Sarroch Refinery
Environmental and Safety Report 2008

SARAS


SARAS

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More information about the Saras Group

Presentation

The annual publication of the Environmental and Safety Report is a key moment in the company's communication with employees and associates, both direct and indirect, and with the people in the region where we operate.
This 2008 edition of the Report features an improved graphic layout, and it is now even richer in content. For the first time, other companies in the Saras Group apart from the refinery are discussed in detail.
The commitment to ongoing improvement has been kept. At the Sarroch facility, in particular, an improvement in emissions has been recorded, with a reduction in sulphur dioxide (SO_2) of 30%. This results from a comparison of the last 2 years with the average of the first 5 years beginning in 2000. This result has been made possible by a series of technical and management measures that have progressively equipped the refinery with the most effective technologies and equipment for working while protecting and caring for the environment.
2008 was an intense year, punctuated by very large market fluctuations with moments of great uncertainty, but nevertheless, from the Environment and Safety standpoints, important objectives have been achieved:

EMAS Registration
Basing itself on its well-established Environmental Management System (ISO 14001), Saras has achieved EMAS Registration, which represents our commitment to protect the environment in the region through constant dialogue with the local community.

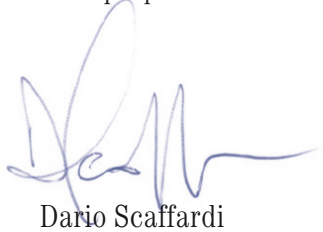
Launch of the Du Pont project
A project has been launched to raise awareness about safety issues. This project will run over a number of years and is being conducted with the Du Pont company, world leader in the sector, and it aims to entrench safety as a fundamental value in our corporate culture.

Completion of the TGTU unit
In December, the TGTU (Tail Gas Treatment Unit) entered service. The TGTU completes the sulphur recovery cycle, and brings Saras into line with the BAT (Best Available Techniques) defined by the European Union. This unit enables us to achieve 99.5 % recovery of the H_2S deriving from the desulphurisation plants, and reduces atmospheric emissions of SO_2 coming from the sulphur recovery cycle to the minimum. The unit required two and a half years of work and an investment of over 65 million euro, and it is deployed on two lines to allow maximum production continuity and reliability.

Environmental Integrated Authorisation (EIA)
The first few days of 2009 saw the conclusion of the authorisation process to obtain the Environmental Integrated Authorisation (EIA), for the integrated prevention and reduction of pollution. Saras is the first Italian refinery to have obtained the EIA: application of this integrated approach will allow us to minimise the impact of our production activities on all environmental matrices, representing an innovative tool for environmental protection.

We'd like to thank everyone who has contributed to creating this document, which we hope will be useful to those who wish to better understand the complexity of the Saras Group and the daily commitment of the people who work there.

Happy reading!



Dario Scaffardi
General Manager, Saras S.p.A.


ARCOLA
Arcola
SARDEOLICA
Ulassai
Macchiareddu
Sarroch
Cartagena
saras
SARAS
akhela
SARLUX
SARTEC

The Saras Group

The Saras Group

The Sarroch facility and subsidiaries

Saras Group, which was founded in 1962 by Angelo Moratti, operates in the energy sector and is one of the principal Italian and European companies in the oil refining sector. Its areas of activity are:

- The sale and distribution of oil products on the Italian and international markets, both directly and through subsidiary companies: Saras Energia S.A. in Spain and Arcola S.p.A. in Italy
- The production and sale of electricity through the subsidiary Sarlux S.r.l. and Parchi Eolici Ulassai S.r.l.
- Computing services through the Akhela company, and industrial engineering services and scientific research for the oil, petrochemical, energy and environmental sectors, through the Sartec company

With over 2,000 direct employees, in 2008 the Saras Group registered excellent operational performance. The Group's revenues were 8,673 million euro, an increase of 29% over the previous year.

Saras S.p.A. is the parent company and a subsidiary of Angelo Moratti S.a.p.a. It was established in 1962 to carry out refining activities, and today it owns the Sarroch production plant. It has shareholdings in a number of subsidiaries in Italy and abroad, which are briefly described below.

Arcola markets oil products on the Italian wholesale market, in Sardinia and in northern and central Italy.

Sarlux – a 100% controlled subsidiary of Saras – is the owner of the IGCC plant and manages the sale of electricity produced by the IGCC, while the plant's operational management is entirely Saras's responsibility.

Saras Energia SA distributes oil products in the Spanish retail and wholesale market. In November 2008 it completed the construction of the biodiesel production plant in Cartagena and it has also signed an agreement to acquire 81 service stations from ERG Petroleos S.A..

Sardeolica manages the wind farm located in the Municipality of Ulassai (OG). Following the acquisition by Saras S.p.A. of the holding owned by Babcock & Brown Wind Energy in the subsidiary company Parchi Eolici Ulassai S.r.l. (PEU), the subsidiary has been entirely consolidated since 30 June 2008.

Akhela is a computer technology company. Its services are organised into two macro-areas: information technology and embedded systems. Its IT solutions concentrate on the areas of logical security, IT optimisation and business continuity. Its embedded systems are mainly applications in the automotive and multimedia sectors.

Sartec (Saras Ricerche e Tecnologie) provides industrial engineering and scientific research services nationally and internationally. Sartec also designs, manufactures and implements modular plants to identify environmental emissions.

SARAS

Saras, with **1,266 employees**, has its legal office in Sarroch, its administrative office in Milan and an office in Rome.

Strategy and investments

In 2008 investments were 257 million euro, in line with the investment plan announced for the year.
Specifically, in 2008 construction of the naphtha desulphurisation plant was completed. This plant enables the refinery to meet the new European specifications, which came into force on 1 January 2009 and which specify a sulphur content in petrol of 10 ppm. In addition, in 2008 construction was completed for a unit treating tail gas to recovering sulphur, which means the Group's refinery is now one of the best in terms of containment of sulphurous emissions.
Finally, in November Saras Energia finished construction of the biodiesel production plant in Cartegena (Spain). Much of the 45.9 million euro of investments made in 2008 was allocated to the completion of this plant, which will produce 200,000 tonnes of biodiesel per year and will begin selling the product in the second quarter of 2009.
For future years, Saras confirms its long-term objectives and the growth strategy announced in June 2008, which is built around the organic growth programme in the Refining and Marketing segments.

The Sarroch facility: oil refining and electricity production

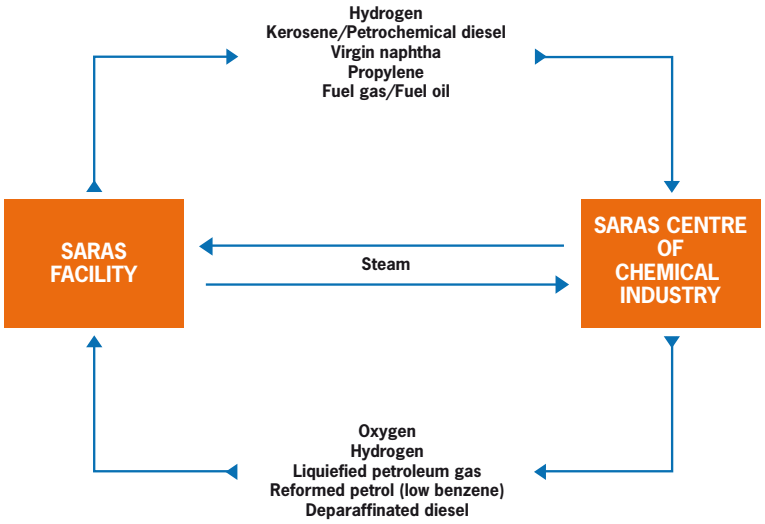
Saras conducts its refining activities at the refinery in Sarroch (Cagliari), on the southern coast of Sardinia. This is the biggest refinery in the Mediterranean in terms of production capacity, and it is one of the most complex refineries in western Europe. The refining cycle is integrated with the IGCC plant, used to generate electricity.
The refining capacity is approximately 15 million tonnes per year (Table 1) and represents 15% of Italian capacity, while the catalytic conversion capacity is 9.6 million tonnes per year (FCC + 2 MHC) and the thermal conversion capacity is 2.4 million tonnes per year. The Sarlux IGCC electricity generation plant has an installed electrical capacity of 575 megawatts and an annual production exceeding 4 billion kWh, all of which is sold to GSE (Gestore Servizi Elettrici, the operator of the national electricity transmission grid).

Table 1 – Raw materials processed (000 t/year)

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

High processing capacity and structural complexity: these characteristics make the Sarroch facility a focal point for productive activities in the Mediterranean, capable of conducting both the separation processes and the conversion processes and of modulating the different phases of the production cycle based on the characteristics of the crude oils to be processed, to obtain oil products of high commercial and environmental quality. Over time the geographic location of the Sarroch production facility has shown itself to be optimal and strategic for trade with the western and central Mediterranean, encompassing both European and North African countries, while the close proximity of the Polimeri Europa, Air Liquide and Sasol Italy factories enable it to add petrochemical production to its refinery operations (Figure 1).

Figure 1 – Synergy between the Saras facility and the adjacent centre of chemical industry



Evolution of the refinery

Saras's connection with Sarroch dates back to 1962, when Angelo Moratti identified it as a strategic location for an oil refinery. In 1963 work began on building the refinery plant and systems, and in 1965 work began on refining.

Until the end of the 1980s, Saras mainly provided refining services for third parties, i.e. it refined crude oil owned by other oil companies that provided Saras with the raw materials to produce oil products.

In the mid-1990s, as a result of a major reduction in demand for high-sulphur fuel oils, Saras began a project of great industrial importance centring on the construction of a plant to gasify heavy refining distillates and subsequently cogenerate heat and electricity using a combined cycle (an IGCC plant).

With the coming into operation of the IGCC, the oil production cycle is closely integrated with the electrical cycle, which enables us to maximise the conversion of raw materials into finished oil products and energy.

In the meantime we have continued investing in technological upgrades to the existing plants and improving the environmental qualities of the fuels, and this is also in response to increasingly stringent quality levels set by

The Sarroch industrial estate

The industrial estate that grew up in the Sarroch area in the 1960s has helped create employment and wealth in the region. Around the big industrial names in this estate – like Saras, Polimeri Europa, Sasol Italy, Air Liquide, and Liquigas – over the years many small and medium enterprises in related industries have emerged. They work on the construction and maintenance of the plants in the estate, in the process generating major induced economic effects. Saras maintains industrial exchange relationships with all of these factories.

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

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

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

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

Description of the facility

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

- Reception of raw materials and shipping of products via the marine terminal
- Production of oil products
- Generation of electricity in the IGCC
- Storage of raw materials, liquid products and liquefied gases
- Shipping of products over land
- Auxiliary services (electricity generation in the thermoelectric power plant, inbound water treatment, wastewater treatment)
- Offices, workshops, warehouses
- Activities conducted by contracted firms

Figure 2 on page 15 shows the areas concerned by the various different types of activity carried out within the facility. These are briefly described below.

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

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

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

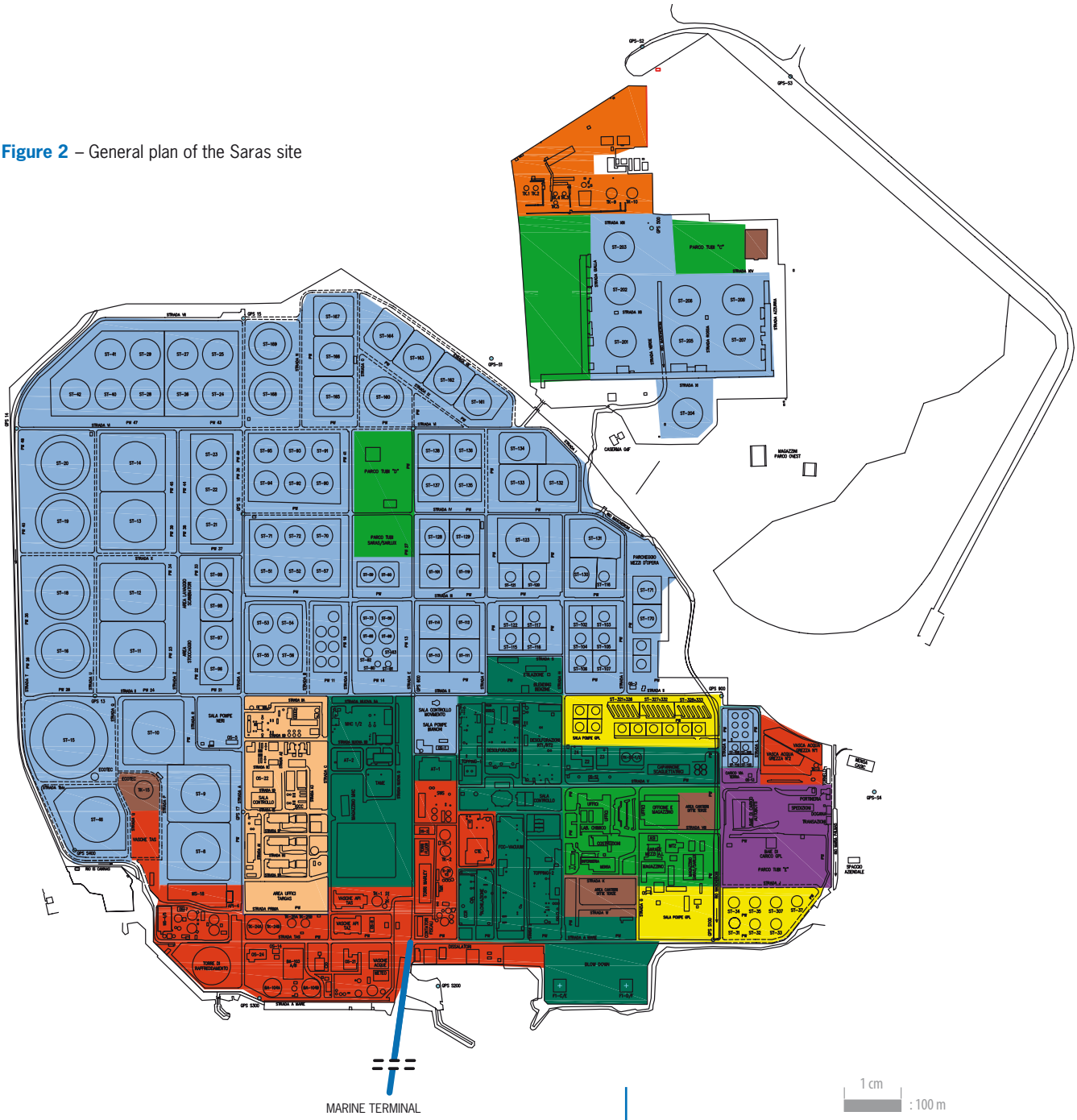
The terminal has eleven independent docking berths, nine of which are for shipping finished oil products and receiving semi-finished products, and can receive oil tankers of up to 65,000 tons, and the remaining two are for receiving raw materials, and can receive oil tankers of up to 300,000 tons.

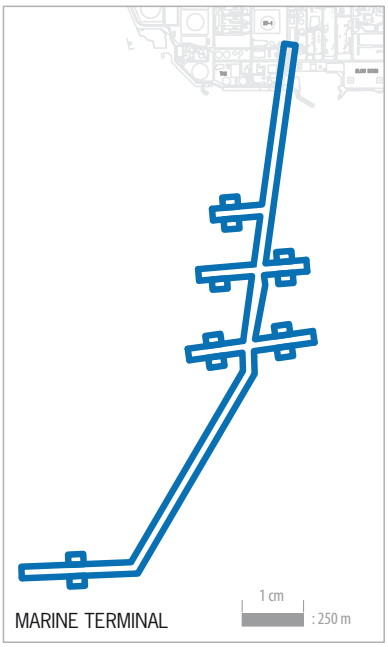
Advanced monitoring systems ensure that all loading and unloading operations take place under conditions of the utmost safety: the phases of docking and mooring of ships and their connection to loading booms to transfer raw materials and finished products from land to ship and vice versa are carried out under continuous surveillance.

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

A dedicated control room, which in 2008 was completely renovated and equipped with the most advanced technology, is manned 24 hours a day and is in continuous radio contact with the ships operating in the terminal, to ensure that all operations are conducted under conditions of maximum safety and in observance of environmental protection.

Figure 2 – General plan of the Saras site





- Reception of raw materials and shipment of products via 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 Depot)
- Shipping of products over land
- Auxiliary Services
- Offices, workshops, warehouses
- Area for use by contracted firms

Production of oil products

The production process is graphically illustrated in the simplified diagram given in Figure 3 and it takes place through the following units:

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

To these plants we now add the units completed in 2008, which were built to diminish the environmental impacts of production: the TGTU unit to reduce emissions of SO_2; the U800 unit for producing low-sulphur petrol; the U600 unit for producing hydrogen used for the desulphurisation units, to produce extremely low-sulphur automotive diesel.

Oil production at the Sarroch facility has a high yield of medium products (diesel) and light products (LPG, naphtha, petrol), which in 2008 represented overall around 80% of total production, as shown briefly in Chart 1 and in detail in Table 2 on page 18, which gives the production figures for the four-year period 2005 – 2008.

Figure 3 – Production cycle at the Saras site: oil products and production of electricity

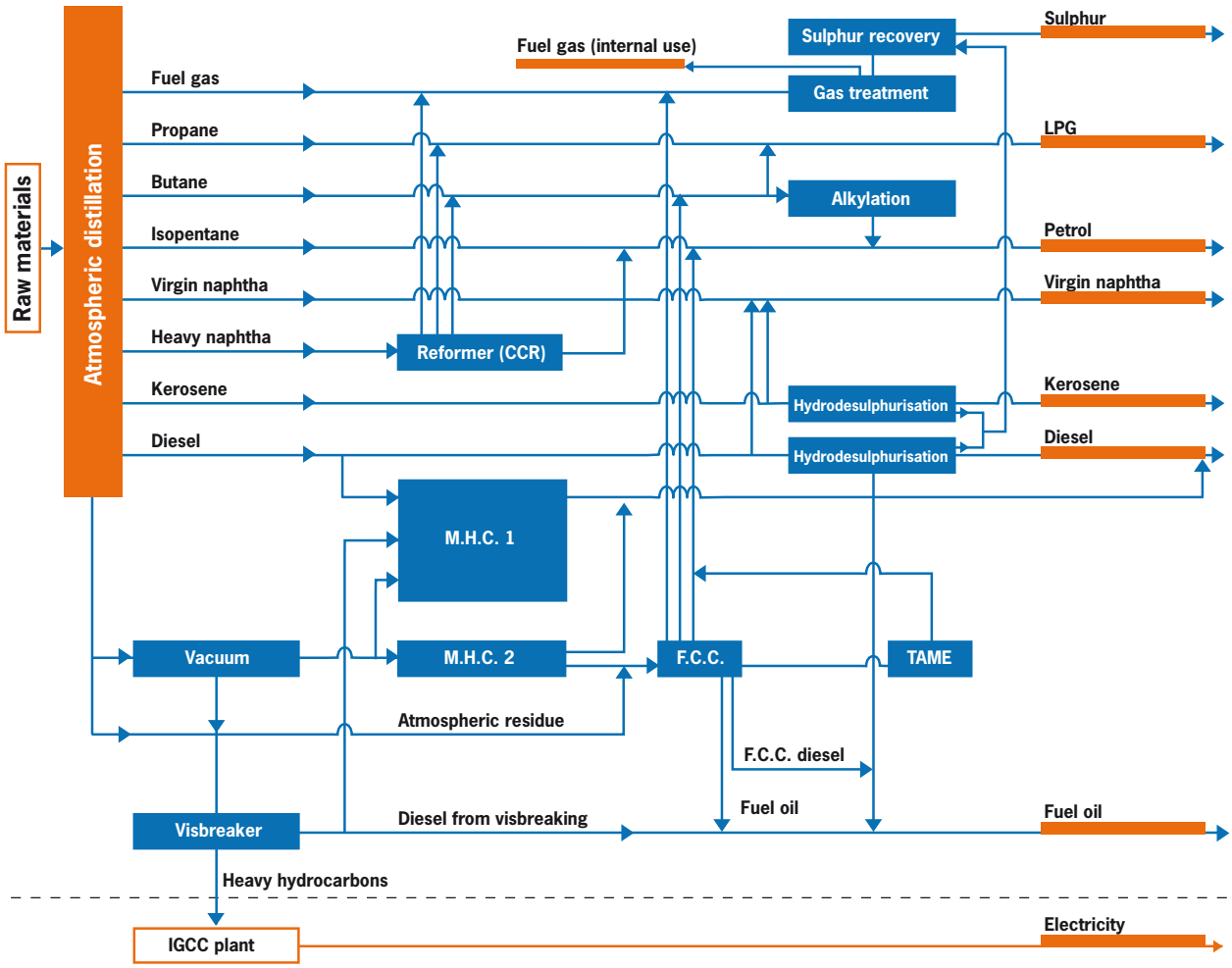
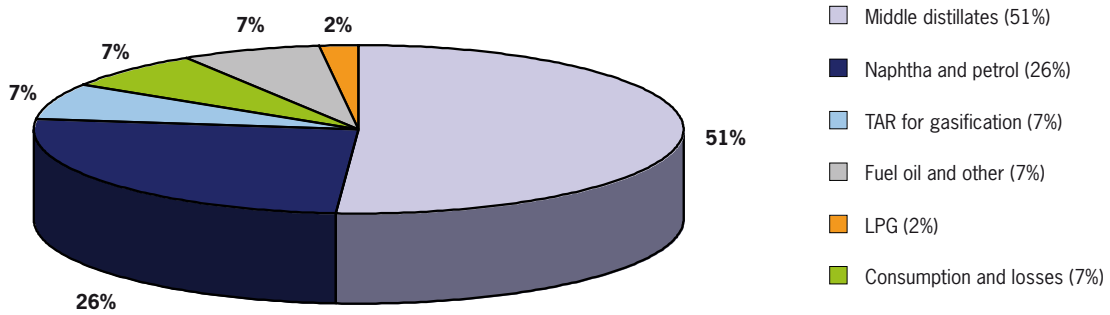


Chart 1 – Products and consumption at the refinery



The raw materials come mainly from the Mediterranean area (North Africa and the Middle East), from the former Soviet Union and from Northern Europe (Table 3). The primary, but not sole destination of refined products is the central and western Mediterranean basin. During the three-year period 2008-2007, almost a quarter of total production of oil products was absorbed by the regional Sardinian market (Chart 2).

Table 2 – Oil products (t/year)

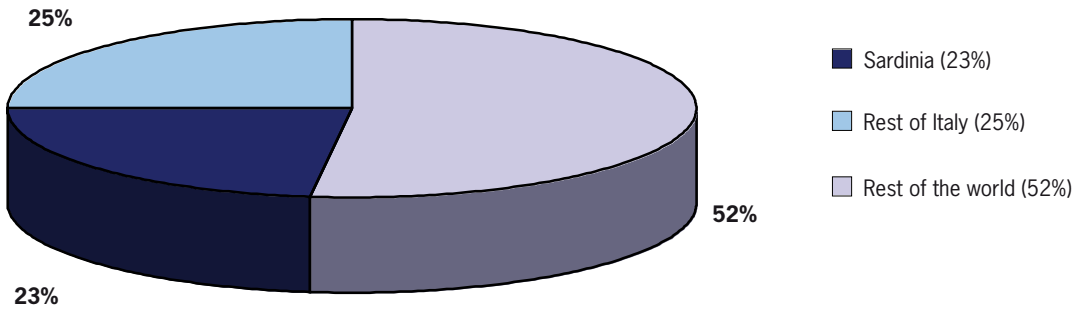
	2005	2006	2007	2008
LPG	363,000	341,000	323,000	359,000
Petrol	3,036,000	2,945,000	3,110,000	3,184,000
Virgin naphtha	873,000	936,000	916,000	862,000
Kerosene	449,000	388,000	467,000	544,000
Diesel	6,423,000	6,713,000	6,813,000	7,498,000
Fuel oil	1,149,000	1,033,000	788,000	896,000
Sulphur*	106,000	111,000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

* Includes sulphur recovered from both refining and from the IGCC

Table 3 – Raw materials processed at the Sarroch refinery: origin of crude (%)

	2005	2006	2007	2008
Africa	61	61	55	48
Middle East	13	13	11	9
Former Soviet Union	8	6	15	26
Europe	18	20	18	16
North America	-	-	1	1
Total	100	100	100	100

Chart 2 – Total shipments for 2008



Sarlux: the production of electricity

The IGCC (Integrated Gasification Combined Cycle) plant produces electricity, hydrogen, steam and sulphur from the heavy hydrocarbons deriving from the refining process, and overall it is recognised as one of the best available techniques for the refining sector.

As shown in Figure 4, the plant is divided into two main sections:

- Gasification
- Combined cycle

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

The electricity – produced in three identical lines, each made up of a gas turbine, a steam recovery boiler and a steam turbine – is sold to GSE (Gestore Servizi Elettrici, the operator of the national electricity transmission grid). Part of the steam produced and not used to generate electricity, and the hydrogen deriving from the gasification section, are sent to the refinery for use in the refining process.

As with the sulphur recovered from the refining cycle, the sulphur recovered by removing sulphuric acid from the syngas is sold (see Table 4 on page 20 for the data).

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

SARLUX

Sarlux, with **24 employees**, has its legal office in Sarroch and its administrative office in Milan.

Figure 4 – The IGCC plant: flow chart

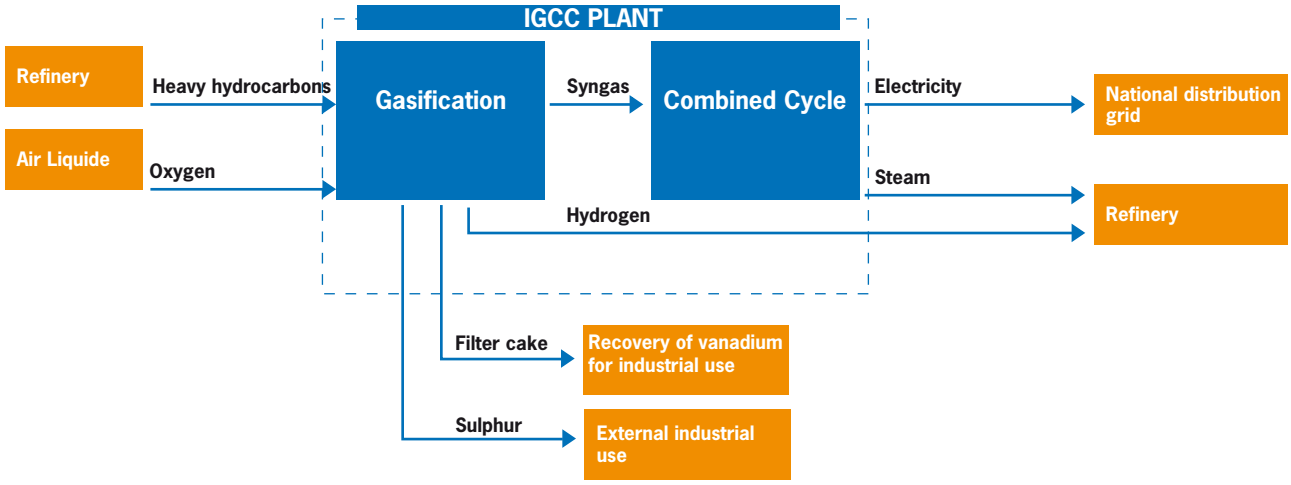


Table 4 – IGCC products

	2005	2006	2007	2008
Electricity (MWh)	4,363,035	4,473,703	4,432,135	4,322,134
Low-pressure steam (t/year)	590,262	608,042	556,828	545,148
Medium pressure steam (t/year)	702,237	677,703	568,650	667,762
Hydrogen (kNm^3)	285,652	360,220	307,083	322,226
Sulphur* (ton/anno)	53,821	48,184	42,589	49,753
Vanadium concentrate (t/year)	1,690	1,250	1,700	1,199

* The quantity shown is included in the figure given in Table 2 on page 18, "Oil products"

The three-line configuration of the IGCC plant ensures continuity of production, both of electricity and of hydrogen & steam for site internal use.
The figures recorded to date confirm the effectiveness of the plant processes and technology, which have shown themselves to be of superior reliability: on average greater than 90%. Of the many advantages of the IGCC plant, of particular importance are the environmental and technological advantages deriving from the adoption of the best available techniques. The yield resulting from these techniques is one of the highest the various different production processes (greater than 50%, see Table 5) and it also results in an extremely low level of emissions, with a better performance than the Enel figure taken as the average national reference level.

Table 5 – Comparison of yields of energy production technologies

Plant	Gross global yeld
Natural gas, combined cycle	56÷57%
Natural gas (turbogas), conventional cycle	30÷35%
Fuel oil, conventional cycle	35÷38%
Sarlux IGCC	51%

With the coming on line of the gasification plant, the Sarroch refinery has seen an improvement in the emissions produced by the "refinery + IGCC" complex compared with the previous situation.
This result is also linked to the implementation of a series of improvement measures on the refinery's plant equipment, especially in terms of emissions of sulphur oxides. In addition, the decrease in output of fuel oils has reduced the number of ships transiting the Gulf of Sarroch area.
From a technological standpoint, the principal advantage associated with adopting IGCC plants lies in the integration of the oil cycle with the electrical cycle: the overall processing cycle constitutes a complete circuit, in which all incoming material is converted to a finished product or to energy.
Lastly, it should be noted that the water requirements of the Sarlux plant (particularly high for electricity production plants of significant dimensions) are entirely met by seawater, which is desalinated and then demineralised in the plants owned and run by Sarlux and Saras, without af-

Filter Cake

The solid product formed by the filter presses and so named because of its physical, cake-like consistency, filter cake is the result of the process of gasification of heavy refined products. It contains high percentages of metals such as iron, vanadium, carbon and nickel.
It is stored in the refinery's temporary deposit area or in a specially-authorised storage area before being sent off-site to plants located in Germany, for recovery of the metals contained in it. For these shipments, every year authorisation is sought for cross-border movement of waste, in accordance with Directive EC/1013/2006.

fecting Sardinia's water reserves. This water is then returned to the sea, keeping control of the full observance of all environmental quality parameters specified by law.

Storage of raw materials and products

The storage facilities on the site are subdivided as follows:

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

Overall, there are 161 tanks with an overall capacity of approximately 3.5 million cubic metres. All tanks are fitted with permanent fire-prevention systems and containment basins of reinforced concrete (35 tanks), or with earthworks (126 tanks).

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

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

- Pumping lines and systems, including oil pipelines connecting to the National Depot and to the marine terminal
- Systems for measurement and additivation of products before shipping
- Land-loading systems (loading bays)
- Sea-loading systems (marine terminal equipment)

Shipping of products over land

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

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

The Saras site is connected to the National Depot and the Liquigas Deposit by gas pipeline, and to the adjacent petrochemical facility by oil pipeline, for commercial exchange of services and semi-processed products (Figure 1, page 13).

Auxiliary services

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

- Thermoelectric power plant for the refining cycle. This produces an amount of electricity and steam that is necessary for the processes

- Air compression system, comprising 4 compressors and 2 distribution networks, one for the instrumentation and one for services
- Unit for treating water brought in to the site (taken from the industrial aqueduct)
- Treatment plant for the wastewater generated by site activities (Process-Water Purification plant, PWP)

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

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

Offices, workshops, warehouses and other services

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

Activities conducted by contracted firms

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

Location of the facility in the local context

The geographic area where the socioeconomic impacts of refinery-related activities are most clearly manifested is administered by four municipalities: Sarroch, Villa San Pietro, Pula and Capoterra, which together form a somewhat homogeneous area to the southwest of Cagliari.
This is a region where two principal types of economic activity can be identified: activity associated with the Sarroch energy/oil hub and the Macchiareddu industrial area, and activity associated with the region's natural resources, agriculture, livestock and tourism, particularly in the Pula area.
With the refinery's existence in the local context, Saras's dominance in terms of dimensions and production capacity assumes notable significance in terms of employment: since the beginning of its activities to the present day, Saras has gone from 100 to over 1,260 employees - divided between the Sarroch facility, where most are located (over 90%), and the two offices in

Rome and Milan - and the company also generates an induced economy (not associated only with refining) employing a further 7,000 persons. In addition, the refinery's production facility constitutes an important driver of development for a group of companies, an industrial entrepreneurial class and also an advanced tertiary sector, all of which are capable of dealing with sophisticated production processes and technologies.
And then of course there is the important function performed by the facility as a supplier of fuels to practically all regional industries, and the active economy of scale with the companies in the adjacent centre of chemical industry, with which there is commercial trade in many raw materials necessary to production.

EMAS and communication with the region

On 20 October 2008 Saras obtained EMAS registration, a new milestone in the company's ongoing improvements which had already (in 2004) resulted in obtaining ISO 14001 certification of the Environmental Management System. EMAS represents an increasing inspiration for the company to voluntarily protect the environment, with the direct involvement of the general public.
Today EMAS represents the most advanced instrument available for attesting to a company's commitment to environmental sustainability: it is a progressive path, to which direct employees and employees of contracted firms are called on to make an active contribution, and also - and in particular - all external stakeholders in the region.

In particular, in 2008 many initiatives were conducted: meetings with environmental, humanitarian, cultural and sports associations and, most importantly, with representatives of the Municipality of Sarroch, the neighbouring Municipalities, the Province and the Region, and with technicians from the control bodies (ARPAS, ASL 8 Health Authority). The purpose of the meetings was generally the exchange of information and communications on matters of common interest, such as environmental protection and safety and regional development, but the meetings also addressed the divulgation of Saras's programmes for improving emissions monitoring.
To continue the programme of meeting and dialogue between Saras and the local community, meetings have been organised with the general public to discuss the principal issues associated with the sustainable development of the region, and meetings with students have also been organised.

Lastly, in 2008 the Saras School Project was held for the tenth time. This is by now a well-established tradition that forms part of the company's general choice to maintain transparency to external stakeholders. The project is a programme that accompanies the activities of around 300 children throughout the school year in the elementary schools of the neighbouring municipalities, raising their awareness of the sensible use of natural resources and the importance of saving energy, beginning by calculating the ecological footprint of the children's own school: a concept that is now widespread and consolidated as an indicator of sustainability that express-

es how much “nature” we are using to support our way of life. To celebrate the tenth anniversary of the School Project, in 2008 Saras, in association with the Municipality of Sarroch, held an interactive multimedia exhibition on ecological footprints and installed a mobile laboratory provided by the “A Come Ambiente” (i.e. “E for Environment”) museum of Turin.
Part of the project consists of a visit to the Sarroch refinery, representing a further important opportunity for meeting the public, especially from the point of view of transparency and openness towards our external stakeholders. There is an internet site set up especially for the School Project, www.sarasperlascuola.it which is a useful tool for communicating both with students and with everyone who wishes to find out more about one of the most important industrial companies in Sardinia and internationally.

Subsidiaries

Akhela: a presence in the Information Technology market

Akhela was founded in 2004 by the merger of the electronics and computing companies in the Saras Group, so inheriting the significant skills sets and experience built up by the originating companies. The refocalising of resources and skills and their aggregation has created a company with solid bases of expertise and with a modern and powerful infrastructure, capable of developing customised solutions for its clients and providing high quality services.

Among other responsibilities, Akhela manages the computer systems used in production and administration at the Saras refinery in Sarroch. This activity has enabled Akhela to build a base of skills and procedures and a corporate culture that enhances the logical and physical security, as well as the continuity, of the services provided: Akhela makes this high-profile expertise available to its clients and partners.

Akhela’s range of products and services is organised into two areas: development and management of Information Technology (IT) and Embedded Systems. In the IT market, Akhela focuses on services and solutions for computer system security and consolidation, performance optimisation, and operating cost reduction. Clients who make use of Akhela’s services are generally medium-to-large organisations, for which security and continuity of service represent an indispensable requirement.

In the field of designing and developing embedded systems, Akhela has built up significant expertise in real time operating systems, signal processing and software development, which has enabled the company to win important contracts in the automotive and avionics sectors, in multimedia systems for consumer applications and in telecommunications.

Akhela is a company in a phase of strong growth, and it aims to become a highly-visible, recognised player in the emerging market of computer security and systems optimisation. It operates in accordance with recognised

akhela

With **220 employees**, Akhela has four offices in Italy: Cagliari (legal and operations office), Milan (general management and marketing), Rome and Turin.

1 - embedded system: an encapsulated, dedicated computer system.

quality standards, it has ISO 9001 certification and it has obtained Level 2 of CMMI® for Development. Akhela's procedures and infrastructures are designed to guarantee maximum continuity of service and the highest possible level of confidentiality of information and of the activities conducted on behalf of its clients, providing a distinct added value. The conduct of the company's employees and associates are governed by a code of ethics.

Around 220 persons work in Akhela. Recognising the strategic importance of its resources, Akhela has a programme of investment in the professional and technological training of its people. To this end the company has stipulated a number of agreements with Italian universities to acquire technologies and expertise and to develop the skills of its employees.

Sartec: research for innovation and the environment

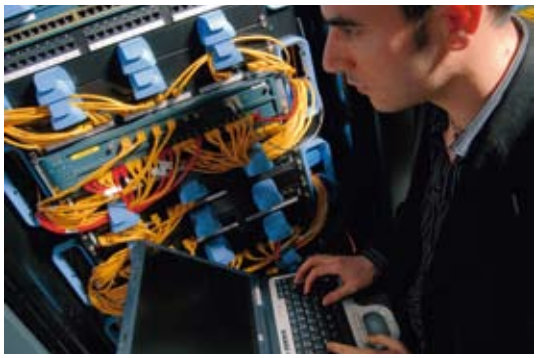
Sartec is the Saras Group's technology and research company for environment and industry. Sartec's environmental consulting and monitoring services, design services, and optimisation of production processes and industrial automation are aimed at supporting innovation and sustainable industrial development. As well as being implemented with the technical expertise of its specialists, these services are benefited by special attention to what for Sartec represent indispensable values, and which thus become added value for its clients: *environmental sustainability, innovation and quality*.

To offer the best technological solutions, Sartec uses the most advanced technologies available on the market and applies the results of studies conducted by research institutes or carried out by Sartec itself, using its research and development department and its ultramodern chemical laboratory.

Sartec provides the following services:

- Services for environmental protection: monitoring systems for air quality, water quality and emissions, engineering services, environmental consultation services and analyses of water, air and emissions, using an advanced analysis laboratory. In particular, in the area of environmental monitoring, Sartec is able to offer everything from individual analysis instruments right up to entire measurement networks supplied using a turnkey formula, managing the entire process from design to aftersales technical service. The consulting services provided by the company include risk analysis, characterisation of contaminated sites, planning of safety containment and decontamination interventions on contaminated sites, and also environmental impact studies (EIS) preparatory to the environmental impact assessment (EIA) procedure, when drafting applications for Environmental Integrated Authorisation.

- Services for industrial efficiency and energy savings: these services range from the construction of package plants for the oil industry (including blowdown recovery systems, filtering systems, and chemical ad-



SARTEC
SARAS RICERCHE E TECNOLOGIE

With **165 employees**, Sartec has two sites in Italy: in Cagliari, in the Macchiareddu industrial area (legal office, factory and laboratories) and in Milan (commercial office).

ditivation systems) to advanced process controls and process analysis systems (from their design and commissioning right up to their overhauling and periodic revamping of the instrumentation). This category of services also includes engineering services (for example, feasibility studies and cost/benefit analyses, process basics, piping and layout engineering, civil engineering, machine engineering, electrical instrumentation engineering and automation engineering), consultations in the oil refining field, tests on catalysers, and alarm rationalisation.

Innovation guides Sartec in every project. This has enabled the company to implement a number of original solutions that have effectively resolved clients' problems. Sartec conducts applied research and development of new products and technologies, both for the Saras Group and for clients, in the environmental sector and for the optimisation of industrial processes. Sartec has developed many research projects, including projects qualifying for financing from the European Union, the MIUR (Italian Ministry of Education, University and Research) and the Sardinia Region, in association with the University, the CNR (Italian National Research Council) and other research centres and innovative enterprises.

Of the innovative projects handled by Sartec, the following are of note:

- *The S.I.M.A.G.E. project*: Sartec has designed and implemented an Integrated System for Environmental, Industrial Risk Management and Emergency Monitoring for the Marghera area.
- *The "Gulf" project*: Sartec has developed, in association with a number of university departments and research institutes, an innovative project for implementing an environmental control and regional management system for the gulf of Cagliari.

Sardeolica: production of wind energy

Sardeolica's activities come fully under the corporate strategies of the Saras Group, for which protecting the environment represents a priority objective. As confirmation of this, in 2006 Sardeolica obtained ISO 14001:2004 environmental certification, and this will be renewed in 2009.

With its 48 authorised wind-powered generators, of which 42 are already installed for a power generation capacity of 72 megawatts, the Ulassai installation (which to date is the first plant built by Sardeolica) is one of the most important wind farms in Sardinia. At full operation it will produce around 165 GWh/year, corresponding to the energy needs of 60,000 families. At the installation there is an electrical substation for the connection with the national distribution grid. The electricity is sold to the operator of the national electricity transmission grid (the current GSE), and for 8 years the wind farm will benefit from green certificates. The wind farm has obtained IAFR (Plant Powered by Renewable Source) qualification from GSE.

From the point of view of the impact on the region, Sardeolica employs 26 persons, mainly young graduates and school-leavers from Ulassai or the immediate vicinity, who work principally in the areas of technical/opera-

The context in which Sardeolica was founded: The Kyoto Protocol

The reduction of climate-altering gases has become a world priority. In this context the European Union has undertaken, by ratifying the 1997 Kyoto Protocol, to reduce its emissions of greenhouse-effect gases by 8% compared to the values recorded in 1990.

As a consequence, a series of acts have been adopted, including the 1997 White Book and the 2001/77/EC Directive, which support and encourage electricity generation from renewable sources. In this scenario the Sardeolica company was founded in 2001, to build and manage plants for generating electricity from a renewable source. Following the acquisition by Saras S.p.A. of the holding owned by Babcock & Brown Wind Energy in the subsidiary company Parchi Eolici Ulassai S.r.l. (PEU), the subsidiary has been entirely consolidated since 30 June 2008.

The environmental advantages of wind energy

Wind energy is a renewable source of energy. It is clean and inexhaustible. The environmental impact of wind-powered generation systems is extremely low, both during construction and in operation. Some of the environmental advantages of this type of plant are the following:

- Extremely low impact on the environment: In operation, wind-powered plants do not produce atmospheric emissions or discharges into the soil. They don't consume water and they don't require the use of chemical products, and they cause no damage to flora and fauna. At the end of the plant's life cycle it can be completely removed without causing any environmental damage, and no restoration or decontamination work will be required on the area since there are no possible risks of pollution.
- Low incidence of noise: The levels of acoustic emissions from the wind-powered generators installed are so low that they are imperceptible, even near the machines.
- Contained visual impact: Correct location of the wind farms and the individual generators - the result of careful study in order to achieve maximum environmental compatibility - means the windmills are sympathetically inserted into the landscape. Wind farms are usually far from populated centres (the nearest populated centre is over 4 km away), and they do not require modifications to the use of the surrounding land. The Ulassai wind farm, for example, covers an area of 2,900 hectares, but only 1% of this land area is used by its installations. In addition, optimal technical solutions have been adopted, such as burying electrical cables, in order to minimise the visual impact and avoid electromagnetic interference with telecommunications.

SARDEOLICA

With **26 employees**, Sardeolica has its legal office in the Macchiareddu (CA) industrial area. The Ulassai wind farm is located in the Corte Porcus and Fenarbu areas, in the province of Ogliastra.

tions management, plant operation & maintenance, monitoring of flora and fauna, activities associated with the Environmental Management System, and administrative, purchasing and tender activities.
This figure is particularly important, because with this initiative a workgroup has been created with advanced technical skills oriented to the industry, in an area where traditional career vocations are predominantly agricultural and/or pastoral and which suffers from high rates of unemployment and emigration. It must also be emphasised that there is also a positive economic effect in terms of an increase in the activities associated with providing maintenance, catering and tourism services. Therefore Sardeolica's commitment to respect and protect the environment, health and safety in the workplace is fundamental to the correct integration of its activities in the region where it operates. Lastly, Sardeolica is conducting studies on the construction of other wind farms, and investigations are also underway for the development of initiatives to produce electricity from other renewable sources, such as photovoltaic.

Arcola and Saras Energia: the distribution grid

Arcola

Arcola is the Group's company that sells oil products in Italy and on the wholesale market. Its activities cover a wide range of products that are made available in various different geographic areas by means of transit through depots owned by Arcola and third-party logistics operators.
The areas of greatest influence are Sardinia and central/northern Italy (see Figure 5). Founded in 1987, Arcola moves around 1,000,000 tonnes per year, has a turnover of €1,200 million and a market share of 6.8%.
As well as the commercial activity, which represents the core business, at the depot in the municipality of Arcola (La Spezia), the company provides primary operators with reception, storage and redelivery services, via sea and land, of oil products for the fuel distribution network and for marine bunker sales.
The company's depot in Arcola has a capacity of around 200,000 m³ through which over 500,000 tonnes of fuels and combustibles transit, both for Arcola and for its customers. The depot receives an average of 30 oil tankers, loads around 80 cargo barges and over 15,000 tanker lorries.

Saras Energia

Saras Energia was founded in 2001 by the merger of Saroil and Continental, two Spanish oil companies created by the Saras Group in 1990 and 1992 respectively. Saras Energia handles the distribution and sale of oil products for wholesale and retail sale on the Spanish market. The company operates throughout Spain, including the Balearic Islands, through a highly competent and professional commercial organisation with an expert knowledge of the market.

The widespread distribution the products throughout Spain is ensured by the company's own logistics network and by an independent network. With

Figure 5 – Depots – Loading bases

Own depots: Arcola and Cagliari

ARCOLA

With **33 employee**s, Arcola has its legal office in Sarroch and its operations site in Arcola (La Spezia).

the acquisition of the Spanish ERG network in 2008, which will become operative by June 2009, Saras Energia will significantly increase its weight in the road network fuel distribution sector, and will have an effective presence in the entire Spanish Mediterranean area (Figure 6).

A notable strong point of Saras Energia is the synergic action within the Saras Group, whose Sarroch refinery is a tributary of the Spanish market: Spain systematically imports 33% of the diesel consumed in that country and, through Saras Energia, in 2008 almost 3 million cubic metres of fuels produced at the Sarroch refinery were introduced to the Spanish market.

Saras Energia has invested in research and development to better meet the challenges of the market. In December 2002, the company activated the modern terminal in Cartagena in Spain's southwest. With a storage capacity of 112,000 cubic metres, the terminal represents an important resupply location for logistics at the centre of the Mediterranean coast.

In addition, at the end of 2008 construction was concluded of a plant for producing biodiesel, with a capacity of 200,000 tonnes per year. The plant is located very close to the existing terminal, with which it is connected through a bundle of pipes which enable the plant and the terminal to share equipment for loading and unloading via sea, as well as significant operational and functional economies of scale. The production of biodiesel fulfils a very important function in the Spanish and Italian scenario, in that it will enable the companies in the Saras Group to meet the requirements of European legislation on mandatory immissions in the consumption of biofuels, and also to meet all the related market opportunities.
The company's development strategy is based on the consolidation and further development of a strong and stable position, especially in the areas adjoining the Mediterranean, on the quest for excellence in service to its customers, on the rigorous application of the strictest environmental and safety regulations, and, of course, on the optimisation of costs.

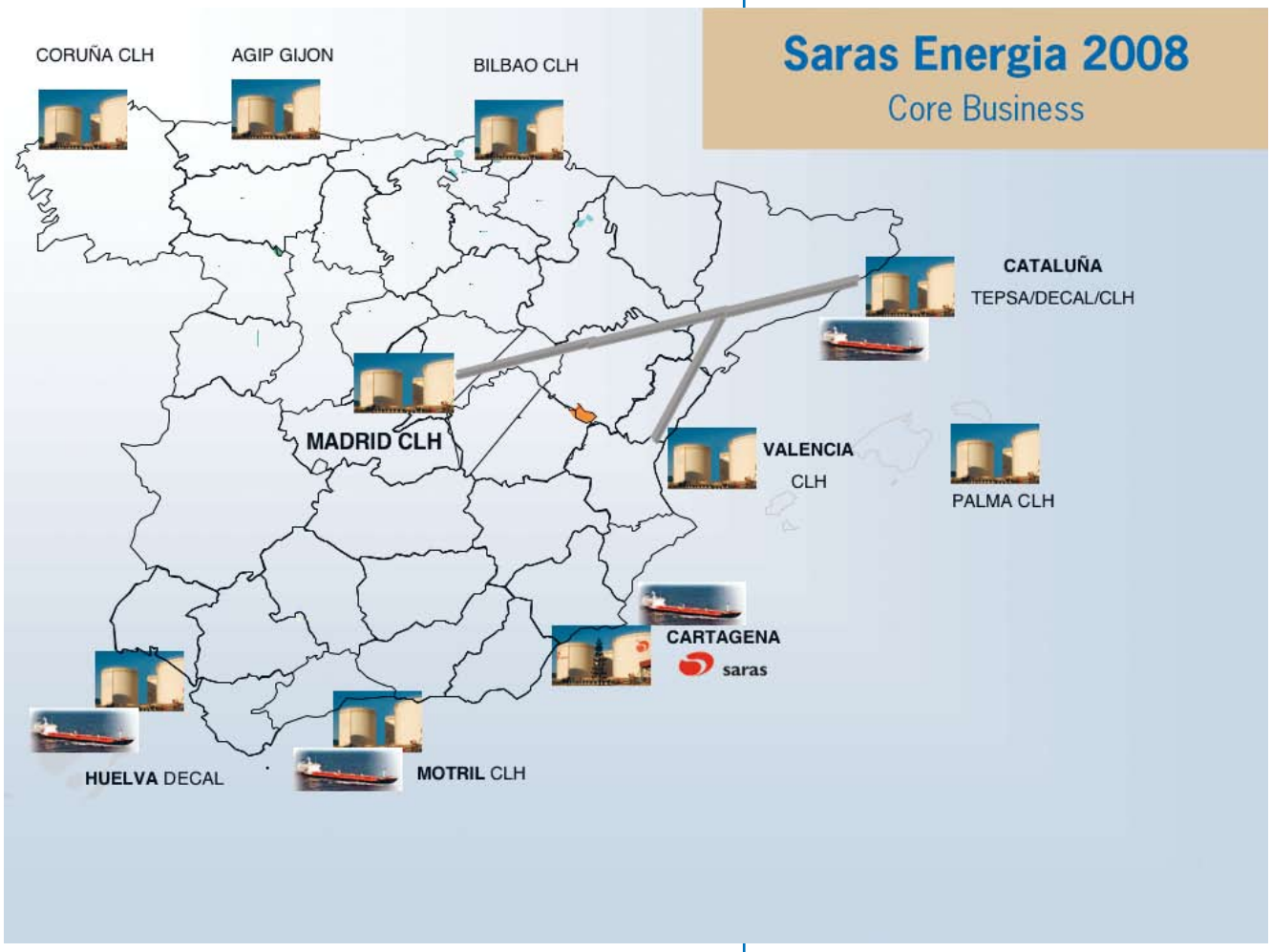
In addition to having a logistics and production section, the former distributed throughout Spain and the latter concentrated in the industrial area of Cartagena, Saras Energia has a commercial and administrative organisation that is very agile and strongly customer-oriented. It can be described in the following points:

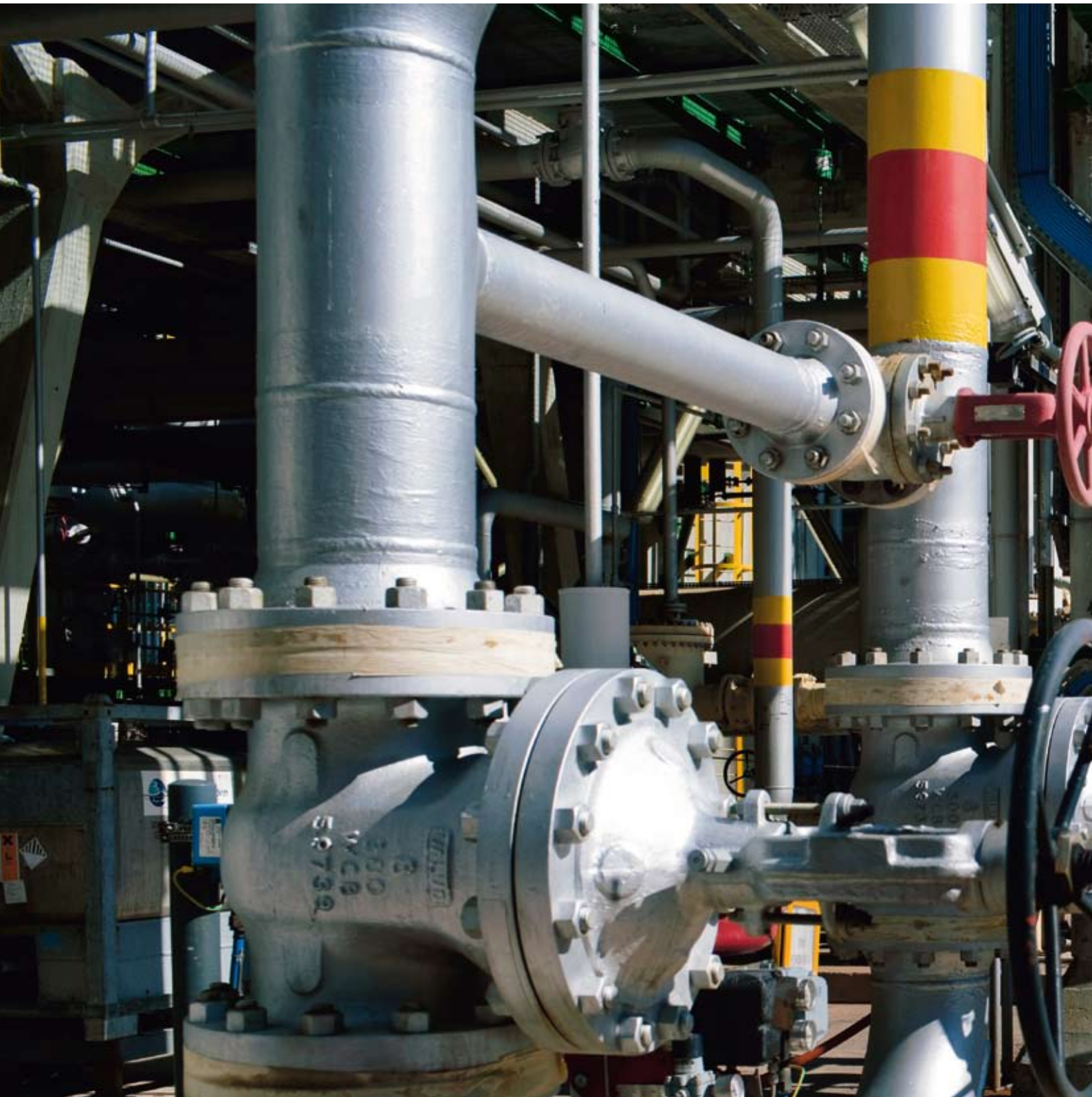
- The sales support services have been designed to give real added value to the company's products and services: a call centre, located in Madrid, can be contacted six days a week to address the customers' needs and comprehensively respond to all their requests for commercial, administrative and/or technical information, so as to propose new initiatives and create a reciprocal relationship of trust.
- Of equally high priority are the organisation and shipping of products using the agreed methods and to the agreed timescales: this is achieved by a system of delivery planning and management that includes our drivers in the sphere of direct involvement.

With **268 employees**, Saras Energia has its legal office in Madrid and its depot in Cartagena.

- All this is managed by the men and women of Saras Energia: the real protagonists of the company's success. They are a team of professionals who work with dedication, a sense of responsibility and attention to customer satisfaction in every phase of the corporate processes: everything, from deliveries, customer support, administration, plant operation and maintenance, right up to and including commercial development.

Figure 6 – Saras Energia's logistics network





Policies

Policies

The environmental management policy

Saras

Saras has always devoted careful attention to many environmental impact factors associated with the activities conducted at the facility and, as part of a programme that was already in place to favour environmental protection, in 2001 the company took steps towards obtaining certification of its Environmental Management System (EMS) to the international ISO 14001 standard.

The achievement of EMAS registration on 20 October 2008 is part of the process of continually improving our environmental management, which was begun by Saras a number of years ago:

- In May 2002 all employees were given the company's *Environmental Policy*, containing the inspiring principles and commitments of Saras's environmental management policy
- Subsequently the Environmental Management System (EMS) Manual was drawn up, together with the related procedures to implement it, thus codifying the actions and conduct for all company personnel
- Objectives for improvement have been defined and approved by the Management Committee. These objectives are verified and updated annually
- Following this, internal audits were conducted to periodically verify that the EMS has been applied correctly
- In June 2004 Saras obtained the certification of its EMS to the ISO 14001:1996 reference standard. Subsequently (in May 2006) this certification was updated to the **ISO 14001:2004** reference standard
- In June 2007 the three-yearly EMS audit was conducted to renew the environmental certification. In addition, as required by the control procedures conducted by certifying body Lloyd's Register Quality Assurance, inspections of the site are carried out every six months by Lloyd's
- In May 2008 the revised Environmental Policy was released and distributed to all direct employees and to all employees of contracting firms working at the site

2008 saw the conclusion of the evolutionary process of the company's Environmental Management System, which enabled the Saras facility to be registered under **EMAS**, the European standard for eco-management and auditing (EC Regulation no. 761/2001) and which resulted in the public release of the 2008 Environmental Declaration. Sarlux produces electricity within the site. This activity is completely integrated into the refinery's production cycle and it is also covered in the certification discussed previously.

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Gestione Ambientale di:

Saras S.p.A.
Galleria De Cristoforis, 8 (MI)
Strada Statale 195 Sulcitana - Km. 19.500 - Sarroch (CA)

è stato approvato dal Lloyd's Register Quality Assurance per conformità alla seguente norma di Sistemi di Gestione Ambientale:

ISO 14001:2004
EN ISO 14001:2004
UNI EN ISO 14001:2004

Il Sistema di Gestione Ambientale si applica a:

Produzione di prodotti della raffinazione del petrolio, programmazione, preparzione e spedizione di prodotti finiti, produzione di energia elettrica. Gestione della progettazione, ingegnerizzazione e costruzione di impianti interni.

La validità di questo certificato è vincolata al certificato dello stesso numero che elenca le ubicazioni oggetto dell'approvazione.

Certificato di Approvazione N.: LRC 1805261/4
Approvazione Originaria: 1 Giugno 2004
Certificato Attuale: 30 Luglio 2007
Scadenza Certificato: 1 Giugno 2010

Emesso da: Lloyd's Register Quality Assurance Italy S.r.l.

Certificate of Saras's Environmental Management System compliance to the ISO14001 standard

Certificato di Registrazione
Registration Certificate

EMAS

SARAS S.p.A.
S.S. Sulcitana n.195 – Km 19
09018 – Sarroch (CA)

N. Registrazione: IT – 000995
Data di registrazione: 20 ottobre 2008

FABBRICAZIONE DI PRODOTTI DERIVANTI DALLA RAFFINAZIONE DEL PETROLIO — NACE: 19.20
PRODUZIONE DI ENERGIA ELETTRICA — NACE: 35.11

Roma, 20 ottobre 2008
Certificato valido fino al: 25 luglio 2011

Comitato Ecolabel - Ecoaudit
Il presidente
Elio Lannutti

Registration of Saras EMS under EMAS

Subsidiaries

Sardeolica

Sardeolica produces electricity from wind via its production units in the municipality of Ulassai (OG). Even though this type of production is an activity with an inherently low environmental impact, Sardeolica considered it a priority to set up an Environmental Management System in order to achieve ongoing improvement objectives on a number of environmental aspects: energy consumption, water consumption and consumption of auxiliary materials, waste production and prevention, and reduction of all forms of pollution.

In 2006 Sardeolica took the necessary steps to certify its Environmental Management System (EMS) to the international **ISO 14001:2004** standard. In March 2006 the company Environmental Policy was released to all employees, containing the policy's guiding principles and environmental management commitments. Subsequently, development of the procedures to implement the Environmental Management System (EMS) codified the action methods and conduct for the entire company staff. In August 2006 Sardeolica obtained certification of its EMS to the ISO 14001:2004 reference standard. In addition, as required by the control procedures conducted by certifying body Lloyd's Register Quality Assurance, inspections of the site are carried out every year by Lloyd's.

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Gestione Ambientale di:

Sardeolica S.r.l.
SP 13 km 11,500
Ulassai (OG)

è stato approvato dal Lloyd's Register Quality Assurance per conformità alla seguente norma di Sistemi di Gestione Ambientale:

ISO 14001:2004
EN ISO 14001:2004
UNI EN ISO 14001:2004

Il Sistema di Gestione Ambientale si applica a:

Installazione, esercizio e manutenzione dei parchi eolici siti in Ulassai (OG) nelle località di Corte Porcus, Fenarbu, Larenzu e Perda Fitta.

Certificato di Approvazione N.: IRC 4251488

Approvazione Originaria: 1 Agosto 2006

Certificato Attuale: 1 Agosto 2006

Scadenza Certificato: 31 Agosto 2009

Emesso da: Lloyd's Register Quality Assurance Italy Srl

Certificate of Sardeolica's Environmental Management System compliance to the ISO14001 standard

Akhela

In September 2008, all employees of Akhela were given the company's Environmental Protection Policy, containing the company's inspiring principles and commitments to protect the environment in the conduct of its activities.

The safety policy

Saras

The Safety Policy Declaration

Based on an increasingly clear-cut legislative framework that also governs safety management in industrial activities, to protect its employees and the surrounding region Saras has put in place a programme of progressive improvement of standards and results, recognising safety as a strategic value in its corporate conduct.

A specific Safety Policy was introduced in 1996 and since then Saras has achieved positive results in the constant prevention of accidents and in the safeguarding of its employees and the surrounding region.

The Safety Management System

The implementation of a Management System for Health and Safety at Work (HSW) has introduced performance measurements and the planning of improvement objectives and milestones.

Following a similar path to that taken by the EMS, in December 2007 Saras obtained certification of its Management System for Health and Safety at Work (HSW) to the OHSAS 18001:2007 standard, issued by Lloyd's Register Quality Assurance Italy.
Saras considers the protection of health and the prevention of all forms of accident or injury (both for its employees and for those of contracting firms) to be primary values, as stated in the Policy for Health and Safety at Work, updated edition as of 19/7/2007.
Saras's Management System for Health and Safety at Work is integrated with the Management System for the Prevention of Major Hazards, which has been implemented in accordance with the Italian Ministerial Decree of 9 August 2000. In addition, a specific Policy for the Prevention of Major Hazards was drawn up for the Sarroch site on 31 March 2008.
The priority objective of Saras's commitment to safety management has always been prevention and coupled with the search for more effective ways of reducing the probability of occurrence of accidents. This management philosophy is the same as that underlying Italian Legislative Decree no. 334 of 1999 ("Seveso II"), which stipulated the adoption of a Safety Management System (HSW) for the prevention of Major Hazards.
Sarlux produces electricity within the site. This activity is completely integrated into the refinery's production cycle and it is also covered in the certifications discussed previously.
In the future, Saras's objective is to integrate the Management System for Health and Safety at Work with the Environmental Management System.


CERTIFICATO DI APPROVAZIONE

Si certifica che il sistema Occupational Health & Safety Management System di:

Saras S.p.A.
Direzione: Galleria De Cristoforis, 8 - Milano
Impianti: Strada Statale 195 Sulcitana,
km. 19,500 – Sarroch (CA)

e' stato approvato dal Lloyd's Register Quality Assurance per conformita' a:

OHSAS 18001:2007

Il sistema Occupational Health & Safety Management System si applica a:

Produzione di prodotti della raffinazione del petrolio, programmazione, preparazione e spedizione di prodotti finiti, produzione di energia elettrica. Gestione della progettazione, ingegnerizzazione e costruzione di impianti interni.

La validità di questo certificato è vincolata al certificato dello stesso numero che elenca le ubicazioni oggetto dell'approvazione.

Certificato di Approvazione N.: IRC 8180526

Approvazione Originaria: 9 Gennaio 2008
Certificato Attuale: 9 Gennaio 2008
Scadenza Certificato: 9 Gennaio 2011

Emesso da: Lloyd's Register Quality Assurance Italy S.r.l.

Certificate of Saras's Occupational Health & Safety Management System compliance to the OHSAS 18001 standard

Subsidiaries

The other companies in the Group have also taken steps to adopt a Management System for Health and Safety at Work, to ensure the utmost safety for all direct employees and for the employees of contracting companies.

Sardeolica

Sardeolica adopted a Management System for Health and Safety at Work, compliant to the international OHSAS 18001:2007 standard. In June 2008 the company's Policy for Health and Safety at Work was released to all employees, containing the policy's guiding principles and commitments for Sardeolica. Subsequently, development of the Integrated Environment & Safety Management System Manual and the procedures to implement the system codified the action methods and conduct for the entire company staff. The registration process is still in progress.

Akhela

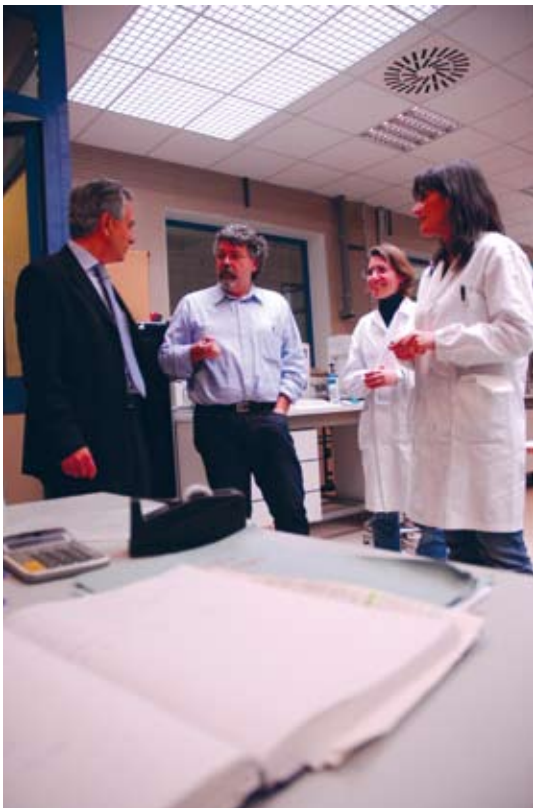
In September 2008 Akhela's Policy for Health and Safety at Work was released to all employees, containing the policy's guiding principles and commitments for Akhela. Subsequently, development of the Manual for the Management System for Health & Safety at Work (HSW) and the procedures to implement the system codified the action methods and conduct for the entire company staff.
[PAG. 36]

Sartec

In 2008 Sartec adopted a Management System for Health and Safety at Work (HSW) capable of integrating objectives and policies for health and safety in the design and management of systems for work and production.
By adopting this HSW system, the company aims to:

- Reduce the possibility of occurrence of any event that would be damaging to persons, the environment or property, and pursue the ongoing improvement of conditions and of quality of work on the site
- Progressively reduce the overall costs of HSW, including those deriving from accidents and work-related illnesses, by minimising the risks to which employees or third parties (customers, suppliers, visitors etc.) can be exposed
- Increase its efficiency and performance levels
- Improve its internal and external image

The HSW system defines the methods for identifying, within the corporate organisational structure, the responsibilities, procedures, processes and resources for implementing the corporate prevention policy, in observance of the health and safety legislation in force.
In October 2008 Sartec's Policy for Health and Safety at Work was released to all employees, containing the policy's guiding principles and commitments for Sartec.



Arcola

In July 2008 Arcola's Policy for Health and Safety at Work was released to all employees, containing the policy's guiding principles and commitments for Arcola. Subsequently, development of the Manual for the Management System for Health & Safety at Work (HSW) and the procedures to implement the system codified the action methods and conduct for the entire company staff. In Arcola's case also, the company's HSW system is integrated with the Management System for the Prevention of Major Hazards, implemented in accordance with the Italian Ministerial Decree of 9 August 2000, to take advantage of the areas the two systems have in common, and a specific Policy for the Prevention of Major Hazards was drawn up for the Arcola site on 5 July 2008.
The priority objective of Arcola's commitment to safety management has always been prevention and coupled with the search for more effective ways of reducing the probability of occurrence of accidents. This management philosophy is the same as that underlying Italian Legislative Decree no. 334 of 1999 ("Seveso II"), which stipulated the adoption of a Safety Management System (HSW) for the prevention of Major Hazards.

The Quality Certification

Saras

Prior to environmental certification, the company had already put in place a programme to adopt a Quality Management System (QMS), which defined the procedures for managing a series of areas/processes internal to

the refinery. Currently, the following corporate processes are certified to the **ISO 9001:2000** quality standard:

- **Movement and Preparation of Products**, by means of which the products are prepared according to the customer's contractual specifications
- **Shipments**, by means of which the distribution, via land and sea, of products requested by the customer is managed
- **Production Scheduling**, which aims to plan and optimise incoming consignments of raw materials (crude oil), their processing, and the preparation and production of the finished products requested by customers
- **Engineering**, by means of which the design of new internal plant is managed, as well as improvement modifications to existing plant
- **Construction**, by means of which the building of new internal plant is managed, as well as building modifications to existing plant

In addition, the processes listed below, although not certified, operate under the QMS in conformance with the requirements of the ISO 9001:2000 reference standard and in accordance with the procedures of the QMS itself, in order to protect the customer and the market in which Saras operates:

- **Reception**, by means of which the unloading of raw materials (crude oils) from oil tankers at the marine terminal is supervised
- **Analytical control of production**, carried out by the chemical laboratory responsible for the verification and control of the hydrocarbons produced. In addition, in June 2008 the chemical laboratory obtained **SINAL accreditation** under the UNI CEI EN ISO/IEC 17025 standard
- **Purchasing and Tenders**, which manages the selection and assessment of suppliers and the assignment and scheduling of orders for materials and tenders
- **Organisation and Human Resources**, which ensures the correspondence of the company's employees to the corporate needs, through the careful recruitment of resources and through training activities geared to the acquisition, development and transfer of professional skills and expertise
- **Commercial**, which stipulates contracts for the resupply of raw materials and the sale of products
- **Maintenance**, which schedules and manages the activities necessary to maintain the infrastructure and equipment for making the products required by the customers, in conditions of efficiency and functionality
- **Materials Warehouse**, which manages the transport of materials to/from the refinery and the associated expediting, the reception and distribution of the materials (both the physical and the accounting activity), and their storage in defined locations.

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Conduzione Aziendale per la Qualita' di:

Saras S.p.A. Raffinerie Sarde
S. S. Sulcitana, km 19.5
Sarroch (CA)

è stato approvato dal Lloyd's Register Quality Assurance per conformità alle seguenti norme di Garanzia della Qualità

ISO 9001:2000
EN ISO 9001:2000
UNI EN ISO 9001:2000

Il Sistema di Gestione per la Qualità si applica a:

Servizi di programmazione, preparazione e spedizione di prodotti petroliferi. Progettazione, ingegnerizzazione e costruzione impianti interni.

Certificato di Approvazione N.: IRC 180526

Approvazione Originaria: 8 Luglio 1999
Certificato Attuale: 9 Luglio 2008
Scadenza Certificato: 8 Luglio 2011

Emesso da: Lloyd's Register Quality Assurance Italy S.r.l.

Certificate of Saras's Quality Management System compliance to the ISO9001 standard for specific corporate processes

CERTIFICATO DI ACCREDITAMENTO

Numero di Accreditamento
0813

Si attesta che

Il Laboratorio SARAS SpA

Strada Sulcitana Km 19 - 09018 Sarroch - CA

è accreditato dal SINAL per l'esecuzione delle prove elencate nelle schede che accompagnano questo certificato. Le schede possono subire variazioni nel tempo.
L'accreditamento attesta la competenza tecnica del Laboratorio relativamente alle prove accreditate, in conformità alle prescrizioni della norma UNI CEI EN ISO/IEC 17025:2005 "Requisiti generali per la competenza dei laboratori di prova e taratura".
I requisiti gestionali della UNI CEI EN ISO/IEC 17025:2005 sono allineati a quelli della ISO 9001:2000.
L'accreditamento resta in vigore fino al **maggio 2012**.
I laboratori sono soggetti a verifiche annuali di sorveglianza e, ogni quattro anni, di rinnovo dell'accreditamento.
La conferma della validità dell'accreditamento può essere verificata sul sito WEB (www.sinal.it) o richiesta direttamente al SINAL.
Il SINAL è firmatario dell'accordo multilaterale di mutuo riconoscimento della European Cooperation for Accreditation (EA-MLA) e dell'accordo dell'International Laboratory Accreditation Cooperation (ILAC-MRA).

Il Direttore
(Dr. P. Bianco)

Il Presidente
(Prof. A. Paoletti)

Sinal accreditation for Saras's chemical laboratory

Subsidiaries

Akhela

Akhela's mission is to provide the market with solutions for computer system security and computer system consolidation, professional services for application software design and development and for software life cycle management, and the design, provision and monitoring of computer services and infrastructure with exceptionally high standards of quality and featuring the utmost security.

To achieve this mission Akhela has adopted a Quality Management System at its Macchiareddu (CA) site, and in April 2004 it obtained quality certification for this system to the **ISO 9001:2000** standard.

Akhela's Quality Management System (QMS) aims to guarantee the quality of the company's products and services. Its prime objective is therefore to implement the Quality Policy set out by the Management, with the involvement of all company departments.

The Akhela QMS is applied to the processes of design, development and provision of computing services, and to the processes of development and maintenance of software, including embedded software. In particular, the domain covered by the certification is:

- The design, development and provision of computing services on standard market and open-source infrastructures and platforms
- The design, development and maintenance of:
  Applications software
  Embedded software

The QMS should also be considered as a powerful tool for acquiring an integrated, high-level corporate culture.

In particular, the Akhela QMS is organised by processes, which are interrelated and which interact with each other:

- Management Processes
- Quality System Management Processes
- Resource Management Processes
- Product Implementation, Provision and Monitoring (Delivery) Processes
- Measurement and Verification Processes
- Operations Support Processes

In order to constantly improve the level of its products and services, in addition to quality certification to the ISO 9001:2000 standard, Akhela has undertaken a programme of certifications and adaptations to international quality standards in the sector. In recent years, one of these, CMMI (Capability Maturity Model Integration) has established itself on the international market as the reference model for corporate process requirements regarding software development. Akhela obtained Maturity Level 2 of CMMI version 1.2 in December 2008, and it is one of the few Italian companies (and as yet the only Sardinian company) to have achieved this rating.


CSQ

CERTIFICATO N. 9151.SARL
CERTIFICATE N.

AKHELA SRL Unipersonale

ISO 9001:2000

2004-04-01 2007-05-31 2010-03-31

SINCERT

CISQ

Certificate of Akhela's Quality Management System compliance to the ISO9001 standard

1 - *open source*: open sourcecode, i.e. software whose authors encourage its free study and its modification by other, independent programmers.

Obtaining this certification gives Akhela a qualified international visibility, partly due to the company's being listed in the directory published on the website of the Software Engineering Institute (SEI) (http://sas.sei.cmu.edu/pars.aspx).

Sartec

Sartec has adopted a Quality Management System, the certification for which, to the **ISO 9001:2000** quality standard, was obtained in October 2001.

The management system applies to the following activities/processes:

- Design and production of analysis systems for the environment and industry
- Provision of technical assistance and maintenance, right up to and including global service, for analysis and measurement systems
- Design and production of "package" modular systems for industry
- Design, configuration, testing and technical assistance for monitoring, control, decision support and optimisation systems for industrial and civil applications
- Design, configuration, testing and technical assistance for environmental monitoring systems for industrial and civil applications
- Chemical/analytical activities on own behalf and for third parties
- Service and consultation activities in the environmental field
- Service and consultation activities in the petroleum field

The System also applies to all corporate processes that contribute to ensuring the capacity to provide products that conform to customer requirements or to applicable compulsory requirements.

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Gestione per la Qualita' di:

Saras Ricerche e Tecnologie S.p.A.
Trav. 2a Strada Est – Z. I. Macchiareddu - Grogastu
Assemini (CA)

è stato approvato dal Lloyd's Register Quality Assurance per conformità alle seguenti norme di sistemi di gestione:

ISO 9001:2000
EN ISO 9001:2000
UNI EN ISO 9001:2000

Il Sistema di Gestione per la Qualità si applica a:

Progettazione, configurazione, collaudo e fornitura di sistemi di automazione, di ottimizzazione di processo e di supporto decisionale per applicazioni industriali e civili. Progettazione, montaggio, collaudo ed assistenza all'avviamento di impianti package per l'industria. Servizi di ricerca applicata e consulenza in campo ambientale e petrolifero. Servizi di chimica analitica. Progettazione, montaggio, collaudo, messa in servizio, assistenza post-vendita e manutenzione (global service) di sistemi di analisi.

La validità di questo certificato è vincolata al certificato dello stesso numero che elenca le ubicazioni oggetto dell'approvazione.

Certificato di Approvazione N.: URC 110876

Approvazione Originaria: 12 Ottobre 2001
Certificato Attuale: 17 Ottobre 2007
Scadenza Certificato: 12 Ottobre 2010

Emesso da: Lloyd's Register Quality Assurance Italy S.r.l.

Certificate of Sartec's Quality Management System compliance to the ISO9001 standard


12
10

Production

Production

The Sarroch facility

The energy balance

The energy incoming to the site comprises raw materials (crudes and semi-finished products), electricity and water, as shown in the diagram in Figure 7. The crude oil goes for refining, which also produces fuels for internal consumption and the fuel for the gasification (IGCC) plant, while the imported electricity is necessary to make up the balance of the energy needs for processing. The "refinery+IGCC plant" complex produces energy in the form of oil products (destined for daily use throughout Sardinia and beyond) and electricity, through the internal thermoelectric power plant and the IGCC plant (Table 7). The electricity produced by the thermoelectric plant is used for internal use, i.e. in the refining cycle, whereas the electricity generated by the IGCC is sold in its entirety to the national external distribution grid.

In 2008 the energy balance of the Sarroch facility registered an energy requirement of 1,014,849 TOE.

Figure 7 – The Saras site in Sarroch: flow diagram

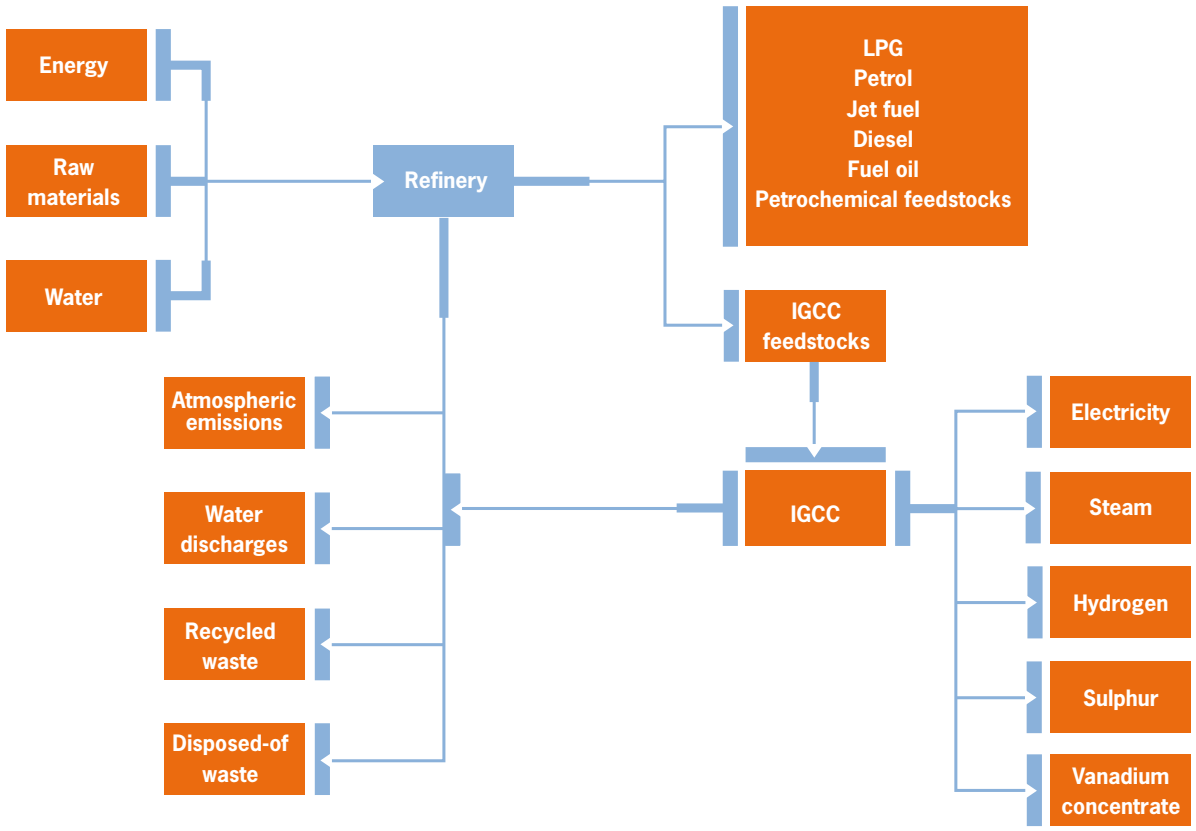


Table 6 – Energy inputs (TOE)

	2008
Crude and fuel oil	15,483,357
Incoming electricity and thermal energy*	312,707
Total	**15,796,064**

* Transformed to TOE using official AEG factors.

Table 7 – Energy outputs (TOE)

	2008
Finished products	13,901,890
Electricity to the grid	783,039
Fuel gas	60,324
Total	**14,745,253**

Refining activity

In 2008 the Sarroch refinery processed a quantity of raw materials (crude oil and fuel oils) equal to approximately 15.5 million tonnes (Mton). This is the highest figure for the last four years. Overall, between 2005 and 2008, 59 million tonnes of raw material were processed, with an average of 14.7 million tonnes per year (Chart 3).

In recent years production has leaned increasingly towards light products, reducing fuel oil production to minimum levels and resulting in heavy refining distillates (TAR) being sent to electricity production (Table 8).

In addition, in 2008 work was completed on the full production of extremely low sulphur diesel and on the production of extremely low sulphur petrol, the latter conforming to environmental quality and compatibility levels that are binding from 2009 onwards.

Chart 3 – Processing of Crudes (000 t/year)

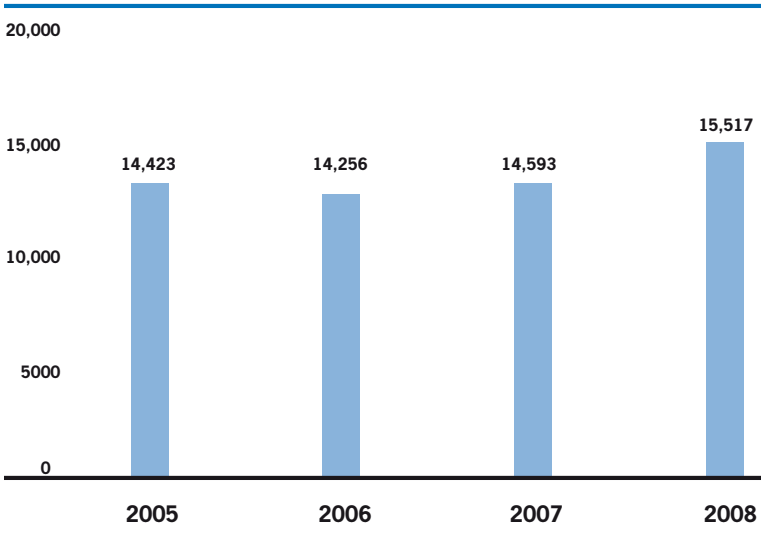


Table 8 – The products of the Saras plants (t/year)

	2005	2006	2007	2008
LPG	363,000	341,000	323,000	359,000
Petrol	3,036,000	2,945,000	3,110,000	3,184,000
Virgin naphtha	873,000	936,000	916,000	862,000
Kerosene	449,000	388,000	467,000	544,000
Diesel	6,423,000	6,713,000	6,813,000	7,498,000
Fuel oil	1,149,000	1,033,000	788,000	896,000
Vanadium concentrate	1,690	1,227	1,700	1,199
Electricity (TOE)	801,490*	821,819*	823,870*	783,039*
Sulphur	106,000	111,000	112,000	110,000
Heavy hydrocarbons to IGCC	1,172,874	1,217,391	1,190,195	1,179,604

*Values recalculated based on actual plant efficiency instead of based on national coefficient (eliminated in 2006)

Environmental quality of the products

Sulphur content is certainly one of the indices of greatest interest for assessing the environmental quality of refining products, and in recent years it has been the focus of legislative measures that have set reference limits. When used in fuels, low sulphur content ensures greater performance in the combustion phase and a lower impact on the atmosphere. The facility's sulphur balance (Figure 8 and Table 9 on page 46) provides useful indications on the quantity of sulphur that enters the production cycle and on how it is distributed in the output. Analysis of the data confirms a decrease in the quantity of incoming sulphur with the raw materials.

In addition, it is interesting to note how, from 2005 to 2008, but particularly in 2008, the quantity of sulphur present in products placed on the market decreased significantly, while the percentage quantity of sulphur sold as a product is increasing strongly (Chart 4). This result is evidence of an ongoing improvement in the site's desulphurisation capacity, accompanied by a slight reduction in the quantity of sulphur emitted into the atmosphere.

Chart 4 – Sulphur in product output

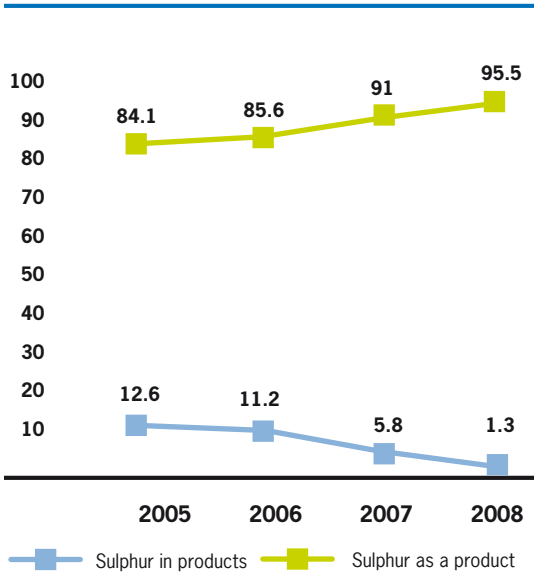


Figure 8 – Sulphur balance of facility (year 2008)

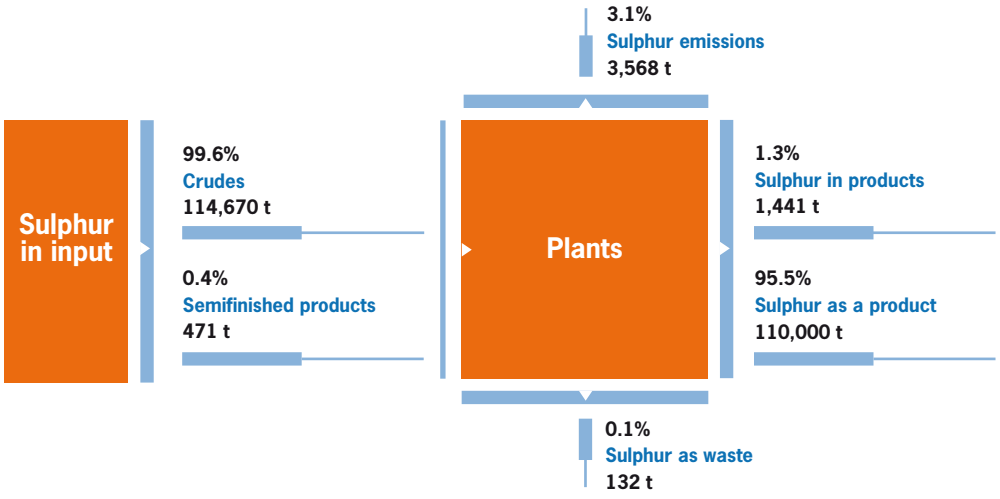


Table 9 – Sulphur balance of facility (year 2008)

	2005		2006		2007		2008	
	t	% of total	t	% of total	t	% of total	t	% of total
Sulphur in input								
Raw materials	125.952	100.0	120.747	100.0	**122.920**	**100**	**115.141**	**100**
Sulphur in output								
In atmosperic emissions	4,250	3.37	3,897	3.2	**3,697**	**3.2**	**3,568**	**3.1**
In products	15,869	12.6	13,512	11.2	**7,148**	**5.8**	**1,441**	**1.3**
As pure sulphur	105,879	84.1	103,312	85.6	**111,815**	**91**	**110,000**	**95.5**
As waste	21	0.02	27	0.02	**260**	**0.2**	**132**	**0.11**
Quantity not counted	-66	-0.05	-1	-0.0008	-	-	-	-

Production of electricity

From 2005 onwards the IGCC plant has recorded excellent production performance levels, and exchanges with the refinery have maintained significant levels.

Below are the figures for 2008 and a comparison with the three previous years.

Table 10 – IGCC consumption (t/year)

	2005	2006	2007	2008
Heavy hydrocarbons for gasification	1,172,874	1,217,391	1,190,195	1,179,604
Syngas (obtained from gasification)	3,827,000	3,943,410	3,942,542	3,770,558
Diesel	10,797	10,256	7,068	4,370
Incoming electricity (MWh)	372,357	379,463	369,491	379,787

Table 11 – IGCC products

	2005	2006	2007	2008
Incoming electricity (MWh)	4,346,187	4,473,703	4,417,843	4,322,134
Medium pressure steam (t/year)	695,994	688,413	568,651	667,762
Low pressure steam (t/year)	596,386	597,339	556,828	545,148
Hydrogen (kNm^3)	285,651	360,220	307,083	322,226
Sulphur (t/year)	53,768	48,184	42,589	49,753
Vanadium concentrate (t/year)	1,690	1,250	1,700	1,199

Subsidiaries

Sardeolica

The net electricity produced at the Ulassai wind farm and distributed in the national grid (GSE) is shown in Table 12.

The same table shows the avoided emissions of CO_2, SO_2 and NO_x.

The figure for avoided emissions is particularly significant because it shows the tonnes of pollutants that were not emitted because the electricity was generated using wind instead of conventional energy sources (like combustible fuels).

Similarly, an estimate is given of the number of families that could be served by electricity using this type of generation, and the corresponding equivalent quantity of oil saved.

Table 12 – Electricity produced at the Ulassai wind farm

	2006	2007	2008
Production (MW/h)			
Net electricity	157,238	168,185	153,735
Indicators			
CO_2 emissions avoided (1)	130,230	139,257	127,292
SO_2 emissions avoided (2)	597	639	584
NO_x emissions avoided (3)	298	319	292
Eqiuvalent famiglie (4)	52,428	56,062	51,245
TOE saved (5)	13,443	14,375	13,140
Barrels of oil saved	98,134	104,936	95,920

(1) Avoided emissions are calculated considering a specific emission coefficent of 828 gCO2/kWh as indicated in the Official Bulletin of the Autonomous Region of Sardinia, Parts I and II, no. 26 page 31 (30/08/2003).

(2) Avoided emissions are calculated considering a specific emission coefficent of 3.8 gSO2/kWh as indicated in the Official Bulletin of the Autonomous Region of Sardinia, Parts I and II, no. 26 page 31 (30/08/2003).

(3) Avoided emissions are calculated considering a specific emission coefficent of 1.9 gNOx/kWh as indicated in the Official Bulletin of the Autonomous Region of Sardinia, Parts I and II, no. 26 page 31 (30/08/2003).

(4) Estimate of consumption of an average Italian family: 3,000 kWh/year (source: www.scienzagiovane.unibo.it)

(5) 1 TOE = 7.3 barrels = 11,700 kWh

N.B.: a barrel of oil is 42 US gallons or 158.98 litres.

Environment

Environment

The Sarroch facility

Commitment to ongoing improvement

For several years, we have presented the Environmental and Safety Report which contains precise and detailed data on all environmental aspects that, directly or indirectly, affect the environment inside and outside the Sarroch facility.

Some of these aspects, such as atmospheric emissions or water discharges, are immediately perceived because they are linked to the environment where people live or work on a daily basis. Other aspects, such as consumption of energy or water or emissions of carbon dioxide (CO_2), refer to issues of more general interest that are experienced on a global scale, without having direct and perceptible effects on the local environment.

Over a time period of 4 years, the trend of emissions shows a general improvement, except for small fluctuations that can occur from year to year, associated with plant interventions and extraordinary maintenance. The improvement of the environmental data is the result of a series of technical and management measures that have progressively equipped the refinery with the most effective technologies and equipment for working while protecting and caring for the environment.

In particular, if we were to compare the last 4 years with the average trends from the 1990s, the difference would be particularly significant: for example, emissions of sulphur dioxide (SO_2) have fallen by around 50%. In addition, comparison of the last two years with the average of the 4 years from 2000-2004 shows a reduction in SO_2 emissions of around 30%, a demonstration of the company's growing and continuous sensitivity to environmental issues.

EMAS Registration

As well as the consolidation of activities adopted to ensure environmental sustainability in the region, 2008 also saw the conclusion of the process of evolution of our Environmental Management System, which has enabled the Saras facility to be registered under the EMAS directive.
And regarding transparency towards the region and the community, and full and diligent conformance to all legislative requirements, also in 2008 the Environmental and Safety Report was published and distributed.

INES

During the year the periodic INES (*Inventario Nazionale delle Emissioni e loro Sorgenti*, or national inventory of emissions and their sources) communications were made, for the site's principal environmental figures. These communications are submitted to the Ministry for the Environment for forwarding to the European Commission and inclusion in the EPER register (European Pollutant Emission Register). The Declaration contained water and air emission values for several parameters characteristic of the activities carried out.

Environmental training

To achieve progressive environmental improvement results, ongoing training of employees is essential, both in terms of updating knowledge and in terms of raising awareness of the importance of the role of each and every person.
This is particularly true in complex systems in which over 1,000 employees work. For this reason Saras has conducted specific training courses on issues of environmental protection and safeguarding, in relation to the activities carried out at the Sarroch site.
In particular, following the course on environmental awareness for all direct employees of the refinery (based on which a multimedia course on CD-ROM has been developed, aimed at employees of contracting firms who work on the site), a number of specific courses have been held on atmospheric emissions and on the treatment, recovery and reduction of water wastage.
In 2008, as part of the training plan for newly-hired employees on the Environmental Management System, 5 classroom training sessions (of two hours each) were held, which involved a total of 56 persons (both shift workers and day workers).
Lastly, in early 2008 an informative course was held by Lloyd's on EMAS Registration, in which 32 persons participated for a total of 512 hours.

EMAS (EcoManagement and Audit Scheme)

Instituted with EC Directive no. 1836/93, and updated with EC Directive no. 761/2001 (EMAS II). EMAS is a voluntary tool designed to encourage constant improvements in the environmental efficiency of industrial activities.
Under the regulations, participating companies must adopt environmental management systems at their production sites based on policies, programmes, procedures and objectives aimed at improving the environment, and must publish an environmental declaration.
Before a site can be added to the register set up by the European Commission, this declaration must be approved by an inspector accredited by an authorised national body. In Italy this body, operational since 1997, is the Ecolabel and Ecoaudit committee, which works with the technical support of ISPRA (Higher Institute for Environmental Protection and Research), which incorporates the former APAT (agency for environmental protection and technical services).

Environmental Integrated Authorisation

The first few days of 2009 saw the conclusion of the authorisation process to obtain the Environmental Integrated Authorisation (EIA), pursuant to Legislative Decree no. 59/05 implementing EC Directive no. 91/61, for the integrated prevention and reduction of pollution.

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

Comparison with the BREFs in the preparation of the application for authorisation was essential to identifying the directives to follow in order to improve environmental performance.

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

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

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

Data

Energy consumption

Energy consumption, which is closely linked to the facility's environmental performance, represents an area of perceptible commitment for the company to rationalisation and optimisation, for future years as well.

Between the late 1970s and the early 1980s Saras made major investments in heat and energy recovery (i.e. energy conservation). At the time these measures were closely linked to the energy crisis of the mid-1970s. Today, energy saving and efficiency still represent strategic objectives linked to the overall environmental improvement of the facility.

Table 13 and Chart 5 – which show the consumption of liquid and gaseous fuels (gaseous fuels are self-produced by the refinery itself) and the quantity of electricity deriving from external supply – show a trend in energy consumption that is substantially stable compared to production in the time period under consideration.

Table 14 on the following page shows the specific electricity needs. In the table, the indication "internal production" indicates the quantity of electricity produced by the refinery's thermoelectric plant. External electricity provision comes from the national distribution grid.

BREFs

The measures for integrated prevention and reduction of pollution, contained in the Integrated Environmental Authorisation, must specifically imply the use of the Best Available Techniques (BATs).

The BATs comprise procedures, techniques, technologies, operating standards, efficiency and consumption, with industrial applications. The environmental authorities establish the conditions and limit values based on those that can be achieved with the BATs, and these are then to be taken as a reference parameter on the basis of which a plant's efficiency can be assessed.

EC Directive 91/61 tasked the European Commission with setting up "an exchange of information between the member states and industries on the best available techniques, emissions control and any developments thereof", and with publishing the results of the exchange of information.

The exchange of information covers all industrial activities covered by the Directive. The results of the exchange of information are published in the form of Reference Documents for the BATs, known as BREF (BAT REFerence document).

Table 13 – Overall energy consumption (Refinery + IGCC, TOE)

	2005	2006	2007	2008
Electricity	186,071	189,603	193,917	194,118
Fuel oil	237,435	198,546	192,254	205,367
Fuel gas	389,156	414,855	452,451	439,011
Flue gas	156,955	161,908	166,124	174,345
Total	**969,617**	**964,912**	**1,004,746**	**1,014,849**

Chart 5 – Overall energy consumption (Refinery + IGCC)

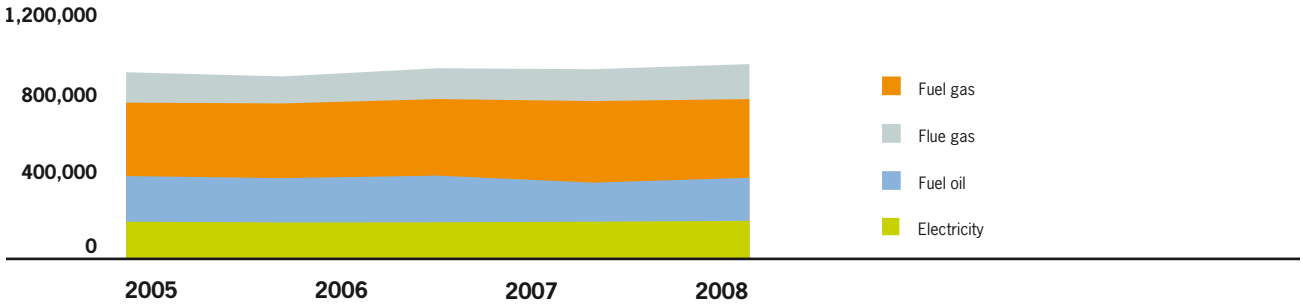
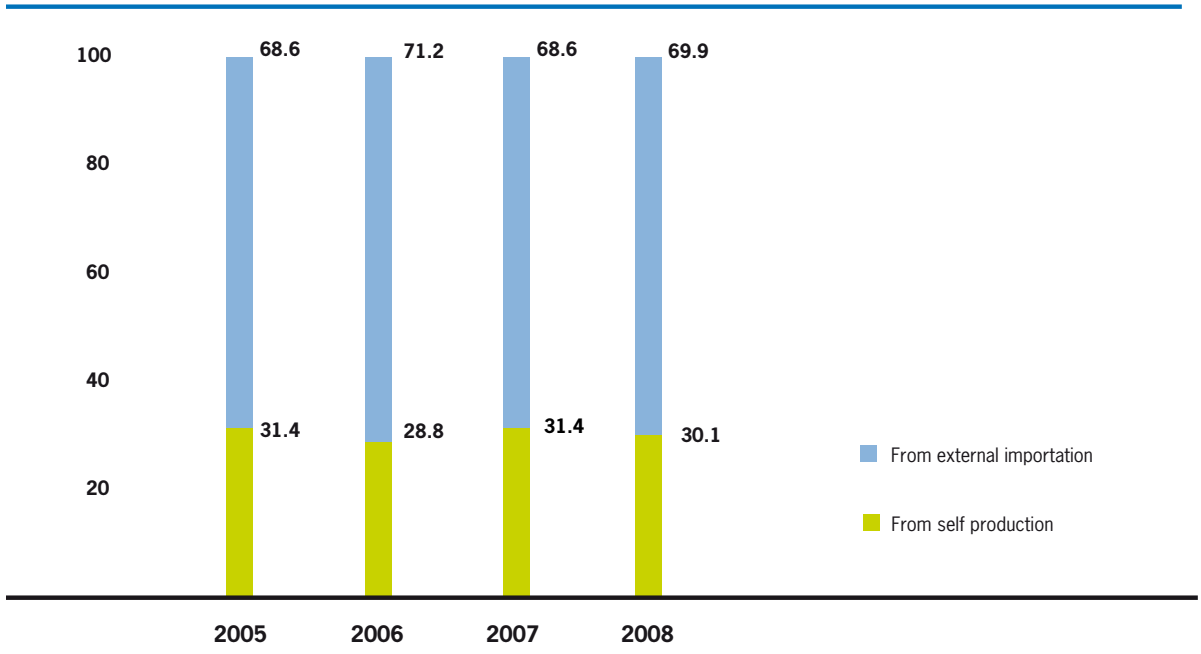


Table 14 – Electricity requirements and provisioning (Refinery + IGCC, MWh)

	2005	2006	2007	2008
Total requirements	1,122,363	1,104,148	1,166,208	1,170,341
- from internal production*	351,995	318,438	366,242	351,952
- from external production	770,368	785,710	799,966	818,389

* production by the refinery's thermoelectric power plant; the production of the IGCC plant is sold in its entirety to the external grid.

Chart 6 – Electricity requirements and provisioning (Refinery + IGCC, %)



Water consumption

Water is a precious resource for the Sarroch facility, and its use is kept under constant control in order to optimise consumption and favour recovery and desalination, rather than resort to using fresh water provided by CASIC (the Cagliari industrial area development body, responsible for managing the aqueduct in the Sarroch industrial area).

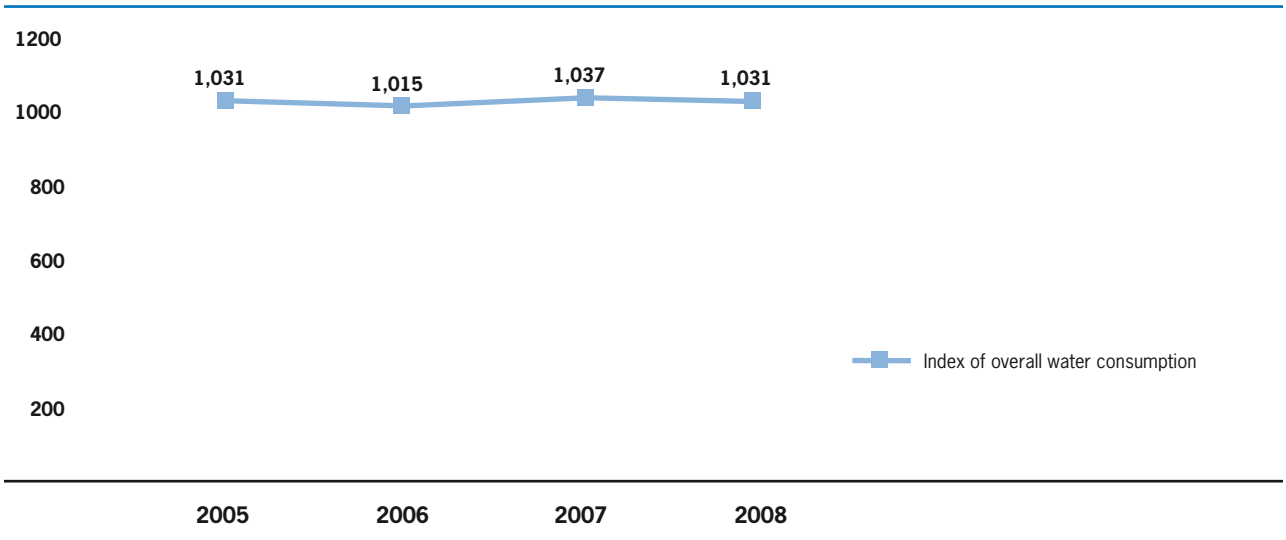
The water used for industrial purposes is mainly used to supply the boilers to produce steam for technological uses (steam stripping, heat exchangers and electricity generation), to supply the fire prevention system, to replace losses from the cooling cycle, and for civil use.
The water consumption figures shown are inclusive of the quantity associated with the IGCC plant, which mainly uses water from its dedicated desalinators for its production, together with seawater which is used in the cooling tower.

The trend in provisioning sources is shown in Table 15. Generally speaking, the water consumption figures show a slight improvement, even when we consider the greater quantities of raw materials being processed, as shown by the overall water consumption index (Chart 7).

Table 15 – Overall water consumption by provisioning source (Refinery + IGCC, m^3/h)

	2005	2006	2007	2008
Desalination	706	685	600	608
CASIC	596	662	711	742
Internal recovery	395	335	416	457
Polimeri Europa	-	-	-	14
Total	**1,697**	**1,682**	**1,727**	**1,821**

Chart 7 – Site water requirements - specific values (m^3/000 t processed)



In the period under review, internal recovery annually met approximately 25% of the total requirement, and desalination accounted for a provisioning source amounting to 34% of the total. Hence, the overall percentage contribution of desalinated water and recovered internal water in meeting the site's requirements in 2008 was approximately 59%. This is an important result for the facility, and one that also shows the direction to take in the future: rationalisation of consumption and increased recycling.

Atmospheric emissions

Saras's commitment to reducing atmospheric emissions has taken tangible form in a series of measures that, over time, have been aimed at improvements to plants and the definition of procedures and management systems designed to ensure the environmental compatibility of our activities, with results that show a reduction in the pollutants emitted over time (Table 16), despite an increase in processing and a higher complexity of the refining cycle.

In this context, a major contribution to abating the emissions load has come from the gasification plant, as described on page 19. In 2008 construction of the Tail Gas Treatment Unit (TGTU) was completed. One of the principal projects with a positive impact on reducing atmospheric emissions, the TGTU increases the yield of the sulphur recovery plant through the abatement of emissions of SO_2.

In addition, the naphtha desulphurisation process has been upgraded and, from January 1, 2009 onwards, this process has enabled Saras to produce, petrol and diesel with a sulphur concentration of less than 10 ppm (parts per million) for the European market, thereby contributing to the reduction of indirect emissions of SO_2. Furthermore, measures to increase sulphur recovery from fuel gas and improvements in combustion in the furnaces have been addressed. Finally significant area of intervention was the reduction of emissions from diffuse sources, which was achieved by equipping the pumps for moving petrol with double seals.

Protecting the water

Saras, aware of the difficulties associated with the scarcity of water resources in Sardinia, has tackled the "water problem" by adopting specific measures aimed at reducing the use of primary water sources in the region. This has been achieved by:

Differentiating provisioning sources

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

In particular, the desalination plant enables a major reduction in offtakes of fresh water from the CASIC aqueduct (CASIC is the Cagliari industrial area development body, responsible for managing the aqueduct in the Sarroch industrial area), but without this causing disturbances to the marine ecosystem in front of the refinery.

Turning to the water treatment systems, the refinery has a Process Water Purification (PWP) plant and a Ballast Water Treatment (BWT) system available to the oil tankers that transport crude oil and products to and from the refinery.

Both were built using the best available technologies on the market, both are equipped with pollutant monitoring systems and, in particular, both process water and ballast water are subjected to a de-oiling process that separates the hydrocarbon particles from the water, which is then sent for treatment.

In addition, part of the water treated by the process water purification system (around 400 m3/hr) is reused in the refinery for industrial purposes, so reducing offtakes from primary sources i.e. the aqueducts and the seawater desalination system.

Table 16 – Overall atmospheric emissions (000 t/year)

	2005		2006		2007		2008	
	Refinery	IGCC	Refinery	IGCC	Refinery	IGCC	Refinery	IGCC
SO_2	8.06	0.43	7.33	0.47	6.97	0.42	6.73	0.41
NO_x	3.96	0.94	3.80	0.98	3.16	0.997	3.13	0.86
Dust	0.53	0.007	0.45	0.003	0.52	0.005	0.45	0.004
CO	1.24	0.09	1.26	0.11	1.19	0.14	1.16	0.13
CO_2*	2,562	3,704	2,349	3,878	2,508	3,751	2,485	3,728

* as per Emission Trading declaration (see box page 60)

SO_2 (sulphur dioxide)

2008 saw the all-time best result for overall emissions of SO_2 at the site, confirming the reduction trend that has been ongoing for several years (Chart 8). The result is attributable to the progressive improvement of the quality of fuels used, specifically the fuel gas in which the percentage of sulphur present has been reducing constantly (Chart 9).

Of note is the reduction in the emissions per tonne of raw materials (Chart 10), which represents an important sign of effective action to improve process performance, despite processing levels that are generally increasing.

The 2008 results, which are also confirmed by the monitoring campaign conducted on the smokestacks of the refinery and the IGCC, also show how all values recorded are comfortably below the legal limits for the refinery (Chart 11) and below the limits set during the authorisation phase of the IGCC plant (Chart 12).

Chart 8 – Emissions of SO_2 (000 t/year)

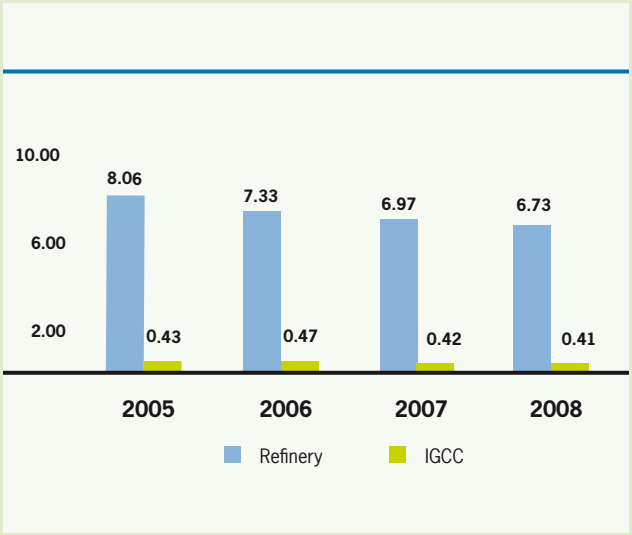


Chart 9 – Sulphur content (% by weight)

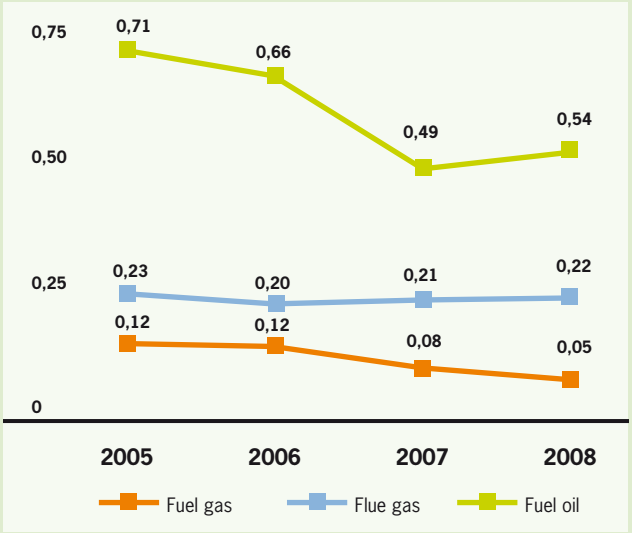


Chart 10 – Emissions of SO_2 (t SO_2 /000 t processed)

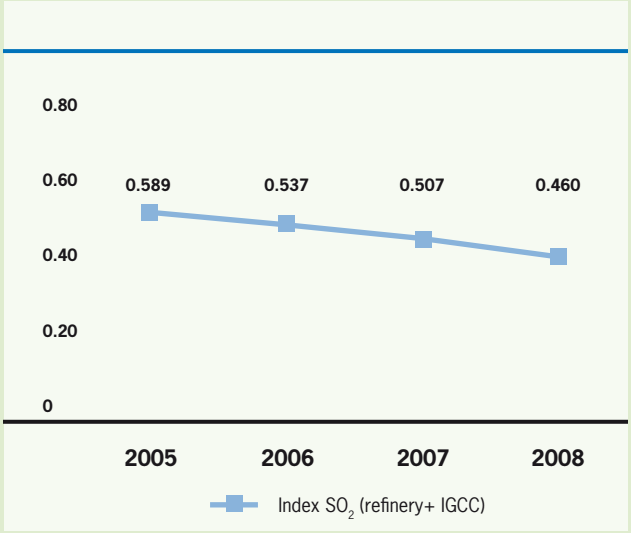


Chart 11 – Concentrations of SO_2 from refinery smokestacks (mg/Nm^3)

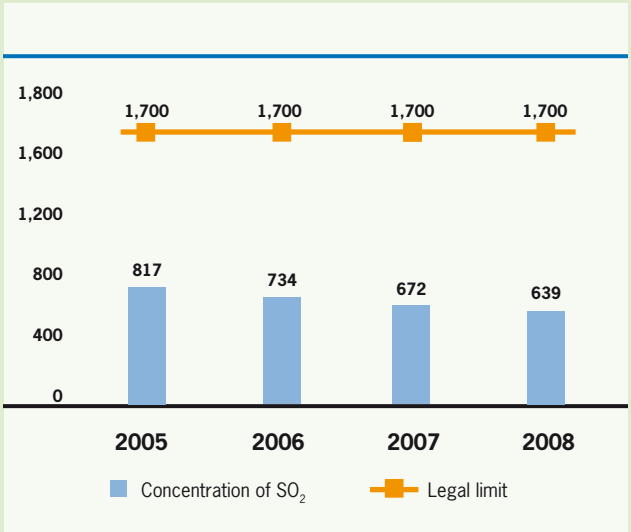
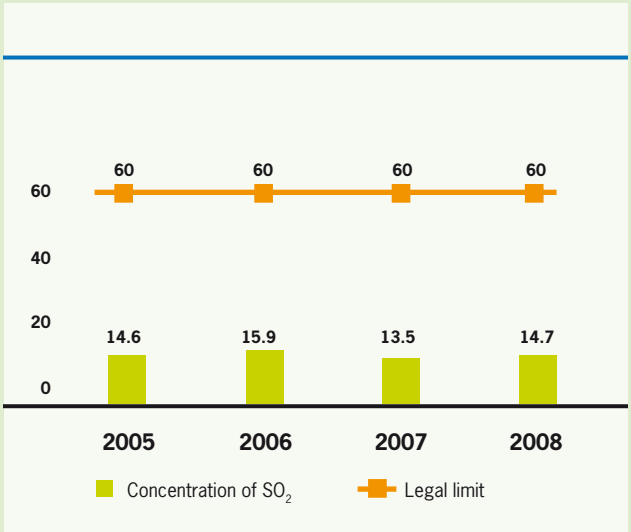


Chart 12 – Concentrations of SO_2 from IGCC smokestack (mg/Nm^3)



Nitrogen oxides (NO_X)

In addition to other pollutants, an overall containment trend has also been recorded at the Saras site for nitrogen oxides.

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

With the coming on-line of the IGCC plant, the trend in NO_x emissions has remained substantially constant over the years (Chart 13). In 2008 this index saw its lowest value for the last four years (Chart 14).

Comparison of the concentrations with the legal reference limits confirms very positive results, comfortably below the limit (Charts 15 and 16).

Chart 13 – Emissions of NO_x (000 t/year)

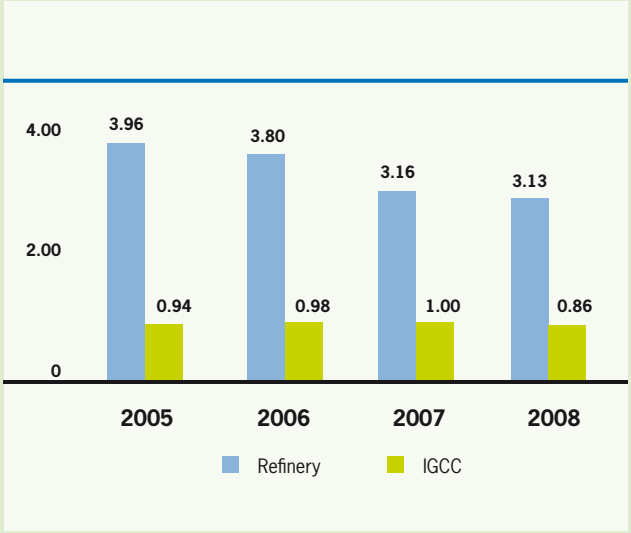


Chart 14 – Emissions of NO_x (t NOx /000 t processed)

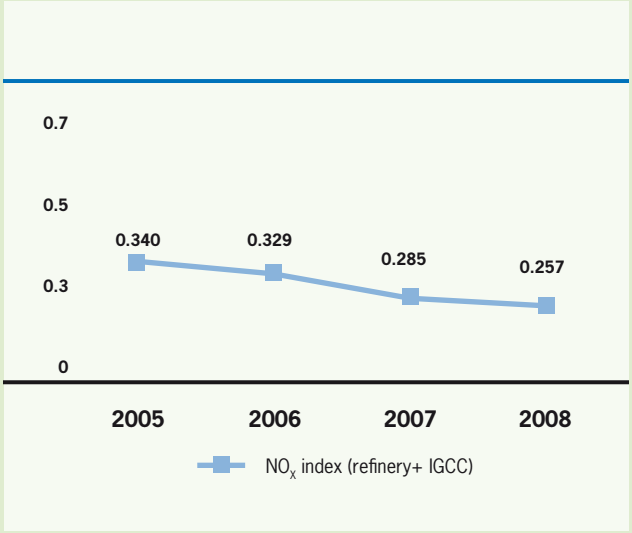


Chart 15 – Concentrations of NO_x from refinery smokestacks (mg/Nm^3)

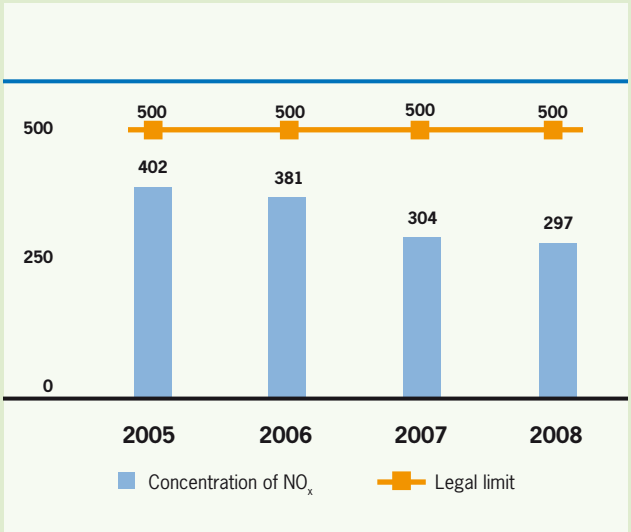
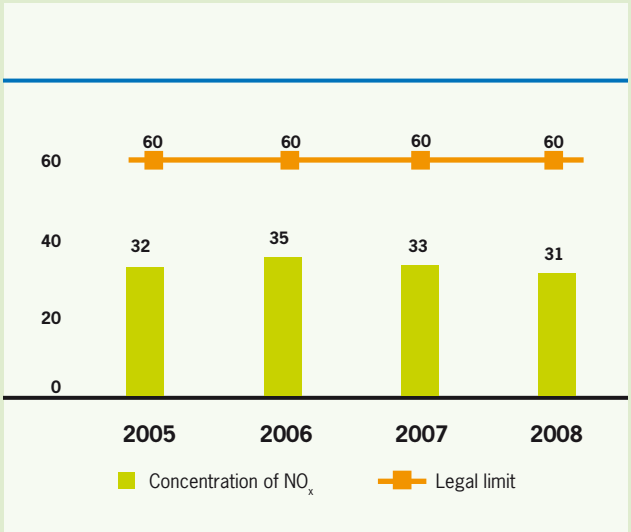


Chart 16 – Concentrations of NO_x from IGCC smokestack (mg/Nm^3)



Dust

The refinery's decision to use exclusively low-sulphur fuel oil, adopted in 2000, has made it possible to stabilise dust emissions at contained levels, below the legal limits (Charts 19 and 20).

The positive performance of the IGCC plant fits perfectly into this context, since it presents negligible dust emissions. This can be seen from Chart 17 on global emissions. The overall trend of the site index is substantially constant (Chart 18).

Chart 17 – Emissions of dust (000 t/year)

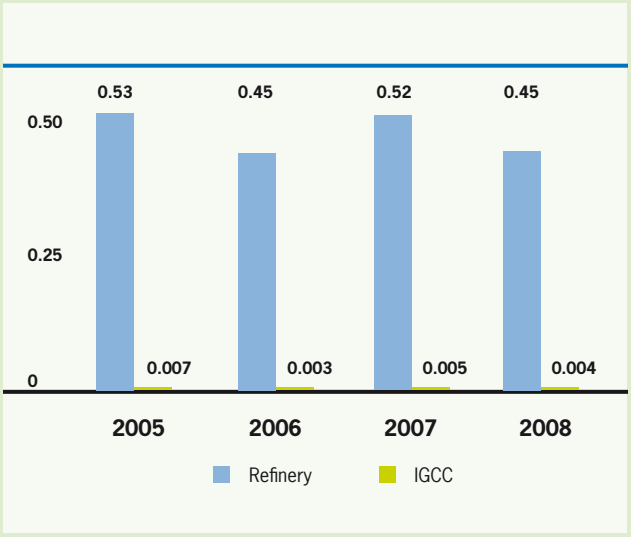


Chart 18 – Index of emissions of dust (t dust /000 t processed)

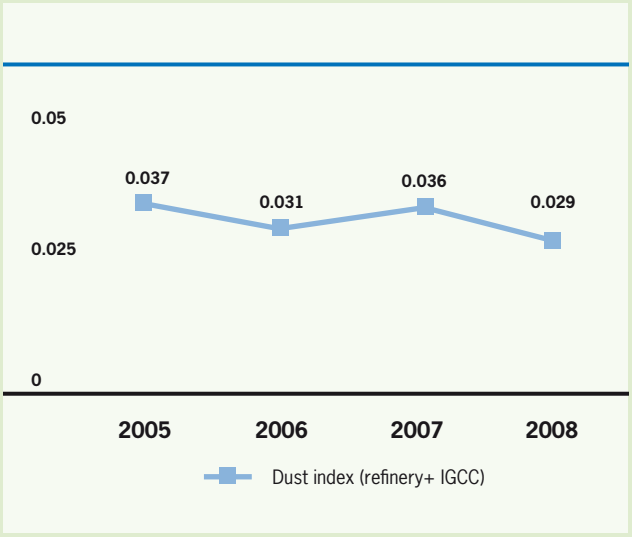


Chart 19 – Concentrations of dust from refinery smokestacks (mg/Nm^3)

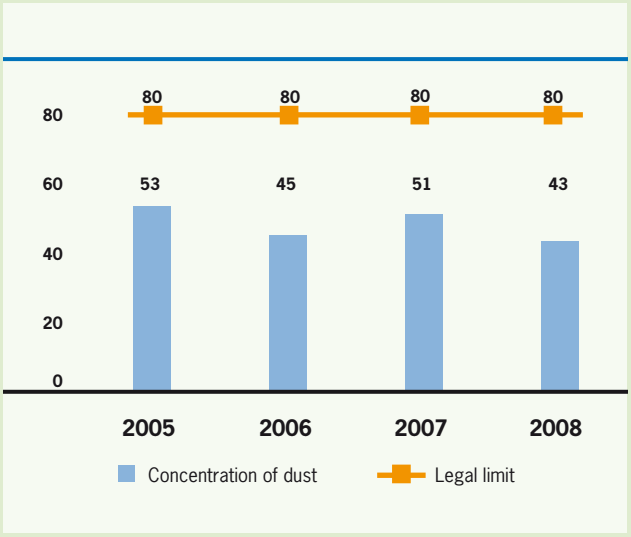
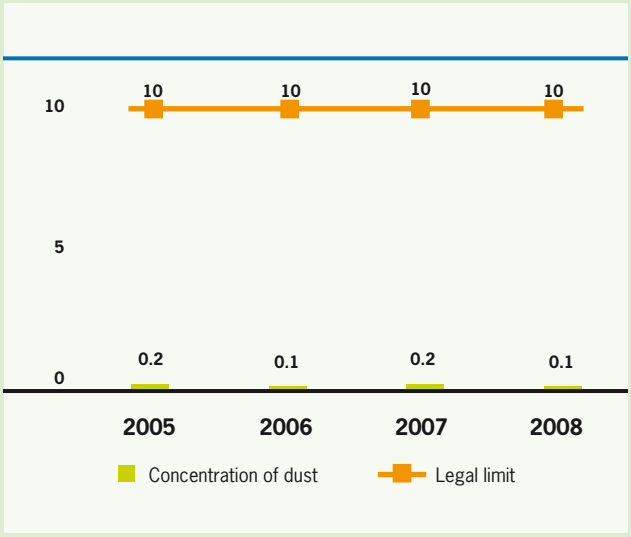


Chart 20 – Concentrations of dust from IGCC smokestack (mg/Nm^3)



Carbon Monoxide (CO)

Emissions of carbon monoxide also show a positive trend: the IGCC figure is practically unchanged, while the figure for the refinery plants is falling as a result of measures to optimise the combustion process in some of the furnaces (Chart 21). Another positive figure is the emission index, which in 2008 recorded the lowest value in the time period under consideration (Chart 22).

In addition, all recorded values are well below the legal limits.

Chart 21 – Emissions of CO (000 t/year)

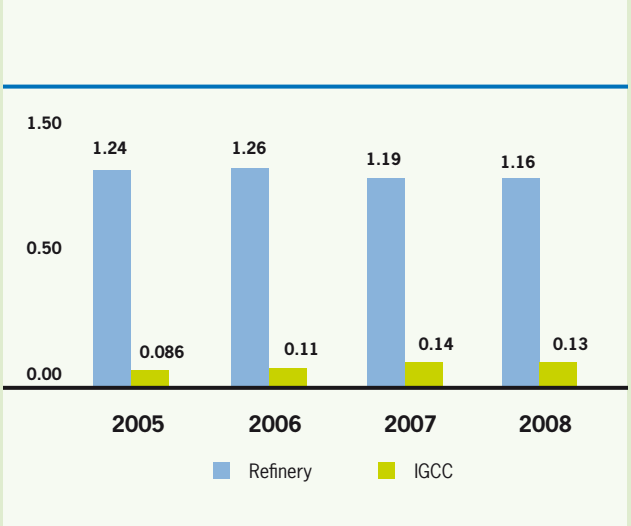


Chart 22 – Index of emissions of CO (t CO/000 t processed)

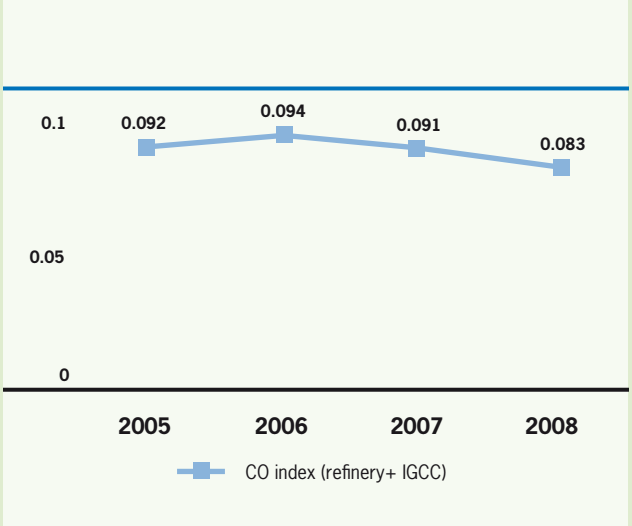


Chart 23 – Concentrations of CO from refinery smokestacks (mg/Nm^3)

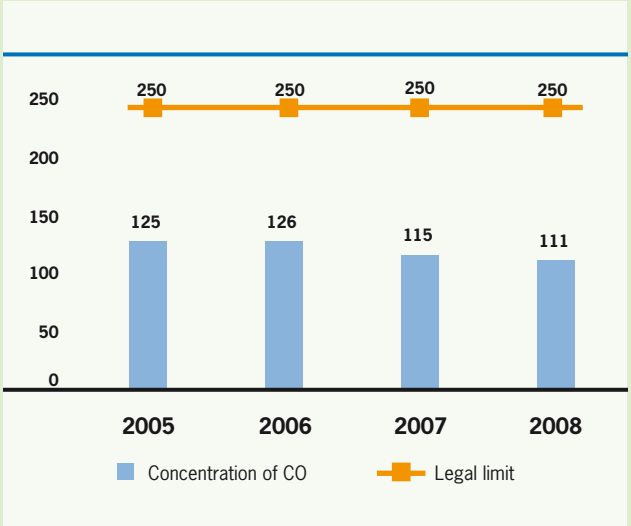
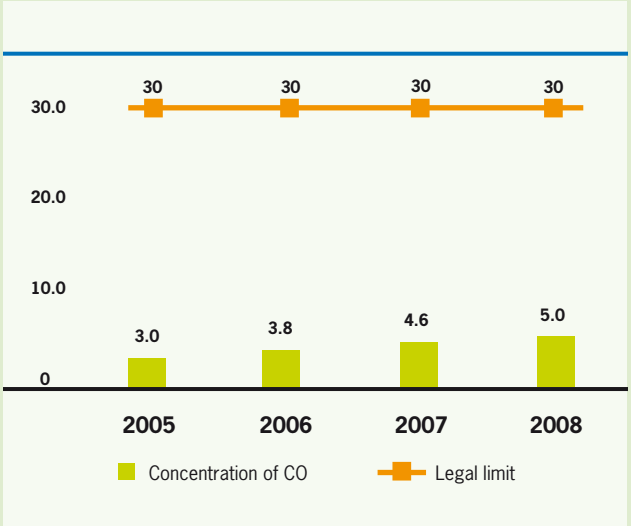


Chart 24 – Concentrations of CO from IGCC smokestack (mg/Nm^3)



Greenhouse gas emissions

The Saras Group comes under the area covered by the European directive on emissions trading with the two activities it operates at the Sarroch site, i.e. the refinery (refining sector) and the IGCC plant (thermoelectric sector). The Directive was introduced across Europe to control and reduce carbon dioxide (CO_2) emissions, to combat the threat of climate change.
Emissions of carbon dioxide do not have a local effect, specifically on the quality of the air in the environment surrounding the site. However, they are correlated to phenomena at a global level (popularly known as the "greenhouse effect"). The Emission Trading scheme was introduced from 2005 onwards, to help member states to observe the requirements of the Kyoto Protocol. It works by assigning each individual plant falling within the directive's field of application an emissions ceiling, established by the member state through a National Allocation Plan.

Surplus allowances may be traded and/or stockpiled, and any deficit must be covered by acquiring emissions allowances on the market.
Allocation is decided for each of the reference periods set by the Directive, and the first reference period covers the 2005-2007 three-year period while the subsequent reference periods are the 2008-2012 five-year period, the 2013-2020 period etc.).
In 2008 the second period of the Directive's application began. The allowances in this period are more stringent, based on the objectives specified in the Kyoto Protocol (Chart 25).

Saras has a protocol for the detection, calculation and control of CO_2 emissions. This calculation system is certified by third parties with accreditation meeting the requirements of the European guidelines.
The principal path to achieving reductions in CO_2 emissions necessarily takes in a rational use of energy and the adoption of efficient production systems. These are choices to which Saras has been strongly committed for a long time.

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

Emission Trading Directive

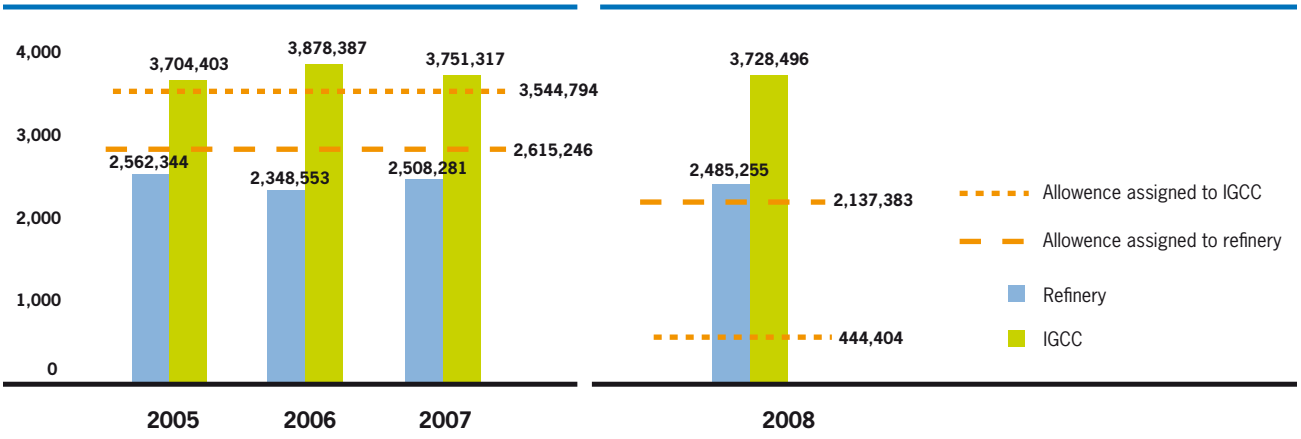
On 13 October 2003 the European Commission published the European directive on emissions trading (Directive 2003/87/EC), better known as the emissions trading system.

The key points established by the directive are as follows:
- Beginning on 1 January 2005, no plant that comes under the directive's field of application may emit CO_2 (basically, it cannot continue to operate) without special authorisation
- Each year the operators of these plants must return allowances of CO_2 emissions equal to those released into the atmosphere to the competent national authority
- Maximum allowances of CO_2 emissions have been assigned to each plant governed by the directive
- Lastly, 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.

Chart 17 – Emissions of CO2 from the facility (Refinery + IGCC, 000 t/year)

	2005	2006	2007	2008
refinery	2,562,344	2,348,553	2,508,281	2,485,255
IGCC	3,704,403	3,878,387	3,751,317	3,728,496
Total	**6,266,747**	**6,226,941**	**6,259,598**	**6,213,751**
Overall allowance assigned (Refinery + IGCC)	**6,160,040**	**6,160,040**	**6,160,040**	**2,581,787**

Chart 25 – Emissions of CO_2: absolute values and allowances assigned (t/year)



Air quality monitoring

Constant monitoring and continuous control of air quality are crucial elements of a tangible policy of environmental protection. For this reason, over time Saras has equipped itself with instruments and has adopted management procedures aimed at these objectives. Currently, air quality control is done by means of bioindicators and biodiversity studies, and is conducted through monitoring networks (measurement sensors).

- **Monitoring via bioindicators and biodiversity studies**

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

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

  In a vast area that comprises the inland Sarroch region, shown in Figure 9, for many years a study has been conducted by the Botanic Sciences Department of the Faculty of Mathematical, Physical and Natural Sciences at the University of Cagliari. This is a campaign of checks on the state of health of the vegetation, and it also adopts the "epiphyte mosses" method for air quality biomonitoring.

  Table 18 shows the reference factors for interpreting the classes of air quality and environmental naturalness, with reference to the "Index of Atmospheric Purity" (I.A.P.).

  Table 18 also highlights the classes which cover the index values taken in the stations monitored.

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

Figure 9 - Location of air quality biomonitoring stations.

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 mosses", 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).

of air quality, "low" naturalness and "low" alteration, for the remaining 3 stations. These measurements include the station nearest to the industrial area. Compared to the previous year, we can see an increase in the I.A.P. for 4 stations, and a modest reduction for just 2 stations. The air quality is higher in the stations furthest in to the area examined, and not as high in the station nearest the Sarroch industrial area. This result was to be expected. However, the picture that emerges from the analyses using bioindicators shows a state of quality that is located in the intermediate band between the extremes of the I.A.P. index assessment scale.

In the area under investigation, a control campaign is also conducted on the state of health of the vegetation. The investigation is conducted by verifying the state of health of the vegetation through visual checks of various different vegetable species, and through verifying the bio-accumulation of pollutant substances. According to the results of the field measurements, there is no critical threat to the health of the vegetation in the area studied.

Table 18 - Index of Atmospheric Purity (I.A.P.): classes of quality and environmental naturalness

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

- **Control via monitoring networks**

  The air quality outside the Sarroch refinery (immissions) is monitored by three monitoring networks, with a grand total of 14 stations, of which 4 belong to Saras, 6 belong to Polimeri Europa and 4 are managed by the Province of Cagliari.

  The Saras network – which is managed in parallel with the local authority's network and those of other companies in the region – provides real-time indications of variations in the significant parameters for air quality, in order to verify that the concentration values of pollutants are kept below the limit values set by current legislation and to take immediate measures when necessary.

  Each of the four Saras stations (Villa d'Orri, Sarroch, Porto Foxi and National Depot) is equipped with analysers that can continuously measure the concentration of the following pollutants in the air: SO_2, NO_2, CO, H_2S, PM10, ozone and hydrocarbons. The station located in

the National Depot area is also integrated with a meteorological and climate measurement station. The network operated by the Province of Cagliari measures hourly average concentration values for the following pollutants: SO_2, NO_2, dust, H_2S and PM10 in all stations, ozone and benzene in three stations, and CO in one station. A dedicated monitoring system keeps the following emissions parameters from the IGCC plant under constant control: SO_x, NO_x, PTS, CO and fume flow rate, ensuring a high degree of reliability which is demonstrated by the data availability rate (the ratio of the hours of operation of the analyser and the hours of normal plant activity), which in 2006 was on average higher than 90%.

A similar control system for emissions is in operation in the refinery, on the centralised smokestack. This system collects around 30-35% of total emissions (Topping 1 and the thermoelectric plant), and the same parameters described previously are monitored. The remaining emissions are monitored periodically by means of manual sampling campaigns.

In the tables on the following page, the figures for the concentrations of the principal parameters measured by the Saras sensors are presented and compared with the limits imposed by current legislation.

The data show how the standard of quality is observed for all monitored pollutants. The values taken by the stations are all below the limit values (Table 19 on page 64).This is an important aspect, because it is closely linked to the environmental health and quality of the region: objectives for which plant interventions are conducted, aimed at production process management that is constantly kept under control with regard to environmental performance.

Table 19 – Readings from monitoring network and comparison with legal limits pursuant to Ministerial Decree no. 60/02 (µg/m^3)

SO_2	Number of times exceeded							
	hourly limit value[2]			24-hourly limit value[3]			limit for ecosystems[4]	
	2006	2007	2008	2006	2007	2008	Valore limite	2008
Villa d'Orri	0	0	1	0	0	0	**20**	4
Porto Foxi[1]	6	21	2	1	5	0	**20**	10
Sarroch	8	8	2	0	0	0	**20**	11
National Depot	4	1	0	0	0	0	**20**	6

1 – The sensor in Porto Foxi is located in an area the destination use of which is "work area".
2 – Hourly limit value, not to be exceeded more than 24 times per calendar year (350 µg/m^3 since 2005).
3 – 24-hourly limit value, not to be exceeded more than 3 times per calendar year (125 µg/m^3).
4 – Limit value for protecting ecosystems (20 µg/m^3).

NO_X	Number of times exceeded 24-hourly limit value[1]			2006		2007		2008	
	2006	2007	2008	Record value	Limit value[2]	Recorded value[3]	Limit value[2]	Recorded value[3]	Limit value[2]
Villa d'Orri	0	0	0	4	**48**	6	**46**	5	**44**
Porto Foxi	0	0	0	10	**48**	9	**46**	5	**44**
Sarroch	0	0	0	7	**48**	6	**46**	6	**44**
National Depot	0	0	0	8	**48**	10	**46**	7	**44**

1 – Hourly limit value, not to be exceeded more than 24 times per calendar year (250 µg/m^3 in 2005; 240 µg/m^3 in 2006; 230 µg/m^3 in 2007; 220 µg/m^3 in 2008).
3 – Annual limit value.
4 – Annual average on an hourly basis.

PM10	Number of times exceeded 24-hourly limit value[1]			2006		2007		2008	
	2006	2007	2008	Record value[2]	Limit value	Record value[2]	Limit value	Record value[2]	Limit value
Villa d'Orri	-	-	-	-	**40**	-	**40**	-	**40**
Porto Foxi	4	15	13	19	**40**	24	**40**	24	**40**
Sarroch	0	14	12	24	**40**	27	**40**	25	**40**
National Depot	-	-	-	-	**40**	-	**40**	-	**40**

1 – 24-hourly limit value, not to be exceeded more than 35 times per calendar year (50 µg/m^3 since 2005).
2 – Arithmetical average of average 24-hour concentrations over 1 year.

CO	Number of times exceeded maximum daily average[1]		
	2006	2007	2008
Villa d'Orri	0	0	0
Porto Foxi	0	0	0
Sarroch	0	0	0
National Depot	0	0	0

1 – Maximum daily average out of 8 hours (10 µg/m^3 since 2005).

Waste water discharges

From 2005 to 2008 typical site trends were recorded, with slight fluctuations associated with maintenance on the process plants. The index has shown a trend towards improvement (Chart 27).

To measure the environmental quality of the water discharged, the following have been adopted as a reference: the COD, the general index of water quality, and the hydrocarbons (mineral oils) indicative of processing (Table 20). The trend in hydrocarbons in the first half of 2007, due to the malfunctioning of flotation units and a prolonged maintenance period, recorded an increase. Consequently, in the second half of 2007 this parameter fell back into realignment with typical values.

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

Based on this data and on the information from the continuous hydrocarbon analysers, we have prepared Charts 32 and 33 on page 66 which show how all concentration values, read in the time period under consideration, are constantly below the limits established by current legislation.

Chart 26 – Overall water discharges (m^3/h)

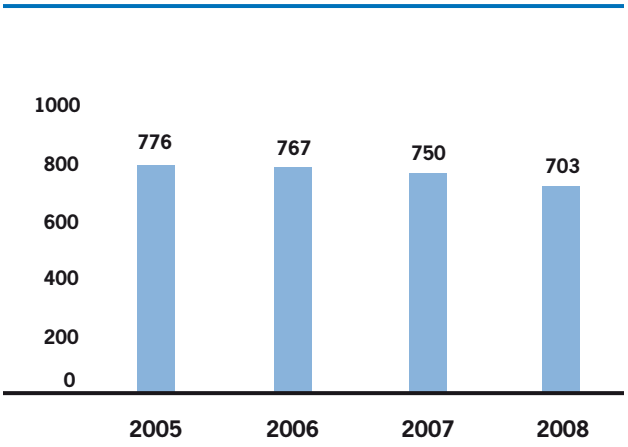


Chart 27 – Overall water discharge index (m^3/000 t processed)

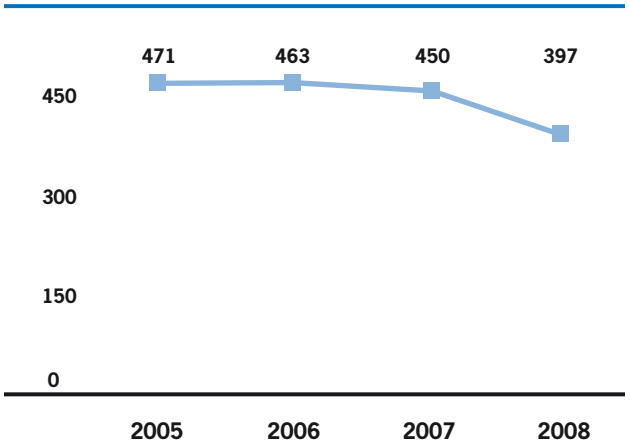


Table 20 – The principal substances detected (t/year)

	2005	2006	2007	2008
COD	502.0	368.0	472.0	368.6
Mineral oils	11.8	10.1	14.3	10.4

Chart 28 – Emissions of COD (t/year)

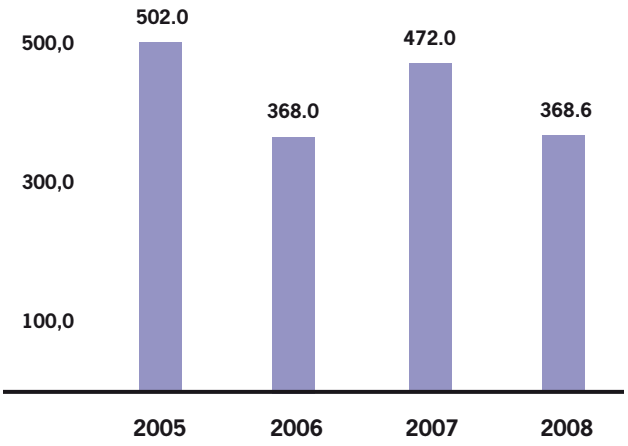


Chart 29 – Emissions of mineral oils (t/year)

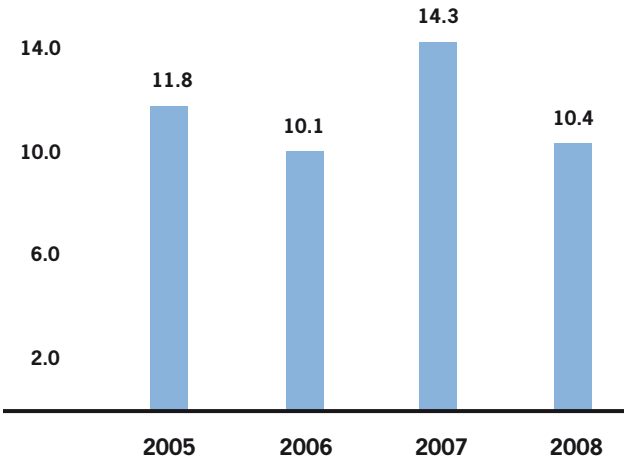


Chart 30 – Index of emissions of COD (t /000,000 t processed)

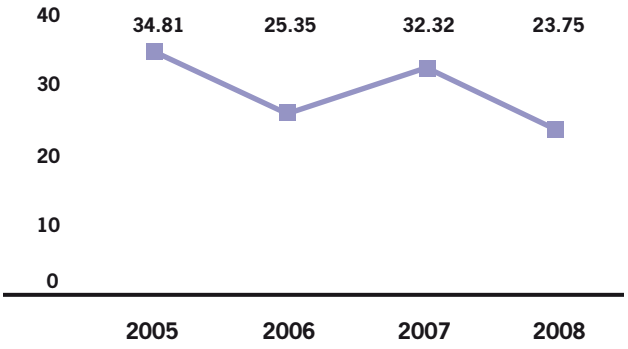


Chart 31 – Index of emissions of mineral oils (t /000,000 t processed)

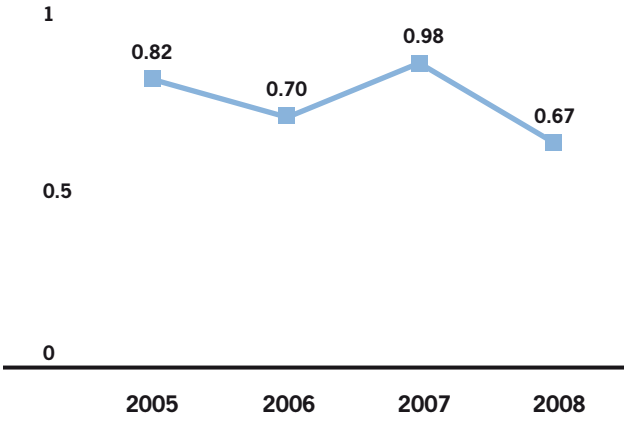


Chart 32 – Concentration of COD (mg/l)

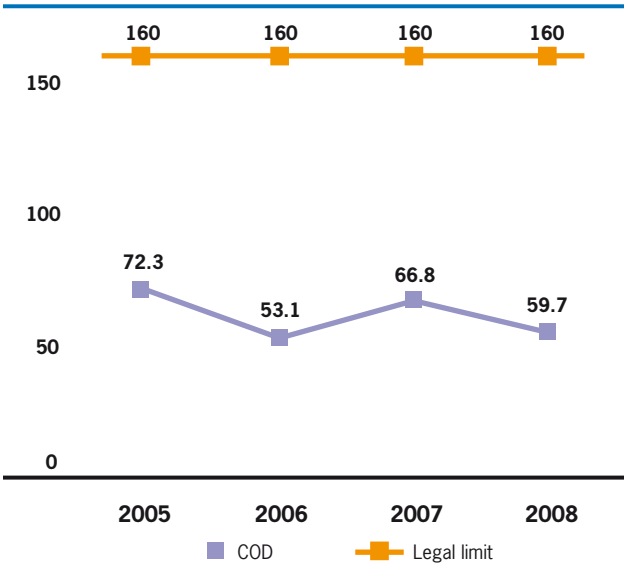
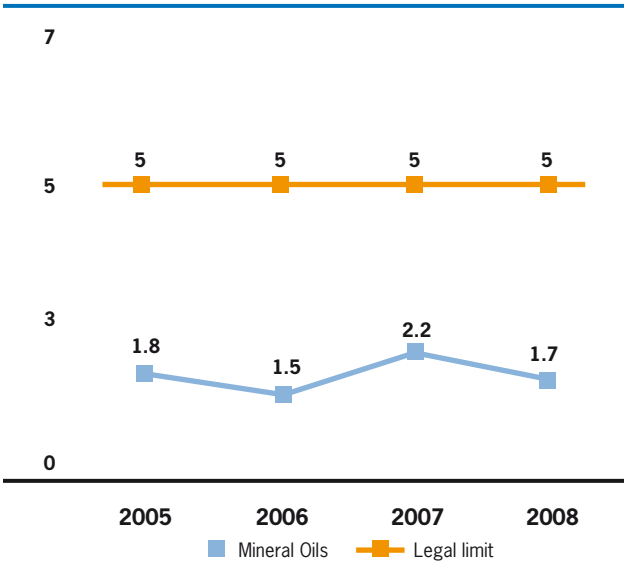


Chart 33 – Concentration of mineral oils (mg/l)

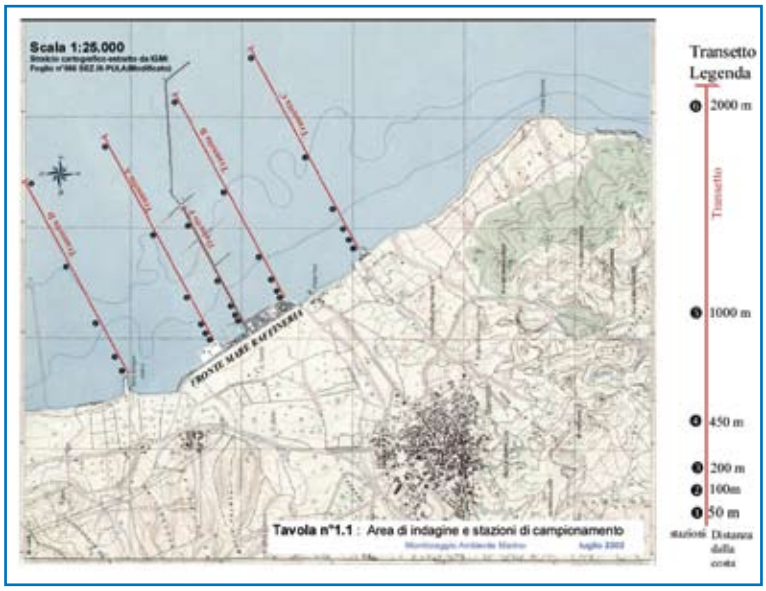


Marine environment monitoring

For Saras, protecting the marine environment represents an ongoing and high-priority commitment that is implemented, first and foremost, via constant control of the quality of the water discharged and also by means of twice-yearly monitoring of the environmental parameters of the marine environment. The area covered by the investigations is shown in Figure 10, and within this area control points have been identified where samples are taken at the sea surface and from the sea floor.

These control points positioned along the five transepts perpendicular to the coastline remain constant, to allow full comparability of the results from successive surveys conducted over time.

Figure 10 - Area covered by the seawater quality survey



The parameters kept under constant control allow us to track the trophic state of the waters in front of the Sarroch facility. This is the principal tool for assessing the sea's state of health, and it is delineated by the data on the following characteristics:

- Hydrology (transparency, temperature, salinity, dissolved oxygen, pH)
- Nutrients (nitrogenous compounds, phosphorus);
- State of vegetation (chlorophyll, phytoplankton, characteristics of the oceanic posidonia, macroalgae)
- State of the fauna (zooplankton and fouling)
- Control of sedimented particles (sediments deposited during the campaign) and superficial sediments
- Control of heavy metals in the sediments described above

Table 21 on page 68 summarises the results of the trophic state of the seawater based on the surveys conducted in the last 4 years on the quality of the seawater in front of the refinery. The rating of the trophic state is given both for the surface waters and the waters at depth.

Table 21 – Trophic index (TRIX): classes of quality and condition of waters (2005-2008 survey)

	Surface waters	Waters at depth
January 2005	Good	Good
July 2005	High	High
January 2006	Good	Good
July 2006	High	High
January 2007	High	High
July 2007	High	High
January 2008	**High**	**High**
July 2008	**High**	**High**

In recent years, to formulate the rating of the trophic state of the water, a new parameter has been introduced: the CAM index (Marine Waters Classification; the acronym reflects the Italian term). The CAM is based on algorithms specific to the sea of Sardinia. In general the CAM index has shown an average water quality across the whole area surveyed, with the exception of a number of cases where the low water quality can be attributed to the period of particularly heavy rainfall which determined the transport of sediment-forming nutrient substances (see Table 22). In any case, these indices are significant for wide time intervals and not on a single period.

Table 22 - Trophic state of seawater (2005-2008 survey)

	Indice CAM (specifico per i mari di Sardegna)	
January 2005	Low	Low
July 2005	Average	Average
January 2006	Low	Low
July 2006	Average	Average
January 2007	Average	Average
July 2007	Average	Average
January 2008	**Average**	**Average**
July 2008	**Average**	**Average**

Sea and coastal protection measures

Since the early 1990s, Saras has put in place several initiatives to protect and safeguard marine waters and the coast. The most important measures are:

- Adoption of "Saras Minimum Safety Criteria" for verification and selection of ships. This is a list of the minimum safety requirements that ships must meet in order to be examined and authorised to operate at the Saras marine terminal.
- Institution of the Safety Service. For the entire duration of operations, this Service involves the on-ship presence of qualified personnel tasked with verifying the vessel's technical and management conformance to safety and environmental protection requirements. This programme,

which is aimed at mitigating and minimising the greater risk to the marine environment posed by ships transporting particularly heavy and dirty products (such as crude oil, fuel oil and some types of diesel), has in recent years been extended to all ships arriving to conduct unloading operations and to all single-hulled ships, including ships that are twenty or more years old. This type of control, which is increasing every year, in 2008 applied to 342 ships, representing 41.3% of marine traffic.

- Installation of the ESD (Emergency Shut Down) automatic control system. This prevents product spills by automatically stopping the loading pumps and closing the oil product shut-off valves in the event of overpressure.
- Prohibition of night-time discharging at sea of segregated ballast (seawater that does not come into contact with the oil product) for ships transporting particularly pollutant and dirty products.
- Agreement with a specialist company on the continuous presence of antipollution personnel and equipment.

In the event of a spill into the sea, a range of vehicles and equipment is available to deal rapidly with the accident, following procedures specified in the Internal Emergency Plan, which includes the Marine Pollution Prevention Plan (see box on the IEP on page 86).

In addition Saras has worked to increase the use of double-hulled ships for transporting crude oil and oil products. Currently, international agreements require all ships transporting fuel oil and heavy (high-density) crude oil to be double-hulled. To ensure higher levels of safety at sea, for 2008 Saras undertook to use at least 98% double-hulled ships for transporting light crude oil (light = low-density, i.e. not covered by the agreement for heavy crude) and at least 95% double-hulled ships for transporting petrol, kerosene and diesel.

Examination of these commitments shows a 100% use of double-hulled ships for transporting light crude oil, and 97.7% for transporting petrol, kerosene and diesel. As part of our policy of ongoing improvement, for 2009 Saras has set itself the objective of using 100% double-hulled ships both for transporting light crudes and for transporting petrol, kerosene and diesel (Table 23).

Refinery equipment for protecting sea and coastline

The Sarroch refinery has 4 seagoing vessels, which are operational 24 hours a day:

- An antipollution motor vessel, "Nettuno" (Neptune), equipped with systems for recovery and storage of heavy hydrocarbons
- A pilot boat, "Pegaso" (Pegasus), for transporting personnel and equipment and for providing support for boom positioning
- A work vessel, "Proteo" (Proteus), for rapid reconnaissance, boom positioning and operations on the sea floor
- A motorboat, "Tripesce" (literally, Three Fish), for boom positioning and operations on the sea floor

An extensive system of resources ensures the facility's full and rapid response capacity to contain and collect any product spills, using the following equipment:

- Skimmers to collect product floating on the water's surface, with a recovery capacity of up to 27 m3/hour
- Floating tanks, of capacity 5 m3 each, for collecting any product recovered at sea
- Motor-driven pumps for product recovery, with capacity up to 48 m3/hour
- 1,950 metres of floating booms to contain floating product, with associated inflation systems (3 motor compressors and 2 electric blowers)
- Radiobuoys connected to a GPS system
- Absorbent systems

Table 23 – Commitments and examination of results on protecting the marine environment from ship traffic (2008)

	Commitment for 2008	Result for 2008	Commitment for 2009
Double hull for light crude oil	At least 98%	100%	At least 100%
Petrol / Kerosene / Diesel	At least 95%	97,7%	At least 100%

Chart 34 – Ship types (%)

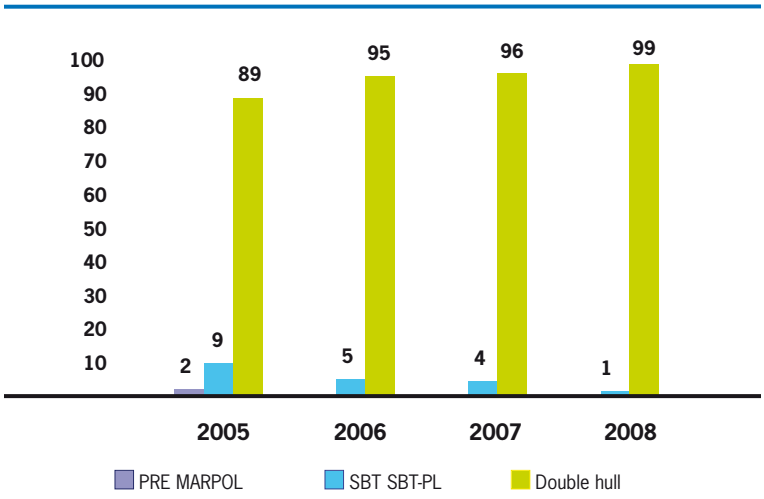
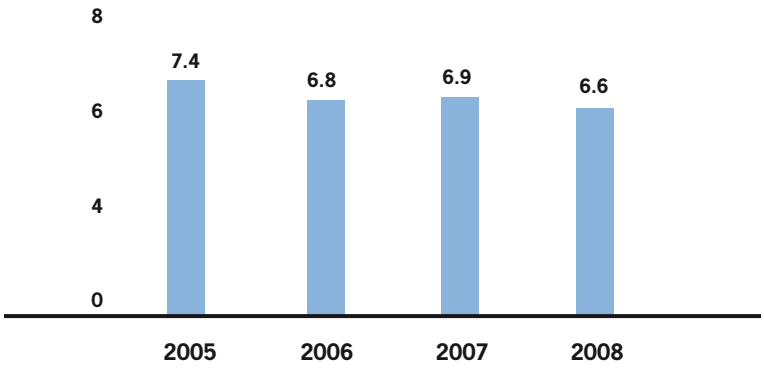


Chart 35 – Average age of oil tankers (years)



As further guarantee of protection for the sea and coastline, all ship charter contracts signed by Saras for the provisioning of raw materials and deliveries of finished products contain clauses to prohibit all ships from transiting the Strait of Bonifacio (an area declared off-limits to all ships carrying dangerous goods).

Waste

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

Related to overall production, 2008 essentially confirmed the figure from previous years for waste deriving from refining activities (Table 24).

New measures for protecting our coastline: the end of the single-hulled oil tanker

To drastically reduce the risk of environmental catastrophe, Italian law (no. 51 of 7 March, 2001: "Provisions for prevention of pollution deriving from the maritime transport of hydrocarbons and for controlling maritime traffic") requires the modernisation of the oil tanker fleet, by encouraging the use of oil tankers with low environmental impact and by favouring the retirement of single-hulled vessels not conforming to the highest standards of safe sailing, applicable to double-hulled ships which have a double external structure in metal with internal cavity that, in the event of an accident, can absorb the shock and so reduce the probability of the load's leaking into the sea.

In particular, the oldest and most vulnerable models of single-hulled oil tankers, built before 1982, had to be withdrawn from circulation by 2005. Other categories of big, single-hulled oil tanker must be eliminated by 2010.

The three principal categories of single-hulled oil tanker are those outlined in EC Directive no. 417/2002:

- **Category 1**: These are single-hulled oil tankers and are known as "**pre-MARPOL**". They are oil tankers with no segregated ballast tanks or associated protection systems (segregated ballast tanks in protective locations, **SBT/PL**). These oil tankers are the oldest and highest-risk, and in general were built before 1982.
- **Category 2**: Single-hulled "**MARPOL**" oil tankers, with the same dimensions as vessels in category 1, but equipped with segregated ballast tanks and associated protection systems (SBT/PL). Generally built between 1982 and 1996.
- **Category 3**: Single-hulled oil tankers of smaller dimensions than those in categories 1 or 2, but with a deadweight capacity of over 5,000 tonnes. These smaller oil tankers are often used in regional traffic.

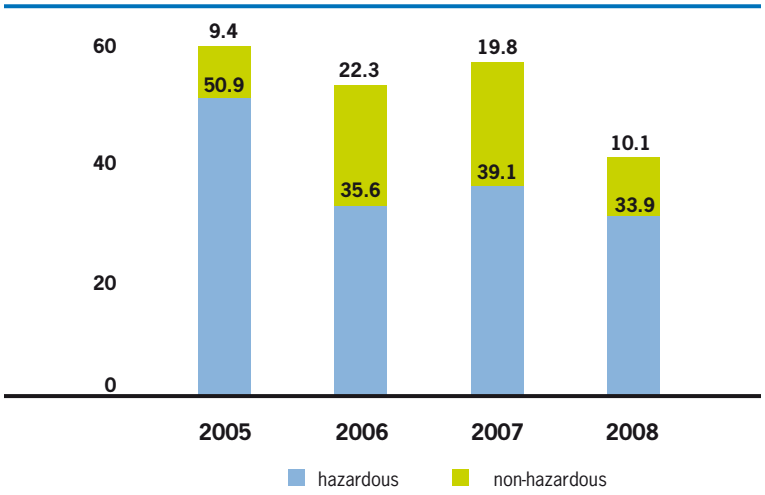
In recent years the use of **Category 6** ships has increased, i.e. ships with **a double hull** to prevent accidents at sea or to limit the consequences of accidents. It is the use of this is the type of ship that Saras has chosen to increase for transporting crude oil and oil products (Chart 34).

Table 24 – Waste processed by the facility (000 t/year)

	2005	2006	2007	2008
Hazardous waste*	50.9	35.6	39.1	33.9
Non-hazardous waste	9.4	22.3	19.8	10.2
Total	**60.3**	**57.9**	**58.9**	**44.1**

* Excluding waste coming from the characterisation plan for 2008

Chart 36 – Waste produced by the facility (000 t/year)



In 2008 approximately 107,338 tonnes of waste was sent for recovery or recycling, with a notable increase over previous years. The increase in this figure is principally linked to site decontamination activities, as shown in Table 25, as well as the sending of exhausted catalysers used in the desulphurisation process to companies specialising in the recovery of metals (Co, Mo, Ni). In parallel with this result, the quantity of waste sent to landfill fell by over 70% (Table 26 and Chart 37).

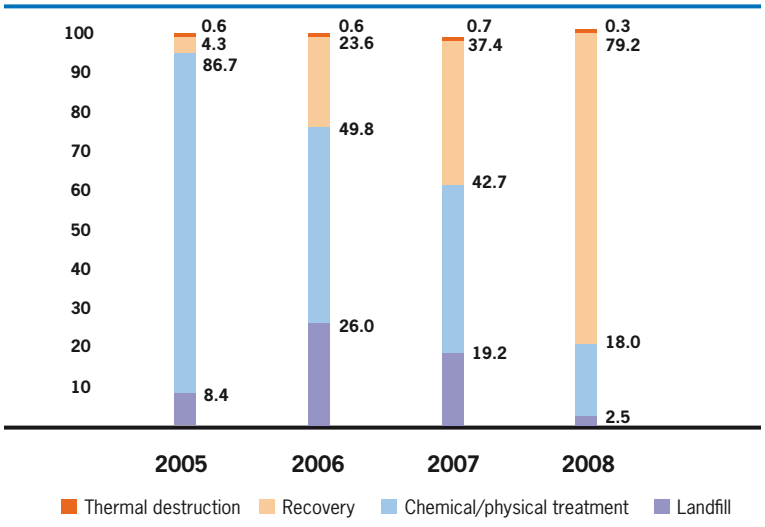
Table 25 – Decontamination activities (000 t/year)

	2008
WATER	77.7
LAND	13.8

Table 26 – Final destination of waste (000 t/year)

	2005	2006	2007	2008
Landfil	5.09	15.04	11.32	3.38
Recovery	2.58	13.63	22.06	107.34
Thermal destruction	0.37	0.37	0.42	0.45
Internal chemical/physical treatment External chemical/physical treatment	52.23	28.77	25.16	22.95 1.46
Total	**60.27**	**57.81**	**58.96**	**135.57**

Chart 37 – Final destination of waste (%)



Chemical/physical treatment of waste is carried out for Saras by a company specialising in this area. The company operates on the facility premises and is regularly inspected as required by the internal procedures for assessing all contracted firms of which Saras avails. The treated waste undergoes a transformation that renders it compatible for sending to landfill (Table 27).

Table 27 – Chemical/physical treatment of waste (000 t/year)

	2005	2006	2007	2008
Chemical/physical treatment of wich:	52.23	28.77	25.16	22.95
Inertised for landfill	24.54	14.83	13.67	10.09
Internal recycling	27.69	13.94	11.49	12.86

Even excavated soil from new building activity, maintenance or decontamination is sent to a recovery plant outside the facility, to eliminate any hydrocarbons present in the soil and so contribute to its future reuse.
In 2008 the on-site inertisation plant sent 10,095 tonnes of inertised waste to controlled landfill on behalf of Saras.

In agreement with the Municipality of Sarroch, in 2008 differentiated refuse collection continued in offices and in the canteen areas. The quantities of material sent for recovery are given in Table 28. 95.8 tonnes of paper, 14.9 tonnes of plastic and 8.1 tonnes of glass and aluminium were collected and sent for recycling. Starting in 2008 the collection of organic waste was also introduced, and yielded a total of 7.4 tonnes in its first year.

Table 28 – Results of differentiated collection of recyclable materials (t)

	2007	2008
Paper	84.5	95.8
Plastic	11.5	14.9
Glass and aluminium	4.3	8.1
Organic waste (from 2008)	-	7.4

Soil, subsoil and underlying groundwater

In observance of the provisions of Italian Ministerial Decree of 25 October 1999, no. 471 and subsequent modifications (regulations containing the criteria, procedures and methods for the safety containment, reclamation and environmental restoration of polluted sites) and pursuant to article 9 of the Decree, Saras has sent the environmental authorities its Site Characterisation Plan for the state of the lands and groundwater underlying the refinery. Following this application, in 2004 Saras, in conjunction with the Ministry for the Environment, the Region of Sardinia, the Province of Cagliari, Local Health Authority (ASL no. 8) and the Municipality of Sarroch, defined the procedures for implementing the Site Characterisation Plan, which set out a series of surveys to be carried out and proposed measures that may be needed to protect the environment and safeguard public health. In July 2004, characterisation activities were initiated at the site using the following techniques:

- **Surveys of the terrain**, by extracting "carrot" core samples from depths of from 5 to 10 metres to establish the subsoil stratigraphy, ascertain whether any contaminants are present and measure their concentrations
- **Piezometry surveys**, special surveys of the terrain conducted by extracting "carrot" core samples at depths of from 10 to 20 metres that

can monitor the surface groundwater. This type of survey not only takes a stratigraphy of the subsoil and its quality (as in the surveys), but also allows examination of the condition of the water in the subsoil. Piezometry is carried out with a tube made of transparent glass inserted in the area where the water flows, which periodically takes samples of water to check its quality.

- **Gas surveys**, a technique to verify the presence of hydrocarbon gas in the soil interstices.

The Site Characterisation Plan is currently in the completion phase. As of December 2008, 670 terrain surveys, 133 piezometry surveys and 500 gas survey control points were made.

Based on the analyses, the following situations were found:

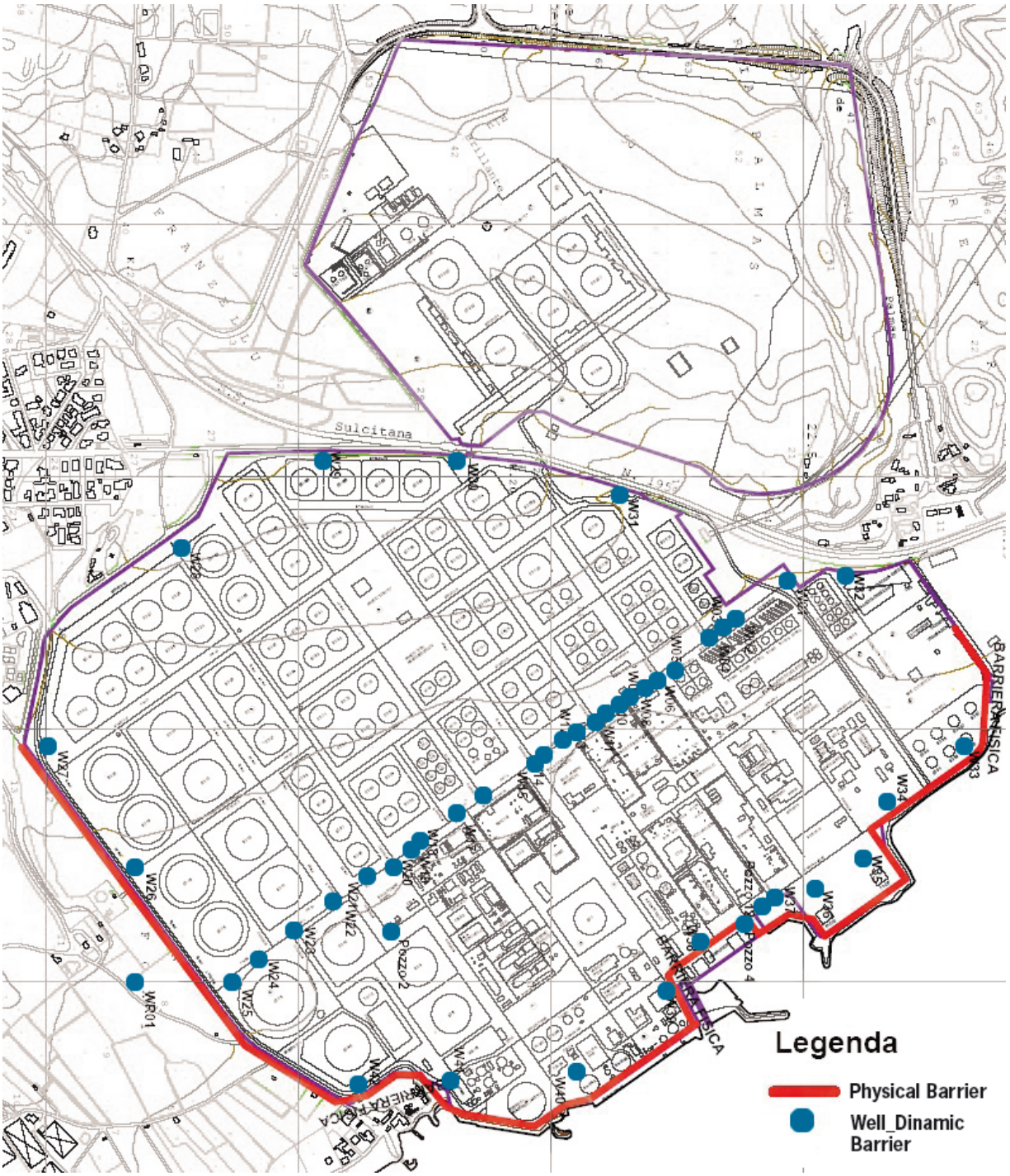
- **Soil analyses** have shown only limited areas where hydrocarbon concentration value limits are exceeded (182 samples out of 3164 samples analysed), with a concentration in the West Tank Farm area and former ST1 tank area. In addition, limited exceeding of other parameters (Cd, Co, Cr, Cu, Ni, Pb, V, Zn and IPA) have been found for a total of 97 samples out of 3164, in limited areas that are never adjoining, confirming that these are isolated cases and that the problem is not widespread.
- **Groundwater analyses** have shown, in some cases, the presence of hydrocarbons over the concentration value limits. The presence of hydrocarbons in supernatant phase (LNAPL) was also found. There was limited exceeding of other parameters (Cd, Ni, Pb, IPA, BTEX, MTBE, sulphates).
- **Gas survey analyses of surface soils** showed all values to be within the normal range.

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

The project involves building a hydraulic barrier with supernatant recovery systems, for emergency safety containment, and an integrated hydraulic barrier/physical barrier system, for operational safety containment.
All 46 wells required for the hydraulic barrier have been dug: 26 wells already in operation on the median line, the function of which is to extract contaminated waters and recover the supernatant; 13 recharge wells on the seafront, of which one is outside the facility premises to the south, to prevent saline incursions, and 7 upstream hydrogeological extraction wells for controlling the groundwater level. The upstream hydrogeological wells and recharge wells are currently in the activation phase. The physical barrier will be 3,300 m in length and will be constructed mainly using jet-grouting techniques and waterproofing injections, and using plastic diaphragm for the south stretch. In 2008 field tests were conducted to test the site-specific operation and implementation conditions, for drawing up the executive project (Figure 11).

In 2008 the decontamination project was drawn up for hydrocarbon "hot spots" (C>12) in the soil in the West Tank Farm area and to make the soil safe in the former ST1 tank area. Excavation and decontamination activities were begun in the third quarter of the year. The soil in the West Tank Farm area will undergo excavation and soil washing treatment to remove hydrocarbons, following which the washed soil will be restored to its area of origin. In the former ST1 tank area, the contaminated soil will be sent for disposal.

Figure 11 – Location of the wells comprising the dynamic barrier, and planned location of the physical barrier



Noise monitoring

To control noise pollution, since 1999 Saras has drawn up and implemented periodic controls of noise levels emitted into the surrounding environment, using specific phonometric surveys to establish the acoustic characteristics of the surrounding environment.

The acoustic phenomenon representative measurement points are located on the peripheral roads running alongside the refinery perimeter, on the access roads to the inhabited centre of Sarroch, and in the inhabited centre of the town, and they can be identified on the aerophotogrammetric map (Figure 12 on page 76).

Phonometric readings have shown that the refinery generates a constant, stationary noise emission.

In the inhabited centre, the noise level assumes increasingly marked fluctuations, influenced by noise phenomena deriving from vehicle traffic or other noises that are not connected with the refinery. The sound immission that can be attributed to the refinery, represented by level L90 (which allows the elimination of noise phenomena deriving from vehicle traffic) measured at night, is perceptibly low in the inhabited centre of Sarroch. The most recent measurement campaign for 2008 confirmed the trend described above, as shown by Charts 38 and 39 on page 76.

Saras's interest in noise is not limited to the assessments made outside the refinery, however. As part of the measures for protection from physical agents, the assessment of employee exposure to noise has been repeated, in fulfilment of Title V bis of Legislative Decree no. 626/94 (as modified by Legislative Decree no. 195/96) and the phonometric measurement campaign that will result in the complete acoustic mapping of the facility, begun in 2006 with the T2-V2 plant, has been continued. In 2008 the areas of the CCR, Alkylation and Topping 1 plants were mapped.

The objectives of this mapping are as follows:

- Define precisely the noise levels to which employees are exposed
- Identify the locations at greatest risk and set out the appropriate preventive measures
- Proceed correctly with the selection of ear protectors and with the identification of containment measures for major noise sources.

Analysis of the phonometric data has allowed us to quantify the potential acoustic effects of the noise emanated in the workplace in normal operating conditions.

Improvement of the internal and external visual impact

Improvement of the facility's visual impact is a corporate commitment that has grown, particularly from 2000 onwards. The objective is to offer not only a more pleasant and tidy working environment, but also to make the refinery's insertion in the region more sympathetic, and attention has been concentrated on creating a more pleasant perception of environments and buildings inside and outside the refinery. To achieve the former objective, the area inside the facility has been the focus of restoration and reorganisation of spaces and structures, painting and varnishing, improvement of green areas, installation of graphics to raise awareness of issues of envi-

Electromagnetic pollution detection activities

To verify the possible existence of risk situations, in 2001 Saras began a study to analyse and assess this phenomenon inside and outside the refinery area.

The first phase of the study was completed in October of that year with the aid of a rigorous system of measurement, and the results obtained provided indications that were utterly reassuring and which confirm that the magnetic fields generated in the facility are comfortably contained below the legal limits established to protect the population. In addition, it has been shown that the presence of these fields is undetectable from outside the facility perimeter.

This study was the forerunner to a subsequent survey, concluded in 2004, which assessed employees' exposure to electromagnetic fields during work activities: the values found in this study were again much lower than the reference values.

In July 2007 a study was conducted to verify the results obtained in 2001. A new monitoring campaign of magnetic fields was conducted, using the same criteria adopted in the 2001 study. The values found are in line with the results that had emerged from the previous study, confirming that the magnetic fields generated within the facility perimeter are comfortably below the legal limits imposed for the population.

In 2008 the survey of employees' exposure to electromagnetic fields was repeated. The legal framework introduced by Legislative Decree no. 81/2008 had also made the situation clearer, with respect to the previous analysis. The data found confirmed the 2004 study, showing that no electrical and magnetic field values were found that were above the threshold limit values imposed.

Figure 12 – Location of noise measurement stations

Map base and urban zone legend taken from the municipal town plan

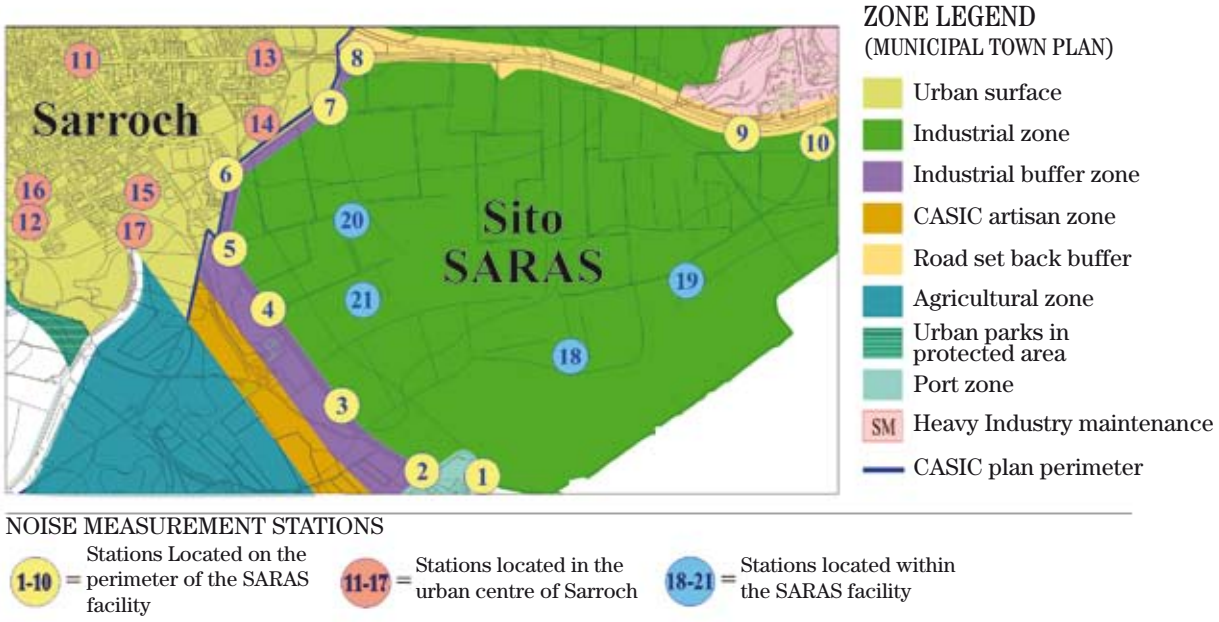


Chart 38 – Sound immission into the surrounding environment (dbA) L90 daytime values (Sarroch inhabited area)

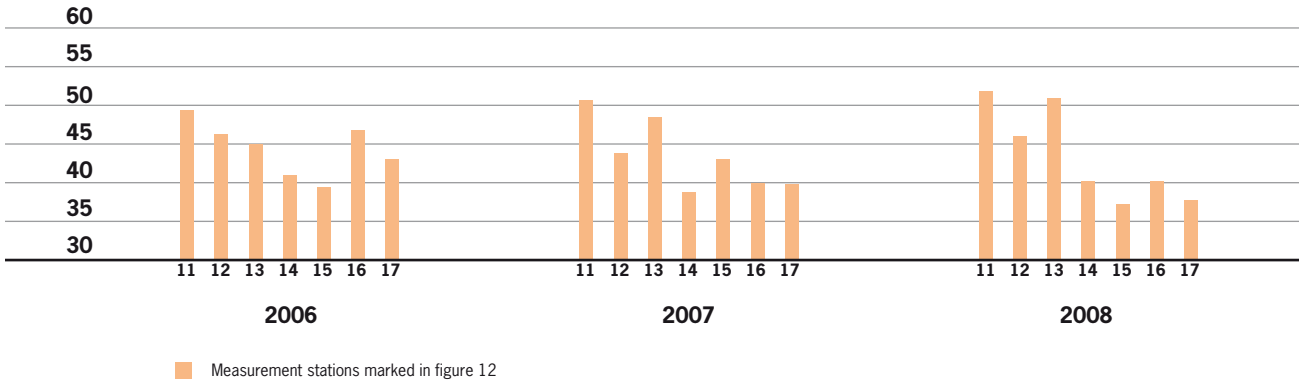
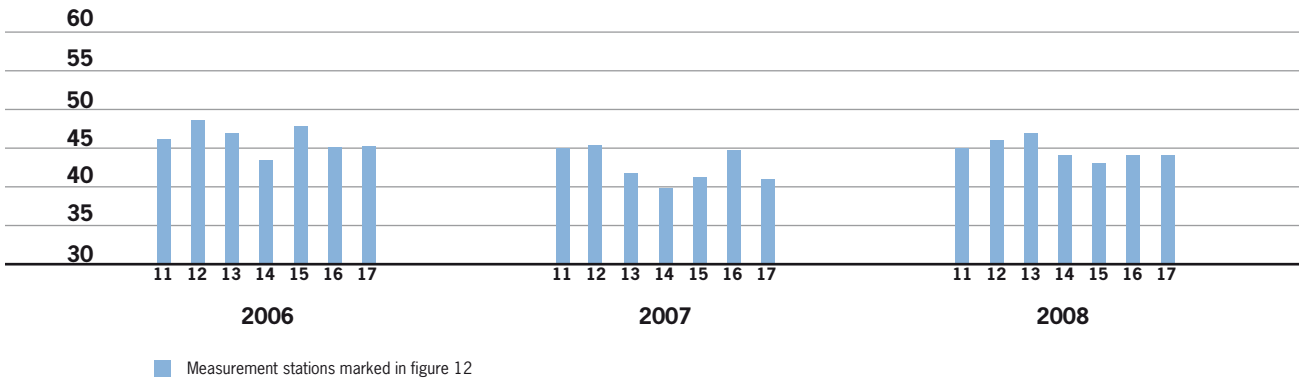


Chart 39 – Sound immission into the surrounding environment (dbA) L90 nighttime values (Sarroch inhabited area)



ronmental protection and safety, and new signage. A number of sculptures have also been installed. These were created at the suggestion of employees and personnel from external companies, using decommissioned materials and work equipment. Transformation measures have also covered structures and spaces that constitute areas of direct contact with the world outside Saras: these consisted of naturalisation measures, to create continuity areas between the facility and the surrounding region. In particular, the junction on S.S. 195 road was rebuilt, the green areas in the parking area were improved, and a green hill was raised on the Sarroch side of the facility. Located in an area that had become available in the zone in front of the facility's storage area, the green hill has allowed us to create a green belt shielding the Sarroch inhabited area from the refinery, by bringing in soil and planting screening trees.

Lastly, in the IGCC electricity generation plant (boiler U702), the new condensation circuit to reduce the plumes of steam emitted into the atmosphere resulting from steam emissions entered service in 2007. In addition to eliminating the visual impact of steam plumes, the new installation also recovers heat for use in process-related activities.
A similar intervention was carried out in the first half of 2008, for the other two boilers in the IGCC.

Investments for the environment
Saras's commitment in favour of increasingly better performance levels on the environmental front can also be measured and assessed through the economic effort expended to this end.
The figures shown in Table 29 on page 78 summarise the major resources spent on this area by the company, with overall investments of over 47 million euro in the last 4 years.
In 2008, the principal investments addressed the following areas:

- Continuing construction of the dynamic barrier for groundwater control
- Implementation of FCC thermal recovery operation
- Continuing activities to install double seals on pumps for moving petrol
- Continuing activities to pave the pipeways and tank retaining reservoirs
- Continuing the installation of double bottoms in the tanks
- The project to implement the CCR-alkylation smoke stack monitoring system

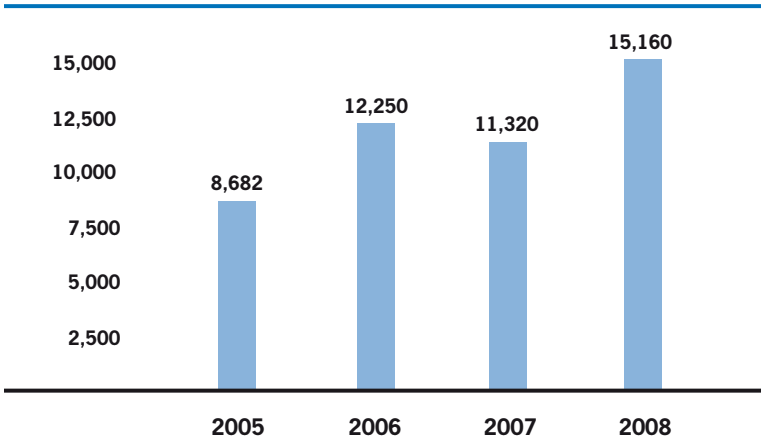
In addition, one measure of particular importance was the completion of construction work on the tail gas treatment unit (TGTU) to reduce emissions of SO_2 from the Claus plants, and which, in the three-year period 2006-2008, involved an overall investment of over 52 million euro.

Table 29 – Investments in the environment (000 euro/year)

	2005	2006	2007	2008
Investments	8,682	12,250*	11,320**	15,160

* by summing the investment for the TGTU (€ 52.7 mln) we get € 64.95 mln
** by summing the investment for the thermal recovery interventions on the FCC (€ 22.7 mln) we get € 34.02 mln

Chart 40 – Investments in the environment (000 euro/year)



Subsidiaries

Arcola

The project to decontaminate the subsoil at the Arcola Depot, which is currently at an advanced executive phase, represents the conclusion of a programme that began in 2002 with the approval of the "Preliminary Project" and the subsequent "Operational Plan" drawn up by Arcola as activities preparatory to the programme of decontamination and making the soil safe at the Arcola Depot. This activity aimed to identify the best subsoil decontamination techniques applicable to the Arcola site, taking account of the fact that the groundwater is used for hydropotable purposes.

The experimental phase was conducted, aimed at planning and defining a decontamination project that included the best available technologies applicable to the site.

The experimental project was developed with the scientific contribution and consultancy of the University of Cagliari.

A number of biodegradation techniques were selected and experimentally conducted in specially-designated areas fitted out as specified in the Preliminary Project and the consequent Operational Plan.

Over the entire experimental phase, a hydraulic barrier was kept active to protect the site. This barrier comprised 5 extraction wells distributed inside the Depot, and effectiveness was constantly checked by monitoring the groundwater quality.

The experimental phase involved a major effort to identify and define the most suitable operational parameters for the site's specificity and vulnerability.

The many experimental test campaigns were conducted by varying the plant and operational elements consistently and in a coordinated fashion, and analysing their results on each occasion, with continuous monitoring supported by analytical field comparisons.

The field experimentation was integrated with research activities developed by the University of Cagliari, aimed at the microbiological characterisation of the site's aboriginal bacterial communities and at determining their evolutionary process.

Among other findings, this research identified an unusual biosurfactant microorganism (known in scientific literature under the name Gordonia Bacterium), which is specially adapted to the biodegradation of hydrocarbons, and which shows the selective evolution of the aboriginal microbiological communities towards specialist microorganisms for the type of organic substrate at the site.

To conclude this complex set of experiments, field monitoring and laboratory research, the basic technique, Bioslurping, was further developed and refined to maximise its effectiveness for the specificity and vulnerability of the site.

Field experimentation of decontamination technologies was concluded in December 2004.

The Definitive Decontamination Project is the fruit of almost 3 years of work, during which time we have developed and perfected the most sui-

Figure 13 – Decontamination project of Arcola site

table techniques to achieve the required result for all the environmental matrices and with particular attention to the hydropotable resources (Figure 13).

The Definitive Decontamination Project involves the simultaneous and synergic application of bioventing and skimming techniques (optimised during the experimentation phase), in 60 new piezometry wells, suitably instrumented and equipped.

In 2005 Arcola drafted and presented the Definitive Decontamination Project to the Services Conference set up by the Municipality of Arcola, which approved it at the end of that year. In early 2006 installation and adjustment of the equipment in the field began, and this activity was concluded in April.

The evolution of the project is being followed constantly via monitoring specific efficiency and effectiveness indicators associated with the precise recording of the environmental conditions. This has been made possible by using special monitoring equipment, including fixed and portable equipment, to record the evolution of the process and measure its effectiveness. For example, the installed instrumentation enables us to assess the activity of the aboriginal aerobic flora by measuring the oxygen and carbon dioxide in the subsoil. Periodic analyses of subsoil samples, taken using a micro-sampling or "microcarrot" technique, supplement the cited information.

The results of the monitoring activity are periodically collected, interpreted and commented in the form of periodic technical reports which are

then sent to the authorities concerned. In December 2008 the V Technical Report on decontamination activities in the period from June to November 2008 was drafted and presented. The most significant figures confirm the effectiveness of the techniques put in place, which have permitted the substantial decontamination of the entire unsaturated zone of the decontamination area. As expected, the focus of attention remains the capillary fringe zone where, due to the groundwater dynamics, there is still an outlook of contamination.

Safety

Safety

The Sarroch facility

Constantly maintaining and encouraging the culture of safety is a priority in our corporate objectives. This is due to the close link it has with creating the right working conditions for our employees' needs, and also to strive towards the progressive reduction of cases of emergencies and accidents.
Similarly to other measurable objectives, like product quality and degree of competitiveness achieved, in this part of the 2008 Report the promotion and maintenance of a high safety level is expressed in specific figures and hard information.
Indeed, to assess whether the choices made are taking the company in the right direction, and to assess the work carried out and the results achieved in this area over time, it is necessary to be able to draw on suitably-indexed data.
The indices considered confirm that much distance has been covered in terms of ongoing improvement of employee safety. However, they also show that there is still room for more improvement.

The Du Pont project

Together with the Du Pont company, Saras has begun a project to promote the improvement of safe conduct of persons at work. Du Pont will be a partner in reaching the objectives in this project.
In 2008 an assessment was conducted of the level of safety in Saras, and an action plan was defined to achieve the following:

- Improve the level of safety culture by creating awareness and commitment at all levels of the Saras organisation
- Make the safety system ongoing and sustainable

The project has been launched by Saras, and will also involve the other companies in the Group.
Saras believes that strong commitment from all of management is essential, together with the appointing and empowerment of "Champions" who will act as promoters of the culture of safety, and also training with specialist personnel who in turn will train the rest of the company's population.

Safety Report

The Saras refinery drafted its 1st Safety Report in 1989 and since then the document has been constantly updated to include all the plant variations carried out over the years and for which correct interaction with the existing system had to be verified.
Currently, analysis of possible accident scenarios excludes the possibility of their having significant consequences outside the refinery, since any consequences would affect an area (in the direction of Italian National Route SS 195) in which there are no inhabited settlements.
To draft the site Safety Report, the company carried out an exacting and in-depth analysis of its activities, with regard to their associated risk deriving from the process, from the substances used, and from the entire complex of procedures that allow such a complicated system as a refinery to operate.
In 2005 the periodic review of the Safety Report was conducted, and was

Safety training

The role of every single employee is essential to pursuing objectives of increasingly higher reliability and safety at work. This is why Saras ascribes great importance to the ongoing training of personnel, with special training initiatives on safety.
The training programme set up involves all personnel at the facility, in a different manner depending on the role performed.
Training consists of both theory and practical sessions. It begins when employees join the company and it progresses throughout their time at Saras. In addition, personnel assigned to firefighting teams take part in a series of special drills.
Overall in 2008 approximately 20,000 hours of safety training and emergency management was provided, involving all personnel, with specific modules for new hires and for those changing position in the company. Specifically, 137 courses were run, with classroom training sessions and in-the-field simulations.
Also in 2008, personnel working for external firms working with the refinery attended the safety training course, the first time they entered the facility. This course is presented on a computer system, and includes a test. Subsequently, a further test is given by the safety training staff of the Prevention and Protection Service.
For some employee positions special courses were run, for example working at the alkylation plant and managing work permissions: in total 3,069 employees of external companies attended courses, for 7,358 classroom training hours overall.

sent to the authorities in October. The review comprised a detailed analysis of the existing plant and management situation. The risk scenarios and possible accident events were reviewed and hence also the possible consequences that these could have, on employees, on the area inside the facility, and on the area outside the facility. The analyses was conducted with the active contribution of the operational personnel and of the staff services personnel (Processes, Maintenance, Engineering, Reliability Engineering etc.). Each employee made a contribution based on their professional experience, to reach the prevention goals assumed.

The Safety Report therefore represents a valuable tool for preventing risk situations and for studying all possible measures to prevent their occurrence. In parallel, the Report also enables the company to identify and adopt the technological solutions, safety equipment and safety systems that will ensure a correct response to any accident episode, minimising the consequences to people, the environment and property. In 2006, pursuant to the requirements of Legislative Decree no. 238/2005, the Safety Report was updated together with the documents required for external planning: the Notification and related Information Files for the population.

In July 2007 the Regional Technical Committee for the Prevention of Fire completed its examination of the Safety Report and submitted its Final Technical Assessment. This Report, and therefore the examination, covers the Saras site in Sarroch in its entirety.

The conclusions, given in a detailed report by the Committee, indicate a positive assessment of the implemented activities and invite the company to continue down the path already begun for ongoing improvement. And indeed, with a view to ongoing improvement, the Committee suggested a series of further development areas for study and possible implementation.

Safety systems at the refinery

The Sarroch refinery has a complex safety system designed to detect potentially dangerous situations immediately. The water distribution system for fires comprises an extensive network that covers the whole plant.

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

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

Internal Emergency Plan

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

- Preventing and limiting injury and providing assistance to anyone hurt
- Bringing accidents under control and limiting their effects
- Preventing and minimising environmental damage
- Preventing and minimising damage to company property

As mentioned earlier, the IEP – progressively revised to take account of modified operating and plant conditions – also includes the Marine Pollution Prevention Plan, drawn up to deal with emergencies resulting from oil spills into the sea or other critical events that could occur at the site's marine facilities.
Based on the content of the Refinery's Safety Report, the IEP defines the criteria for a reportable accident, and distinguishes between three types (i.e. three levels) of emergency:

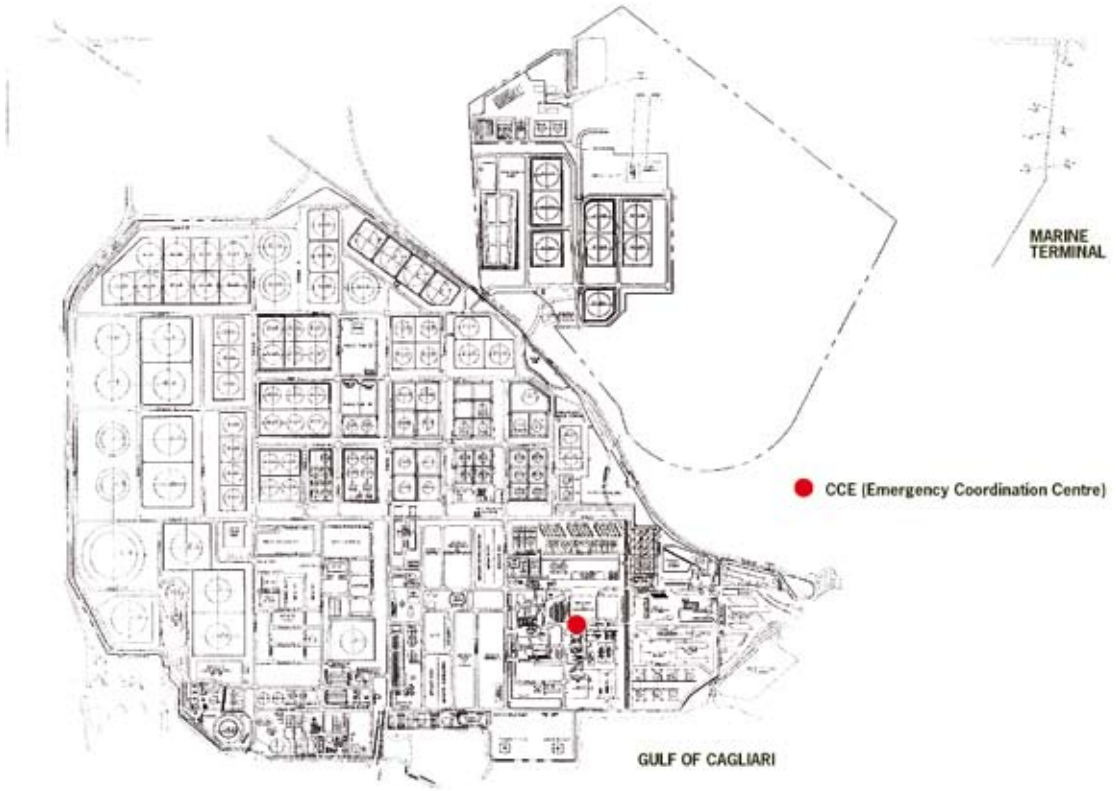
- **Limited emergency**
- **General emergency**
- **Near accidents**

A **limited emergency** is when the accident event is limited to a well-defined part of the facility, usually without involving a fire, and can be quickly eliminated using only the locally-available resources. **General emergencies** are when an accident event, by its nature or due to specific environmental conditions, presents the danger of propagating to other parts of the facility or affecting areas outside the refinery. Lastly, **near accidents** are situations that could potentially have led to accidents, the analysis and assessment of which are of major importance to the ongoing improvement of site safety (see data shown on page 90). In addition, for prompt and effective intervention, it is fundamentally important to have alarm and emergency reporting procedures that are designed to alert all corporate representatives concerned according to the type of event. Lastly, the communication variable also assumes great importance within the Plan, to set up clear, direct systems with which to inform those who are involved with putting the plan into practice, those present in the facility, external assistance forces (Carabinieri/police, fire brigade etc.), and public opinion.
Deployed throughout the refinery area there are communication and reporting tools (button-operated fire alarms, telephones, fixed and portable radio receiver/transmitters supplied to installations or to key corporate representatives), which permit the real-time activation of men and resources. According to a list of priorities, the Emergency Coordination Centre located inside the refinery (Figure 14 on page 87) provides communications and updates on the management of the accident event to external bodies concerned, which, according to the type of accident registered, will be the following:

- Fire brigade
- Prefecture
- Neighbouring industrial sites

Other notifiable bodies in the area are the Municipality of Sarroch, the Carabinieri in Sarroch, the Italian State Police and the Port Authority. Constant updates on the developing situation, until the emergency is completely dealt with, also allow all external parties to best manage their communications with the local community.

Figure 14 – Location of Refinery Emergency Coordination Centre



Data

Accidents

Saras personnel. The accident trend recorded in 2008 confirms our need to proceed with the workplace safety performance level improvement project which, over the past year, we launched with the Du Pont company, a world leader in the workplace safety field. Comparison of the data shows a substantial stability in the indices of frequency (total number of events occurred in relation to the hours worked) and of severity (extent of damage in relation to the number of days' sick leave due to the accident), with a reduction in the average duration of accidents (Charts on page 88). The nature of the causes of the accidents recorded, associated predominantly with behavioural factors, confirms the need to press ahead with involving employees in "safe working" issues, including by means of intense training and information initiatives, in line with the principles already set out in the Policy for Safety and in the company's management system. In detail, for 2008 the Total Frequency Index (Chart 41) and the INAIL Frequency Index (Chart 42) show values that are slightly lower than for 2007: the former went from 12.2 to 11.6, while the latter, which records accidents reported to the work accident compensation authority (INAIL), i.e. accidents resulting in more than one day's absence from work, went from 7.5 to 6.4.

Other reference parameters of particular significance and usefulness to for an analysis of the situation are the Severity Index and the Average Duration of Accidents (Table 30). For the former, in 2008 there was a

External Emergency Plan (EEP)

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

The plan concerns the Sarroch industrial complex as a whole, and considers hypothetical accidents affecting sites belonging to the various companies located there (Saras, Polimeri Europa, Sasol Italy, ENI, Liquigas, Air Liquide Italia) 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, especially populated districts and infrastructure) are used to plan the best way of managing accidents given the potential effects on people living nearby. Procedures have been defined for executing and managing the EEP, from raising the alarm to intervention by all company and third-party personnel with responsibilities for the various roles required to deal with the emergency, such as direct management of internal accidents at the site, control and monitoring of the surrounding area, provision of information and assistance to local residents (road management, health services, information media etc.).

Prefecture, Questura, Fire Brigade, Highway Police, Carabinieri (police), Financial Police, Forestry Corps, Port Authority, local health authority (ASL), ARPA Sardinia, the local governments for the Region of Sardinia, the Province of Cagliari, and the Municipality of Sarroch: all of these bodies will be involved in their various ways in providing rapid and effective management of an accident with possible repercussions for the region outside the facility perimeter.

The effectiveness of the EEP and its implementation is monitored via accident response exercises involving the companies and organisations responsible.

Table 30 – Saras employees: accident indices

	2005	2006	2007	2008
Total frequency index	12.7	12.0	12.2	11.6
INAIL frequency index	5.7	5.7	7.5	6.4
Severity index	0.129	0.120	0.123	0.172
Average duraition of accidents	22.8	21.3	16.5	26.7

Chart 41 – Saras employees: total frequency index

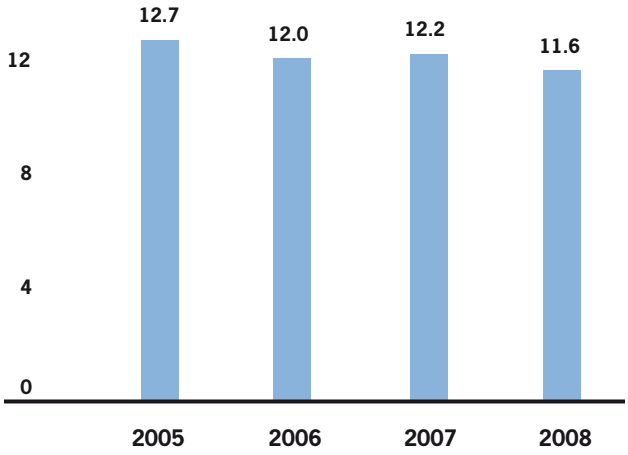


Chart 42 – Saras employees: INAIL frequency index

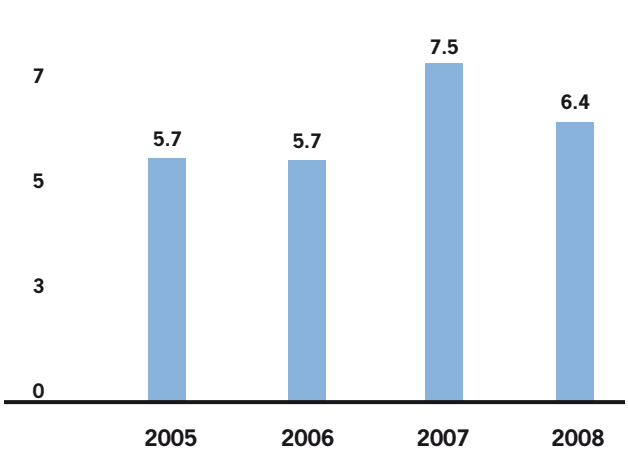


Chart 43 – Saras employees: accident severity index

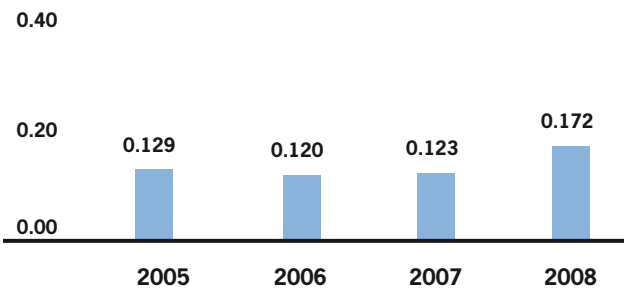
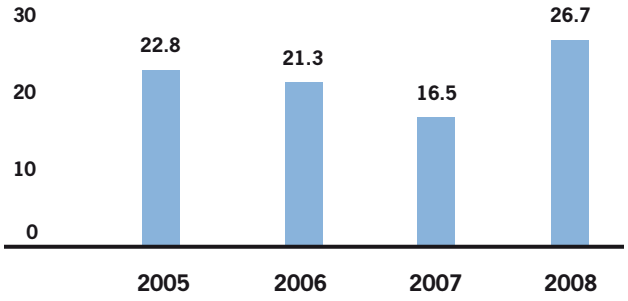


Chart 44 – Saras employees: average duration of accidents (days)



reduction over 2007 that is not immediately visible in Chart 43: the value 0.172 includes days of absence deriving from accidents in 2007, and the value with days for 2007 accidents subtracted is 0.10.

External companies. Workplace accident data involving employees of contracted firms is also recorded and analysed by the refinery. This is an area which has been assumed as an improvement objective, by means of training and motivation actions with the firms. Once again in 2008, the work done to date with the Saras RLSA (Staff Safety & Environment Representatives) and the RLS (Staff Safety Representatives) of the contracted firms

was actively continued, and the reduction in the INAIL frequency indicators is a clear demonstration of this. The introduction of the Single Interference Risk Assessment Document ("Unico di Valutazione del Rischio di Interferenza", or DUVRI) in 2008 has also allowed greater control of the work done by contracted firms and, in particular, it has allowed significant improvements in works planning, which has led to a reduction in accidents and the related indices (Charts 45, 46, 47).

Table 31 – External company employees: accident indices

	2005	2006	2007	2008
Total frequency index	8.0	13.37	10.93	5.77
INAIL frequency index	5.70	8.14	5.75	2.26
Severity index	0.221	0.170	4.58	0.061
Average duration of accidents	38.7	15.6	39.8*	26.7

* Figure does not include fatal accident

Chart 45 – External company employees: total frequency index

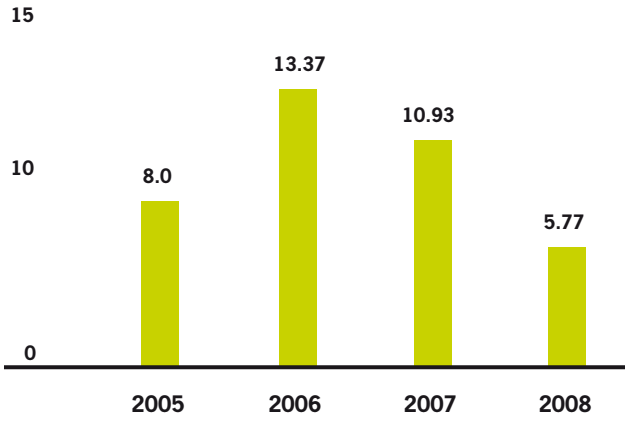


Chart 46 – External company employees: INAIL frequency index

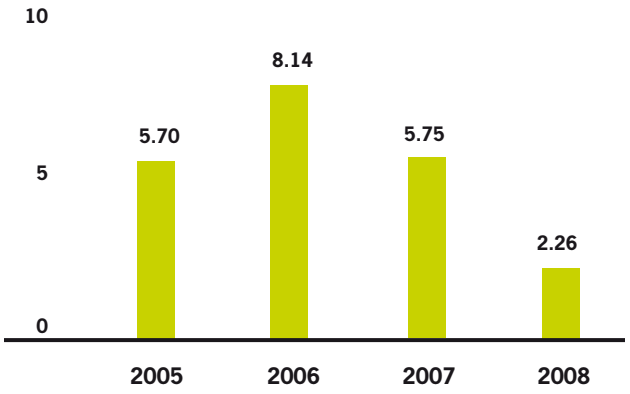


Chart 47 – External company employees: accident severity index

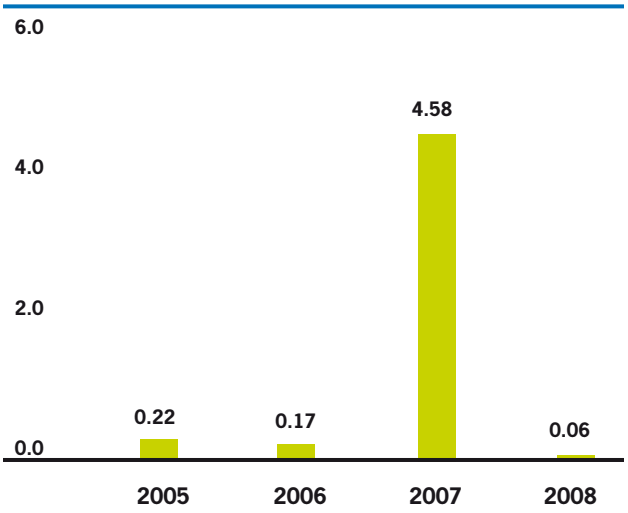
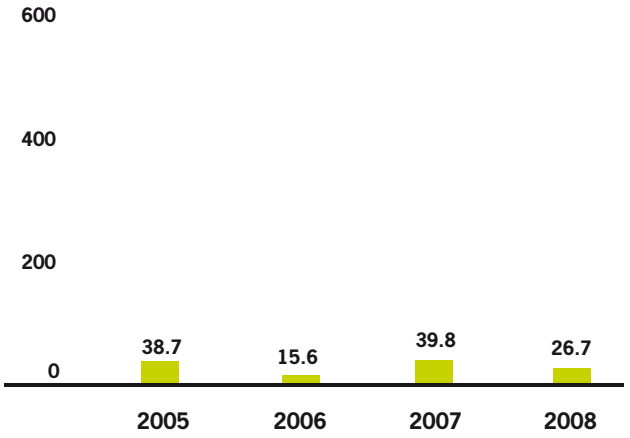


Chart 48 – External company employees: average duration of accidents



Emergencies

As can be seen in Table 32, in 2008 the number of limited emergencies recorded has continually decreased in the last 3 years. General emergencies are in line with the consolidated trend of previous years. Analysis of near accidents (Chart 51) shows an increase over past levels: reporting of events, which we are increasing through a major campaign of internal awareness-raising, both for employees of Saras and for employees of contracted companies, is essential and has allowed the reduction of the number of events in the year to 25, the best result since records began. On the facing page are the charts showing the number of plant shutdowns following an emergency and the consequent number of shutdown days recorded. Charts 52 and 53 show that the 2008 results are in line with the 2007 results.

Table 32 – Emergencies: Number of events

	2005	2006	2007	2008
Limited emergencies	24	27	21	18
General emergencies	7	4	6	7
Near accidents	1	1	10	11

Chart 49 – Limited emergencies

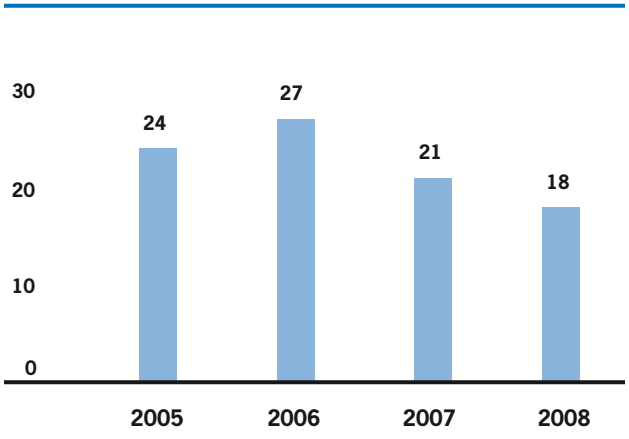


Chart 50 – General emergencies

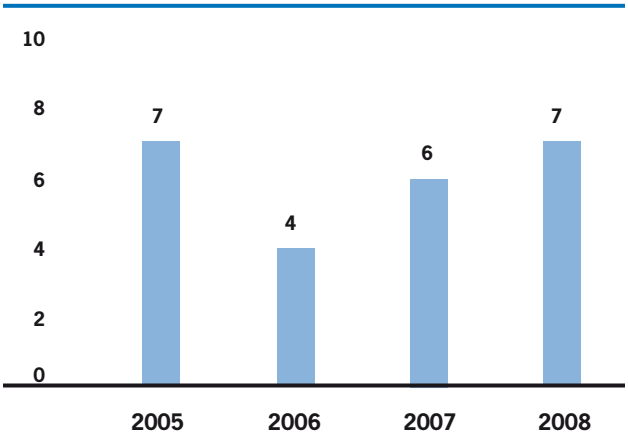


Chart 51 – Near accidents

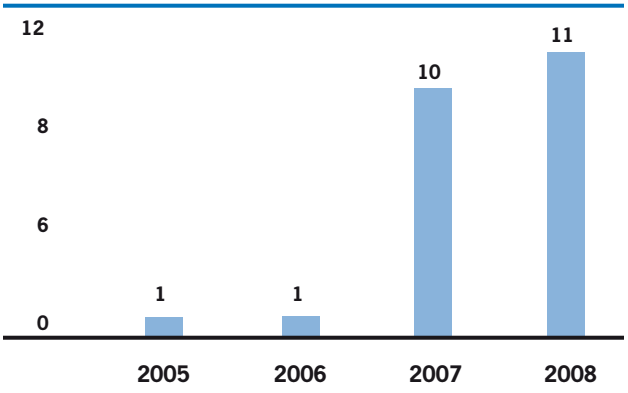


Table 33 – Shutdowns following an emergency

	2005	2006	2007	2008
Plant shutdowns	5	2	2	1
Shutdowns days	31	11	1	3

Chart 52 – Shutdowns

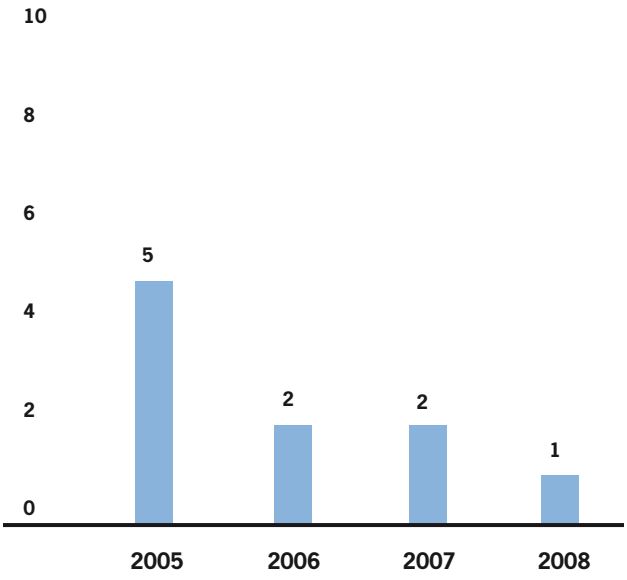
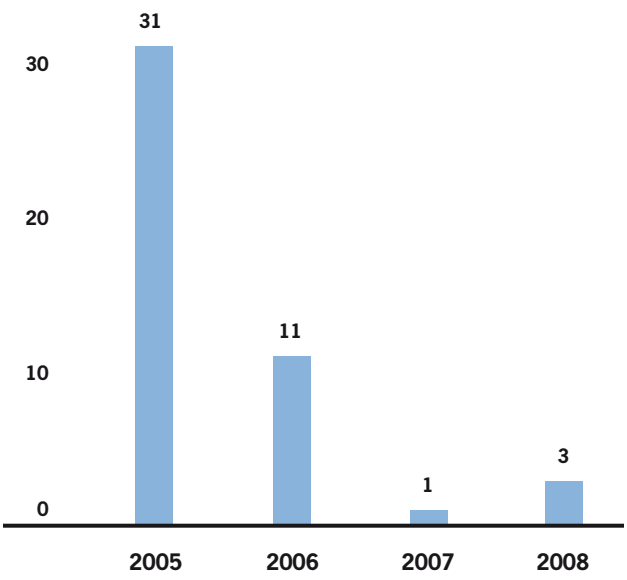


Chart 53 – Shutdown days



Investments in safety

Saras's policy and projects for the ongoing raising of safety levels at its facility have meant that, from 2005 to 2008, over 22.6 million euro of investments have been made, with an average of 5.66 million euro/year (Table 34 on page 92).

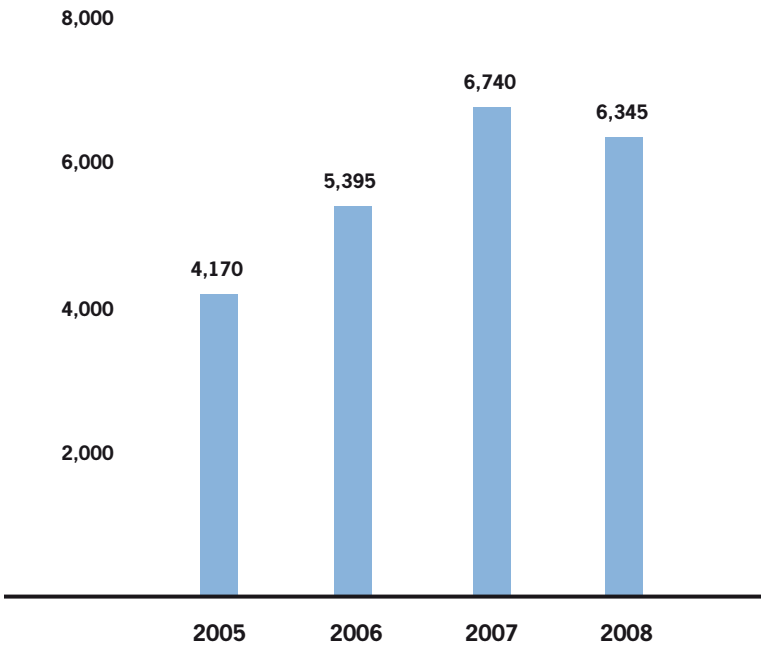
The principal measures financed in 2008 concerned both improvements to existing safety equipment and modifications to plant systems and product movement systems, as described below:

- Addition of extra shut-off valves for product volumes in the Alkylation plant
- Replacement of the glass Klingers in process plants with magnetic ones
- Continuation of upgrading of the fire prevention system and new equipment
- Continuation of upgrading of the fire detection and hydrocarbon detection system
- Completion of upgrading of the fire protection systems for structures (T2/ V2 / V1)
- Safety upgrading of the interior of the tank containment reservoirs
- Preparation of fire protection systems for structures in the alkylation and T1 plants

Table 34 – Investments in safety (000 euro/year)

	2005	2006	2007	2008
Investmnets	4,170	5,395	6,740	6,345

Chart 54 – Investments in safety (000 euro/year)



Subsidiaries

The charts that follow show the trends of the principal accident indices for the Group's companies.

The figures for the Sarroch site have already been described elsewhere in the document.

Saras's Milan office, Arcola, Sarlux and Sardeolica did not register accidents with losses of working days, either for direct employees or for employees of contracted firms.

Akhela registered one accident among the personnel of contracted firms, and the value of the index is a consequence of the low number of hours worked by external firms.

Sartec registered one accident among its employees and the value of the index (3.46), in relation to the number of hours worked, is lower than the group average. The trend of the total frequency index (Chart 55) and of the severity index (Chart 57 on page 94) follow the same trend.

In the following charts, the column marked "Total" gives the index calculated from the sum of direct and indirect accidents and the sum of hours worked by direct and indirect employees.

Chart 55 – Total frequency index

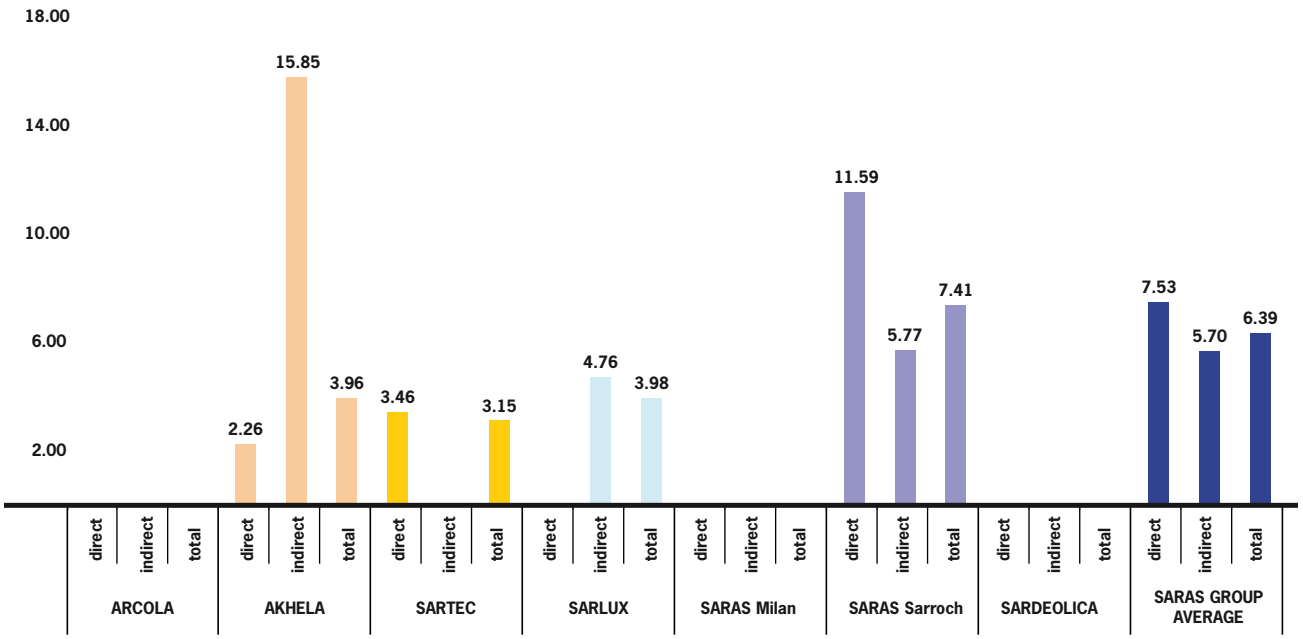


Chart 56 – INAIL frequency index

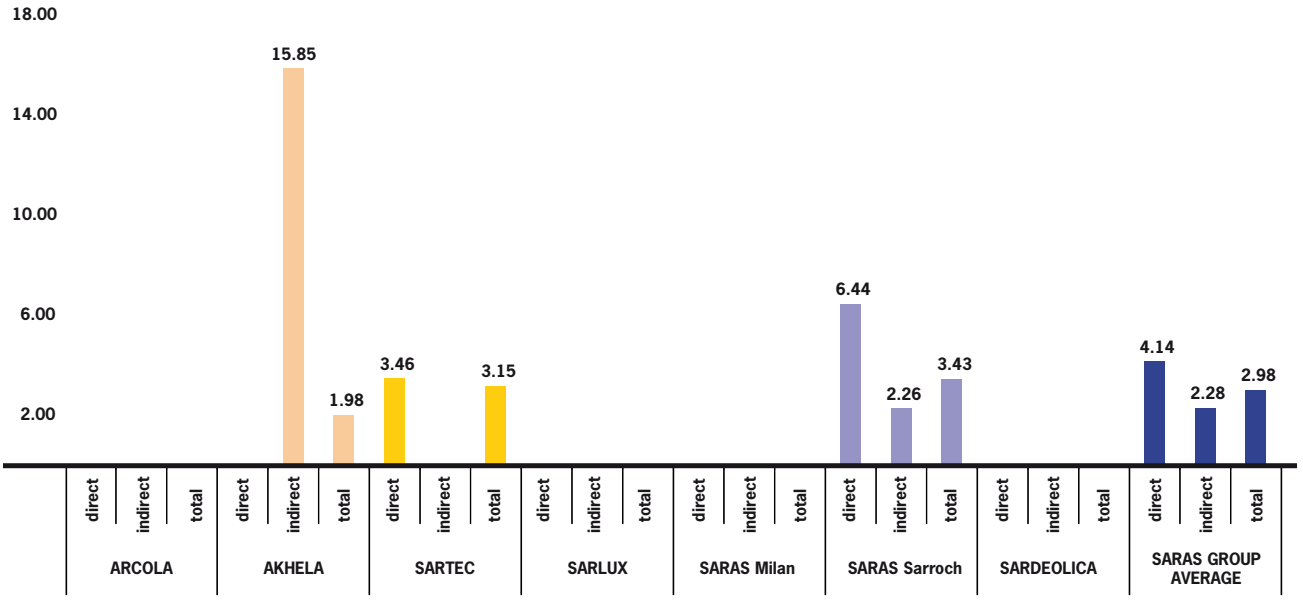


Chart 57 – Accident severity index

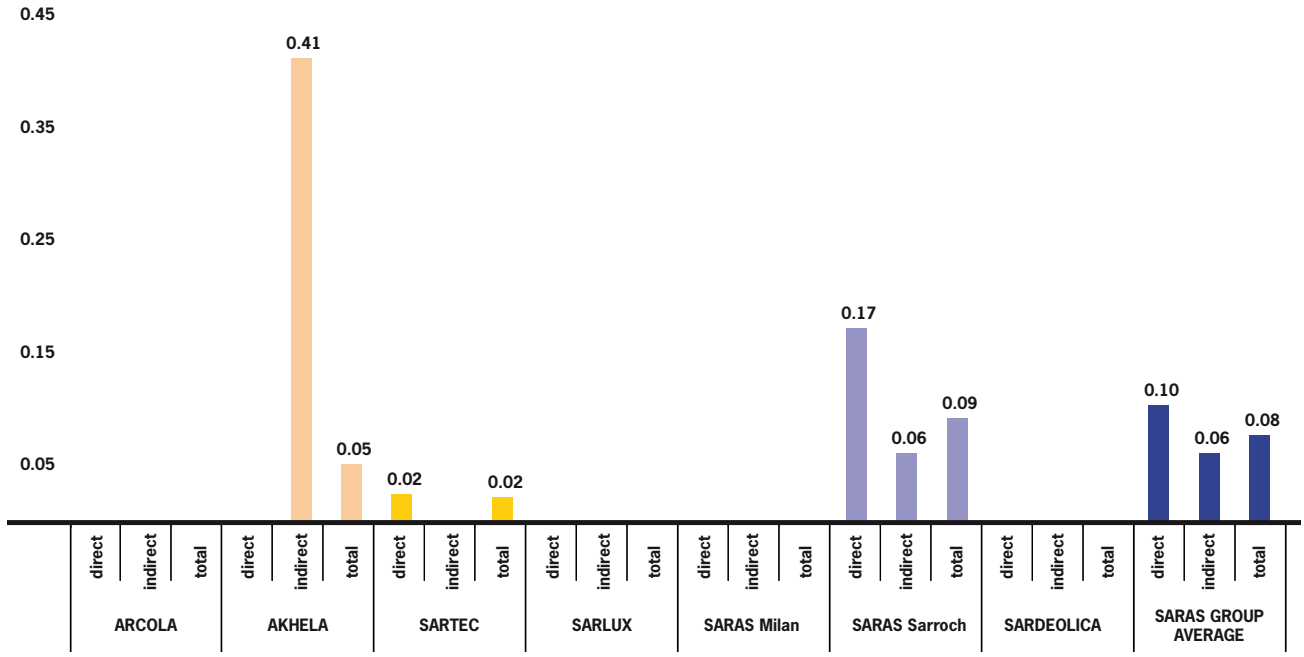


Chart 58 – Hours worked (direct employees)

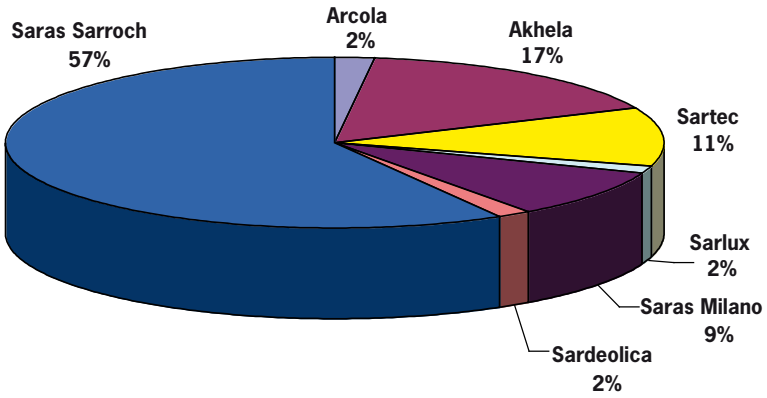
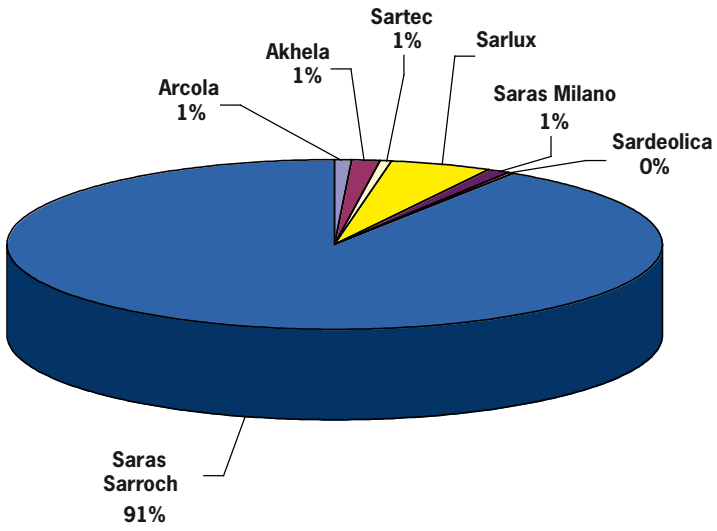
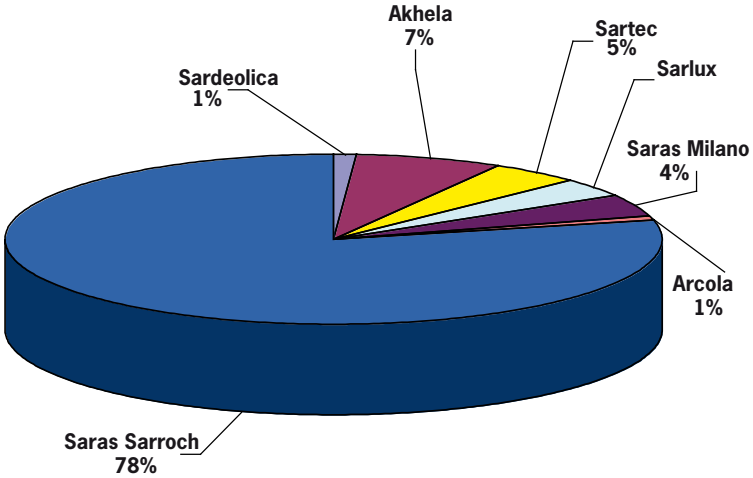


Chart 59 – Hours worked (contracted firm employees)



The personnel at the Sarroch site has a major influence on the trend of the indices in the Group, because the number of hours worked is 57% of the total for direct employees (Chart 58) and 91% for employees of contracted firms (Chart 59).

Chart 60 – Total hours worked



Glossary

Glossary

ARPA (AGENZIE REGIONALI PER LA PROTEZIONE AMBIENTALE)

These are "Regional Agencies" tasked with local environmental supervision and control. The ARPAs were set up by Italian Law no. 61 of 1994, which also set up ANPA, the national environmental protection agency, today known as ISPRA (Higher Institute for Environmental Protection and Research), which incorporates the former APAT agency. ISPRA is tasked with setting guidelines and coordinating the regional agencies and those based in Italy's autonomous provinces. Subsequently, all of Italy's regions and autonomous provinces set up their own agencies. ARPA Sardinia was created under Regional Law no. 6 of 18 May 2006.

AUDIT

A term used in various contexts to mean "inspection check" or "assessment". The term indicates a systematic, independent and documented process for obtaining evidence (registrations, declarations of fact and/or other information) and assessing this evidence objectively, in order to establish how far the criteria of the inspection check (policies, procedures or requirements) have been met.

BALLAST WATER

Water deriving from the ballasting of empty ships with sea water.

CAM INDEX (MARINE WATERS CLASSIFICATION)

This is the index used in coastal marine environment monitoring (CAM refers to the Italian acronym, "Classificazione Acque Marine"). The index converts the values read into a summary rating of the state of the quality of the sea under three types, interpreted and referred a three classes of quality, where by quality we mean that associated with the state of eutrophication of the coastal systems and with the potential incidence of hygienic/health risks: High quality - uncontaminated waters;
Medium quality - waters with different degrees of eutrophication, but which are ecologically integral;
Low quality - eutrophicated waters with evidence of environmental alterations including alterations of anthropic origin.

CARBON MONOXIDE (CO)

A gas produced by the incomplete combustion of fossil fuels. The main source is petrol engines not equipped with catalytic converters.

CO_2 (CARBON DIOXIDE)

An odourless, colourless, flavourless gas produced from the combustion, respiration and decomposition of organic material. Its characteristics include the ability to absorb infrared radiation emitted by the 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 nonbiodegradable matter.

COGENERATION

Process by which two different energy products, such as electricity and heat, can be generated together by a single plant designed specifically for the purpose, resulting in high environmental efficiency.

DECONTAMINATION

The set of physical, chemical and/or biological measures intended to reclaim deteriorated situations or remove plant/equipment that is no longer operational in order to eliminate or limit risks to human health and/or to the environment.

DESULPHURISATION

Process for treating oil fractions in order to reduce the sulphur content in refined products.

DIESEL

A blend of hydrocarbons that is principally obtained from the primary distillation of crude.

DISTILLATION

A process of progressive separation of the components of crude in a distillation column, at the base of which the crude is injected. In the process, the counter-flow of a liquid and a vapour enrich each other, respectively, with the heaviest and lightest components.

EMAS (ECOMANAGEMENT AND AUDIT SCHEME)

Established by EC regulation no. 1836/93, updated by EC regulation no. 761/2001 (EMAS II), this is a voluntary scheme intended to promote continuous improvement in the environmental efficiency of industrial activities. Under the regulations, participating companies must adopt environmental management systems at their production sites based on policies, programmes, procedures and objectives aimed at improving the environment, and must publish an environmental declaration. Before a site can be added to the register set up by the European Commission, this declaration must be approved by an inspector accredited by an authorised national body. In Italy this body, operational since 1997, is the Ecolabel and Ecoaudit committee, which works with the technical support of APAT (now ISPRA).

EMISSION TRADING

On 13 October 2003 the European Commission published the European directive on emissions trading (Directive 2003/87/EC), better known as the emissions trading system. The key points established by the directive are as follows: From 1 January 2005 no plants falling within the scope of the directive may emit CO_2 (i.e. continue to operate) without appropriate authorisation; each year the operators of these plants must return CO_2 allowances equal to those released into the atmosphere to the competent national authority; maximum CO_2 allowances have been set for every plant regulated by the directive; CO_2 emissions effectively released into the atmosphere are monitored in accordance with the requirements of the competent national authority and certified by an accredited inspector.

EMISSION

The discharge of any solid, liquid or gaseous substance into the ecosystem from a plant or any other source, which can have a direct or indirect effect on the environment.

ENVIRONMENTAL IMPACT

Any change to the environment, positive or negative, deriving in whole or in part from the activities, products or services of an organisation.

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

FILTER CAKE

The solid product formed by the filter presses and so named because of its physical, cake-like consistency. Filter cake is the result of the process of gasification of heavy refined products. It contains high percentages of metals such as iron, carbon vanadium and nickel.

FUEL OIL

A heavy fraction of oil refining, used as a fuel. Increasingly used in low-sulphur form to limit its negative impacts on the environment in terms of atmospheric emissions (principally SO_2 and particulates).

GREENHOUSE EFFECT

Gradual increase in average atmospheric temperature due to the increased concentration of gases in the atmosphere. Substances that contribute significantly to the greenhouse effect (greenhouse gases) include chlorofluorocarbons (CFC), carbon dioxide (CO_2), methane (CH_4), nitrogen oxides (NO_x) and sulphur hexafluoride (SF_6).

IGCC (INTEGRATED GASIFICATION COMBINATED CYCLE)

A plant that produces syngas (synthesis gas) from heavy hydrocarbons and subsequently produces electricity and heat using a combined cycle.

IMMISSION

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

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 (formula: number of accidents reported to INAIL x 10^6/hours worked).

INES (INVENTARIO NAZIONALE DELLE EMISSIONI E LORO SORGENTI, OR NATIONAL INVENTORY OF EMISSIONS AND THEIR SOURCES)

National register of emissions set up pursuant to Legislative Decree no. 372 of 4 August 1999 (implementing Directive 96/61/EC) and to Decrees issued by the Ministry for the Environment on 23 November 2001 and 26 April 2002. It consists of information on emissions from industrial sites in Italy which are subject to IPPC regulations. The regulations state that such companies must submit qualitative and quantitative data to ISPRA (formerly APAT) each year in relation to a set list of pollutants present in gaseous and aqueous waste from their plants. This information is then submitted to the environment ministry for forwarding to the European Commission and inclusion in the EPER register.

IPPC (INTEGRATED POLLUTION PREVENTION AND CONTROL)

European directive of 1996 relating to the reduction of pollution from the various places where it is emitted throughout the European Union, implemented in Italy by Legislative Decree 59/2005.

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

An international non-governmental organisation based in Geneva, to which the standard-setting bodies of around 140 countries belong. It is responsible for examining, drafting and distributing to the international community standards relating mainly to environmental management (ISO 14000) and quality assurance (ISO 9000) for companies in all sectors.

ISPRA (ISTITUTO SUPERIORE PER LA PROTEZIONE E LA RICERCA AMBIENTALE)

The Higher Institute for Environmental Protection and Research or ISPRA is an Italian research body formed in 2008 by the merging of three bodies reporting to the Ministry for the Environment: APAT (Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici), ICRAM (Istituto Centrale per la Ricerca scientifica e tecnologica Applicata al Mare) and INFS (Istituto Nazionale per la Fauna Selvatica), to rationalise the activities carried out by these three organisms and streamline them to ensure greater effectiveness in environmental protection, and also as a measure to contain public expenditure.

KYOTO PROTOCOL

Act approved by the Conference of the Parties in Kyoto, 1-10 December 1997, containing the initial decisions on the implementation of some of the commitments of the United Na-

tions Framework Convention on Climate Change (UN-FCCC), which was approved in 1992 and ratified by Italy in 1994. The treaty came into force on 16 February 2005, after being ratified by Russia. To be mandatory at international level, the Protocol had to be ratified by at least 55 countries. One of the key points is the requirement for the most industrialised countries (including Italy) to reduce their emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrated fluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5% of 1990 levels, in the fulfilment period running from 2008 to 2012. In addition, these countries must set up projects to protect woods, forests, and agricultural land that absorb carbon dioxide, set up a national system for estimating gaseous emissions, and can earn "carbon credits" by helping developing countries to avoid polluting emissions. Signatory countries face sanctions if they fail to meet their targets. The rules for developing countries are more flexible.

KWH (KILOWATT-HOUR)

Unit of measurement of electricity produced or consumed, equivalent to the power produced by 1 kW in one hour.

MAJOR HAZARD

Probability that an event linked to uncontrolled development of an industrial activity could give rise to serious danger, either immediate or in the future, for people and the environment.

MANAGEMENT SYSTEM

The organisational structure, planning activities, responsibilities, procedures, practices, processes and resources to formulate, implement, obtain, re-examine and maintain control, where possible, over all the internal and external variables of an organisation.

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. 1 MW = 1,000 kW.

MWH (MEGAWATT-HOUR)

Unit of measurement of electricity produced or consumed, equal to the power produced by 1 MW in one hour and equivalent to 1,000 kWh.

NO_X (NITROGEN OXIDES)

Gaseous compounds consisting of nitrogen and oxygen (NO, NO_2 etc.), normally released during the combustion of fossil fuels when free nitrogen (N_2) 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.

PETROL

A blend of hydrocarbons made up of fractions of various different refined products. In ambient conditions of temperature and pressure, it takes liquid form.

PIEZOMETER

Small-diameter tube or well inserted into a body of water and used to measure, by means of the water level reached inside the tube, the level of piezometry (the line where points with a height equal to that of the body of water are located) at a set point.

PPM (PARTS PER MILLION)

Unit of measurement of the concentration of a substance present in small quantities in a liquid or gas.

REFINING

A set of processes to transform crude oil into derivatives of varying levels of quality (mainly LPG, light petrol, naphtha, kerosene, diesel and residues).

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.

REVAMPING

Interventions on industrial systems to improve or increase processing capacity.

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 10^3/hours worked).

SO_2 (SULPHUR DIOXIDE)

It is a colourless, pungent gas that is released during the combustion of fossil fuels containing sulphur. High concentrations of SO_2 in the atmosphere are the principal cause of the formation of acid rain.

SULPHUR

A chemical element present in crude oil as sulphurised compounds. After recovery by the desulphurisation processes, sulphur is sold for use in the chemical industry.

TOE (TON OF OIL EQUIVALENT)

Unit of measurement conventionally used to determine the energy contained in various sources taking into account their calorific potential.

TOTAL FREQUENCY INDEX

Calculated using the total number of events that occurred (accidents reported by the company to the work accident compensation authority INAIL, plus injuries treated) and the number of hours worked (formula: number of events x 10^6/hours worked).

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 µm(1 µm= 1 millionth of a metre) can pass through the airways and penetrate the lungs, becoming a potential health hazard depending on the substances involved.

WHOLESALE

The channel for selling oil products to wholesale customers, such as industries, consortia and public bodies.

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.

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