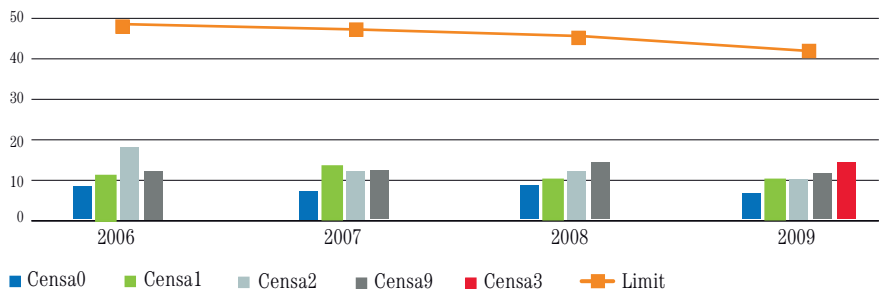


TABLE 41 NO_x: measurements recorded by the provincial network - annual average concentration of NO_x

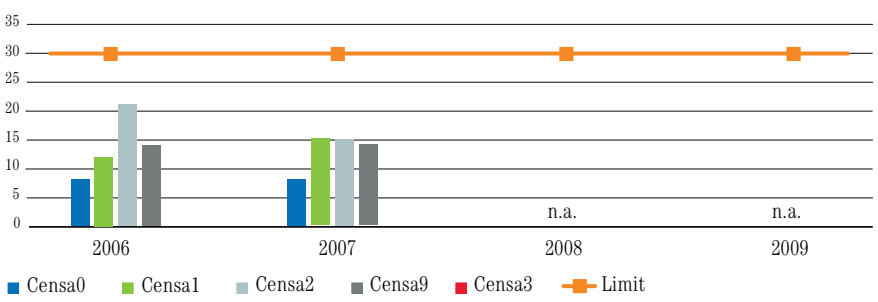
Sensor	2006	2007	2008	2009
CENSA0 (µg/m³)**	8	8	n.a.	n.a.
CENSA1 (µg/m³)	12	15	n.a.	n.a.
CENSA2 (µg/m³)	21	15	n.a.	n.a.
CENSA9 (µg/m³)	14	14	n.a	n.a.
CENSA3 (µg/m³)**	-	-	-	n.d.
Limit*	30 µg/m³ limit for the protection of vegetation			

*Limit stipulated by Ministerial Decree 60/2002

n.a. figure not available as not supplied by ARPAS

**The sensor CENSA0 (Sarroch – Su Nuraxeddu) was removed on 13 July 2009. From 16 July 2009, the sensor CENSA3 was installed (urban area of Sarroch, Via Rossini), with identical equipment to that of CENSA0. Data from the new sensor are available from 16 July 2009.

CHART T41 (µg/m³)



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

As regards the other pollutants monitored, the report from the provincial authority shows that:

- the values for **CO** were much lower than the legal limits and in line with those of the years prior to 2008; in 2009, the only data received related to the sensor CENSA2 and confirmed that there were no breaches of the legal limit **[Ministerial Decree 60/2002]**
- the values for **benzene** were lower than the legal limits with the exception of the sensor CENSA0 (which has now been eliminated as it was considered by ARPAS* not to be representative), which recorded an annual average of 10.3 µg/m³ in 2009 compared with the legal limit of 6 µg/m³. None of the other sensors recorded breaches **[Legislative Decree 183/2004]**
- for **ozone**, four breaches of the information thresholds were recorded (CENSA1) in 2009, while no warning thresholds were exceeded and no data relating to the protection of human health were received. The report emphasises that the problem of ozone emissions can only be tackled on a large scale given the long-distance transportation of this pollutant **[Presidential Decree of 15 April 1971]**
- the concentration values of **hydrogen sulphide** for 2006-2009 were lower than the legal limit of 40 µg/m³ for average daily concentrations and 100 µg/m³ for average hourly concentrations, with the exception of 2008, when two breaches of the daily average and 15 breaches of the hourly average occurred, and 2009, when six breaches of the hourly average were recorded. **[anomaly 13-15 February 2008]**

  The incidents in 2008 occurred on 13 and 14 February when certain plants were shut down due to an electrical fault, in accordance with operating procedures. No faults were found in the plants.

  Saras sent an analysis of the event to the local and national authorities.

* È disponbile una valutazione ufficiale pubblicata sul sito Sardegna Arpas www.sardegnaambiente.it.

Figure 15 Location of the air quality bio-monitoring stations

4.2.4.4.2 Monitoring of air quality using bio-indicators and biodiversity studies

Air quality can be monitored using bio-indicators as well as chemical indicators.

Epiphyte mosses (mosses that grow on tree trunks) are the bio-indicators most frequently used for monitoring air quality. The monitoring methodology is based on a measurement of biodiversity, i.e. the abundance of different moss species. The presence of atmospheric pollutants (mainly sulphur and nitrogen oxides) can reduce biodiversity values.

For some years, the Botanical Sciences Department of the Mathematical, Physical and Natural Sciences Faculty at Cagliari University has been monitoring the condition of the vegetation over a huge area covering the inland region of Sarroch, as illustrated in Figure 15. It also uses the epiphyte mosses methodology as a bio-monitor of air quality. Table 42 shows the key criteria for interpreting the categories of air quality and atmospheric purity, with reference to the Index of Atmospheric Purity (IAP)[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 (IAP): categories of air quality and atmospheric purity

I.A.P. categories	I.A.P. values	Air quality assessment	Purity/Pollution
7	I.A.P. = 0	Very poor	Very high pollution
6	1 < I.A.P. < 10	Poor	High pollution
5	11 < I.A.P. < 20	Low	Average pollution
4	21 < I.A.P. < 30	Mediocre	Low purity/low pollution
3	31 < I.A.P. < 40	Average	Average purity
2	41 < I.A.P. < 50	Fair	High purity
1	I.A.P. > 50	Good	Very high purity

The categories that include the indicator values measured in the stations being monitored are highlighted in Table 42.
In 2009, the air quality in the region being surveyed fell within category IAP3 with an assessment of "average" for the air quality and purity in eight out of the 11 monitoring stations, and in category IAP4 with an assessment of "mediocre" for air quality, "low" for purity and "low" for pollution for the remaining three stations. These results are in line with those for 2008.
The monitoring stations also include the one nearest the industrial area.
As could be reasonably expected, air quality is generally higher in the stations further inland and lower in the one nearest to the Sarroch industrial area.
The picture that emerges from an analysis using bio-indicators shows, therefore, that the air quality falls in the mid-range of the IAP.
In the area under review, a survey is also carried out to monitor the condition of the vegetation. The survey is conducted through visual checks of the condition of different species of vegetation and by monitoring the bioaccumulation of pollutants.
According to the results of these field measurements, there is no critical threat in 2009 to the condition of the vegetation in the area studied.
Saras' Sarroch site (including the refinery, IGCC, national storage facility and the tank farm) covers an area of 2,724,142 m^2, which has not changed in the period 2006-2009.
For some years a programme to recover "green" areas in the site has been under way.
In addition, Saras has promoted and implemented various initiatives over the years to extend green areas beyond the site and into the surrounding area. These include the planting of 5,696 plants and the creation of 5,900 square metres of grassed areas in the town of Sarroch.

4.2.4.5 – Greenhouse gas emissions

[implemented by Legislative Decree 216/06 as subsequently amended]

Greenhouse gas (carbon dioxide, CO_2)

The activities carried out on the Sarroch site, i.e. refining and electricity generation, fall within the scope of application of the European Emissions Trading Directive.

The directive was introduced across Europe to control and reduce carbon dioxide emissions in accordance with the Kyoto Protocol. The objective of this legislation is to reduce greenhouse gas emissions, especially carbon dioxide, which are thought to cause the progressive global warming of the planet known as the greenhouse effect.

The emissions trading scheme was introduced in 2005 to help member states comply with the requirements of the Kyoto Protocol. It works by assigning each individual plant falling within the scope of the directive 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 purchasing emissions allowances on the market.

The allocation authorised by the competent authority for the five-year period 2008-2012 (2009 is the second year) involved a reduction of around 15% for all companies in the oil sector. In 2009, Saras obtained additional allowances due to the start-up of Unit 800.

Once Unit 800 came on stream, and based on the regulation governing new entries (Decree of 28 February 2008), Saras received additional allowances as follows: 489 tons of CO_2 for 2008 and 22,313 tons of CO_2 per year for the period 2009-2012.

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

The objective of the new directive for the period until 2020 is to reduce CO_2 emissions by 20% compared to the levels recorded in 2005. The system to allocate allowances to companies will also be changed significantly. CO_2 emissions from the Saras site are calculated based on an appropriate monitoring plan, which is defined in accordance with specific European and Italian[1] guidelines. Monitoring is carried out by measuring fuel consumption and applying specific emissions factors for each fuel.

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

The National Emissions Trading Register, which is available for consultation, records both the allowances assigned and the annual CO_2 emissions in Italy. SARAS has been assigned a single position grouping the total emissions from its operations at the Sarroch site.

The tables and charts on the next page show the annual figures on CO_2 emissions from the site in both absolute and relative terms, as a proportion of the quantity of raw materials processed in a year. The figures for 2009 (like those relating to 2005-2008) have been validated by LRQA Italy, one of the companies on the list of bodies specifically accredited for this purpose by the Italian Ministry for the Environment. The emissions recorded over the first period (2005-2007), which were also confirmed by the 2008 figures, are typical of the site.

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[1] European guidelines for the period 2005-2007 are contained in Decision 2004/156/CE; these were implemented in Italy through the provisions of DEC/RAS/854/05. For the subsequent five-year period, 2008-2012, the new Guidelines contained in Decision 2007/589/CE followed by Resolution 14/2009, must be applied.

[2] The standard for the accreditation of laboratories is ISO 17025.

The reduction in emissions in 2009 was mainly due to the long shutdowns that occurred during the year, which allowed the company to make significant investment in energy recovery. The results of this investment have partly filtered through to the year under review but the full benefits will not be seen until 2010.

TABLE 43 CO_2 emissions: absolute values and allowances assigned

Parameter	2006	2007	2008	2009
Refinery emissions (t/year)	2,348,553	2,508,281	2,485,255	2,130,113
Allowances assigned to the refinery* (t/year)	**2,615,246**	**2,615,246**	2,137,872	2,159,696
IGCC emissions (t/year)	3,878,387	3,751,317	3,728,496	3,539,598
Allowances assigned to the IGCC (t/year)	**3,544,794**	**3,544,794**	444,404	444,404

*Annual CO_2 allowances assigned for 2005 – 2008

CHART T43A (t/year)

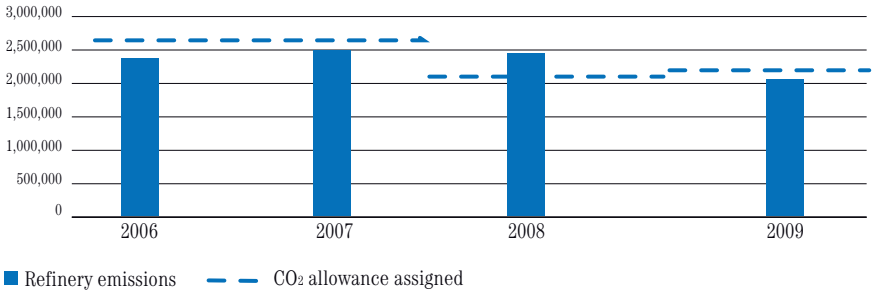


CHART T43B (t/year)

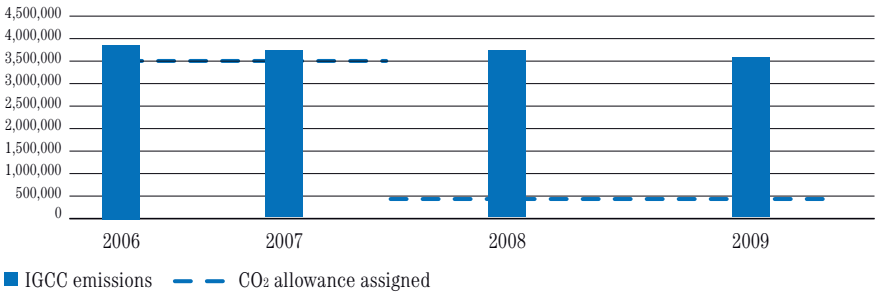
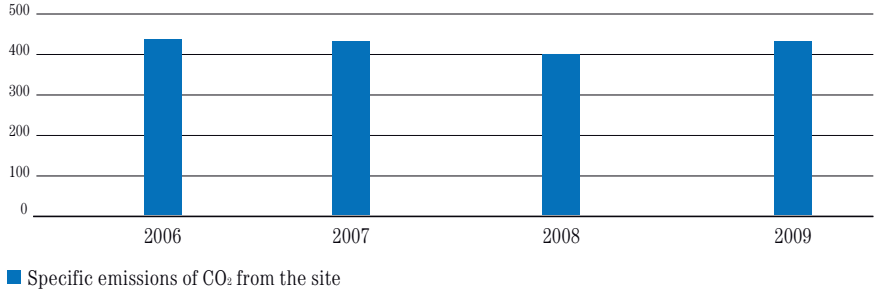


TABLE 44 Specific CO_2 emissions from the site

Parameter	2006	2007	2008	2009
Specific emissions from the site: t CO_2/kt raw materials	429	429	400	427

CHART T44 (t CO_2/kt raw materials)

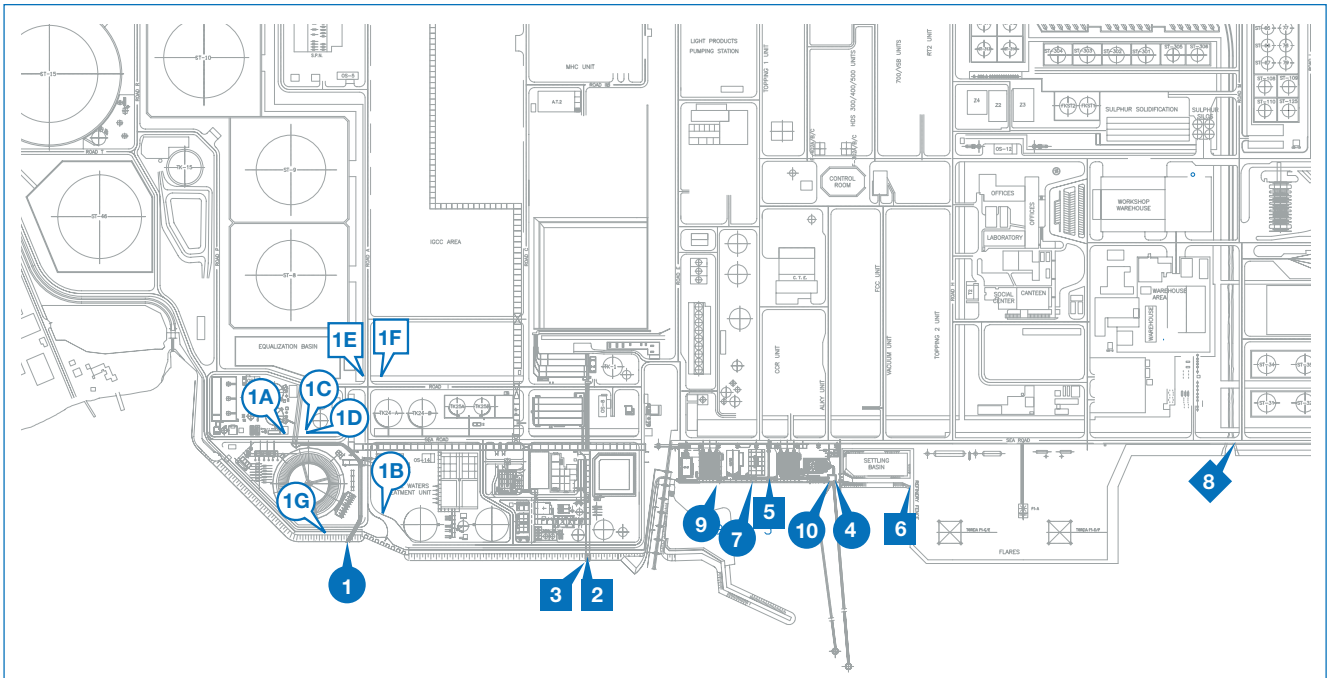


4.2.5 – Discharges into water

4.2.5.1 – General

[AIA permit DSA-DEC-2009-0000230]

Figure 16 shows the location of the Saras site's points of discharge into water. In accordance with the AIA permit, each discharge point is identified by a specific code.



Discharge points in normal operating conditions

- 1 Principal discharge point.

into this flow the following:

- 1A Discharge from biological plant
- 1B Discharge from new biological plant
- 1C Discharge from BWT (treatment of ballast/bilge water)
- 1D Discharge from filtering reservoir
- 1G Discharge from IGCC cooling tower
- 4 Discharges from primary water treatment plant
- 7 Discharge from refinery desalinator
- 9 Discharge from IGCC South desalinator
- 10 Discharge from IGCC North desalinator

Discharge points in emergency operating conditions

- 2 Emergency process water floodway
- 3 Emergency meteoric water floodway
- 5 Plant emergency meteoric water floodway
- 6 Building Zone emergency meteoric water floodway
- 1E Southern Zone emergency meteoric water floodway
- 1F IGCC Zone emergency floodway

} these flow into the principal discharge (1)

Discharge of meteoric water

- 8 Rio Mascheroni channel

Figure 16 Map with location of site discharge points

Discharge points in normal conditions

Water from the plants and units listed below is discharged into the sea via the main discharge point (1).

- treatment plant for the wastewater generated by the facility, which has two discharge points (1a and 1b); the plant carries out chemical, physical and biological treatment of waters from the oily water sewer network, to which wastewater and meteoric water from the plant areas and domestic water are ducted
- treatment plant for ballast water (slops and washing water) and bilge water (section 4.2.6) from tankers that dock at the marine terminal and from private ships, respectively; water pumped from the wells in the site's hydraulic barrier (section 4.2.7); and meteoric water, except for water collected from the plant area; the treatment plant has one discharge point (1c)
- filter tank, which collects water that has been purified in the treatment plant for wastewater, equipped with an overflow discharge point (1d)
- discharge point from the IGCC cooling tower (1g)

The following plants also discharge water into the sea from discharge points 4, 7, 9 and 10:

- primary unit for treating water coming into the site, taken from the industrial water supply (4)
- desalinators in the refinery and the IGCC (7, 9, 10)

All the above-mentioned discharges occur under normal conditions and are continuous, with the exception of the discharges from the filter tank and the primary unit for treating incoming water.

Meteoric water principally coming from roads and large paved areas in the northern part of the refinery and from the basins around the LPG spheres, which does not come in contact with pollution sources, is ducted to the Rio Mascheroni and from there to the sea (discharge point 8).

CONTRIBUTIONS TO THE DISCHARGE FLOW (%) 2009

Main discharge point (excluding IGCC tower)	19
Discharge from desalinators	50.2
Discharge from IGCC tower	29.6
Discharge from treatment of incoming water	1.3

Discharge points in emergency conditions

In emergency conditions caused by extraordinary events (e.g. torrential rain), meteoric water (including water from the roofs of the buildings in the IGCC and the terraces that lead from the IGCC to the sea, is ducted via emergency process water floodways and the plants' drainage systems (1e, 1f, 2, 3, 5, 6).

These discharge points are normally closed and sealed by the supervisory authorities. The integrity of the seal applied by the authorities is periodically checked and any tampering is reported.

If it becomes necessary to open one or more of these discharge points, an internal emergency procedure is followed and the supervisory bodies are informed of the reasons for the removal of the seals and the time taken to restore normal conditions within the deadline specified by the permit.

Calculation of water discharge values

In line with the provisions of the AIA permit, monthly samples are taken from discharges into the sea and sent for analysis by an accredited external laboratory, while daily samples are analysed by the site's in-house laboratory. This data (for COD, nitrogen and suspended solids), together with information from continuous hydrocarbon analysis, forms the basis for calculating the annual figures, which are shown below.

4.2.5.2 – Water discharge figures

Discharges from wastewater treatment units

The significant parameters regarding quantities of discharges into waters that are ducted to the main discharge point (1) are as follows:

- flow rate of water discharged
- COD
- total hydrocarbons
- nitrogen in various forms (ammoniacal, nitrous or nitric)

[flow rate]

The data on these parameters for the four discharge points (1a, 1b, 1c and 1d) ducted to the main discharge point are shown below.

Table 45 and Charts T45A and T45B show the figures for average hourly flow rate of the water discharged both in absolute terms and in specific terms as a proportion of raw materials processed. An analysis of the figures for the four years 2006–2009 shows that the trend has been broadly stable both in absolute and specific terms.

TABLE 45 Discharges from wastewater treatment plants (discharge points 1a, 1b, 1c, 1d) – flow rate

Parameter	2006	2007	2008	2009
Total water discharged – average annual flow rate (m^3/hour)	767	750	703	729
Total water discharged/raw materials processed (m^3/kt raw materials)	463	450	398	480

CHART T45A (m^3/hour)

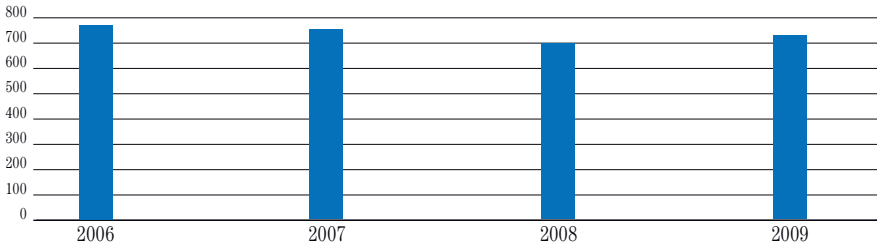
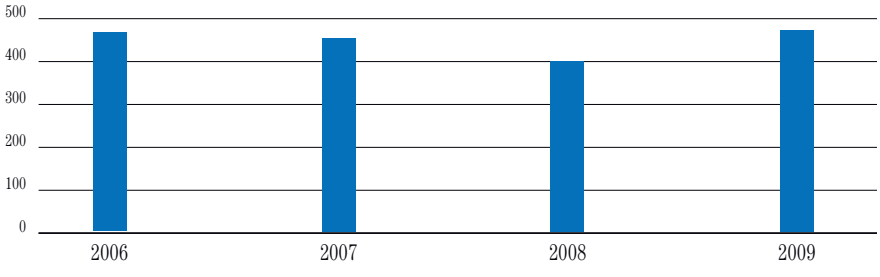


CHART T45B (m^3/kt raw materials)



[COD]

The data relating to the COD indicators, expressed as absolute and specific mass flow values and average annual concentration, are shown in Table 46. The concentration values of COD have fluctuated over the years but have always been well below the legal limit.

TABLE 46 Scarichi unità di trattamento acque reflue (punti 1a, 1b, 1c, 1d) – COD

Parameter	2006	2007	2008	2009
Absolute values (t/year)	368	472	369	561
Specific values (t/millions of t raw materials)	25.4	32.3	23.8	42.2
Average concentration values (mg/l)*	53.1	66.8	59.7	87.9

* Compared with the limit of 160 mg/l, stipulated by Legislative Decree 152/06 Part III, Appendix 5

CHART T46A (t/millions of t raw materials)

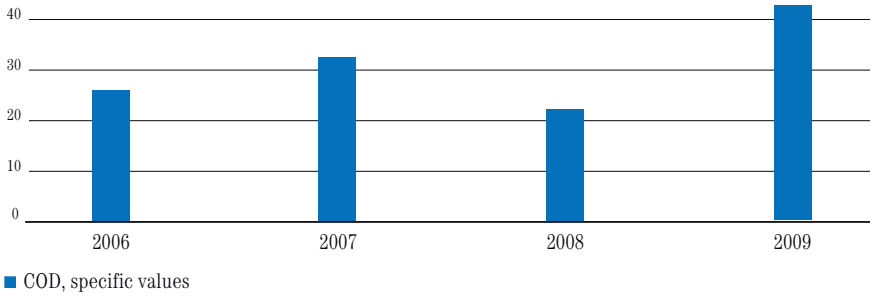
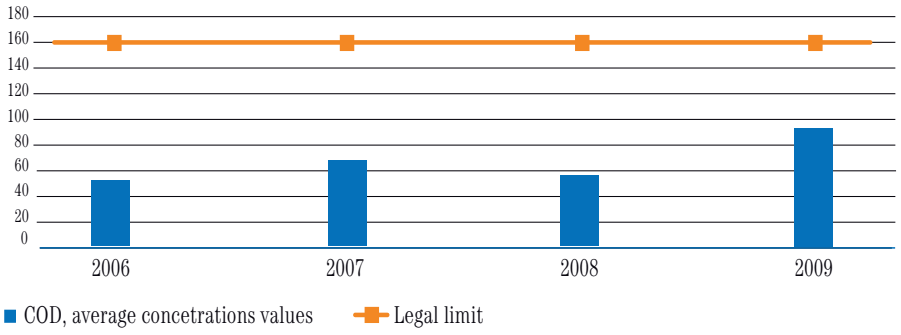


CHART T46B (mg/l)



[total hydrocarbons]

Table 47 shows the data relating to the total hydrocarbon indicators, expressed as absolute and specific mass flow values and annual average concentration values.

TABLE 47 Discharges from wastewater treatment plants (discharge points 1a, 1b, 1c, 1d) – total hydrocarbons

Parameter	2006	2007	2008	2009
Absolute values (t/year)	10.1	14.3	10.4	12,2
Specific values (t/millions of t raw materials)	0.70	0.98	0.67	0,92
Average concentration values (mg/l)*	1.5	2.2	1.7	1,9

* Compared with the limit of 5 mg/l, stipulated by Legislative Decree 152/06 Part III, Appendix 5

CHART T47A (t/millions of t raw materials)

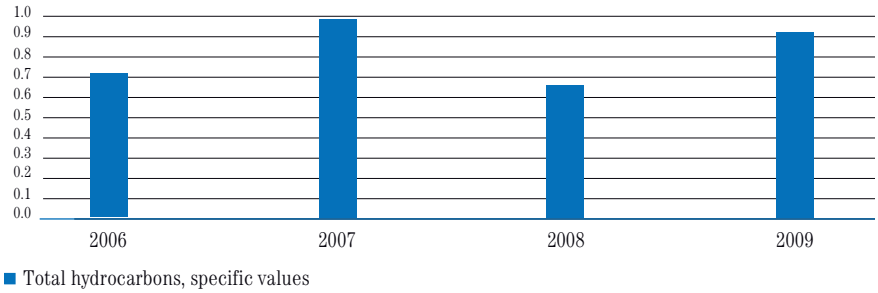
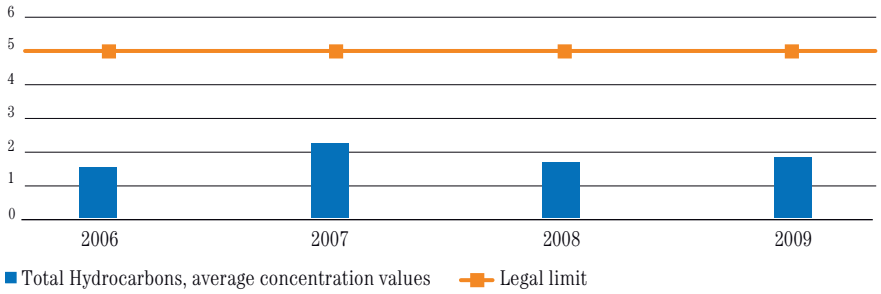


CHART T47B (mg/l)



The average concentration values of total hydrocarbons have always been well below the legal limit.
In the first half of 2007 the values for this parameter increased due to the malfunctioning of flotation units and a prolonged maintenance period.
The problem with the plant was resolved in the second half of 2007 and the values for the parameter in question returned to their previous levels.

[nitrogen]

The data relating to nitrogen indicators, expressed as absolute values of nitrogen mass flow and as average annual concentrations of nitrogen in its individual forms (ammoniacal, nitrous and nitric) are shown in Tables 48 and 49. These indicators have been broadly constant during the period, apart from a continuous reduction in total nitrogen from 2007 onwards (Table 48).

TABLE 48 Discharges from wastewater treatment plants (discharge points 1a, 1b, 1c, 1d) – total nitrogen (ammoniacal, nitrous and nitric): mass flow

Parameter	2006	2007	2008	2009
Absolute values (t/year)	56.7	31.6	19.0	23.2
Specific values (t/millions of t raw materials)	3.91	2.17	1.22	1.74

CHART T48A (t/year)

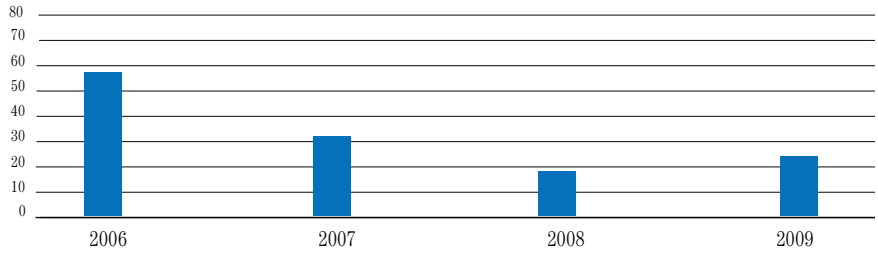


CHART T48B (t/millions of t raw materials)

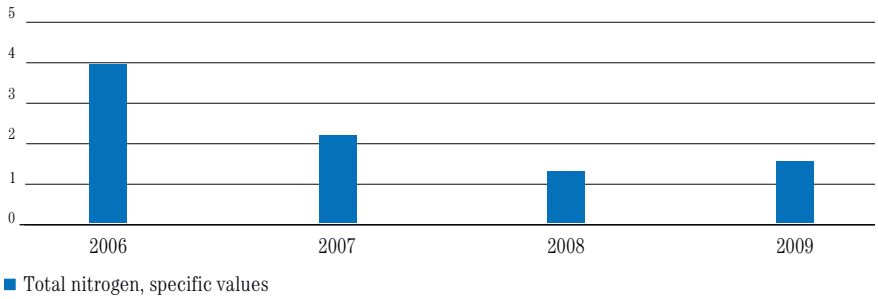


TABLE 49 Discharges from wastewater treatment plants (discharge points 1a, 1b, 1c, 1d) – ammoniacal, nitrous and nitric: average concentrations

Parameter	2006	2007	2008	2009	Valore limite*
Ammoniacal (mg/l)	1.12	2.09	2.09	1.82	15.00
Nitrous (mg/l)	0.09	0.04	0.06	0.04	0.60
Nitric (mg/l)	7.24	2.68	1.70	1.77	20

*Limit stipulated by Legislative Decree 152/06 Part III, Appendix 5

In 2009, there were no significant variations from the trend over the previous three-year period for the parameter shown in Table 49.
The figures for the last four years are shown in the charts on the next page.

CHART T49A (mg/l)

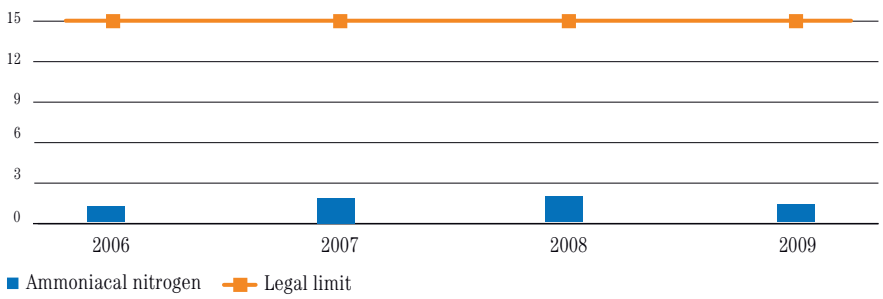


CHART T49B (mg/l)

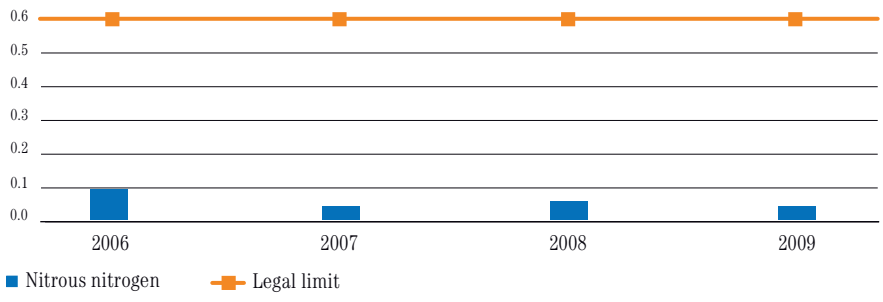
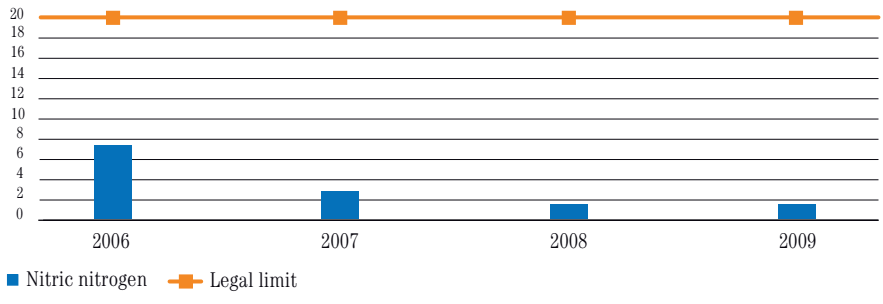


CHART T49C (mg/l)



Discharges from other units

The flow rate of discharged water and suspended solids are the two main parameters for the discharge points from the following units:

- primary treatment units for incoming water (discharge point 4)
- desalinators (discharge points 7, 9, 10)
- IGCC tower (discharge point 1g)

The figures relating to these parameters for the above-mentioned three types of discharges are shown in the tables and charts below.

Table 50 shows the average hourly flow rate of discharged water as both absolute and specific values. **[flow rate]**

The significant contributions to the total flow rate made by the desalinators and the IGCC tower can also be seen in the charts.

TABLE 50 Discharges from the primary treatment units for incoming water (point 4), desalinators (points 7, 9, 10), the IGCC tower (point 1g) – flow rate

Parameter	2006	2007	2008	2009
Absolute values (m³/hour)				
Treatment of incoming water	36.9	36.5	44.1	48.0
Desalinators	2,893	2,778	2,323	1,925
IGCC tower	928	977	972	1,134
Specific values (m³/kt raw materials)				
Treatment of incoming water	22.3	21.9	25.0	31.6
Desalinators	1,746	1,668	1,315	1,268
IGCC tower	560	587	550	747

CHART T50A (m³/hour)

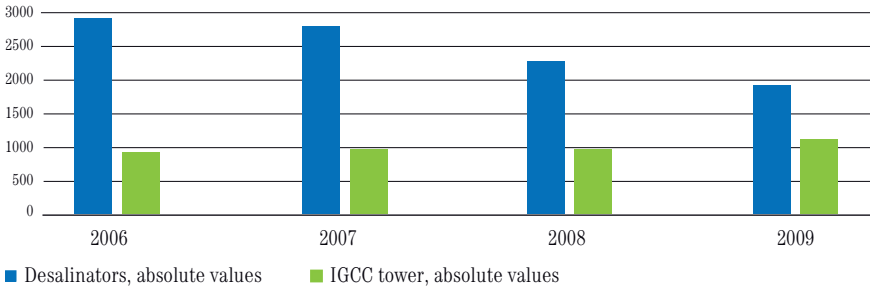
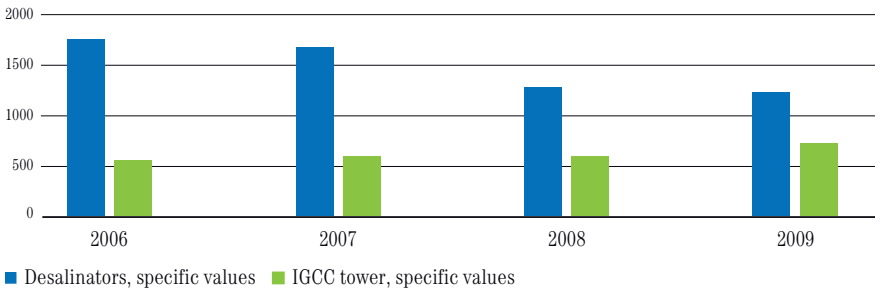


CHART T50B (m³/kt raw materials)



[suspended solids - mass flow]

Table 51 shows the figures relating to the suspended solids indicators, expressed as absolute and specific mass flow values. These charts also show the significant contributions made to the total flow rate by the desalinators and the IGCC tower.
The average annual concentrations are shown in Table 52 and related charts on the opposite page.
The data relating to mass flow and concentrations of suspended solids in discharges from the desalinators and the IGCC tower show variations over the years. The variations in suspended solids are mainly due to the number of sea storms during the year.

TABLE 51 Discharges from the treatment units for incoming water (point 4), desalinators (points 7, 9, 10) and the IGCC tower (point 1g) – suspended solids: mass flow

Parameter	2006	2007	2008	2009
Absolute values (t/year)				
Treatment of incoming water	10	7	10	6
Desalinators	528	536	507	414
IGCC tower	288	287	289	327
Specific values (t/millions of t raw materials)				
Treatment of incoming water	0.7	0.5	0.6	0.4
Desalinators	36.4	36.7	32.7	31.1
IGCC tower	19.9	19.7	18.6	24.6

CHART T51A (t/year)

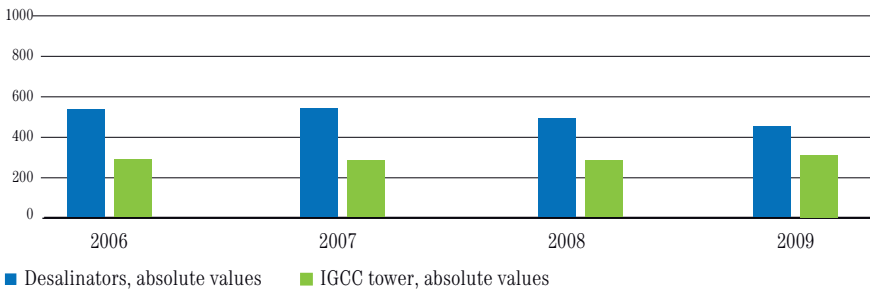
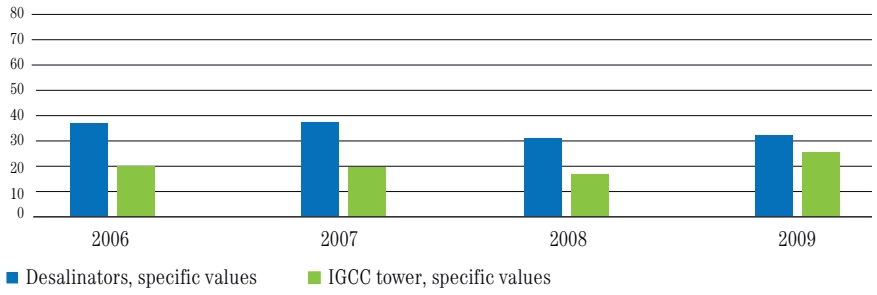


CHART T51B (t/millions of t raw materials)



[suspended solids – concentrations]

TABLE 52 Discharges from the treatment units for incoming water (point 4), desalinators (points 7, 9, 10) and the IGCC tower (point 1g) – suspended solids: average concentrations

Parameter	2006	2007	2008	2009	Valore limite*
Primary water treatment units (mg/l)	29.9	21.2	25.1	14.2	80
Desalinators** (mg/l)	22.4 – 23.9	20.7 – 23.6	23.8 – 25.3	24.0-25.7	80
IGCC tower (mg/l)	34.8	33.0	33.8	33.0	80

*Limit stipulated by Legislative Decree 152/06 Part III, Appendix 5
**The minimum and maximum values for the three desalinators are shown.

CHART T52A (mg/l)

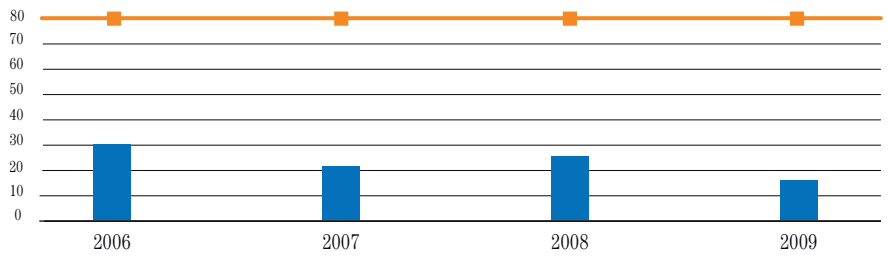


CHART T52B (mg/l)

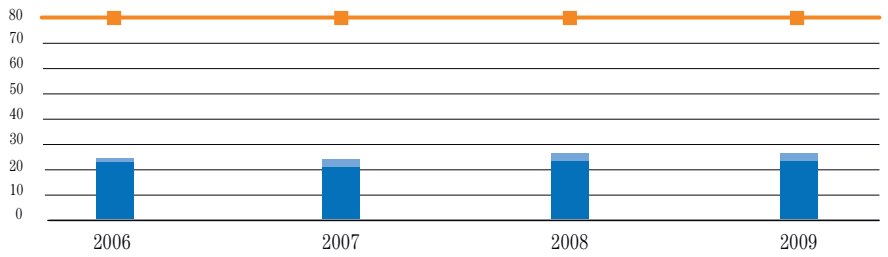
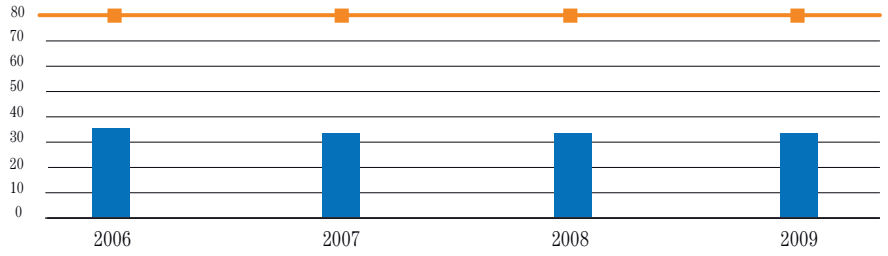


CHART T52C (mg/l)



Emergency situations following spills into the sea

Emergency situations that could affect seawater are caused by spills of hydrocarbons from the marine terminal. These situations are analysed and assessed in the Safety Report (section 3.3, page 38).

Measures to prevent 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 (section 4.3.2, page 113).

A marine pollution prevention plan has been drawn up to deal with emergencies at sea. It describes the different procedures to be taken according to the type of spill.

There were no spills of hydrocarbons into the sea in 2006–2009.

4.2.5.3 – Seawater quality

For several years, marine biologists have been carrying out periodic checks on the quality of the seawater in the stretch of sea in front of the area occupied by the Saras site. The surveys include detailed chemical and physical analysis of seawater samples taken at different depths at a series of points positioned along lines perpendicular to the coastline, as shown in figure 17.

Figure 17 Area covered by the study of the seawater quality

[TRIX, seawater quality indicator]

The quality of seawater can be described in summary form using an indicator known as the Trophic Index (TRIX[1] for short). This indicator is calculated using a mathematical formula that takes into account chemical values (percentage of dissolved oxygen, concentrations of phosphorous and nitrogen) and biological values (chlorophyll "a") measured in the seawater.

Table 53 on the opposite page provides a key to interpreting the categories of seawater quality. The categories that include the indicator values measured at the points in the above-mentioned survey are also highlighted in the same table.

The results of the seawater surveys in 2006-2009 all fall into the top two bands of the classification (high/good).

[1]L'indice TRIX – previsto dal D.Lgs. 152/99 per la caratterizzazione dello stato di qualità della acque marine – non è stato ripreso dal D.Lgs. 152/06, che ha abrogato il decreto precedente. Tuttavia, in attesa di un recepimento completo della direttiva europea in materia di acque, tale indice continua ad essere utilizzato anche da parte degli enti di controllo (ARPA) anche per confronto con i dati raccolti nel corso degli anni precedenti.

TABLE 53 Trophic index (TRIX): seawater quality categories and results

Trophic index	Trophic state	Seawater quality
2 – 4	High	Good transparency of water; no abnormal water colouration; no undersaturation of dissolved oxygen in the benthic zone.
4 – 5	Good	Occasional turbidity of water; occasional water colouration, occasional hypoxia in the benthic zone.
5 – 6	Mediocre	Poor water transparency; abnormal water colouration, hypoxia and occasional anoxia of the benthic zone; benthic ecosystem under stress.
6 – 8	Poor	High degree of water turbidity; widespread and persistent abnormal water colouration; widespread and persistent hypoxia/anoxia in the benthic zone; kills of benthic organisms; alteration/simplification of benthic communities; economic damage to the tourism, fishing and aquaculture industries.

In recent years a new parameter, the CAM1 (classification of seawater) index, has been introduced to provide an assessment of the trophic state of water. This index is based on specific algorithms for the sea around Sardinia. Generally, the CAM index produced an "average" rating for the quality of seawater in the entire survey area. The sole exception was 2009 when the quality of seawater was poor due to a particularly rainy period that started in the last quarter of 2008, causing a number of water courses to overflow into the Gulf of Cagliari with the resulting transport of sediment-forming nutrient substances (Table 53 bis). In any case, these indices are significant over long periods rather than in a single period.

[new parameter CAM index]

TABLE 53 BIS CAM index (specific to the sea around Sardinian)

		bottom water
January 2006	low	low
July 2006	average	average
January 2007	average	average
July 2007	average	average
January 2008	average	average
July 2008	average	average
January 2009	low	low
July 2009	low	low

The stretch of sea covered by the analysis is also affected by thermal discharges, i.e. discharges of water at a higher temperature than the ambient water. Applicable legislation stipulates that the increase in the temperature of the receiving body should not exceed 3°C over 1000 metres away from the point of introduction. Every six months, in accordance with the IRSA method (Manuale dei metodi analitici per le acque, Quaderno Istituto Ricerca sulle Acque no. 100, 1995, Manual of water analysis methodology, Institute of Water Research Paper 100, 1995) provided for in Ministerial Decree of 16 April 1996, a check is made of temperature differences at 1,000 metres from the point of discharge from the IGCC's seawater cooling circuit along a semi-circular line centred on the discharge point. The results of the checks carried out in 2009 show temperature differences of less than 1°C in the winter survey and just above 1°C (1.0 – 1.4°C) in the summer survey, as can be seen from the figures in Table 54.

[Law 502 of 6 December 1993]

[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 Measurements taken at a depth of 0.1 m along the semi-circular curve with a 1 km radius from the IGCC tower discharge point (point 1g)

	January 2006	July 2006	January 2007	July 2007	January 2008	July 2008	January 2009	July 2009
Minimum T°C	11.5	27.5	14.7	24.1	13.1	24.8	12.3	25.6
Maximum T°C	12.3	28.9	15.1	25.2	14.1	26.1	12.5	26.8
Thermal increase °C	0.8	1.4	0.4	1.1	1.0	1.3	0.2	1.2

4.2.6 – WASTE

4.2.6.1 – General

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

With reference to the areas indicated in Figure 18, the main operational phases of waste management at the site before the waste is sent off-site for disposal or recovery are described below:

[waste management phases]

- the waste generated, appropriately separated into uniform categories, is generally sent to temporary storage areas (point 2, Figure 18)
- filter cake from the IGCC can be stored in the temporary storage area or in an area specifically authorised[1] for this purpose before it is despatched externally for the metals to be recovered (points 3 and 4)
- ferrous scrap metal is recovered in a specially designated area, managed by an authorised[2] external company, which subjects the scrap metal to a selection process and reduces its volumes without altering the type and mass (point 1)
- used oils are stored in designated containers (point 7)
- plastic, glass, aluminium and paper waste is collected separately and stored in a designated area (point 5)
- most of the waste generated, consisting mainly of waste contaminated by hydrocarbons, is sent to an internal plant, which separates it into its oily and aqueous phases and then subjects it to a process to convert it into chemically inert matter. These processes considerably reduce the mass of waste and, by mixing it with an inert matrix, change its type; the recovered oily phase is reused in the refining process and the aqueous phase is collected by the sewerage network and ducted from there to the treatment plant for wastewater generated by the facility. This plant is managed by an external company specifically authorised[3] for this purpose (point 6)

All the waste generated on the site, including waste sent to the two companies mentioned above, is disclosed in the annual declaration of waste generated by Saras and Sarlux (filter cake) entitled Modello Unico di Dichiarazione Ambientale, or MUD (Unified Environmental Declaration). The two companies are responsible for the waste they receive from Saras, and disclose the quantities of waste sent externally, after carrying out the necessary treatment processes, in their annual declaration. These companies were carefully selected and are checked regularly, including by means of specific audits (section 4.3.3).

[Law 70 of 25 January 1994]

[1] Regional decision no. 739 of 01/06/2006

[2] Regional decision no. 163 of 23/06/2009

[3] Integrated Environmetal Autorizathion (AIA) determination of the province of Cagliari 86 of 21/4/2006

Figure 18 Areas designated for the principal activities for managing waste on site

As the filter cake from the IGCC is sent for external recovery to plants located in Germany, the company applies for a permit for the cross-border shipment of waste[1] every year in accordance with EC Regulation 1013/2006.

[treatment of bilge water]

Lastly, Saras is authorised[2] to receive and treat waste comprising bilge water, slops and ballast water that has come from ships.

This activity is carried out completely free of charge for the ships that dock in the marine terminal and for the ships that send these types of waste to Saras from regional ports in tanker trucks.

These types of aqueous waste are treated at the ballast water treatment plant mentioned in section 4.2.5.

This plant also treats the groundwater pumped from the wells in the site's hydraulic barrier (section 4.2.7): this waste is also classified and disclosed as part of the waste generated by the activities of the Saras site.

[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 – Waste data

Based on the waste management processes described, the figures and assessments relating to waste take into account both the waste generated by Saras' activities (figures disclosed in the MUD) and the waste leaving the site after treatment to convert it into inert matter. Table 55 shows the data on total waste generated by Saras' activities, broken down into hazardous and non-hazardous waste.

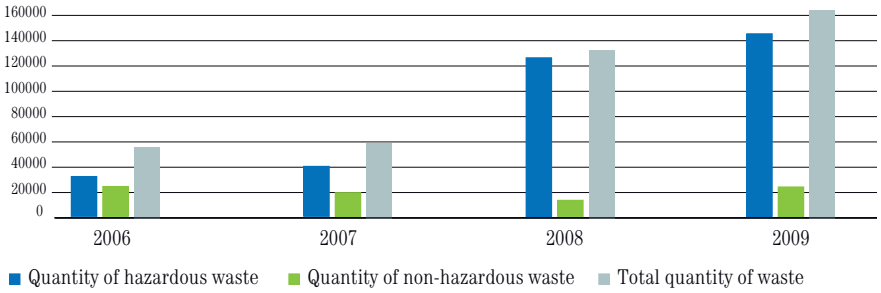
WASTE GENERATED ON SITE (%) 2009	
Waste to on-site inertisation plant	14,0
Water from wells in the hydraulic barrier to wastewater treatment plant	55,9
Filter cake sent to off-site recovery	0,5
Other types of waste	29,6

TABLE 55 Waste generated on site by Saras (refinery and IGCC)*

Parameter	2006	2007	2008	2009
Hazardous waste (t/year)	36,731	40,735	126,671	141,948
Non-hazardous waste (t/year)	22,240	19,806	10,152	22,035
Total waste (t/year)	58,971	60,541	136,823	163,984

*Includes all types of waste generated by the refinery and the IGCC disclosed in the Unified Environmental Declaration (MUD).

CHART T55 (t/year)



The increase in the quantity of hazardous waste in 2009 is mainly due to site remediation work, as can be seen from the table below. However, the table also shows that the quantity of hazardous waste generated by ordinary operations fell compared with previous years (see Table 55 bis "Hazardous waste (t/year)").

TABLE 55 BIS Hazardous waste (t/year)

Parameter	2008	2008
Water from site remediation (t/year)	77,705	91,661
Soil from site remediation (t/year)	13,803	19,497
Hazardous waste from ordinary operations (t/year)	35,162	30,791
Total (t/year)	126,671	141,948

Table 56 shows the figures relating to outgoing waste from the Saras site: this has also increased compared with previous years due to the site remediation work.

TABLE 56 Outgoing waste from the Saras site*

Parameter	2006	2007	2008**	2009**
Hazardous waste (t/year)	4,209	9,365	38,498	39,644
Non-hazardous waste (t/year)	35,678	22,862	7,917	20,350
Total waste (t/year)	39,886	32,227	46,415	59,993

* Includes all types of waste generated by the refinery and the IGCC, with the exception of waste sent to the on-site plant to be converted into inert matter and water pumped from the wells in the site's hydraulic barrier. Waste that has been converted into inert matter by the on-site plant is included.
** The increase in the quantity of hazardous waste generated in 2008 and 2009 is mainly due to site remediation work.

CHART T56 (t/year)

Table 56 bis shows the figures relating to vanadium concentrate (filter cake) leaving the Saras site. This is the solid formed from the gasification of heavy refinery products, which contains high percentages of metals, especially vanadium.

TABLE 56 BIS Outgoing waste from the Saras site - filter cake

Parameter	2006	2007	2008	2009
Filter cake - quantity leaving the site (t/year)	1,151	1,585	1,369	1,657

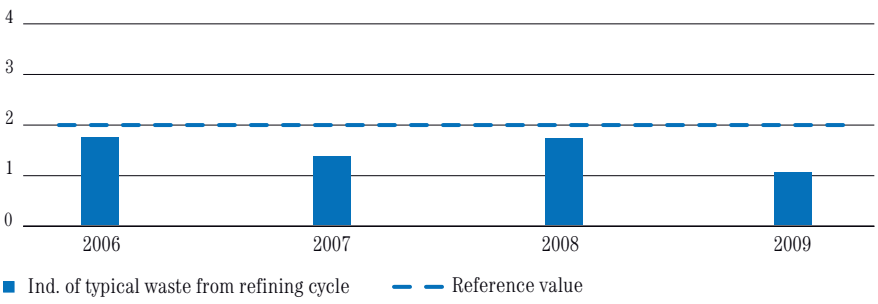
The indicator shown in Table 57 is calculated taking into account the various types of waste from the refining process, as a proportion of the quantity of raw materials processed. The indicator values are compared with the reference values (less than 2 kg of waste per ton of crude processed) contained in the Italian guidelines on the best techniques available in the refining sector.

TABLE 57 Waste generated by Saras' activities

Parameter	2006	2007	2008*	2009	Reference value**
Indicator of typical waste generated from the refining process * (kg/t raw materials)	1.72	1.37	1.37	1.07	≤2

* Indicator calculated by subtracting waste from extraordinary activities and/or waste that does not pertain to the refining process (e.g. excavated soil and rocks, material resulting from the cleaning of the sea floor of the small harbour, vanadium concentrate from the IGCC plant, etc.) from total outgoing waste.
** Value indicated by the Italian guidelines on the best available techniques (Decree issued by the Italian Ministry for the Environment on 29 January 2007)

CHART T57 (kg/t raw materials)



In addition to industrial waste, the site also generates urban solid waste, mainly from its office and catering activities. The separated waste collection of plastic, glass and paper, which started in 2006 with a total amount of 50 tons collected, doubled in 2007 and reached over 118 tons in 2009. This increase was obtained thanks to an in-house campaign to raise awareness and, most importantly, to the contribution of all staff.

[table of objectives and measures objective 11, page 125]

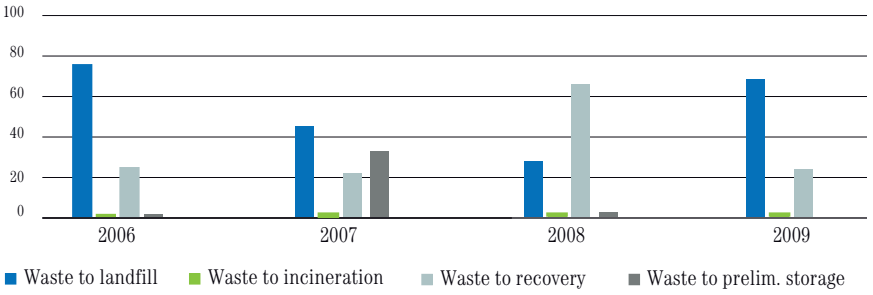
Since 2008, the company has also collected organic waste from the company canteen. The company has a specific objective to improve the collection of separated waste. Table 58 shows the final destinations of waste and the percentages of waste from the site sent to each of them.

TABLE 58 Destination of outgoing waste from the Saras site

Destination of waste	2006	2007	2008	2009
Waste sent to landfill (% of total waste)	74.9	44.7	30.4	73.0
Waste sent for incineration (% of total waste)	0.94	1.31	0.97	0.83
Waste sent for recovery (% of total waste)	24.1	21.2	66.8	26.1
Waste sent for preliminary storage (% of total waste)	0.006	32.8*	1.85	0.02

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

CHART T58 (%)



[table of objectives and measures objective 12, page 125]

It can be seen from Table 58 that the quantity of outgoing waste from the site sent for recovery increased significantly until 2008, from around 12% per year in 2005 to 67%, with a resulting reduction in the quantity of waste sent to landfill. This trend then reversed in 2009 due to the smaller recoverable percentage of total excavated soil from site remediation and the waterproofing of tank containment basins. Recovery of the soil is undertaken at an external site located in the industrial area of Macchiareddu.
The percentages of hazardous and non-hazardous waste sent from the site for recovery are shown in Table 59. It can be seen that more non-hazardous waste than hazardous waste was sent for recovery until 2007. The trend then reversed in 2008 and continued until, in 2009, the percentage of hazardous waste recovered reached 81.3%.
If the internal recovery plants on site are included, however, rather than just the outgoing waste from the site, around 107,300 tons of waste were sent for recovery or recycling in 2009. This figure is in line with that recorded in 2008, when there was a marked increase on previous years.
The company has a specific objective to improve the quantity of waste sent for recovery (12A, page 124).

TABLE 59 Outgoing waste from the Saras site sent for recovery: hazardous and non-hazardous

Parameter	2006	2007	2008	2009
Hazardous waste sent for recovery (% of total waste sent for recovery)	43.7	38.0	79.7*	81.3*
Non-hazardous waste sent for recovery (% of total waste sent for recovery)	56.3	62.0	20.3*	18.7*

* The increase is mainly due to site remediation work

4.2.7 – Accidental spills into the soil and subsoil

Past activity

[Ministerial Decree 471/99, replaced by Legislative Decree 152/06, Part IV, Section Five]

In accordance with the provisions of Ministerial Decree 471 of 25 October 1999 (regulations containing criteria, procedures and methods for the safety, reclamation and environmental restoration of polluted sites), and having identified a problem of contamination of the soil, subsoil and underground water on its production site, Saras submitted its Site Characterisation Plan on the condition of the terrain and the layers of water beneath the refinery to the competent authorities, pursuant to Art. 9 of the above Decree. The contamination mainly stems from the presence, in concentrations above the limits stipulated for underground waters, of the following substances or categories of substances: total hydrocarbons, benzene, lead, methyl tert-butyl ether (MTBE), p-Xylene and toluene. There have been few instances where the limits for heavy hydrocarbons (C>12) in the soil and subsoil have been exceeded.
Subsequently, based on Ministerial Decree 468 of 18 September 2001 and the Ministerial Decree of 12 March 2003, the Sarroch municipal area and 33 other municipalities were included in an area called "Sulcis Iglesiente Guspinese", identified as a site of national interest for remediation.
In 2004, in conjunction with the Italian Ministry for the Environment, the Region of Sardinia, the Province of Cagliari, Local Health Authority no. 8 and the Municipality of Sarroch, Saras defined the procedures for implementing the Site Characterisation Plan, which set out a series of surveys to be carried out and proposed the measures needed to protect the environment and safeguard public health.

[site characterisation activities]

In July 2004, work to assess the site was initiated using the following techniques:

- environmental surveys using continuous core drilling at depths of between 5m and 10m, to establish the stratigraphy of the subsoil and extract samples to ascertain whether any contaminants are present and measure their concentrations
- piezometric surveys at depths of between 10m and 20m, which monitor the water table and ascertain the environmental condition of the underground water. Piezometric surveys are conducted by inserting windowed PVC tubes into the aquifer, which is separated from the surrounding terrain by drainage gravel, in order to periodically take samples of water to check its quality
- gas surveys, to check for the presence of hydrocarbon gas in the soil interstices.

The assessment plan was completed in June 2009 following 879 drilling operations, comprising 140 piezometric readings (obtained via continuous drilling to extract soil samples) and 739 environmental surveys, plus 500 gas survey control points. The analysis of results and the preparation of final technical documentation for the Site Characterisation Plan are nearing completion.
Analysis of the surveys provided the following information:

[Decisory Services Conference on the remediation of the site of national interest "Sulcis Iglesiente Guspinese" of 13 March 2008]

- soil analysis showed that only 136 of the 879 boreholes drilled revealed breaches of the contamination concentration thresholds and that, in total, the thresholds were exceeded only 223 times out of 129,704 readings
- groundwater analysis showed that in some cases hydrocarbons were present in concentrations above the threshold. Hydrocarbons were also detected in the light non-aqueous (supernatant) phase liquid (LNAPL); and certain other parameters (Cd, Ni, Pb, IPA, BTEX, MTBE, sulphates) marginally breached the limits
- analysis from the gas surveys of the surface soil showed that all values fell within the legal limit.

[The Intervention Plan]

Based on the results of the first phase of characterisation, a plan was drawn up to make the groundwater safe in emergency and operational situations, which was approved at the Services Conference held at the Italian Ministry for the Environment in April 2007. The project involves building a hydraulic barrier with supernatant recovery systems to protect the groundwater in emergency situations, and an integrated system containing both a hydraulic and a physical barrier to protect it in operational situations. To date, all 46 wells required for the hydraulic barrier have been dug: of these, 27 are already operating on the mid-line, extracting contaminated water and recovering supernatants, while 13 are being used for groundwater replenishment on the sea side, including one outside the plant to the south, to prevent salt inflows. The remaining six extraction wells are hydrogeologically upstream, controlling groundwater levels. The upstream and replenishment wells are currently being brought into service. The physical barrier will extend over 2,860 m^2 and will be constructed using jet grouting, waterproofing injections and soil consolidation. The reduction from 3,300 m^2 (as stated in the 2009 Environmental Declaration) to 2,860 m^2 is due to the recalibration of the groundwater directions, which allows the hydrogeologically upstream side of the barrier to be shortened.
Saras informed the Ministry for the Environment of this change.

[table of objectives and measures objective 9, page 124]

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

In March 2009, the company completed a number of field tests using jet grouting and injections. Five tests were carried out using jet grouting and three using injections. The executive project for the physical barrier was drawn up in November 2009 and submitted to the Ministry for the Environment on 17 May 2010. Also during 2009, a Ministry for Industry and Economic Development project to decontaminate the former ST-1 tank area was nearing completion with the removal of around 80% of the decontaminated soil. Around 2,000 cubic metres of soil are still to be removed and sent to an authorised landfill. The remediation project for the West Tank Farm, an area with hydrocarbon hot spots (C>12), which started in September 2008, continued throughout 2009. The project involves excavating, characterising and treating contaminated soil using the technique of soil washing. Most of the washed soil is then returned to its site of origin, while the soil that does not respond to the treatment is sent to an authorised landfill. This remediation project is also rapidly approaching completion.

TABLE 60 Past activity

Parameter	2006	2007	2008	2009
Ratio of quantity of product recovered to water drained* (%)	0.27	0.49	1.05	0.70

* Activities relating to the hydraulic barrier and product recovery started in 2007

Prevention of soil and subsoil contamination

It is not possible for the soil and subsoil to become contaminated under normal conditions. Contamination is only likely to occur after an accidental spill of liquid hydrocarbons (raw materials, semi-processed products or finished products).

This type of event may particularly affect storage areas and the stretches of land underneath the pipes that connect the plants, tanks and wharf. Assessments of abnormal and emergency situations associated with the internal movement and storage of hazardous substances are examined and documented in the Safety Report (section 3.3, page 38).

The indicators given in Table 61 show how the company is continually implementing additional measures to prevent contamination of the soil and subsoil.

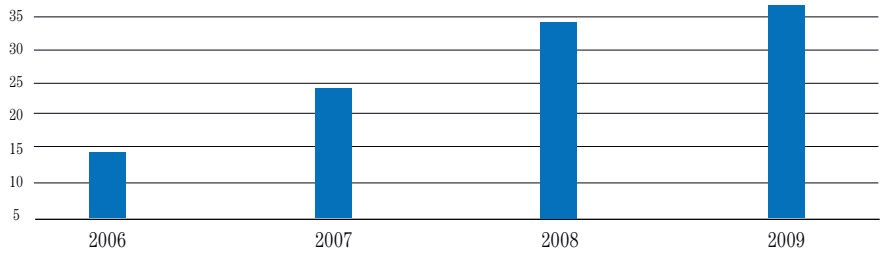
In 2009, the costs of non-destructive controls were lower than in previous years. This is due to the fact that, in accordance with the multi-year plan, fewer audits were required in the period under review. Audit activities are planned and fine-tuned, in broad terms, with reference to risk evaluation. In addition to the initiatives already undertaken, further progress is currently being made in implementing improvement measures to prevent soil and subsoil contamination.

[table of objectives and measures objective 9, page 124]

TABLE 61 Activities to prevent contamination

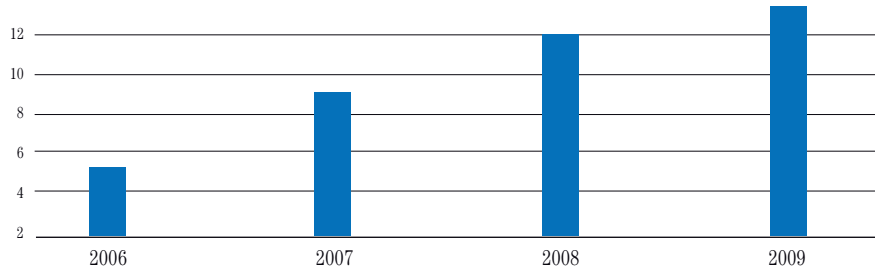
Parameter	2006	2007	2008	2009
Paving of containment basins for crude oil and product tanks: paved surface/total surface (cumulative figure) (%)	14.5	24.4	34.5	36.5
Protection of soil in storage areas: no. of double-bottom tanks (cumulative figure)	5	9	12	14
Protection of the soil along pipeways: paved surface (cumulative figure) (m^2)	18,207	18,207	22,719	33,092
Inspection and maintenance: non-destructive testing expenses (k€/year)	2,155	2,933	1,640	1,474

CHART T61A



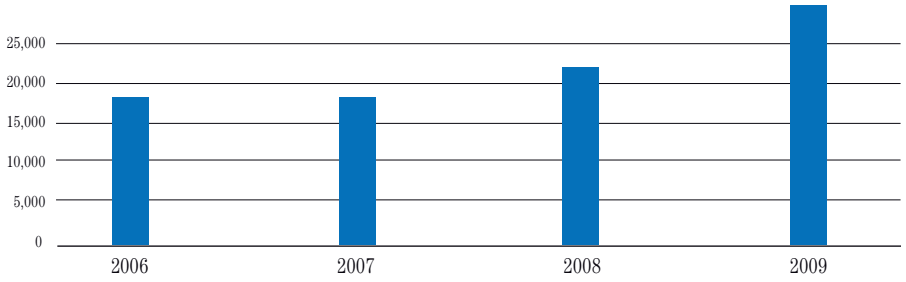
■ Paving of reservoirs for crude/product tanks (%)

CHART T61B



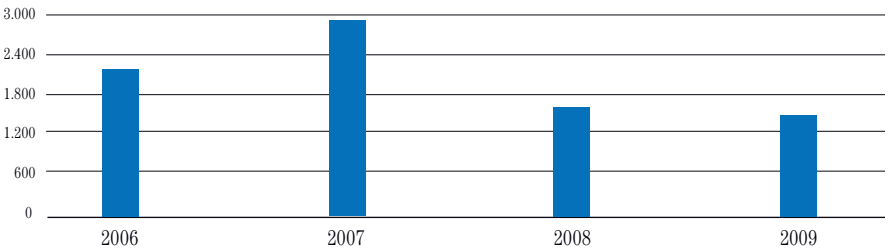
■ No. of thanks with double bottom

CHART T61C



■ Paving along pipeways (mq)

CHART T61D (k€/year)



■ Costs of inspection and maintenance activities

4.2.8 – Noise

To monitor noise pollution, in 1999 Saras planned and implemented annual, systematic controls of sound levels in the local area, by means of phonometric surveys to establish the acoustic characteristics of the surrounding environment.
The surveys have been repeated over the years at the same measurement points, some of which are located in the Saras plant and in the streets adjacent to its boundaries, while others are in access roads and in Sarroch city centre. The location of the measurement points is shown on the map at Figure 20. The cartographic basis for the map is taken from the Municipal Town Plan. In assenza della classificazione acustica del territorio comunale, ai sensi della legislazione vigente, trovano applicazione i valori limite per il rumore nell'ambiente esterno previsti dal D.P.C.M. 1/03/1991, presentati nella tabella seguente.

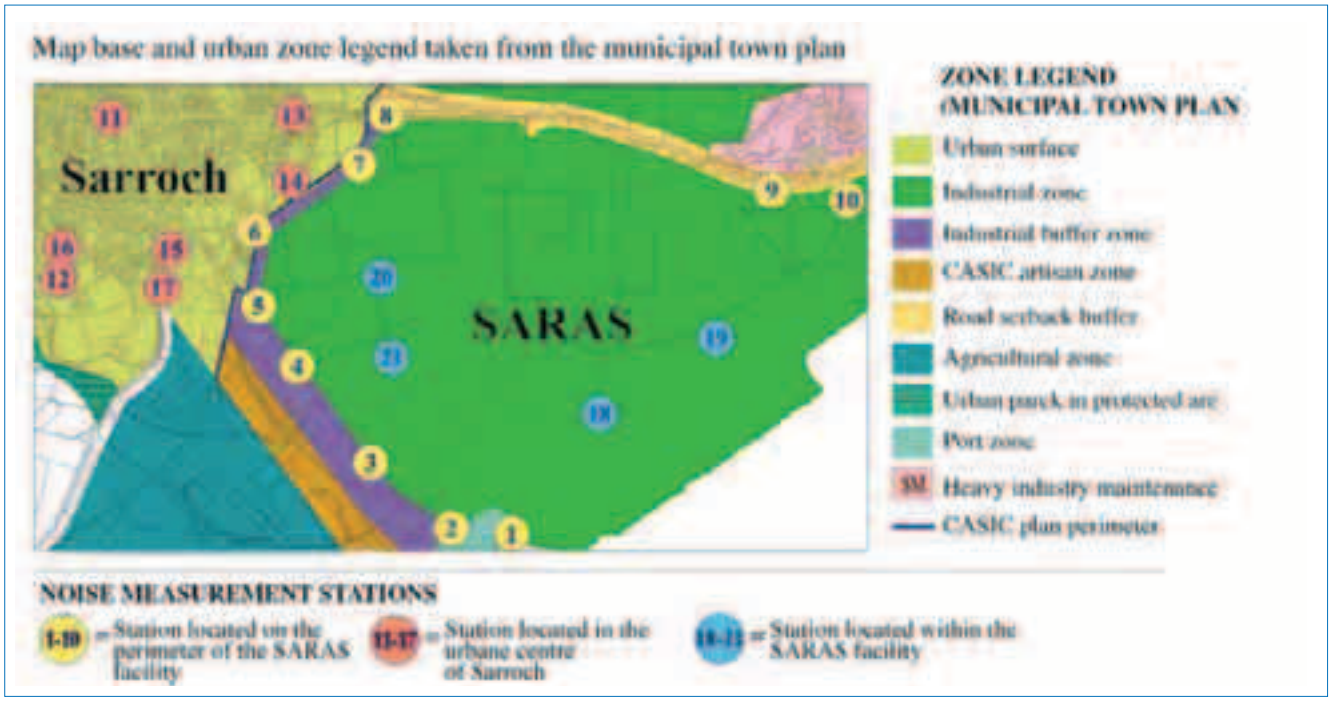


Figure 20 Location of noise measurement stations

[Prime Ministerial Decree of 1 March]

In the absence of an acoustic classification for the municipal area, the thresholds for external ambient noise stipulated by the Prime Ministerial Decree of 1 March 1991 are used. These are shown in the table below.

table 62 Thresholds for external ambient noise – Prime Ministerial Decree of 1 March 1991

Categories of the area's intended use	Areas corresponding to the area of interest	Daytime limits*** LAeq [dB(A)]	Night-time limits*** LAeq [dB(A)]
The entire national territory	External areas bordering on the Saras production site	70	60
Zone A*	---	65	55
Zone B**	Sarroch city centre	60	50
Industrial zone only	Saras production site	70	70

*Areas of historic or artistic interest or of particular environmental merit in the region under consideration
**Completely or partially built-up areas other than those in zone A
***The daytime period runs from 6 a.m. to 10 p.m.; the night-time period runs from 10 p.m. to 6 a.m.

Tables 63A and 63B show the noise levels recorded at some of the measurement points for the last three years. Specifically, Table 63A shows the emission values recorded at some of the stations located at the boundaries of the site, i.e. nos. 3 and 6. The applicable limits are those stipulated by the Prime Ministerial Decree of 1 March 1991 (and shown in Table 62), but the limits for Category V, which could reasonably be applied to the areas of the municipality where the measurements in question were recorded, are also shown (these are 5 dB lower and therefore extremely conservative).

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

Acoustic classification Prime Ministerial Decree of 1 March 1991	Measurement point	Values measured [dB(A)] (L90 values)			Emission limit (applicable near emission sources)	
		Year	Daytime period*	Night-time period*	Daytime period*	Night-time period*
The entire national territory (external areas bordering the Saras production site)	3	2009	48.5	48.5	70 (65***)	50 (55***)
		2008	45.2	46.6		
		2007	44.5	51.5		
		2006	49.7	51.7		
	6	2009	38.5	41.0		
		2008	38.7	51.9**		
		2007	37.2	47.0		
		2006	42.3	43.4		

* Il periodo diurno si estende dalle 06:00 alle 22:00, il periodo notturno dalle 22:00 alle 06:00. I valori sono riferiti alla clas*
The daytime period runs from 6 a.m. to 10 p.m.; the night-time period runs from 10 p.m. to 6 a.m. The values relate to the classification for "the entire national territory", in accordance with Article 6 of the Prime Ministerial Decree of 1 March 1991.
** From values prepared from annual monitoring with reference to important indicators used for ascertaining emission limits.
*** Values typical of Category V (predominantly industrial areas), which are 5 dB lower and therefore conservative compared to the limits in force, stipulated by Presidential Decree of 1 March 1991.

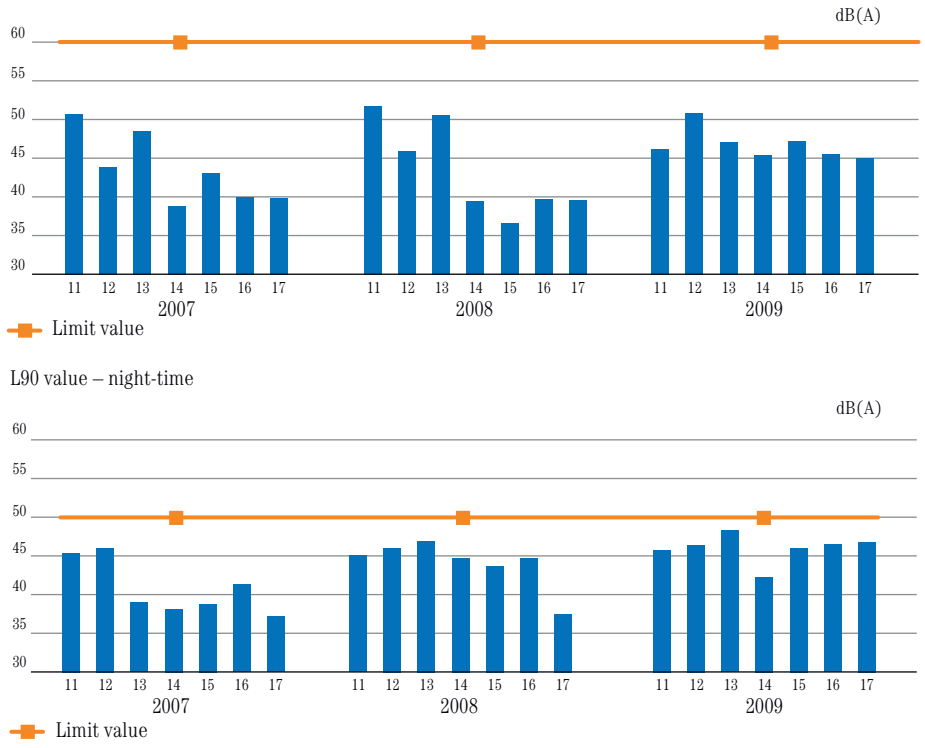
Table 63B shows the noise immission values recorded at two stations in the external environment located in Sarroch city centre, near the boundaries of the industrial site (nos. 14 and 15). These values relate to the statistical parameter L90, i.e. the noise is above this level for 90% of the time. This parameter can be considered to include industrial noise, which is continuous and largely sustained over time, in the sense that the value recorded excludes one-off acoustic events and includes the noise generated by the Saras site, other sites and acoustic events of a significant duration not caused by Saras (e.g. vehicle traffic noise). The applicable limits stipulated by the Prime Ministerial Decree of 1 March 1991 are shown. These limits are the same as the ones for Category III of the municipal area, to which the areas in which these points are located might reasonably be assigned.

TABLE 63B Noise (immission) levels at representative points in the centre of Sarroch

Acoustic classification Prime Ministerial Decree of 1 March 1991	Measurement point	Values measured [dB(A)] (L90 values)			Emission limit (applicable near emission sources)	
		Year	Daytime period*	Night-time period*	Daytime period*	Night-time period*
Zona B (Sarroch city centre)	14	2009	45.5	43.0	60***	50***
		2008	40.5	44.3		
		2007	39.6	43.0		
		2006	41.4	43.8		
	15	2009	47.5	45.5		
		2008	37.4	43.7		
		2007	45.0	43.0		
		2006	39.8	48.3		

* The day-time period runs from 6 a.m. to 10 p.m.; the night-time period runs from 10 p.m. to 6 a.m. The values relate to the classification for "the entire national territory", in accordance with Article 6 of the Prime Ministerial Decree of 1 March 1991.
** From values prepared from annual monitoring with reference to important indicators used for ascertaining immission limits.
*** Values typical of Category III (mixed areas), which are the same as the limits in force, stipulated by the Prime Ministerial Decree of 1 March 1991.

GRAFICO **T63B** Noise levels at the representative points located in the centre of Sarroch - L90 values - daytime



[Framework Law 447/95, Art. 22]

Chart T63B shows the complete series of data recorded at all the measurement points located in Sarroch city centre, compared with the applicable legal limits. Each bar of the histogram is labelled with a number identifying the corresponding noise measurement station shown in Figure 20 on page 103. The differential criterion is not applicable to the existing continuous production cycle plants or plants that already held permits at the time the decree came into force, as in the case of the refinery and the IGCC at the Sarroch site, pursuant to Art. 31 of the Ministerial Decree of 11 December 1996. Following a specific request from the assessment committee for AIA permits, Saras submitted, as a provisional measure prior to the completion of the municipal acoustic classification, an acoustic classification relating to the measurement points being surveyed in April 2008. The provisional classification, which was determined by an acoustics engineer, was based on the zones contained in the Municipal Town Plan, applying the criteria for defining acoustic categories set out in the Ministerial Decree of 14 November 1997.

Specifically:

- stations located at the boundaries of the plant (points 1 to 10) were deemed to fall into Category V: “predominantly industrial area”, with limits of 65 dB(A) during the day and 55 dB(A) at night, except for points 9 and 10, which, given that they fall within the boundaries of the plant, are to be considered, to all extents and purposes, to belong to Category VI with a limit of 65 dB(A) for both daytime and night-time periods
- most of the stations located in Sarroch city centre (points 11 to 17) were deemed to belong to Category II: “predominantly residential areas” with limits of 55 dB(A) during the day and 45 dB(A) at night; or Category III “mixed areas” with limits of 60 dB(A) during the day and 50 dB(A) at night.

Forthcoming studies will refer to existing legal limits if the municipal acoustic classification plan has not been approved.

4.2.9 – Visual impact

The company has also made a commitment to improving the plant's visual impact, which has been stepped up since 2000. Improvements were made to structures and spaces comprising areas in direct contact with the outside: these involved naturalisation projects to provide areas of continuity between the site and the region. In particular, the junction on the S.S.195 was rebuilt and the green spaces in the car park were improved.

In 2007-2008, in the IGCC power generation plant (boilers U702, U702 and U703), the new condensation circuit to reduce the plumes of smoke emitted into the atmosphere resulting from steam emissions came into service.

[table of objectives and measures objective 8, page 124]

The mechanical installations for the new circuit to eliminate the plumes of steam released into the atmosphere by the U950 deaerator are scheduled to be completed in 2010.

4.2.10 – Odours

In the past, the company received a number of reports on the presence of unpleasant odours outside the site. As a result, in 2004, it conducted an initial investigation to identify the sources of the odours reported in the surrounding area.

In the following years, the company undertook more in-depth investigations and analysis, which led in 2008, after a phase of experimentation, to the development of a monitoring methodology using a combination of analytical techniques, modelling and olfactometric assessments. The ultimate objective of the work is to arrive at an assessment of the main odour-emitting sources and the possible events that could generate an olfactory impact on the surrounding area.

In 2009, a number of different sampling and analysis activities were performed within the refinery (sources) and in the parts of Sarroch most at risk (receivers). These activities were necessary to validate the methodology and prepare the Monitoring and Control Plan for odour emissions.

In accordance with the regulations in the AIA permit (preliminary assessment of 12 January 2009), the Monitoring and Control Plan was submitted to the Ministry for the Environment in October 2009. This document describes the methodology, timeframe and methods of communicating the results obtained.

[table of objectives and measures objective 14, page 125]

The methodology is based on an integrated approach that uses instrumentation and sensory techniques to examine the odour-emitting sources and identify the compounds responsible for the odour (tracers), in conjunction with modelling to study the dispersion of odour-emitting compounds into the atmosphere. This approach provides an accurate assessment of the olfactory impact produced by the emitting source on the receivers at risk.

The Plan includes two six-monthly monitoring campaigns: a "summer" one in the spring/summer (June-July) and a "winter" one in the autumn/winter period (November-December). The refinery and the points at risk in Sarroch will be investigated in both campaigns.

The first monitoring campaign will start in June 2010.

[1] United States Environmental Protection Agency

4.2.11 – Less significant environmental aspects

PCBs

Polychlorinated byphenals (PCBs) are chlorinated organic compounds that are chemically and thermally extremely stable. For this reason, they were widely used in the past as dielectric fluids in electrical equipment (e.g. industrial transformers) before the dangers were recognised and their use banned.

Today, the sale and use of PCBs in new applications is prohibited but, given the recognised difficulties in disposing of such substances, there are various legal provisions that apply to existing equipment, according to the quantities and concentrations of PCBs present. Following an inventory and periodic analytical checks, the 130 oil-insulated transformers were decontaminated by removing the PCBs. Periodic checks are undertaken to ascertain the condition of the transformers and to ensure that the PCB content is kept below the minimum threshold required by law to consider an item of equipment decontaminated.

[Ministerial Decree of 11 October 2001]

Asbestos

Asbestos was used for a long time in a variety of industrial and domestic applications until the dangers of this material were discovered and its use banned.

Over the years, Saras has implemented the requirements of sector legislation. It has compiled an inventory of materials containing asbestos, notified all the supervisory authorities and decontaminated plant and equipment when any maintenance was carried out. Cement asbestos roofs have gradually been eliminated over the years, from a surface area of 10,800 m^2 in 2004 to the complete absence of such roofs on the site today. Any asbestos still present (as an insulator used in the layers of insulation on pipes) is protected from the effects of atmospheric agents that could alter its integrity, and is removed when maintenance work is carried out. Specialist firms are used when asbestos is discovered.

[Law 257/1992, as subsequently amended]

Ozone-depleting substances

Legislation stipulates specific management procedures to prevent the dispersal of these substances into the atmosphere and to ensure their progressive elimination from the production process.

All the equipment in the facility is checked via periodic maintenance operations by specialist personnel.

In recent years, the company has gradually been replacing ozone-depleting substances with others that do not have this effect.

Currently, the only substance of this type is Freon R22, which is present in a total quantity of 1,203 kg. The use of this type of substance as virgin gas in existing air conditioning plants is permitted until 31 December 2009. As recycled or reclaimed gas, it will be permitted until 31 December 2014. From 1 May 2015 its use as recycled or reclaimed gas will also be banned.

[EC Regulation 2037/00 and Presidential Decree 147/2006]

Non-ionising radiation (electromagnetic fields)

The main sources of electromagnetic fields in the facility can be broken down into two broad categories:

- point sources such as pumps, electrical switchboards, motors
- linear sources, i.e. conductor cables for transmitting electricity, such as the buried cable operating at 380 kV that transmits electricity from the IGCC to the ENEL electrical substation situated on the western boundary of the site.

A study on the presence of electromagnetic fields was carried out across the whole site and at external measurement points near the boundary in 2004. It was repeated in 2007 using the same methodology but with an increased number of measurement points.

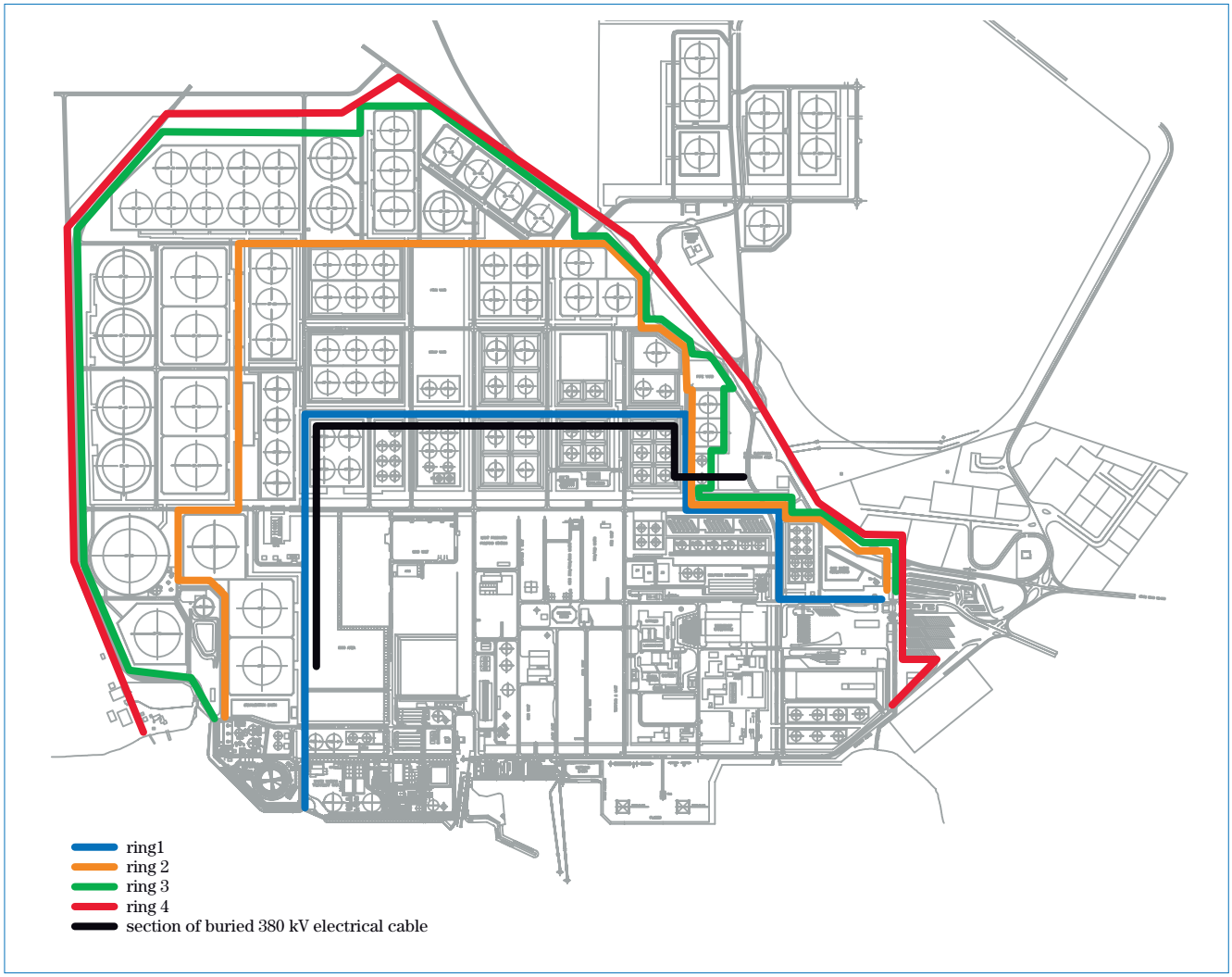


Figura 21 Map of sampling lines for investigation of electromagnetic fields

As shown in Figure 21, measurements were made along four main lines:

- the first line largely follows the route of the buried 380 kV cable, which constitutes the main source of electromagnetic fields in the site
- the second follows the route of the buried cable but at a distance of around 200 m
- the third and fourth follow the inside and outside of the site boundaries respectively

[Prime Ministerial Decree of 8 July 2003]

The results obtained for both the electrical and magnetic fields are much lower than the legal limits stipulated for exposure of the general public.

The electrical field values decrease very rapidly as the distance from the buried cable increases and are undetectable at just a few metres away.

The magnetic field values measured along the external boundary do not exceed 1.5 µTesla, compared to a limit of 100 µTesla for exposure of the general public and a limit of 3 µTesla, set as a qualitative objective. As expected, the maximum values were measured along the route of the buried cable and near to the ENEL electrical substation. These were 20 µTesla and 10 µTesla respectively.

Ionising radiation **[Legislative Decree 230/95]**

The sources of ionising radiation in the facility consist of small radiogenic sources in level gauges and analytical equipment located in the internal laboratory. All radiogenic sources are adequately confined and are checked annually by an appropriately qualified specialist pursuant to Legislative Decree 230/95, as subsequently amended.

4.3 – Indirect environmental aspects

4.3.1 - Product design

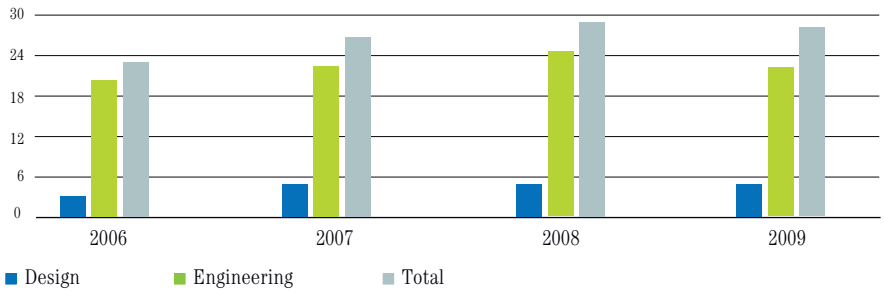
4.3.1.1 – General

Saras carries out research and development activities aimed at designing products that meet the demands of the market and the requirements of environmental legislation. Bringing plans to modify products to fruition usually also requires adjustments to be made to existing plants. The modifications that need to be carried out on the site's plant and equipment are also designed and developed in-house with the assistance of specialist engineering companies. Product design is mainly developed at the Milan office, while plant design and engineering activity is undertaken by the Sarroch facility in close co-operation with the Milan office. As shown in Table 64, both product innovation and plant engineering design declined slightly year-on-year, mainly due to the peak in activity in 2008 relating to the large investment plans that were to be undertaken in 2009. However, the total indicator values are still considerably higher than the average of the previous four years (2005-2008), which confirms the company's ongoing commitment to this area.

TABLE 64 Design and engineering activities

Parameter	2006	2007	2008	2009
Product design hours/thousands of hours worked	3.0	4.7	4.6	4,5
Plant & equipment engineering hours/thousands of hours worked	20.1	22.2	24,7	23,2
Total hours of product design and plant & equipment engineering/thousands of hours worked	23.1	26.9	29.3	27.7

CHART T64 (hours/ khours worked)



4.3.1.2 – Low-sulphur fuel oil

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

In recent years, the production of motor vehicle fuels has been guided by legislation on the determined reduction of sulphur, as described below.

From 1 January 2005	- sulphur content in gasoline and diesel fuel must be less than 50 ppm - the sale of gasoline and diesel fuel with sulphur content of less than 10 ppm
From 1 January 2009	- sulphur content in gasoline and diesel fuel must be less than 10 ppm

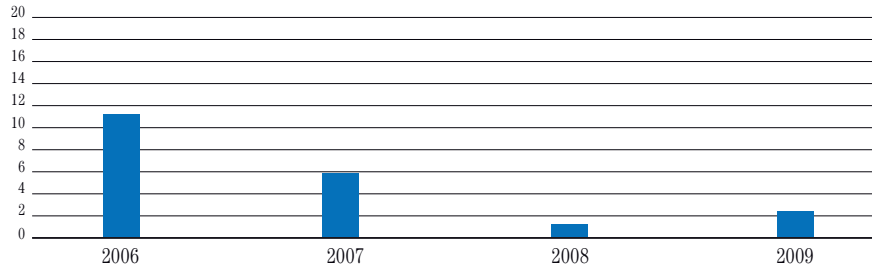
To enable Saras to achieve the 2009 objective for reducing the sulphur content of gasoline, it was necessary to modify the FCC plant by installing the new U800 desulphurisation unit. Note how from 2005 to 2008 (particularly in 2008) the quantity of sulphur in finished products entering the market decreased significantly, which led to

the increase in the quantity sold as a product. This can be attributed to the company's ongoing investment in the desulphurisation capacity of the production plants, which led to the completion of the gasoline desulphurisation plant in 2008. This has allowed the refinery to comply with the new European requirements stipulating a sulphur content in gasoline of 10 ppm, which entered into force on 1 January 2009. As shown in Table 65, the indicator relating to the sulphur content in products compared with the quantity of sulphur entering the site with raw materials, which had fallen steadily and significantly since 2005, increased slightly in 2009, although it remained on a par with the value recorded in 2008. This is substantially due to the increased production of fuel oil, the product with the highest specific sulphur content, given that it was not possible to complete the upgrading of products during the planned maintenance phase carried out on the Sarroch site during the year. The TGTU plant for the treatment of tail gases and sulphur recovery, which was built in 2008, was fully operational throughout 2009, allowing the company to significantly reduce the sulphur content of emissions.

TABLE 65 Sulphur content in products

Parameter	2006	2007	2008	2009
Quantity of sulphur in products/quantity of sulphur entering the site with raw materials (%)	11.2	5.8	1.3	2.3

CHART T65 (%)

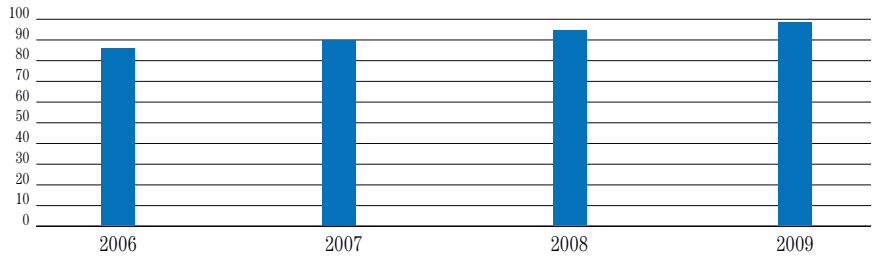


As a result of the above, the quantity of sulphur recovered in the production cycle compared with the quantity entering the site increased, as shown in Table 66.

TABLE 66 Quantity of sulphur recovered in the production cycle

Parameter	2006	2007	2008	2009
Quantity of sulphur produced/quantity of sulphur entering the site with raw materials (%)	85.9	91.0	95.5	95.9

CHART T66 (%)



Range of oil products

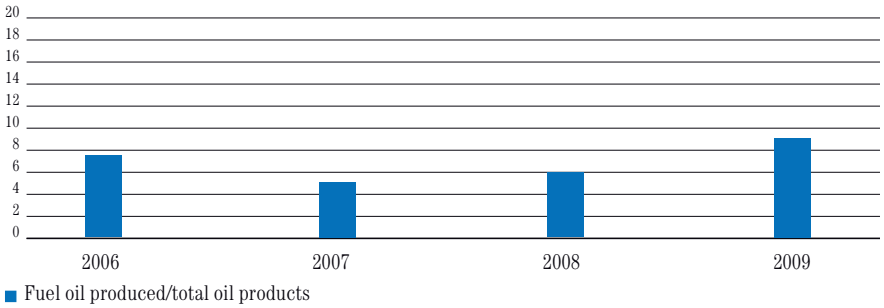
In recent years, the production and sale of oil products has increasingly revolved around the "light" fractions, while the refinery's production of heavy distillates was for the most part destined to be converted into syngas for the purposes of generating electricity in the IGCC.

Table 67 below shows the figures relating to the fuel oil fraction produced compared with total oil products: as mentioned earlier, production of fuel oil increased in 2009 due to intensive planned maintenance activity.

TABLE 67 Fraction of fuel oil as a percentage of total oil products

Parameter	2006	2007	2008	2009
Fuel oil produced/total oil products (%)	7.5	5.7	6.1	8.7

CHART T67 (%)



As described in section 3, the production cycle of the IGCC removes the pollutants in the heavy hydrocarbons used as feedstock for the plant. This applies particularly to sulphur, which is recovered and sold, thereby contributing to the positive results shown in Table 66 on the previous page.

Summary of considerations relating to the indirect aspects of product design

Based on the foregoing, it can be observed that:

- the lower sulphur content in motor vehicle fuels destined for sale leads to a reduction in SO_2 emissions from vehicle traffic
- the production of syngas obtained from the gasification of heavy hydrocarbons maximises the use of incoming raw materials and allows the sulphur content to be recovered
- sulphur recovered from the production cycle is effectively considered a product, which is sold and used as a raw material in other production cycles (e.g. for the production of sulphuric acid), thus reducing the need for natural raw materials (minerals) to be refined, with further savings of energy and other resources.

4.3.2 – Transport

Maritime traffic

All raw materials entering the site and a significant portion of oil products leaving the site are transported by sea. Given the large number of ships (around 750–800 per year), Saras has for several years promoted a policy of selecting and checking the ships used, with the aim of preventing accidents and spills of hazardous substances at sea. It has done this ahead of the deadlines stipulated by European regulations for discontinuing the use of single-hulled ships.

[International convention for the prevention of pollution from ships, MARPOL 73/78, and EC Regulation 417/2002, as amended by EC Regulation 1726/2003]

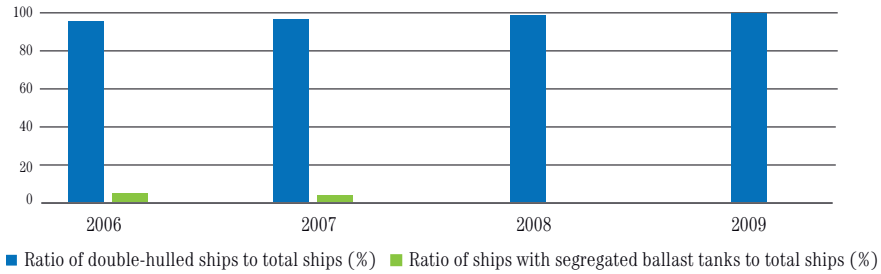
As early as 2006, Saras met the deadline stipulated by the regulation for 2010 relating to the discontinuation of single-hulled ships and is considerably reducing its use of ships with segregated ballast tanks (SBTs), which must be taken out of operation entirely by 2015. Table 68 shows the numbers of double-hulled ships compared to the total number of incoming ships. As can be seen from the figures, the percentage of double-hulled ships has increased considerably in the space of a few years, while the percentage of ships with SBTs has fallen sharply.

[table of objectives and measures objective 16, page 125]

Table 68 Double-hulled ships

Parameter	2006	2007	2008	2009
Ratio of double-hulled ships to total ships (%)	95.0	95.0	99.0	100.0
Ratio of ships with segregated ballast tanks to total ships (%)	5.0	5.0	1	0

Chart T68 (%)



Given the potential seriousness of accidents at sea, Saras selects ships by consulting international databases (e.g. SIRE) containing the results of checks made on transport ships, and carries out a programme of direct checks, encompassing both technical and operational aspects, on ships arriving at the marine terminal.

[table of objectives and measures objective 17, page 125]

Saras has adopted the "Minimum Safety Criteria" document as its benchmark specification in accordance with the ship inspection protocols established by the Oil Companies International Marine Forum (OCIMF), an organisation that promotes improvements in safety, responsible environmental management in the transportation of oil and its derivatives, and marine terminal management.

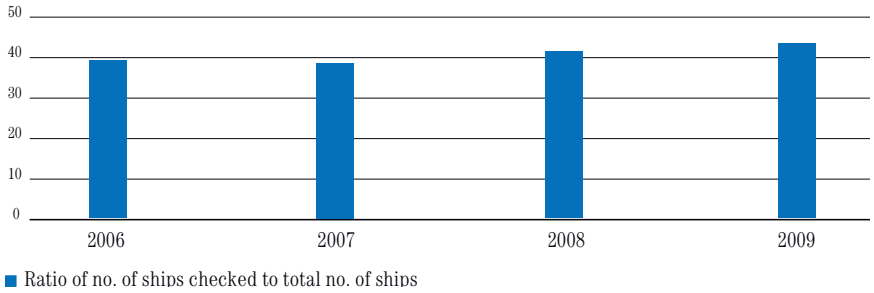
A high number of ships are checked and this has increased over the years, as shown in Table 69.

The ships expected at the site are meticulously checked at the port of departure before they set sail by specialist companies on behalf of Saras.

TABLE 69 Ship safety checks

Parameter	2006	2007	2008	2009
Ratio of number of ships checked to total ships (%)	39.1	38.3	41.0	42.0

CHART T69 (%)



Road traffic

The road traffic caused by the activities carried out on the Saras site is due mainly to:

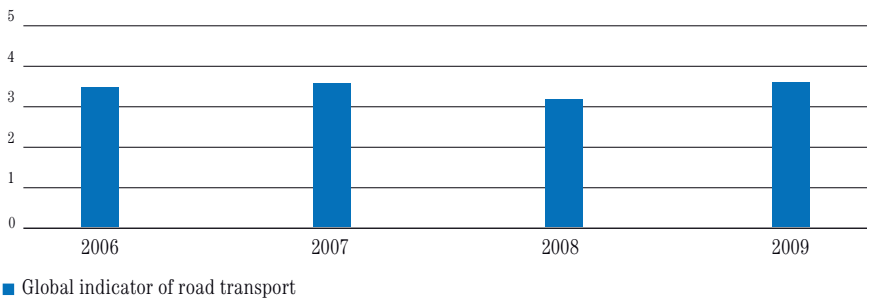
- transport of refined oil products via tanker trucks (around 47,000 vehicles a year)
- transport of sulphur via articulated lorries (around 3,900 vehicles a year)
- transport of auxiliary production materials and substances (around 400 vehicles a month)
- transport of employees of the company and of external companies working on the site (around 800 motor vehicles and 60 buses a day)

The table below shows the indicator for heavy vehicle traffic, which mainly consists of tanker trucks for transporting products and, to a lesser extent, articulated lorries for transporting sulphur.

TABLE 70 Road traffic

Parameter	2006	2007	2008	2009
No. of heavy vehicles/kt raw materials (no. of vehicles/kt raw materials)	3.44	3.54	3.25	3.58

CHART T70 (%)



[table of objectives and measures objective 17, page 125]

In 2007, the company implemented a regular programme of checks to verify the compliance of the tanker trucks used for transporting products. 18.8% of tanker trucks authorised for entry were checked, representing a rise on the 17% checked in 2007.
The percentage of ships checked via the “Safety on Board” service is also continually increasing. This involves specialist personnel checking the safety of all the operations involving the unloading of crude oil and the loading of products (fuel oil, heavy diesel) at the marine terminal.

4.3.3 – Environmental conduct of external companies

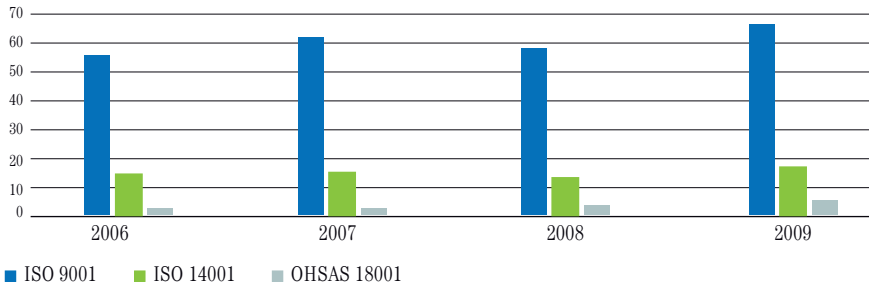
Saras has put in place appropriate procedures governing relationships with third parties involved in the site's activities. These are intended to ensure that the conduct of the staff of external companies complies with Saras' policies on safety, health and the environment.

Saras places great value on the commitment of external companies to achieve and maintain certification of their quality, environmental and safety management systems. 2009 saw a rise in the number of companies that had a certified environmental management system (see Table 71), totalling 17.3% as a proportion of the increased number of suppliers. Other companies are currently working towards achieving certification.

TABLE 71 Percentage of external companies with certified management systems

Parameter	2006	2007	2008	2009
Subcontractors with ISO 9001 certification (quality management system) (%)	55.2	61.2	58.5	67.7
Subcontractors with ISO 14001 certification (environmental management system) (%)	13.9	14.5	14.0	18.4
Subcontractors with OHSAS 18001 certification (occupational health and safety management system) (%)	2.3	2.3	3.9	5.3

CHART T71 (%)



Before being allowed to carry out any type of activity at the site, each company must satisfy the necessary conditions by demonstrating that it complies with the basic legal requirements relating to administrative, tax and insurance matters and that it operates in conditions conducive to health and safety and that safeguard the environment both on the industrial site and outside it.

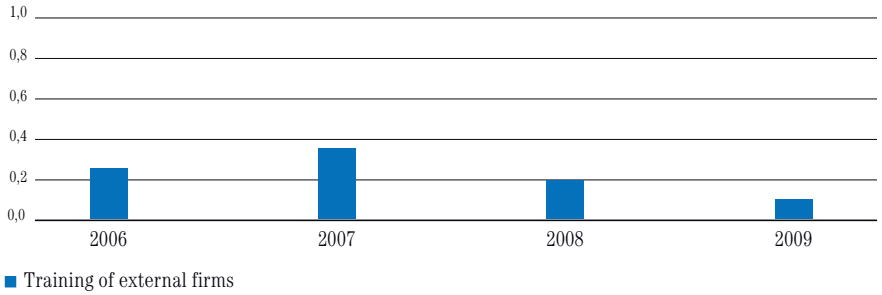
Before entering the facility, employees of external companies undergo further basic training on the risks relevant to the areas in which they will work. This is in addition to the requirement that they must work in accordance with their own company's organisation plan on safety.

Saras plays an active role in the provision of training on health, safety and environmental protection to the employees of external companies. With regard to Table 72, it should be borne in mind that employees of external companies worked a considerably higher number of hours in 2009. This figure more than doubled compared with the previous year, with the resulting knock-on effects on the indicator.

TABLE 72 Training for external companies

Parameter	2006	2007	2008	2009
Training for external companies: no. of training hours provided by Saras on the environment and safety/no. of hours worked by external companies (%)	0.25	0.35	0.20	0.14

CHART T72 (%)



One of the major impacts of external companies' activities, in environmental management terms, relates to the generation and management of waste.
Two specialist waste treatment companies operate on the Saras site, as shown in section 4.2.6, on page 94.
Specific procedures govern the methods of waste management at the plant, including the transfer of waste to waste treatment plants and storage areas. The work of the external companies that manage the waste treatment plants is subject to regular checks and various audit activities, in accordance with the waste management procedure. More generally, the conduct of employees of external companies is the subject of checks under the Arrow programme (section 4.4.2, page 118).
Note that most of the waste generated by the activities of external companies on the site is dealt with and accounted for by Saras.
This applies particularly in periods of general shutdown and plant maintenance when more waste is produced.

4.4 – Management performance indicators

In addition to specific indicators for various environmental aspects and the environmental factors that are or could be involved, Saras has defined other types of indicator that allow it to monitor certain activities essential for improving the environmental management system.
These indicators relate to training and audit activities, and engineering work aimed at developing technological and plant improvements.

4.4.1 – Training on environmental protection and safety

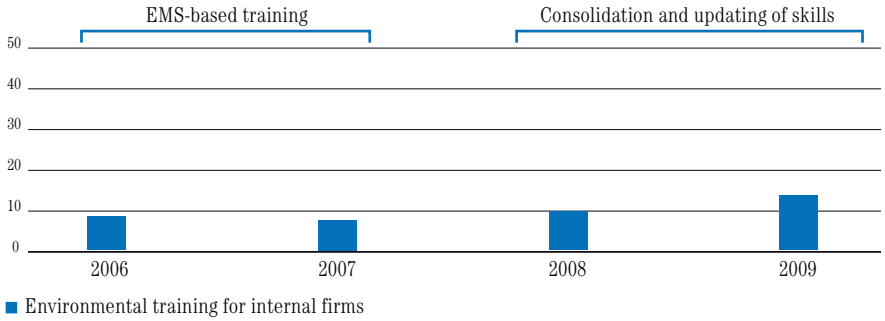
Staff training on environmental protection was given a particular boost in 2005 with the launch of information and awareness-raising initiatives on the environmental management system throughout the company.
Specific in-depth training sessions were arranged for operational staff, focusing particularly on the management of atmospheric emissions and discharges into water. The company's auditors attended specific training modules, to prepare them for conducting internal audits.

Thus the indicator on environmental training for in-house staff peaked in 2005, due to the drive to familiarise all staff with the objectives of the environmental management system, and the training on the new concepts introduced. In the next few years, however, the indicator continued to represent a significant proportion of the total figure for training, mainly aimed at updating and maintaining skills.

TABLE 73 Environmental training for in-house staff

Parameter	2006	2007	2008	2009
Environmental training for in-house staff: no. environmental training hours/total training hours (%)	8.28	7.39	10.30	13.23

CHART T73 (%)

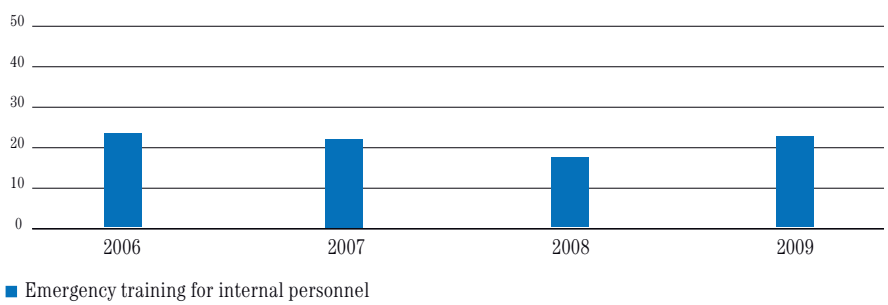


Training on health and safety issues complements environmental training. Training on these issues begins when staff first join the company and continues throughout their working lives with Saras, with theoretical instruction and practical exercises. Staff assigned to fire-fighting teams participate in a series of special training exercises relating to emergency management.
Saras' commitment to emergency management training and exercises, which could have an impact on both individual health and environment protection, can be seen from the figures in Table 74.

TABLE 74 Emergency management training for in-house employees

Parameter	2006	2007	2008	2009
Training for emergencies: no. of hours of emergency management training/total training hours (%)	23.06	21.76	17.73	23.02

CHART T74 (%)



4.4.2 – Audit activities

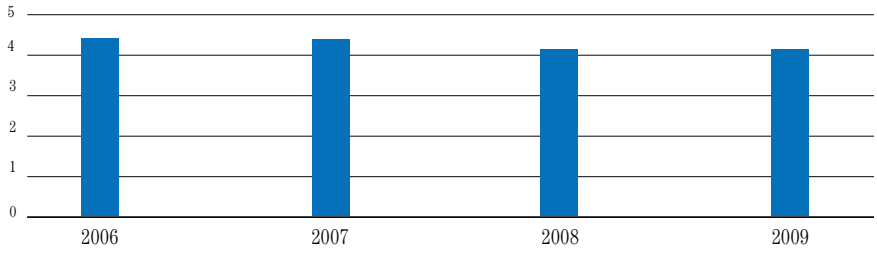
Saras places particular emphasis on the conduct of internal audits as a verification, training and improvement tool. The company employs 61 internal auditors trained to carry out quality, environmental and safety audits. This equates to around 5% of the total Saras workforce.

Internal audit activities are planned annually and combine environmental, safety and quality management issues to ensure that all activities that directly or indirectly influence these areas are included for each process audited. Audits may reveal areas for improvement or failure to comply with the procedures of the management system or reference legislation. These nonconformities are formally reported to the managers of the activities in which they were encountered so that measures can be identified to restore conformity and avoid a repetition of such breaches. This indicator has remained virtually unchanged compared with 2008.

TABLE 75 Internal audit activities (combined environmental, safety and quality audits)

Parameter	2006	2007	2008	2009
Internal audit activities: no. of hours spent on audit/total hours worked by auditors and employees undergoing audits (%):	4.38	4.37	4.15	4.15

CHART T75 (%)



Other checks are also regularly carried out on the methods of managing operating activities following the launch of the Arrow programme.

The programme is effectively an internal plan of field inspection visits (audits) covering the whole of the site, the adjoining national storage facility and the wharf. The aim of the project is to develop an awareness of accident prevention and environmental protection both in the audited employees and the auditors. To achieve this aim, the Arrow programme relies on an extensive programme of inspections in the facility's 24 operational and administrative areas. Arrow inspections are carried out by groups that normally comprise a director or manager from the parent company, 3-4 technical and/or administrative employees and staff safety representatives. The constitution of the 24 audit groups changes each month, as does the area that each group is required to inspect. The Arrow programme has been operational for many years and is carried out regularly, as shown by the indicators in Table 76.

TABLE 76 Arrow programme activities (field inspections)

Parameter	2006	2007	2008	2009
No. of hours spent on activities	1,774	1,966	1,942	1,606
Hours spent/hours worked by auditors and employees undergoing audits (%)	0,12	0,12	0,12	0,12

4.4.3 – Investment in environmental protection and safety

Saras has implemented a number of major projects to improve environmental performance, site safety and employee protection, which has led to an increase in total investment in the environment and safety. Information on investment in the environment and safety is given below.

Investment has increased considerably since 2005 in line with the 2008-2011 industrial plan. Projects relating to the environment concern:

- ongoing work on the dynamic groundwater control barrier
- launch of heat recovery operations at the FCC plant
- ongoing installation of double seals on gasoline pumps
- ongoing tank and pipeway paving
- ongoing installation of double bottoms in tanks
- launch of project to build a monitoring system for the T2 smokestack
- launch of project to build a monitoring system for the FCC/CO boiler smokestack
- launch of project to build a monitoring system for the CCR/alkalisation smokestack

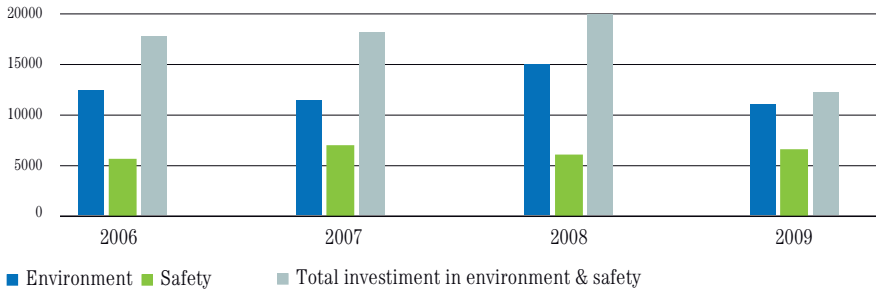
Investment in safety involving either improvements to existing safety equipment or modifications to plant and product movement systems are as follows:

- fitting of further product volume interception valves to the FCC plant
- replacement of glass 'Klingers' with magnetic ones in the processing plants
- continued upgrading of the fire prevention system and the purchase of new equipment
- continued upgrading of the fire and hydrocarbon detection systems
- safety improvements within the tank containment basins
- work on the fire protection systems for the alkalisation and T1 plants

TABLE 77 Investment in improvements to environmental protection and safety

Parameter	2006	2007	2008	2009
Investment in environmental protection (k€/year)	12,250	11,320	15,160	11,690
Investment in safety (k€/year)	5,395	6,740	6,345	6,608
Total investment in the environment and safety (k€/year)	**17,645**	**18,060**	**21,505**	**12,298**

CHART T77 (k€/year)



5.
Environmental objectives and programmes

Complete, accurate and transparent information remains the solid basis of any dialogue.

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

The information and figures contained here show the areas where Saras is working towards new improvements that are expected to be achieved in the next few years: the result of technological and managerial decisions that are consistently aimed at achieving simultaneous progress on health, safety and the environment.

Saras is committed to clarity and completeness of information, which will allow it to engage in clear, concrete and ongoing dialogue with stakeholders, in order to give the surrounding area the answers that it expects.

5. Environmental objectives and programmes

5.1 – Environmental improvement objectives planned for 2010-2013

With regard to the objectives presented in this section, it should be noted that the environmental objectives for 2009-2013 were rescheduled during the first half of 2009, mainly as a result of the current situation on the international markets and the recent global financial and economic crisis, which meant that the company had to revise its investment plans for 2008-2013 (see objectives 2B, 2C, 2D, 4A, 6A, 6B and 13B).
The rescheduling of the investments set out in the table on the next page has caused the period of implementation for the activities to be postponed for a maximum of two years.
In the Environmental Declaration's table of objectives to be completed in 2010, there are still the two new objectives relating to the continuous monitoring of atmospheric emissions from the CO boiler and Topping2 smokestack (see objective 3C and 3D), in line with the AIA plan. At the same time, by summer 2010 a similar measure will be in place for the smokestack of the CCR/Alky plant.

For each EMAS objective, one or more **actions** have been put in place and the **indicators** for monitoring the progress made towards achieving the objective and the **period of implementation** have been identified.
This year, the table of objectives has been expanded to include a column showing the situation at end-2009.
The main objectives relating to significant direct environmental aspects are:

- **Atmospheric emission**s, with measures to reduce the quantity of pollutants and extend continuous monitoring
- **Energy consumption**, with measures to recover energy and consequently reduce fuel consumption
- **Prevent potential spills of hydrocarbons into the soil**, with the extension of paved floors in the storage areas and, in parallel, oil recovery activities using the dynamic barrier

The objectives linked to significant indirect environmental aspects relate specifically to:

- **Sea traffic and road traffic**, with increased monitoring of ships used to transport raw materials and road vehicles used to transport products.

No.	Objective	Actions	Indicator	Implement-ation period	Situation at end-2009
	Significant environmental aspect: atmospheric emissions (SO_2)				
1	Reduction of SO_2 emissions by around 30% compared to current levels	**A** - Increase the yield from the sulphur recovery plant and reduce the associated SO_2 emissions by bringing the new tail gas treatment unit (TGTU) into service	% reduction in SO_2 emissions on an annual basis	2009	Objective achieved thanks to the regular operation of the TGTU: SO_2 emissions reduced by over 40% compared to 2008. Objective closed.
	Environmental aspect: Energy consumption - atmospheric emissions (SO_2, dust)				
2	Energy recovery and reduction of fuel oil consumption by around 30% compared to current levels	**A** - Implement measures to recover energy from the FCC plant	% reduction in fuel oil emissions on an annual basis	2009	The energy recovery measures planned for the K1T1, GT10 and CO boiler were completed in conjunction with the turnaround of the FCC plant in summer 2009. Thanks to these measures, total emissions resulting from fuel oil consumption in 2009 were cut by around 3.5%: applying this result to the whole of 2009 would produce a reduction of around 10%[1]. Closed.
		B - Implement measure to recover energy from the U500-U700 desulphurisation units		2012	
		C - Install a boiler to recover energy from the sensible heat of the fumes from the Topping1 plant (GVR1)		2013[10]	
		D - Install a boiler to recover energy from the sensible heat of the fumes from the Topping2, RT2, VSB, Vacuum1 and Vacuum2 plants, which will be ducted to the new centralised smokestack (GVR2)		2013	Feasibility study completed in 2008.
	Environmental aspect: atmospheric emissions (SO_2, NO_X, dust, CO)				
3	Extension of continuous monitoring to: - 65% of SO_2 emissions - 50% of NO_X emissions - 65% of dust emissions - 60% of CO emissions	**A** - Entry into service of the continuous monitoring[2] system for SO2, NO_X, PTS and CO emissions on the smokestacks of the Z3-F2 and Z4-F2 plants	% of emissions under continuous monitoring	2009	Closed in April 2010. Analysers delivered in December 2009. After a transition period when emissions were monitored using calculations, continuous monitoring of emissions began in March. Except for a period of downtime during April, the system was fully available.
		B - Install the continuous monitoring system for SO2, NOX, PTS and CO emissions on the smokestack of the CCR/Alky plant Installation by the end of 2010		2009 - 2010	Work in progress. The continuous monitoring system for the CCR/Alky plant is expected to be fully installed, tested and put into service by 30 August 2010.
		C - Install the continuous monitoring system for SO_2, NO_X and CO emissions on the smokestack of the CO boiler plant		2010	Work in progress. The continuous monitoring system for the smokestack of the CO boiler plant is also expected to be fully installed, tested and put into service by 30 August 2010.
		D - Install the continuous monitoring system for SO_2, NO_X, PTS and CO emissions on the smokestack of the Topping2 plant		2010	Work in progress. The continuous monitoring system for the smokestack of the Topping2 plant is also expected to be fully installed, tested and put into service by 30 August 2010.
4	Feasibility study for a new centralised smokestack and extension of continuous monitoring to: - 85% of SO_2 emissions - 70% of NO_X emissions - 99% of dust emissions - 85% of CO emissions	**A** - Implement the continuous monitoring system	% of emissions under continuous monitoring	2013	Work in progress. Feasibility study completed in 2009.
	Environmental aspect: atmospheric emissions (dust)				
5	Confirmation of the use of fuel oil with a carbon residue of less than 9.5% by weight	**A** - Prepare fuel oil with the required characteristics	annual average % of carbon residue in fuel oil	2009 - 2010	Objective met (9.5%) and maintained in 2010.

1 - The figure for the situation at the end of 2009 (3.5%) refers to the estimated reduction in emissions from fuel oil recorded in 2009 from the moment the recovery systems were installed and/or put into service. The figure of 10% is the estimated value for the whole year had the same systems operated continuously.

2 - The monitoring of SO_2, NO_X, PTS and CO emissions on the smokestacks of the Z3-F2 and Z4-F2 plants is expected to be implemented before the end of 2010; the change in timescales between 2009 and 2010 is due to technical and contractual issues.

No.	Objective	Actions	Indicator	Implement-ation period	Situation at end-2009
	Environmental aspect: atmospheric emissions (volatile organic compounds)				
6	Reduction in diffuse and fugitive emissions of volatile hydrocarbons	**A** - Complete[3] the installation of double seals on the gasoline-handling pumps	% replacement completed (cumulative figure)	89% in 2009 93% in 2010	Installation of double seals on the 20 pumps planned for 2009 completed: In total, double seals have now been installed on 89% of the pumps, in line with the 2009 deadline. Work has been authorised for a further eight pumps which are in the process of being bought. This will take the total number of pumps upgraded to 213 out of 229.
		B - Install a system for sealing the bypass pipes and support pipes in the floating-roof tanks at the refinery perimeter[4] (77.7% in 2010)	no. of tanks upgraded / total no. of tanks at the refinery perimeter (cumulative figure)	2009 -2012	55.5% of the checks scheduled in the multi-year plan have been completed, with 100% of the checks planned for 2009 complete. The activities will continue with the scheduled checks for 2010.
		C - Apply the Smart LDAR methodology to all of the site's units, proceeding in accordance with the monitoring and action timelines specified by the AIA permit	- IR 100% - PID[5] or FID[5] 100% for components leaking from IR - statistical sampling for components not leaking from IR 100% plants	2009-2010	Topping1, FCC, CCR, Alky, MHC1, MHC2, TAME and U800[6] plants monitored using the Smart LDAR methodology in accordance with the timelines specified by the AIA permit. Following two three-monthly monitoring campaigns that revealed leakage levels of less than 2%, in 2010 the plants will undergo six-monthly monitoring campaigns. In 2010, two consecutive three-monthly campaigns are planned for the U300, U400, U500, U700, visbreaking, RT2, T2 and blow down plants and the interconnecting, movement and shipping areas.
	Environmental aspect: atmospheric emissions – air quality				
7	Prompt identification of potential increases in concentrations of pollutants in emissions prevent any breaches of the warning threshold for concentrations of pollutants in the soil measured by the public air quality monitoring network	**A** - Apply the ISC/AERMOD simulation model of the ground-level effects of atmospheric emissions from the Saras site, based on the weather conditions and relief of the area and the concentrations measured by the air quality monitoring network in the surrounding environment	100% in line with AIA Monitoring Plan	2009	Objective closed. Application of the simulation model of the ground-level effects of atmospheric emissions from the Saras site: - 100% with ISC/AERMOD model
		B - Complete implementation of the CALMET-CALPUFF model. Apply the model.	100% with CALMET-CALPUFF model 100% in line with AIA Monitoring Plan	First half 2010	Completion postponed until end 2010. It was not possible to apply the CALMET-CALPUFF model since the new SARROCH weather station was not installed during 2009 and the weather stations at the national storage facility and the PPS building at the refinery were not reinstated. In 2009, the work therefore remained 90% complete. Currently, the station at the national storage facility is on line and the station at the PPS building has been installed, while there is still no indication from the Sarroch administration regarding the definitive position of the third station.
	Environmental aspect: energy consumption – visual impact				
8	Completion of mechanical installations for the new circuit to eliminate the steam plume released into the atmosphere by the U950 deaerator	**A** - Modify the circuit and insert a suitable steam condenser: fully complete mechanical/equipment installations	% completion of work	2009 -2010	Work 98% complete. All the mechanical equipment to contain the steam plume has been installed: the only thing that remains is to connect the system, which will have to wait until the IGCC turnaround planned for the first quarter of 2011.
	Environmental aspect: prevention of hydrocarbon spills into the soil				
9	Reduction in the risk of soil and subsoil contamination	**A** - Continue work to pave the containment basins for the crude oil and product tanks, covering 17,107 m^2 (in accordance with AIA/CTR requirements)	% of surface paved compared to total planned for 2009/2010	2009-2010	Work 33.9% complete in total. 5,795 m^2 were paved in 2009, equating to 100% of the work planned for the year[8].
		B - Fully complete the cement floor for the Rio Mascheroni channel	% completion of work	2009-2010	The authorisation to carry out work on waterways, which was requested from the Civil Engineering Department in January 2009, was received in the fourth quarter of 2009. The work, planned to be carried out when the river is at its lowest, is now under way. Work 80% complete
		C - Perform instrumentation checks on the integrity of the pipework for transporting crude oil from the marine terminal to the tanks and transporting hydrocarbons internally/externally	% checks performed/ checks planned completion of work	2009	Closed. All the planned checks have been performed.

3 - The work is 89% complete in total, in line with the plan for 2009, but it should be noted that some of the work on the pumps was carried out in the first quarter of 2010; the remaining pumps are mostly those used to move light products (cold pumps) rather than plant pumps. The delays are largely due to the impossibility of carrying out maintenance activities on some pumps required to ensure the operation of certain plants, as well as interference with the major planned maintenance activities performed at the site in 2009. The work to replace the seals has been further postponed: 93% of the total programme is expected to be complete by the end of 2011.

4 - Limited to the 18 tanks at the refinery perimeter compared to the 65 planned. This work is also being carried out on all the floating-roof tanks that are out of service for maintenance; four of these have currently been completed, in addition to those at the refinery perimeter.

No.	Objective	Actions	Indicator	Implement-ation period	Situation at end-2009
	Environmental aspect: prevention of hydrocarbon spills into the soil				
10	Confinement of contamination from past activities	**A** - Build the physical barrier planned as part of the site remediation project. The technical specifications for the request for proposals are planned to be issued in 2010, based on the findings from the field tests.	% completion of work	2009-2012	Executive planning complete. Field tests performed. Ministerial authorisation not yet received. Authorisation to change the project was requested from the Ministry due to interference with the roadway.
	Environmental aspect: waste				
11	Raising awareness among employees about the separate collection of USW to meet the 20% target	**A** - Implement a campaign to raise employee awareness about the separate collection of plastic, aluminium, glass and paper	% separated USW	2009	18% achieved instead of the 20% planned for 2009: the target remains the same for 2010.
12	Increase quantity of industrial waste sent for recovery to 50%	**A** - Increase the amount of excavated earth sent for recovery	% of waste leaving the site sent for recovery	2009-2010	Level achieved: 66%. The target remains the same for 2010.
	Environmental aspect: noise				
13	Containment of noise emissions at the source	**A** - Install sound-absorbent panels in the MHC-2 plant	% completion of work	2009	Closed. Activities to limit noise emissions from the MHC-2 plant fully complete[9].
		B - Complete study and planning for soundproofing the areas of sheds 109 and 110 containing the hydrogen network compressors	% completion of work	2009 - 2011	30% complete. The feasibility study for limiting the impact of noise from the HNC110 hydrogen network compressors was performed in 2009. The noise measurement tests revealed an opportunity to limit noise more effectively in relation to the covering of the C101 compressors (Topping1 service) next to the hydrogen network compressors. This proposal was included in the 2011 investment budget.
	Environmental aspect: odours				
14	Assessment of the main sources of odour emissions for the prevention or reduction of the odour impact on the surrounding area	**A** - Identify the chemicals responsible for the odour nuisance in the emissions sources at the refinery. Prepare artificial mixtures of these odour-generating substances in order to correlate the odour nuisance to the concentration.	% completion of work	2009	Preparation of Monitoring Plan for odour impact complete. Identification of the substances responsible for the odour nuisance complete. Preparation of artificial mixtures of odour-generating substances not defined, as its applicability is still being assessed.
		B - Implementation of the six-monthly monitoring plan in accordance with AIA requirements	% in line with AIA Monitoring Plan.	2010	The first monitoring campaign (summer campaign) in line with the Monitoring and Control Plan, as per AIA requirements.
	Environmental aspect: transport - maritime traffic: prevention of emergencies at sea				
15	100% use of double-hulled ships for loading/unloading operations	**A** - Continue to select double-hulled ships	% double-hulled ships out of total no. of ships	2009	Closed. Objectives achieved in full: 100% double-hulled ships for supplying light crude and 100% double-hulled ships for shipping products.
	For ships unloading products with a flash point below 55°C at the marine terminal, at least 98% use of ships with an inert gas system	**B** - Select ships equipped with an inert gas system (IGS)	% ships with IGS out of the total no. of ships unloading products with a flash point below 55°C	2010	Objective introduced in 2010.
16	Performance of on-board checks on at least 42% of ships during loading/unloading	**A** - Continue inspection activities in line with the criteria adopted by Saras to protect workers' safety and the environment (minimum safety criteria)	% ships checked	2009-2010	The objective of 42% for 2009 was achieved. Given the environmental importance of these checks, the objective was raised to 43% for 2010
	Environmental aspect: transport - road traffic: accident prevention				
17	Performance of checks on at least 21% of the tanker trucks used to transport products	**A** - Continue checking activities in line with Saras internal procedures	% tanker trucks checked	2009-2010	Level achieved: 21.6%, exceeding the 2009 objective. Objective raised for 2010 to new level of 22%.

5 - The leakage of VOC (volatile organic compounds) from process components was quantified in accordance with method 21 - DETERMINATION OF VOLATILE ORGANIC COMPOUND LEAKS - EPA using a PID (Photo Ionisation Detector) rather than an FID (Flame Ionisation Detector) for safety reasons.
6 - The objective was revised as shown in the table due to delays in the supply of the instrumentation required for the Smart LDAR methodology.
7 - The work completed includes minor activities carried out in 2010.
8 - At 31 December 2009, tank 163 was out of service due to the ongoing work to pave the basin.
9 - The work was completed in February 2010, as a result of rescheduling associated with the MHC process shutdown times.
10 - Postponed until 2013 due to restructuring of investments (cf. the report from the AIA assessment committee CIPPC_00_2010_0001027 of 19 May 2010).

5.2 – Improvement activities carried out in 2009

During 2009, the majority of the environmental objectives set out in the 2009 Environmental Declaration were achieved.
Investments mainly concerned the reduction of atmospheric emissions, the reduction of energy consumption, the prevention of potential spills of hydrocarbons into the soil and the monitoring of air quality.

[significant environmental aspect: SO_2 atmospheric emissions]

For many years now, a large portion of investment has been directed towards the environment and safety, and this programme also includes constant monitoring of air quality. The activities targeting atmospheric emissions addressed a number of different aspects. One of the most important of these was the construction of the tail gas treatment unit (TGTU): with the TGTU in regular operation during 2009, it was possible to increase the percentage of sulphur recovered, reducing SO_2 emissions by more than 30%, thereby meeting the formal commitment made by Saras through its environmental improvement objectives.

[environmental aspect: odours]

A programme of monitoring has also been implemented as far as odours are concerned, using a combination of analytical techniques, modelling and expert assessment: during 2009, a number of different sampling and analysis activities were performed within the refinery (sources) and in the parts of Sarroch most at risk (receivers). These activities are necessary to validate the methodology and prepare the Monitoring and Control Plan for odour emissions.

[environmental aspect: prevention of hydrocarbon spills into the soil]

In terms of the protection of the soil and subsoil, measures aimed at reducing the risk of contamination were continued. The percentage of paving in the containment basins for crude oil and product tanks has reached 36.5%, in line with the target for 2009. In addition, the instrumentation checks on the integrity of the pipework for transporting crude oil from the marine terminal to the tanks and transporting internal/external hydrocarbons, which were scheduled for 2009, were completed.

[environmental aspect: energy consumption, visual impact]

In line with the 2008-2012 investment plan, work on the FCC plant (K1T1, GT10 and CO boiler) aimed at achieving greater energy efficiency was completed. These measures have led to a considerable decrease in fuel consumption, with a resulting drop in CO_2, SO_2 and dust emissions.

At the same time, in order to ensure the high quality of the fuels used at the site, the company maintained the excellent result it achieved last year on the use of fuel oil, with a carbon residue of less than 9.5% by weight.

[environmental aspect: air quality]

In 2009, important progress was also made on the use of instruments that can quickly identify potential increases in the concentration of pollutants in emissions and prevent any breaches of the warning threshold for concentrations of pollutants measured in the soil by the public air quality monitoring network. Specifically, widespread use was made in 2009 of the ISC/AERMOD Gaussian stationary simulation model of the ground-level effects of the atmospheric emissions from the Saras site, calibrated using the concentrations measured by the ARPAS network for monitoring air quality in the surrounding environment.

There have also been improvements in the data for the transport of products by sea: the company continued to use only double-hulled ships for the supply of light crude, and hit its target of ensuring that 100% of the ships transporting products out of the Saras terminal also had double hulls. The target for checks on board ships during the loading and unloading stages was also met, reaching 42% in 2009.

[environmental aspect: transport - maritime traffic]

Finally, in order to prevent road traffic accidents, checks were carried out on 21.6% of the tanker trucks used to transport products, which was consistent with the objectives set.

[environmental aspect: transport - road traffic]

Last, but certainly not least, we turn to the activities to reduce noise emissions from the MHC-2 plant, where the work to install sound-absorbent panels was completed. An acoustic study and a study of the technical and financial feasibility of further measures to limit noise emissions in the area of the hydrogen network compressors were also carried out.

[environmental aspect: noise]

6.
Summary of relevant lagislation

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6. Summary of reference legislation

Below is a non-exhaustive list of the main environmental laws that apply to the activities carried out at the Saras site. The detailed list is checked under section 4.3.2 of the EMS.

Atmosphere

- Resolution 14 of 10 April 2009.
  Provisions implementing decision 2007/589/EC of the European Commission of 18 July 2007, which establishes the guidelines for monitoring and reporting greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.
- Resolution 20 of 27 November 2008.
  Execution of the decision to allocate CO_2 allowances for 2008-2012, drawn up pursuant to Art. 8 (2)(c) of Legislative Decree 216 of 4 April 2006, as subsequently amended, in compliance with the authorisation from the European Commission.
- Legislative Decree 284 of 8 November 2006 with "Corrective and supplementary provisions to Legislative Decree 152 of 3 April 2006, establishing environmental legislation".
- Resolution 14 of 6 August 2008.
  Updates to permits for greenhouse gas emissions.
- Legislative Decree 4 of 16 January 2008 with further corrective and supplementary provisions to Legislative Decree 152 of 3 April 2006, establishing environmental legislation.
- Legislative Decree 152 of 3 April 2006.
  Environmental legislation. Part V: Laws governing the protection of air quality and the reduction of atmospheric emissions.
- Legislative Decree 216 of 4 April 2006, as subsequently amended.
  Implementation of Directives 2003/87 and 2004/101/EC governing greenhouse gas emissions allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms.
- Resolution 001/2008 of the Italian National Committee for Managing and Implementing Directive 2003/87/EC. Recognition of permits to emit greenhouse gases issued between 2005 and 2007 for the purpose of issuing permits for 2008-2012 pursuant to the Legislative Decree of 4 April 2006.
- Decisions of the European Commission of 29 January 2004 and of 18 July 2007.
  These establish guidelines for monitoring and reporting greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.
- Ministerial Decree 60 of 2 April 2002.
  Implementation of Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide, oxides of nitrogen, particulate matter and lead in ambient air, and Directive 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.
- Legislative Decree 183 of 21 May 2004.
  Implementation of Directive 2002/3/EC relating to ozone in ambient air.
- Presidential Decree 322 of 15 April 1971.
  Regulation for the execution of Law 615 of 13 July 1966, containing provisions against atmospheric pollution, limited to the industrial sector.

Water

- Legislative Decree 4 of 16 January 2008.
  Further corrective and supplementary provisions to Legislative Decree 152 of 3 April 2006, establishing environmental legislation.
- Legislative Decree 152 of 3 April 2006.

Environmental legislation. Part III, specifically: Laws governing the prevention of water pollution and the management of water resources.
- Regulation 417/2002 of 18 February 2002, amended by Regulations 1726/2003 of 22 July 2003 and 2172/2004 of 17 December 2004.
  Fast-track introduction of laws governing double hulls or equivalent technology for single-hulled oil tankers, repealing EC Council Regulation 2978/94.

Waste, soil and subsoil

- Ministerial Decree of 17 December 2009.
  Establishment of a system to monitor the traceability of waste, pursuant to Art. 189 of Legislative Decree 152 of 2006 and Art. 14-bis of Decree Law 78 of 2009, converted – with amendments – by Law 102 of 2009.
- Legislative Decree 4 of 16 January 2008.
  Further corrective and supplementary provisions to Legislative Decree 152 of 3 April 2006, establishing environmental legislation.
- Legislative Decree 152 of 3 April 2006.
  Environmental legislation. Part IV: Laws governing the management of waste and the remediation of polluted sites.
- EEC Regulation 259 of 1 February 1993.
  Supervision and control of shipments of waste within, into and out of the European Community.

Noise

- Regional Council Resolution (Sardinia) 62/9 of 14 November 2008.
  Regional directives governing environmental noise pollution.
- Ministerial Decree of 16 March 1998.
  Methods of detecting and measuring noise pollution.
- Ministerial Decree of 11 December 1996.
  Application of the differential criteria to continuous production cycle plants.
- Law 447 of 26 October 1995.
  Framework law on noise pollution.
- Prime Ministerial Decree of 14 November 1997.
  Establishing limits for noise sources.
- Prime Ministerial Decree of 1 March 1991, as subsequently amended.
  Maximum limits for noise exposure in inhabited areas and outdoors.

Asbestos

- Ministerial Decree 248 of 29 July 2004.
  Regulation governing the definition of and rules for the recovery of products and goods made from or containing asbestos.
- Ministerial Decree of 14 December 2004.
  Prohibition on the installation of materials containing asbestos that has been intentionally added.

PCBs

- Legislative Decree 209 of 22 May 1999.
  Implementation of Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls
- Ministerial Decree of 11 October 2001.
  Conditions for the use of transformers containing PCBs awaiting decontamination or disposal.
- Law 62 of 18 April 2005, European Community Law 2004, Art. 18.
  Obligations on holders of equipment containing PCBs and PCTs.

Ozone-depleting substances

- Presidential Decree 147 of 15 February 2006.
  Methods for monitoring and recovering leaks of ozone-depleting substances from refrigeration, air conditioning equipment and heat pumps, pursuant to EC Regulation 2037/2000.
- EC Regulation 2037/2000 of 29 June 2000 on substances that deplete the ozone layer.

Electromagnetic fields

- Legislative Decree 194 of 6 November 2007.
  Implementation of Directive 2004/108/EC on the approximation of the Laws of Member States relating to electromagnetic compatibility, which repeals Directive 89/336/EEC.
- Prime Ministerial Decree of 8 July 2003.
  Definition of exposure limits, warning levels and quality objectives for protecting the population from exposure to electrical, magnetic and electromagnetic fields generated at frequencies between 100 kHz and 3,000 GHz.
- Law 36 of 22 February 2001.
  Framework law on protection against exposure to electrical, magnetic and electromagnetic fields.

Ionising radiation

- - ISPESL Circular no. 40 of 3 January 2002.
  New methods for sending documentation relating to workers who have been exposed to ionising radiation pursuant to Legislative Decree 230.1995, as subsequently amended (Legislative Decree 241/2000 and Legislative Decree 257/2001).
- Legislative Decree 230 of 17 March 1995.
  Implementation of Directive 89/618/Euratom, 90/641/Euratom, 92/3/Euratom and 96/29/Euratom on ionising radiation.

AIA permit

- DSA-DEC-2009-230 of 24 March 2009.
  Integrated environmental authorisation (AIA) permit for Saras SpA to operate its refinery and the IGCC plant.
- Ministerial Decree of 1 October 2008.
  Establishing guidelines for the analysis of economic aspects and cross-media effects for the activities listed in Annex I of Legislative Decree 59 of 18 February 2005.
- Ministerial Decree of 7 February 2007.
  Format and method for submitting an application for a state-issued AIA permit.
- Ministerial Decree of 29 January 2007.
  Establishing guidelines for identifying and applying the best available techniques in the refining sector for the activities listed in Annex I of Legislative Decree 59 of 18 February 2005.
- Ministerial Decree of 19 April 2006.
  Determination of timescales for submitting an application for an AIA permit for plants falling within the state's responsibility, pursuant to Legislative Decree 59 of 18 February 2005.
- Legislative Decree 59 of 18 February 2005.
  Full implementation of Directive 96/61/EC concerning integrated pollution prevention and control.

In addition, the following laws on health and safety in the workplace and the prevention and control of major-accident hazards are also applicable.

Health and safety in the workplace

- Legislative Decree 106 of 3 August 2009.
  Supplementary and corrective provisions to Legislative Decree 81 of 9 April 2008 governing health and safety in the workplace.
- Law 133 of 6 August 2008.
  Supplementary and corrective provisions to Legislative Decree 81 of 9 April 2008 governing health and safety in the workplace.
- Legislative Decree 81 of 9 April 2008.
  Implementation of Art. 1 of Law 123 of 3 August 2007 governing health and safety in the workplace.

Prevention and control of major-accident hazards

- Ministerial Decree 138 of 26 May 2009.
  Regulation governing the forms of consultation with members of staff working in the facility in relation to internal emergency plans, pursuant to Art. 11 (5) of Legislative Decree 334 of 17 August 1999.
- Prime Ministerial Decree of 16 February 2007.

Guidelines for informing the population about industrial hazards.

- Legislative Decree 238 of 21 September 2005.
  Implementation of Directive 2003/105/EC, which amends Directive 96/82/EC, on the control of major-accident hazards involving dangerous substances.
- Prime Ministerial Decree of 25 February 2005.
  Guidelines for preparing the external emergency plan pursuant to Art. 20 (4) of Legislative Decree 334 of 17 August 1999.
- Ministerial Decree of 19 March 2001.
  Fire prevention procedures for activities involving major-accident hazards.
- Ministerial Decree of 9 August 2000.
  Guidelines for implementing a safety management system.
- Ministerial Decree of 9 August 2000.
  Identification of changes to plants and deposits, industrial processes, or the nature or quantity of dangerous substances that could increase the underlying level of risk.
- Legislative Decree 334 of 17 August 1999.
  Implementation of Directive 96/82/EC on the control of major-accident hazards involving dangerous substances.


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.

AIA: the AIA (integrated environmental authorisation) permit is a provision authorising operation of a plant, while imposing measures for the avoidance or reduction of emissions into the air, water or soil in order to achieve a high level of overall environmental protection. The AIA permit replaces all other environmental permits, approvals, authorisations or opinions specified by law and in the implementation legislation.

ARPA: Agenzie Regionali per la Protezione Ambientale (or regional environmental protection agencies). In April 1993 a referendum resulted in the removal of environmental control and protection powers from Italy's national and local health services. 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 managing and co-ordinating the regional agencies and those based in Italy's autonomous provinces. In the years that followed, all of Italy's regions and autonomous provinces set up their own agencies. ARPA Sardinia (ARPAS) was created under Regional Law 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 organisation's compliance with set environmental management criteria.

CO (carbon monoxide): a gas produced by the incomplete combustion of vehicle fuels and fossil fuels. The main source is gasoline engines that do not have 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 earth's surface, thereby contributing to the greenhouse effect.

COD (chemical oxygen demand): the quantity of oxygen needed to oxidise the organic content of waste, including non-biodegradable matter.

Cogeneration: the process by which two different energy prod ucts, such as electricity and heat, can be generated together by a single, purpose-built plant, resulting in high environmental efficiency.

Desulphurisation: the process of treating oil fractions in order to reduce the sulphur content in refined products.
dB(A): the unit of measurement of sound, expressed in logarithmic units (deciBels) and frequency-weighted to take account of the varying sensitivity of the human ear to different sound frequencies ("A-weighting" filter).

Greenhouse effect: gradual rise 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 (CFCs), carbon dioxide (CO_2), methane (CH_4), nitrogen oxides (NO_X) and sulphur hexafluoride (SF_6).

EMAS (Eco-Management and Audit Scheme): Established by EC Regulation 1836/93, updated by EC Regulation 1221/2009 (EMAS III), 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 is the Ecolabel and Ecoaudit committee, which has been operational since 1997 and works with the technical support of APAT.

Emissions 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 surrender 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 the EU's first and most wide-ranging record of emissions into the air and water from industrial plants.

Wholesale: refers to the wholesale market in oil products sold to customers such as industries, consortia and public bodies.

Filter cake: the solid formed from the gasification of heavy refinery products. It contains high percentages of metals such as iron, carbon vanadium and nickel.

GSE (Gestore dei Servizi Elettrici): a company established by Article 3 of Legislative Decree 79/99 and controlled by the Italian treasury, which provides incentives for the production of electricity from renewable sources and other eligible sources and is responsible for assessing renewable energy plants and their electricity production.

Immission: the release of a pollutant into the atmosphere or water, which then spreads into the environment. The concentration of the pollutant is measured at a distance from the point at which it was emitted.

CAM (classification of seawater) indicator: this is the indicator used in monitoring the coastal marine environment. The indicator converts the measurements into a summary rating of sea quality, which can be interpreted and assigned to three quality classifications, where quality is understood to mean the degree of eutrophication of the coastal systems and the likelihood of a potential heath or hygiene hazard:
High quality - uncontaminated water
Average quality - water with varying degrees of eutrophication, but ecologically intact
Low quality - eutrophic water with evidence of environmental changes that are partly due to human activity

Frequency index: together with the severity index, 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 (calculated using the formula: number of accidents reported to INAIL x 1,000,000/ 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/hours worked).

INES: Inventario Nazionale delle Emissioni e loro Sorgenti (or national inventory of emissions and their sources). The inventory was set up pursuant to Legislative Decree 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. The inventory contains information on the emissions of Italian industrial sites that 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 Ministry for the Environment 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: the level of sound pressure exceeded for 90% of the time for which a noise is measured. This statistical indicator is frequently used to describe the background noise caused by continuous sources over time, as is the case with many continuous-cycle industrial sources.

kt (kiloton): unit of measurement of mass, equal to 1,000 tons.

kWh (kilowatt-hour): unit of measurement of electricity generated or consumed, equal to the power generated by 1 kW in one hour.

MW (megawatt): a multiple of kW (kilowatt), the unit of measurement of a power station's 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 generated or consumed, equal to the power generated 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, OHSAS 18001 certification can be obtained by following a similar procedure to that used for the ISO standards.

Piezometer: a 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 piezometric level (the line where points with a level equal to that of the body of water are located) at a set point.

PM10: particulates with a diameter of less than 10 mm (1 mm = 1 micrometer) which can pass through the airways and penetrate the lungs and are a potential health hazard, depending on the substances which they contain.

ppm (parts per million): unit of measurement of the concentration of a substance present in small quantities in a liquid or gas.

Kyoto Protocol: an 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 priorities 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 Protocol commits industrialised countries and those whose economies are in a transition phase (eastern European countries) to reduce overall emissions of greenhouse gases (carbon dioxide, methane, nitrogen oxide, hydrofluorocarbons, 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 which they contain.

Major-accident hazard: the probability that an event linked to an uncontrolled development in 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, achieve, review and maintain control, where possible, over all the internal and external variables of an organisation.

SO_2 (sulphur dioxide): 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 acid rain.

TOE (ton of oil equivalent): a unit of measurement conventionally used to determine the energy contained in various sources taking into account their calorific value.

Note

Note

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