Sarroch Refinery
Environmental and Safety Report 2009

SARAS


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Foreword

Welcome to the Saras Group Environmental and Safety Report 2009.
2009 was a year of particularly complex challenges, marked by the fatal accident on 26 May involving three employees of a subcontractor, a tragedy that shook the Saras Group and the local industry, leaving a deep impression and opening up new avenues for reflection.

In particular, those events have led the company to redouble its commitment and attention to safety, strengthening all the measures implemented over the years.

In this regard, as already mentioned in the ESR 2008, Saras is co-operating with Du Pont, the world leader in safety, on a multi-year project, entitled **"Safety is our energy",** intended to promote safe practices during working activities, with a view to progressively reducing the number of accidents and emergencies.
This project was further strengthened on the back of experiences gained in the field, particularly relating to procedures and working methods at the plant, both by Saras and its subcontractors.
In 2009 the initiative progressed through activities and tools such as safety talks (coupled with plant visits), accident analyses, on-site audits, training, communication and organisation.
Our vision summarises what we want to represent when it comes to safety: "We want see ourselves and be seen as an industrial group made up of people who live and promote a culture of safety through our daily actions". It is therefore through co-operation between everyone at all levels that we will be able to achieve constant improvement, while recognising that this is a long process requiring a huge amount of determination.

While pursuing the path of improvement initiated in the last few years, the Group has made a significant investment in the **Focus** programme, which is intended to focus on managing company processes to ensure availability, reliability, efficiency and productivity are maximised over the long term. Starting from the results of other projects completed recently, we will define more efficient processes and organisational structures and functional models of conduct, in order to guarantee Saras' competitiveness and future sustainability.

The company's performance was affected by the financial crisis and global economic recession that began in mid-2008 and had an impact on all industries. The economic slowdown was even more severe in 2009. As well as the Focus programme, our response to the crisis was to continue to implement our plans to invest in both ***safety*** and the ***environment***, and measures to maintain our competitive advantage by improving plant technology, albeit within the context of wider replanning.

While the situation remains complex, the market is showing timid signs of recovery, which is cause for hope that 2010 will be better than the previous year. We are certain that the actions we have undertaken, partly as a response to the accident, will give us greater unity and strength to meet the new challenges and look ahead with confidence.

Dario Scaffardi
General Manager, Saras SpA


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

The Saras Group

The Saras Group

The Saras Group

The Sarroch site and Saras' subsidiaries

The Saras Group, established in 1962 by Angelo Moratti, operates in the energy sector, and is one of the leading operators in the oil refining industry in Italy and Europe. It operates in the following areas:

- the sale and distribution of oil products on the national and international markets, both directly and through its subsidiaries Saras Energia SA in Spain and Arcola Petrolifera SpA in Italy;
- the generation and sale of electricity through Sarlux Srl and Parchi Eolici Ulassai Srl
- the provision of IT services through Akhela and industrial-engineering services and scientific research for the oil, petrochemical, energy and environmental sectors through Sartec.

Saras SpA, a subsidiary of Angelo Moratti Sapa, is the parent company, established in 1962 to carry out refining activities. Today, it owns the Sarroch production site. It has shareholdings in a number of subsidiaries in Italy and abroad, which are briefly described below.

Arcola sells oil products on the domestic wholesale market, in Sardinia, North and Central Italy.

Sarlux, a wholly-owned subsidiary of Saras, owns the IGCC plant and manages commercial activities relating to the energy generated by the IGCC, while Saras is wholly responsible for the plant's operational management.

Saras Energia SA distributes oil products on the Spanish retail and wholesale market. In 2009 its biodiesel plant in Cartagena became operational, and the company acquired 81 service stations from ERG Petroleos SA.

Sardeolica manages the wind farm located in the municipality of Ulassai (Province of Ogliastra). Following the acquisition by Saras of the stake held by Babcock & Brown Wind Energy in the subsidiary Parchi Eolici Ulassai Srl (PEU), this company was fully consolidated from 30 June 2008.

Akhela is an IT company. Its offers two main types of services: information technology and embedded systems. Within its range of IT solutions, the issues of logical security, IT optimisation and business continuity are particularly important, while its embedded systems find application chiefly in the automotive and multimedia fields.

Sartec (Saras Ricerche e Tecnologie) provides industrial engineering and scientific research services nationally and internationally. It also designs, builds and rolls out modular plants to monitor emissions.

SARAS

Saras has **1,278 employees**. Its registered office is in Sarroch, and it has an administrative office in Milan and a sales office in Rome.

Strategy and investment

2009 was a very difficult year for the global economy. The sharp drop in demand for oil products led to a marked reduction in refining margins. Nevertheless, Saras introduced some significant technological improvements to its plants, on the back of a huge cycle of investment and planned maintenance. In 2009, the Group invested approximately EUR 317 million, in line with its investment plan. The bulk of this investment, EUR 244.4 million, was allocated to the refining segment:

- EUR 50 million was invested in Saras' "Health, Safety and Environment (HSE)" programme, mainly dedicated to environmental-protection measures and improvements in energy efficiency with a consequent reduction in the fuel burned and therefore emissions
- the investments also concerned the completion of the TGTU plant, a tail gas treatment and sulphur recovery unit, which led to a significant reduction in sulphur emissions
- investments in the electricity generation segment totalled EUR 12.4 million, mainly relating to the planned maintenance carried out on the parallel trains of the "Gasifier - Combined Cycle Turbine"
- investment in the marketing segment was EUR 56.6 million, of which EUR 40 million related to the acquisition of Spanish service stations from ERG Petroles and was divided almost equally between the second and third quarters of 2009, with the remainder being invested to complete the biodiesel production plant.

As regards future investments, the company has revised its plans in light of the current economic recession, but will, however, remain focused on increasing operating efficiency, improving energy recovery and introducing initiatives to cut both fixed and variable costs.

As a result of the recession, all the main projects concerning "conversion capacity growth" from 2010 onwards have been put back by approximately 12-18 months, in order to keep debt under control. In the short term, the asset management programme will form part of the company's efforts to improve energy efficiency and energy recovery. This recently-launched programme is intended to increase:

- asset integrity, which concerns maintenance strategies, both routine and for shutdowns
- asset efficiency, which is intended to address consumption and losses
- asset effectiveness, aimed at improving productivity, reducing plant shutdowns to a minimum.

The Sarroch site: refining and electricity generation

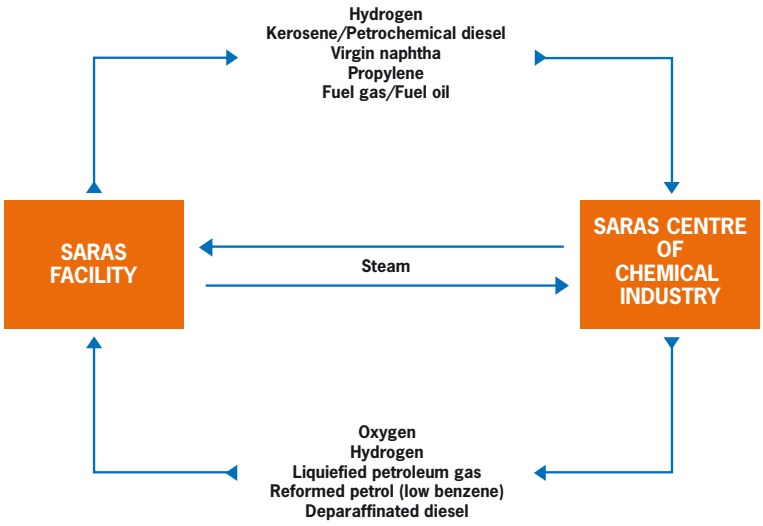
Saras conducts its refining activity at its plant in Sarroch (Cagliari), on the southern coast of Sardinia. This is the largest refinery in the Mediterranean region in terms of production capacity and the most complex in Western Europe. The refining cycle is integrated with the IGCC plant, which generates electricity.

Refining capacity totals approximately 15 million tons per year (Table 1), and represents around 15% of Italy's capacity, while the site's catalytic conversion capacity is 9.6 million tons per year and its thermal conversion capacity is 2.4 million tons. The Sarlux IGCC electricity generation plant has an installed capacity of 575 megawatts and an annual production in excess of 4 billion KWh, sold entirely to national grid operator GSE (Gestore Servizi Elettrici).

Table 1 – Raw materials processed (thousand tons/year)

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

Figure 1 – Synergies between the Saras plant and the neighbouring chemical companies



Its large processing capacity and structural complexity make the Sarroch site a focal point of production activity in the Mediterranean region, capable of handling both separation and conversion operations, and of adapting the different stages of the production cycle based on the characteristics of the crude oil to be processed, to obtain oil products of high commercial and environmental quality.

The excellent geographical location of the Sarroch production site has proved strategic for trade with central and western Mediterranean countries, both in Europe and North Africa, while its proximity to the plants of Polimeri Europa, Air Liquide and Sasol Italy enable its refinery operations to be integrated with petrochemical production (Figure 1).

History of the refinery

Saras' connection with Sarroch dates back to 1962, when Angelo Moratti identified it as a strategic location for an oil refinery. Construction of the refinery facilities began in 1963, and refining activity began in 1965. Until the end of the 1980s, Saras mainly provided refining services for third parties (i.e. it refined crude oil owned by other oil companies that provided

The Sarroch industrial hub

The production hub that built up around Sarroch in the 1960s has helped generate employment and wealth in the region.

Over the years, numerous small and medium-sized companies have sprung up around the large industrial companies present in the region – such as Saras, Polimeri Europa, Sasol Italy, Air Liquide, Liquigas and Eni RM. These companies build and maintain the plants of the larger firms, and therefore represent a significant satellite industry. Saras maintains mutually beneficial industrial relations with all these production companies.

The site shared by Polimeri Europa and Sasol Italy was built in the early 1970s, under the name Saras Chimica (in which Saras also had a stake). The name then went through various changes over the years, until it took on the current names of Polimeri Europa and Sasol Italy.

The Polimeri Europa plants receive the raw materials from Saras and use them for production destined for the plastics industry, while those of Sasol Italy produce detergents and the bases for synthetic lubricants, again from raw materials received from Saras (mainly diesel and kerosene).

Air Liquide produces liquid oxygen, which is used in the Saras plants (IGCC plant). Finally, the Liquigas site stores and sells the LPG from Saras.

Saras with the raw materials to produce oil products). In the mid-1990s, following a significant downturn in demand for high-sulphur fuel oil, Saras launched a major industrial project to build a plant for the gasification of heavy distillates from the refining process and the subsequent combined-cycle cogeneration of electricity and thermal power (IGCC plant). With the IGCC plant on stream, the oil production cycle was closely integrated with the electricity generation cycle, thereby maximising the conversion of raw materials into finished oil products and energy. Meanwhile, the company continued to invest in updating the technology of its existing plants and improving the environmental impact of fuels, partly to comply with increasingly stringent quality standards defined by European law. These investments have led to a progressive reduction in the percentage of sulphur in the oil products and to an improvement in the quality of middle distillates and gasoline.

Site layout

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

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

Figure 2 on page 15 shows the areas used for the different types of activity performed within the facility, summarised below.

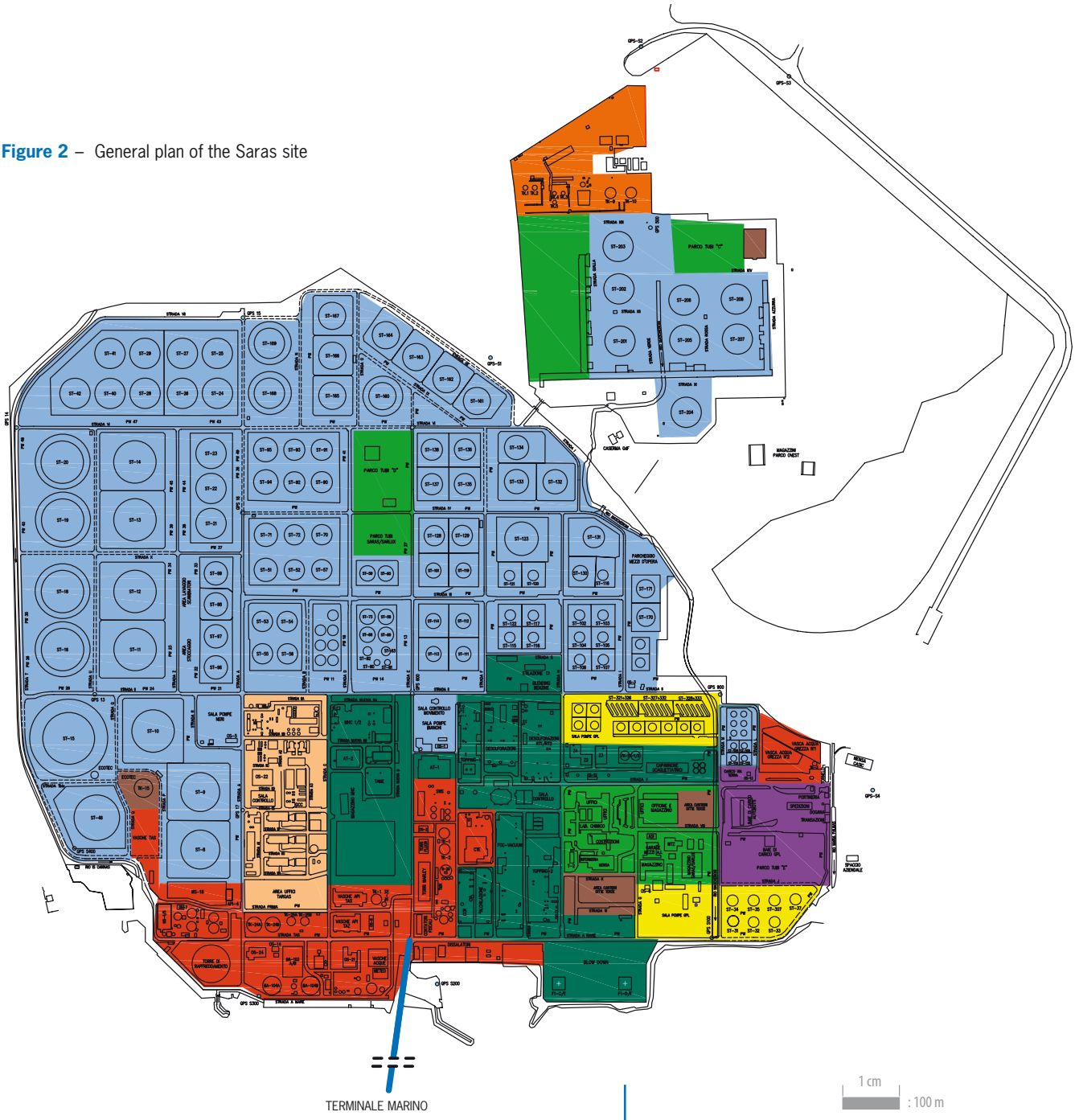
Receipt of raw materials and shipping of products through the marine terminal

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

All raw materials are delivered here, and the bulk of the oil products are shipped from here. In 2007-2009, 80% of oil products were shipped by sea.

The terminal has 11 independent docking berths, nine of which are for shipping finished oil products and the receipt of semi-finished products, docking oil tankers of up to 65,000 tons, while the remaining two are for the receipt of raw materials, docking oil tankers of up to 300,000 tons. Advanced monitoring systems ensure that all receipt and shipping operations take place under conditions of the utmost safety: the phases relating to the docking and mooring of ships and the connection between the ship and the loading arms transferring raw materials to the shore and finished products to the ship are carried out under continuous surveillance. In order to be admitted to the Saras marine terminal, all incoming ships must comply

Figure 2 – General plan of the Saras site



with rigorous safety standards that conform to internationally-recognised criteria as well as additional requirements laid down by Saras. A dedicated control room, which was completely renovated and updated with the latest monitoring technology in 2008, is manned and operational 24 hours a day, and is in continuous radio contact with the ships operating in the terminal, ensuring that all operations fully comply with all safety and environmental protection requirements.

Production of oil products

The production process is illustrated in the simplified diagram shown in Figure 3, and involves the following units:

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

Figure 3 – Production cycle of the Saras plant: oil production and electricity generation

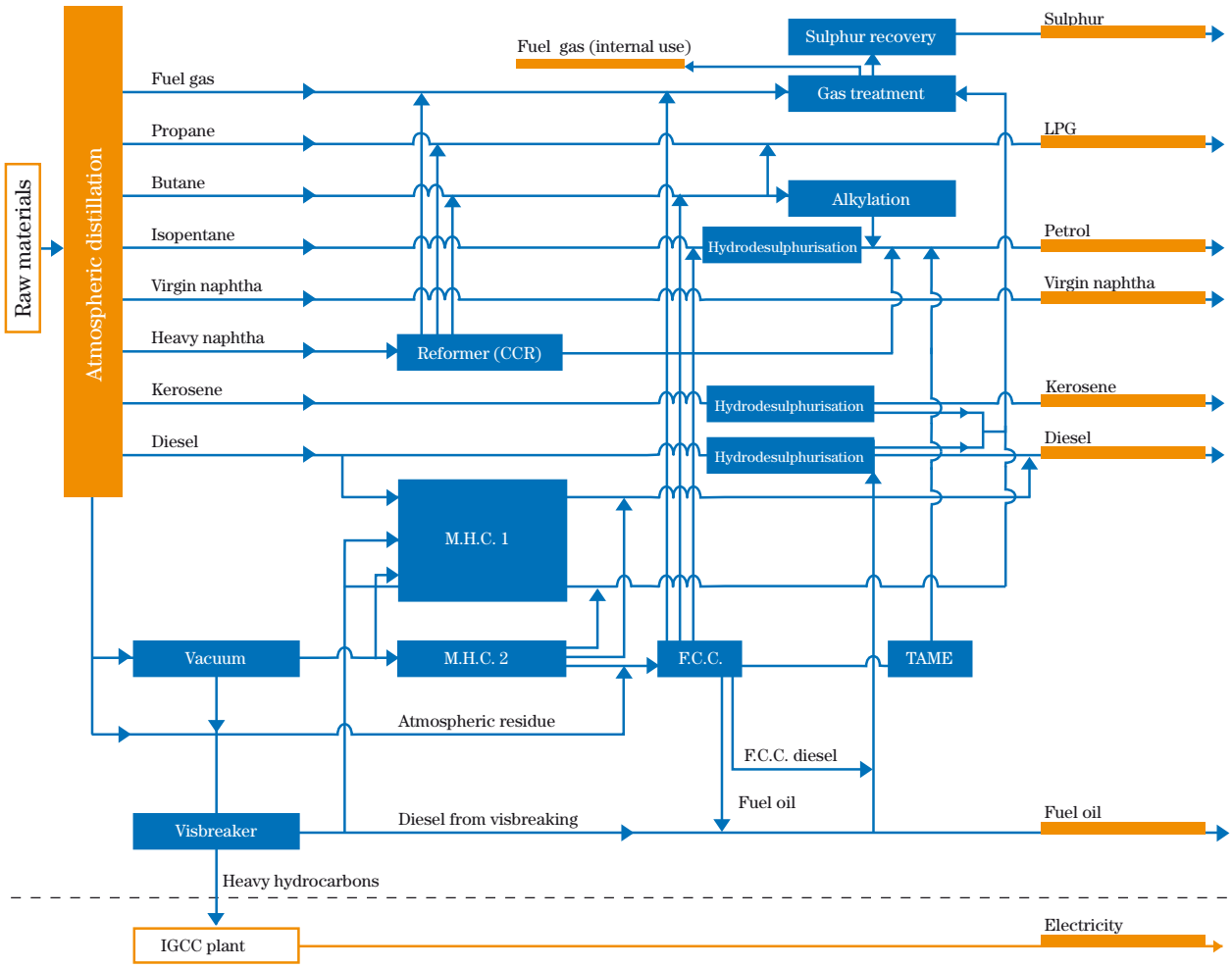
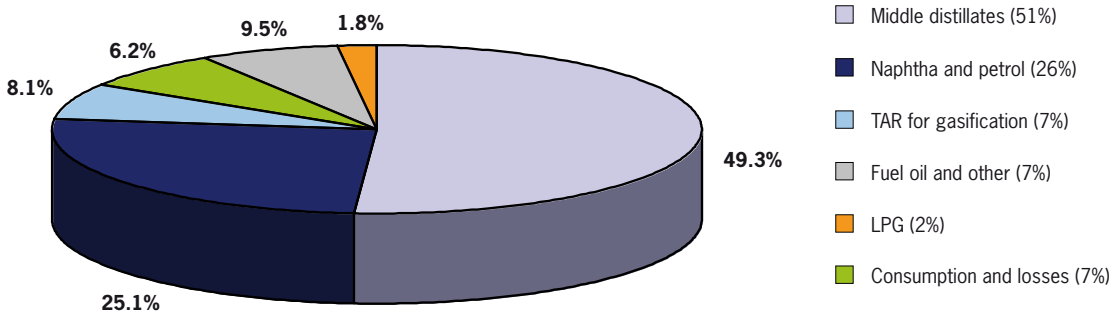


Chart 1 – Refinery products and consumption



In addition to these plants, some units were completed in 2008, and came fully on stream in 2009:

- the TGTU unit, which increases the sulphur recovery yield, and consequently reduces SO_2 emissions
- the U800 unit, which produces low-sulphur gasoline
- the U600 unit, which produces hydrogen used in the desulphurisation of motor diesel, resulting in a very low sulphur content.

Table 2 – Oil products (tons/year)

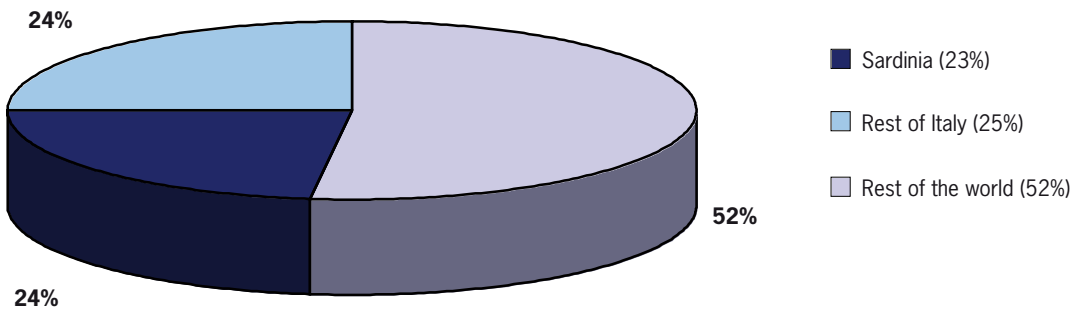
	2006	2007	2008	2009
LPG	341,000	323,000	359,000	242,000
Gasoline	2,945,000	3,110,000	3,184,000	2,532,000
Virgin naphtha	936,000	916,000	862,000	799,000
Kerosene	388,000	467,000	544,000	358,000
Diesel	6,713,000	6,813,000	7,498,000	6,205,000
Fuel oil	1,033,000	788,000	896,000	1,155,000
Sulphur*	111,000	112,000	110,000	110,000
Heavy hydrocarbons to IGCC	1,217,391	1,190,195	1,179,194	1,076,783

* Includes sulphur recovered both from refining and the IGCC

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

	2006	2007	2008	2009
Africa	61	55	48	44
Middle East	13	11	9	12
Former Soviet Union	6	15	26	29
Europe	20	18	16	15
North America		1	1	0
Total	100	100	100	100

Chart 2 – Total shipping, 2009



The Sarroch plant has a high output of medium oil products (diesel) and light oil products (LPG, naphtha and gasoline), which in 2009 accounted for around 80% of total production, as summarised in Chart 1 and shown in detail in Table 2, which sets out production data relating to 2006–2009.
Raw materials mainly come from the Mediterranean area (North Africa and the Middle East), the former Soviet Union and North Europe (Table 3). The primary, but not sole, destination of refinery products is the central and western Mediterranean region.
Specifically, in 2009, almost a quarter of total production of oil products was absorbed by the local Sardinian market (Chart 2).

Sarlux: electricity generation

The IGCC (Integrated Gasification Combined Cycle) plant generates electricity, hydrogen and steam from the heavy hydrocarbons resulting from the refining process. Taken as a whole, it is recognised as one of the best techniques available for the refining sector.
As shown in Figure 4, the plant is divided into two main sections:

- gasification
- combined cycle.

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

SARLUX

Sarlux has **11 employees.** Its registered office is in Sarroch and its administrative office in Milan.

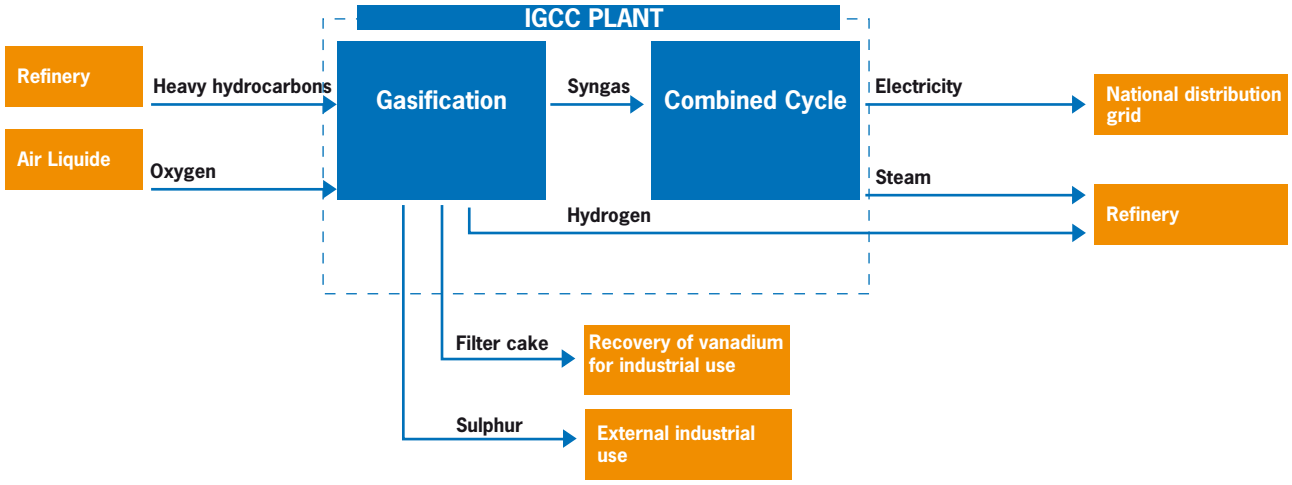


Table 4 – IGCC products

	2006	2007	2008	2009
Electricity (MWh)	4,473,703	4,432,135	4,322,134	4,066,306
Low-pressure steam (tons/year)	608,042	556,828	545,148	433,649
Medium-pressure steam (tons/year)	677,703	568,650	667,762	570,546
Hydrogen (kNm^3)	360,220	307,083	322,226	359,108
Sulphur* (tons/year)	48,184	42,589	49,753	48,406
Vanadium concentrate (tons/year)	1,250	1,700	1,199	1,633

*Including 877 tons/year that do not meet the specification, which are therefore sent for disposal rather than

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

The metals removed from the syngas are used to form a metallic panel called "vanadium concentrate" or "filter cake", sent to external plants to recover the metals. The IGCC plant therefore enables the Saras site to maximise the conversion of raw materials into value-added products.

The three-line conFiguretion of the IGCC plant ensures continuity in electricity generation and the production of hydrogen and steam for internal use on the site. The figures recorded to date confirm the effectiveness of the plant processes and technology. The plant is extremely reliable (an average of over 90%). The IGCC plant offers particularly significant environmental and technological advantages, relating to the adoption of the best available technologies, which have delivered one of the highest efficiency ratings among the various production processes available (over 50%, see Table 5) and result in extremely low emissions, with a performance superior to ENEL's national average benchmark figure.Con l'entrata in funzione dell'impianto di gasificazione, nella raffineria di Sarroch si è ottenuto un miglioramento delle emissioni prodotte dal complesso "raffineria + IGCC" rispetto alla situazione antecedente.

Table 5 – Comparison of power plant efficiency

Plant	Overall efficiency (gross)
Natural gas combined cycle	56÷57%
Natural gas conventional cycle (turbogas)	30÷35%
Fuel oil conventional cycle	35÷38%
IGCC Sarlux	51%

A reduction in emissions produced by the Sarroch site as a whole (refinery + IGCC) was achieved following the start-up of operations at the gasification plant.

This result is also due to a series of improvements made to the refinery's equipment, especially as regards sulphur oxide emissions; furthermore, reduced fuel oil production has led to a fall in the number of ships crossing the Bay of Sarroch.

The filter cake

This is the solid formed from the gasification of heavy refinery products. It contains high percentages of metals such as iron, carbon, vanadium and nickel.
It is stored in the refinery's temporary storage area, or in an area specifically authorised for this purpose before it is shipped externally to plants located in Germany, which recover the metals contained therein. In order to ship this solid, the company applies for a permit for the cross-border shipment of waste each year, in accordance with EC Regulation 1013/2006.

From a technological viewpoint, the main advantage of IGCC plants is the integration of the oil cycle with the electricity cycle: the overall processing cycle constitutes a complete cycle during which all incoming material is converted into a finished product or energy.
Note that the Sarlux plant's water requirements – which are particularly high for large power plants – are met entirely from sea water, which is desalinated and then demineralised in specific Sarlux and Saras plants; it therefore does not affect Sardinia's water supplies. This water is then returned to the sea, in full compliance with all environmental quality criteria established by law..

Storage of raw materials and products

The storage facilities on the site break down 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 storage facility, located outside the bonded area, further along the S.S. 195
- storage of liquefied gases in special pressurised containers ("spheres" and "bullets").

In total, there are 161 tanks with an overall capacity of around 3.5 million cubic metres. All tanks are fitted with permanent fire-prevention systems and containment basins of reinforced concrete with cement floors (39 tanks), or earthworks (122 tanks).
The fire-prevention system in the LPG storage areas is controlled by a device that, depending on various factors (including wind direction) activates systems to prevent fires and contain any product leaks. In addition, to prevent accidents, the LPG tanks are equipped with instruments that monitor and protect against unexpected pressure surges.
Raw materials and products are moved within the site between plants and storage and shipping areas using the following systems and equipment:

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

Shipping of products by land

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

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

The Saras site is connected via oil and gas pipelines to the national storage facility and the Liquigas storage facility, and via an oil pipeline to the

neighbouring petrochemical plant, for the commercial exchange of semi-finished products and services (Figure 1, page 13).

Auxiliary services

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

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

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

Offices, workshops, warehouses and other services

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

Activities conducted by subcontractors

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

The site and the local area

The area most affected by refinery operations from a socio-economic standpoint covers four municipalities: Sarroch, Villa San Pietro, Pula and Capoterra, which form a fairly homogeneous area south-west of Cagliari.
The region has two main areas of economic activity: one connected to the energy and petrochemical hub around Sarroch and the Macchiareddu industrial area, and one relating to the region's natural resources, as exemplified by agriculture, livestock farming and tourism, especially in the Pula area.

Saras' predominant position in terms of size and production capacity means that the refinery's location in the area has a significant impact on employment; since it began its operations, the company has increased its workforce from 100 to 1,278, split between the Sarroch site, which employs the majority (over 90%), and its two offices in Rome and Milan. It also supports a satellite industry that employs around 7,000 people, and not simply through its refining activity. The refinery's production units are a major development driver not only for a group of companies and a particular class of industrial business, but also for the advanced service sector, which is able to play its part in sophisticated production and technological processes. It should not be forgotten that the company fulfils an important role as a supplier of fuel to almost all regional industries, and that it actively co-operates with the neighbouring chemical companies in the commercial exchange of many of the raw materials required for production.

EMAS and communication with the local community

On 20 October 2008, Saras achieved EMAS registration, representing a new starting point within the drive towards continuous improvement that led to ISO 14001 certification of the Environmental Management System as early as 2004. EMAS encourages us to adopt ever greater voluntary environmental-protection measures with the direct involvement of the public in its capacity as the real beneficiary of the initiative.

EMAS is currently the most advanced tool available to demonstrate a company's commitment to environmental sustainability: this is a progressive initiative, to which employees of the company and those of subcontractors, and especially all external partners in the region, are encouraged to make an active contribution.

In 2009, Saras organised various initiatives, such as meetings with the representatives of the Municipality of Sarroch and the Sarroch Environmental Commission. The purpose of the meetings was to discuss the sharing of information and communication on matters of common interest, such as environmental protection, safety and development of the region, as well as announcing the objectives to improve the monitoring of emissions through the distribution of the 2009 Environmental Declaration.

To continue the dialogue and the sharing of ideas between Saras and the local community, Saras established a plan for communication through the media and specialist publications on the main issues relating to the region's sustainable development.

In 2009, Saras celebrated the eleventh year of the School Project, a tradition that forms part of the company's wider choice to embrace transparency in its relations with the outside world. This is an initiative that accompanies the activities of around 300 children from nearby primary schools throughout the school year, raising awareness of the responsible use of natural resources and the importance of saving energy, starting with the calculation of their own school's ecological footprint. This is a widely used and accepted sustainability indicator that measures the natural resources we use to sustain our lifestyle.

Part of the project consists of a trip to the Sarroch refinery and the Ulas-

sai wind farm, which represents another important opportunity to interact with the region, especially within the context of transparency and openness towards our external stakeholders. The School Project has its own dedicated website, www.sarasperlascuola.it, which is a useful tool for communicating with pupils and all those wishing to learn more about one of the most important industrial companies in Sardinia.

Group companies

Akhela: a presence on the IT market

Akhela was created in 2004 from the merger of the IT and electronics companies of the Saras Group, from which it inherited vast experience in its field of activity.

Akhela's services break down into two areas: the development and management of IT services and embedded systems. In the IT market, Akhela focuses on services and solutions for logical and physical security, the optimisation and consolidation of IT services, IT architecture management and software development. Within this area, one of the company's main activities has been the remote management of IT infrastructure at the Saras refinery.

In the design and development of embedded systems, Akhela has gained significant knowledge of real-time and Linux embedded operating systems, which has enabled it to acquire important contracts in the automotive and multimedia applications sectors.

Akhela is a company establishing itself on the market and growing rapidly. In the annual ranking of the main software and service providers in Italy compiled by Computerworld magazine, Akhela was in 87th position in 2009, climbing seven positions compared with the previous year.

The company's customers are mainly large and medium-sized companies operating in industry/manufacturing, finance, telecommunications, energy/utilities and IT services.

In 2009, Akhela bought 51% of Artemide Tecnologie Informatiche Srl. Artemide is a Rome-based ICT services and software development company founded in 2006, and has around 50 employees. This acquisition enables Akhela to strengthen its national presence by expanding its organisational structure in Rome, generating both portfolio and commercial synergies. Akhela currently has four bases: to its original offices of Cagliari (registered office and operational site) and Milan (sales), it added Rome in 2005 and Turin in 2008, which manage customers in their respective regions.

Akhela's procedures and infrastructure are designed to ensure the maximum continuity of service and the utmost confidentiality regarding information and activities conducted on its customers' behalf. The company operates in accordance with benchmark standards on quality, is ISO 9001 certified and has attained Level 2 of the CMMI® for Development. Approximately 220 staff work for Akhela. Because it recognises the strategic importance of its human capital, Akhela invests systematically in professional and technological training.

Finally, Akhela's search for innovation is highlighted by its partnership with

akhela

With **229 employees**, Akhela has four bases in Italy: Cagliari (registered office and operational site), Milan (head office and marketing), Rome and Turin.

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

universities, through participation in research projects and the creation of apprenticeships and internships, and the search for selected international partners, whose emerging technologies complete and add further value to Akhela's product range.

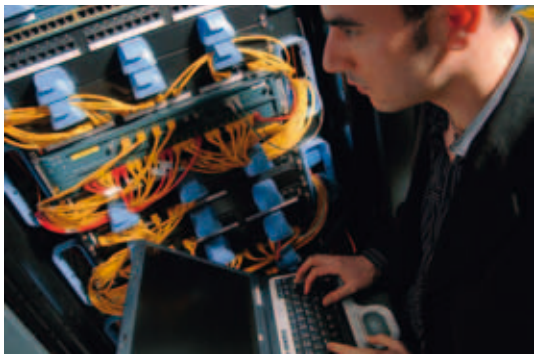
Sartec: environmental research and innovation

Sartec is the environmental and industrial technology and research company of the Saras Group. Its environmental consultancy and monitoring, design, and production-process and industrial-automation optimisation services are aimed at supporting innovation and sustainable industrial development. As well as delivering these services through the technical expertise of its specialists, they are strengthened by a special focus on Sartec's indispensable values, which add value for its customers: environmental sustainability, innovation and quality.

In order to offer the best technological solutions, Sartec uses the most advanced technologies available on the market, and applies the results of studies from around the world or conducted on its behalf by its own research and development unit equipped with a cutting-edge chemical laboratory

Sartec offers the following services:

- *Environmental protection services:* systems monitoring air, water and emissions quality, environmental consultancy and engineering, and water, air and emissions analysis services through its leading analysis laboratory. Specifically in relation to environmental monitoring, Sartec is able to offer both individual analysis instruments and entire turn-key measurement network systems, managing the whole process from design to after-sales technical assistance; in consultancy services, the company provides support for risk analysis, contaminated site characterisation, the planning of measures for the safety and reclamation of contaminated sites, and the monitoring of fugitive emissions, as well as for environmental impact studies (EIS) prior to environmental impact assessments (EIA), and the preparation of applications for the integrated environmental authorisation (AIA) permit.
- *Industrial efficiency and energy saving services:* these services range from the building of package plants for industry (including blowdown gas recovery systems, filtration systems and chemical additivation systems) to advanced process controls and process analysis systems (from their design and start-up to the periodic overhaul and revamping of the instrumentation). This type of service also includes engineering services (for example, feasibility studies and cost/benefits analysis, basic process, piping and layout, civil, mechanical, electrical and instrumentation and automation engineering), consultancy in the field of oil refining, tests on catalysts and alarm rationalisation, development of training systems for operators of the OTS (Operator Training Simulator) plant, integrated services for the implementation and subsequent management of measures to improve energy efficiency. In 2009, Sartec gained accreditation from the Italian Regulatory Authority for Electric-



SARTEC
SARAS RICERCHE E TECNOLOGIE

With **159 employees**, Sartec has two locations in Italy: Cagliari, in the industrial zone of Macchiareddu (registered office, facilities and laboratories) and Milan (sales office).

ity and Gas (AEEG) as an ESCO (Energy Service Company) in order to offer energy consultancy services aimed at obtaining energy efficiency credits (TEE), which can be traded privately with obliged parties and/or on the exchange organised by Italy's energy market operator (GME).

Sartec applies innovation as its guiding principle in every project; this has enabled the company to develop original solutions that have effectively resolved customers' problems. The company conducts applied research and develops new products and technologies, for itself and third parties, in the environmental sector and for the optimisation of industrial processes. It has worked on numerous research projects, some funded by the European Union, the Ministry for Education, Universities and Research and the Region of Sardinia, in partnership with the university, the Italian National Research Council and other research centres and innovative companies.
Sartec's innovative environmental projects include the project to monitor fugitive emissions of volatile organic compounds coming from leaks of process components from industrial plants.
The company applies a new approach called "Smart LDAR", which detects leaks of volatile organic compounds through a visual survey of production plant process components with a camera and the evaluation of leaks using a PID or an FID.

Sardeolica: wind energy generation

Sardeolica's activities are fully in line with the corporate strategy of the Saras Group, which has designated environmental protection as one of its top priorities. As proof of this, in July 2009 Sardeolica updated its environmental certification in accordance with the ISO 14001:2004 international standard, which it has held since 2006.
The Ulassai facility, the first wind farm built by Sardeolica, is one of the largest in Sardinia. At full capacity, the wind farm will produce approximately 65 GWh/year, meeting the needs of approximately 55,000 households. In 2010, the plant is to undergo a repowering, which will increase capacity from 72 to 96 MW. The wind farm is connected to the national electricity grid through an electricity substation. Power is sold to the grid operator, GSE, while the plant will also receive green certificates for 15 years after its initial start-up. The Ulassai wind farm has obtained IAFR (plant fed by renewables) certification from the national grid operator.
In terms of its impact on the region, Sardeolica has 26 employees, mainly young graduates and diploma-holders from Ulassai and the surrounding area, chiefly employed in technical and operational management, plant operation and maintenance, the monitoring of flora and fauna, activities related to the company management system and in administrative, purchasing and contracting activities.
This is a particularly significant since the initiative has created a working group with advanced technical expertise geared towards industry in a predominately agro-pastoral region, affected by high unemployment and migration.
Furthermore, it has also had a positive economic effect in terms of the in-

The background to the creation of Sardeolica: the Kyoto Protocol

The political context in which Sardeolica was formed: the Kyoto Protocol
The reduction of climate-changing gases is a global priority. Against this backdrop, and on the basis of the 1997 Kyoto Protocol, the European Union committed to reducing greenhouse gas emissions by 8% compared to 1990 levels.
As a result, a series of measures were adopted, including the 1997 White Paper and Directive 2001/77/EC, which support and incentivise the generation of electricity from renewable sources.
It was in this context that Sardeolica was formed in 2001 to build and manage plants generating power from renewable sources. Following the acquisition by Saras SpA of the stake held by Babcock & Brown Wind Energy in the subsidiary Parchi Eolici Ulassai Srl (PEU), this company was fully consolidated from 30 June 2008.

The environmental benefits of wind energy
Wind is a clean and inexhaustible source of renewable energy. The environmental impact of wind power generation systems is extremely low, both during construction and when on stream. The environmental advantages of this type of plant include:

- extremely low environmental impact: when operational, wind farms do not produce atmospheric emissions or contamination of the soil, nor do they consume water, require the use of chemical products, or cause any damage to flora and fauna. At the end of their life cycle, they can be completely removed without causing any environmental damage, and no restoration or reclamation work is necessary, as there are no possible pollution risks.
- low noise levels: the level of acoustic emissions from the aerogenerators installed cannot be detected, even in close proximity.
- limited visual impact: if located carefully, following painstaking studies to ensure maximum environmental compatibility, wind farms and individual generators can be blended well into the landscape – usually far from inhabited areas (the closest inhabited area is in fact more than 4 km away) – without changing the designated use of the surrounding land. The Ulassai wind farm, for example, covers an area of 2,900 hectares, buts its installations only occupy less than 1% of this area. Furthermore, optimal technological solutions have been adopted, such as the burying of electric cables, in order to minimise the visual impact and prevent electromagnetic interference with telecommunications.

SARDEOLICA

Sardeolica has **26 employees**, and its registered office is in the industrial zone of Macchiareddu (Cagliari). The Ulassai wind farm is situated near Corte Porcus and Fenarbu, in the province of Ogliastra.

crease in activities related to maintenance, catering and tourism. Sardeolica's commitment to respecting and protecting the environment and health and safety in the workplace, and integrating its activities in the area in which it operates, is therefore fundamental.
Finally, Sardeolica is currently assessing the construction of other wind farms, both directly and by assisting other Saras Group companies, and is also studying the development of initiatives to generate power from other renewable sources, such as photovoltaic energy.
In 2009, an 18.9 kW photovoltaic plant was put into operation on the roof of the Ulassai Multifunctional Building.

Arcola and Saras Energia (Spain): the distribution network

Arcola

Arcola is the Group company that sells oil products on the Italian wholesale market. Its activities cover a wide range of products that are made available in different geographical regions via distribution through Saras' own storage facilities and third-party logistics centres. These are mainly located in Sardinia and central-northern Italy (see figure 5). Formed in 1987, Arcola transported approximately 1,240,000 tons of products for the retail and wholesale market in 2009, with a market share of 7.6%. In addition to its sales activities, which constitute its core business, the company also provides leading operators with reception, storage and land or sea redelivery services for oil products for the fuel distribution network and maritime bunkering at its storage facility in Arcola, Liguria. Its storage facility has a capacity of approximately 200,000 m³, which the company uses to more than 500,000 tons of fuels on its own and its customers' behalf, and where it receives on average 30 tanker ships, loads around 80 barges and more than 15,000 tanker trucks. In 2009, the Arcola storage facility was the "point of entry" for associate Saras Energia SA to introduce biodiesel to Italy, part of the quota that receives tax relief, which was subsequently mixed with engine diesel and released for sale to consumers.

Figure 5 – Storage facilities – loading bases

Own depots: Arcola and Cagliari

ARCOLA

With **34 employees**, Arcola has its registered office in Sarroch and operational sites in Arcola, in Liguria, and Sarroch; furthermore, the company has agreed transit contracts at third-party bases (Civitavecchia, Livorno, Ravenna, as well as various logistical bases in the Po Valley), in order to cover the distribution area corresponding to the whole of central and north-western Italy

Saras Energia

Saras Energia was established in 2001, from the merger of Saroil and Continental, two Spanish oil companies created by the Saras Group in the early 1990s. The company occupies a leading position on the Spanish market for retail and wholesale oil products.

Saras Energia operates across Spain, including the Balearic archipelago, through its own sales structure endowed with a high degree of expertise, professionalism and market knowledge.

The company's own logistics network and an independent network ensure the widespread distribution of products throughout the country. In 2009, it completed the acquisition of ERG's Spanish network; today Saras Energia is the exclusive supplier of 124 plants, of which it owns 88 and has special agreements with 36, ensuring effective coverage of the whole of Spain (Figure 6).

In spite of a decline in the Spanish fuels market of approximately 6%, Saras Energia increased its share by approximately 3.3% (excluding the effect of large commercial/logistics operators), thereby consolidating within the Saras Group the synergic function with the Saras refinery. In 2009 Saras Energia once again introduced onto the Spanish market approximately three million cubic metres of fuel produced by the Sarroch refinery.

Saras Energia has supplemented the modern fuels storage facility in Cartagena (with a capacity of 112,000 m^3, an important logistics supply structure at the heart of the Mediterranean coastline) with a new biodiesel production plant, which has a capacity of 200,000 t/year. The biodiesel plant is very close to the fuel storage facility, with which it shares sea loading and unloading equipment, generating significant operational and functional synergies. In the second half of 2009, the plant came fully on stream, and by the end of the year it had produced 112,000 tons of biodiesel, largely to be used for the additivation of motor diesel for the Spanish and Italian markets. Saras Group companies were thereby able to satisfy European legal requirements regarding the release of biofuels for sale to consumers, and benefit from all the related market opportunities.

The company's growth strategy is based on the consolidation and further development of a strong and stable position, particularly in the areas lying along the Mediterranean coast, and on increasing its margins. It has therefore focused on sales channels offering greater added value to the detriment of less profitable sectors. Development has been geared towards the large retailers, free service stations and direct sales to small and medium-sized resellers. The company's activities are therefore based on the search for excellence in customer service, the rigorous application of the most stringent environmental and safety regulations, and, of course, cost optimisation.

Saras Energia has a very flexible commercial and administrative organisation with a strong customer focus, which works in synergy with the logistics and production segments.

Sales support services and the Madrid call centre aim to achieve customer satisfaction and to respond comprehensively to their commercial, admin-

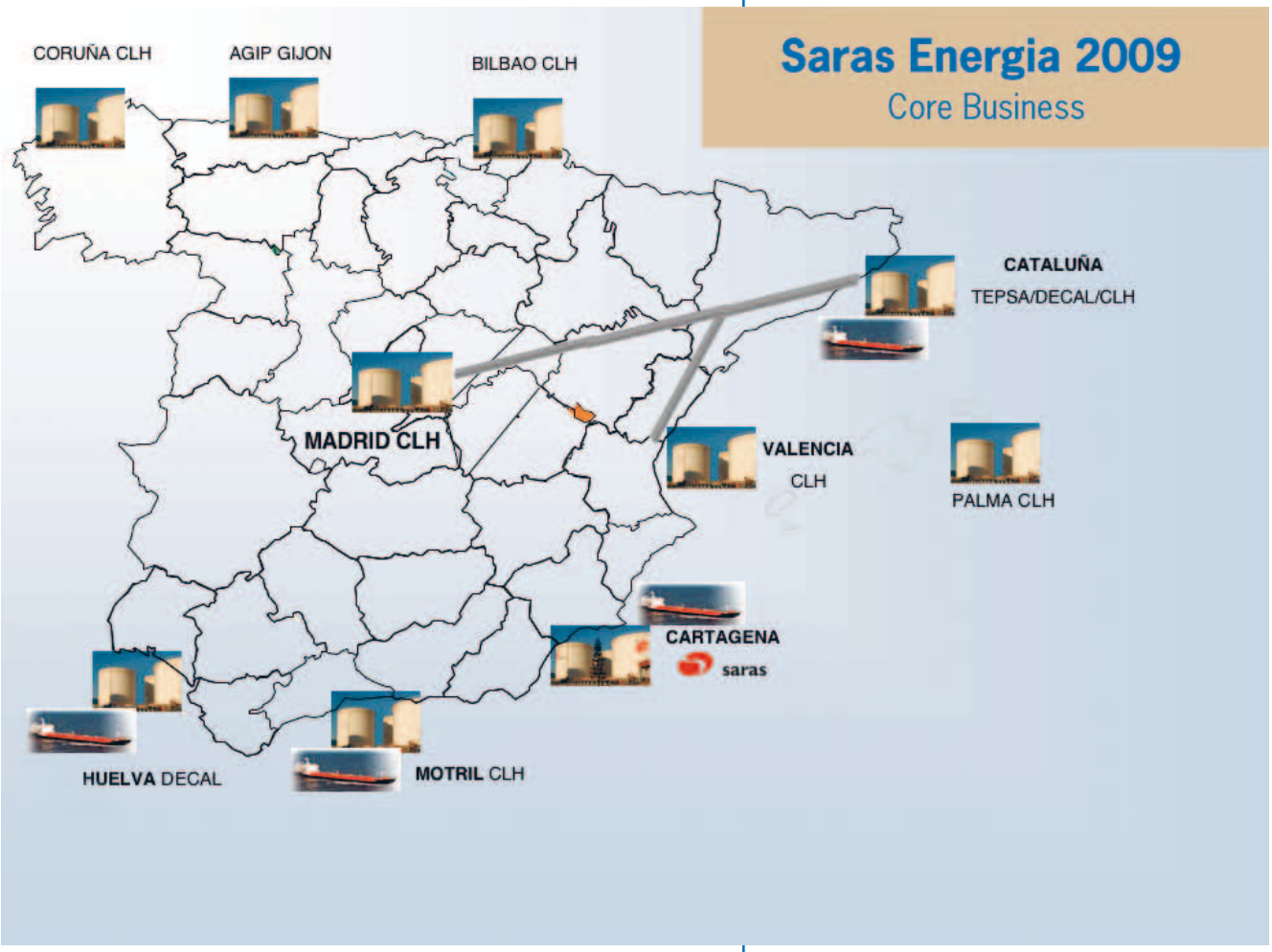
With **268 employees**, Saras Energia has its registered office in Madrid and a storage facility in Cartagena.

istrative or technical enquiries and to create a relationship of reciprocal trust.

Products are organised and shipped promptly according to delivery operations planned at every level, including with the direct involvement of our drivers.

Saras Energia's men and women are the real heroes behind the company's success; a team of professionals that operates with dedication, a sense of responsibility and a focus on customer satisfaction, at every phase of the processes, with the sole intent of growing the company.

Figure 6 - Saras Energia's logistics network



The policies

The policies

Environmental management policy

Saras

Saras has always paid attention to the various aspects of the site's activities that have an impact on the environment, and in 2001, as part of its long-held commitment to environmental protection, it implemented measures to obtain Environmental Management System (EMS) certification for the refinery in accordance with the ISO 14001 international standard.

The achievement of EMAS certification on 20 October 2008 was part of the continuous improvement process for environmental management that Saras had had in place for a number of years:

- in May 2002, the company's Environmental Policy, containing Saras' guiding principles and environmental management commitments, was issued to all employees
- the subsequent production of the Environmental Management System (EMS) manual and the associated implementation procedures established a code of conduct for all of the company's employees
- objectives for improvement have been set and approved by the Management Committee; these are then checked and updated annually
- internal audit activities have thus been put in place to periodically check that the EMS is being applied correctly
- in June 2004, Saras' EMS achieved ISO 14001:1996 certification, and in May 2006, this was updated to ISO 14001:2004 certification (Fig. 6)
- in June 2007, the three-yearly check on the EMS was carried out for the renewal of the environmental certification; the certifying body, Lloyd's Register Quality Assurance, also conducts six-monthly inspections as part of its planned assessment activities
- the revised version of the Environmental Policy was issued in May 2008 and distributed to the company's direct employees and to subcontractors working on site.

In 2008, the process of developing the EMS was completed, enabling the Saras site to register in accordance with the **EMAS Regulation**, the European eco-management and audit standard (EC Regulation 761/2001), which led to the publication of the 2008 Environmental Declaration (Figure 7). This document, aimed at the company's internal and external community, is intended to establish a transparent relationship with the local population, local authorities and employees. It also illustrates Saras' activities, the direct and indirect environmental aspects associated with these activities and the environmental improvement targets that the company has set itself.

In 2009, the certifying body, Lloyd's Register Quality Assurance, continued its inspection activities, and the six-monthly inspection of the Environmental Management System was completed successfully. In July 2009, the certifying body approved the 2009 Environmental Declaration, which was then published, presenting figures updated to 31 December 2008, and Saras' EMAS registration was confirmed.

Sarlux generates electricity within the site, an activity that is completely integrated into the refinery production cycle and is also included in the above-mentioned certification.

CERTIFICATO DI APPROVAZIONE

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

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

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.

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

Certificato di Registrazione
Registration Certificate

EMAS

SARAS S.p.A.

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

Group companies

Sardeolica

Sardeolica generates electricity from wind power at its production unit in the municipality of Ulassai. Although this type of energy generation is in itself already an activity with a low environmental impact, Sardeolica believes it is important to adopt an Environmental Management System in order to ensure continuous improvement in various environmental aspects: consumption of energy, water and auxiliary materials, production of waste and the prevention and reduction of all forms of pollution.

Since 2006, Sardeolica has achieved ISO 14001:2004 environmental certification for its Environmental Management System (EMS); the certification was successfully renewed in July 2009.

In March 2006, Sardeolica's Environmental Policy, containing the guiding principles and the company's environmental management commitments, was released to all employees; the subsequent drafting of the implementation procedures established a code of conduct for all of the company's staff.

In August 2006, Sardeolica achieved ISO 14001:2004 certification of its EMS; the certifying body, Lloyd's Register Quality Assurance, also conducts annual inspections as part of its planned assessment activities


CERTIFICATO DI APPROVAZIONE

Sardeolica S.r.l.
SP 13 Km 11 + 500
08040 Ulassai (Ogliastra) - Italia

ISO 14001:2004

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

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

Akhela

In September 2008, Akhela issued its *Environmental Protection Policy*, containing its guiding principles and commitments on environmental protection when performing its activities, to all employees.

Safety policy

Saras

The Safety Policy Declaration

On the basis of increasingly stringent legislative guidelines for safety management in industrial activities and for the protection of workers and the local area, Saras has also launched a process of continuous improvement to standards and results, recognising that safety is of strategic value to its corporate activities. The company introduced a specific safety policy in 1996, and since then has achieved good results in accident prevention and in continuously protecting both its workers and the region.

As part of the continuous improvement process, on 10 March 2009 Saras launched the implementation phase of the "Saras Safety" project in support of safety management, designed in co-operation with Du Pont – a global leader in issues relating to occupational safety – with a presentation of the work plan and project milestones.

The Safety Management System

The implementation of a Health and Safety Management System (HSMS) introduced performance measures and defined improvement targets.

Following a similar process to that undertaken for the EMS, in December 2007 Saras obtained OHSAS 18001:2007 certification for its Occupational Health and Safety Management System from Lloyd's Register Quality Assurance Italy.

Saras considers the protection of health and the prevention of any form of accident or injury (either to its own employees or workers of subcontractors) as core values, as stated in the Occupational Health and Safety Policy updated on 19 July 2007.

To make synergic use of the common parts of the two management systems, Saras' HSMS is integrated with the Management System for the Prevention of Major Accidents, implemented in accordance with the Ministerial Decree of 9 August 2000. Furthermore, the company drafted a specific Major Accident Prevention Policy for the Sarroch site on 31 March 2008.

The main objectives of Saras' commitment to safety management have always been accident prevention and the identification of the most effective methods of reducing the likelihood of accidents. This approach is the same as that which underlies Legislative Decree 334/99 (Seveso II), which stipulated the adoption of a Safety Management System for the prevention of major accidents.

Sarlux generates electricity within the site, an activity that is completely integrated into the refinery production cycle and is also included in the above-mentioned certifications.

Saras has set itself the objective of integrating the Health and Safety Management System with the Environmental Management System in the future.

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.: LRC 8180526

Approvazione Originaria: 9 Gennaio 2008

Certificato Attuale: 22 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

The subsidiaries and the Occupational Health and Safety Management System

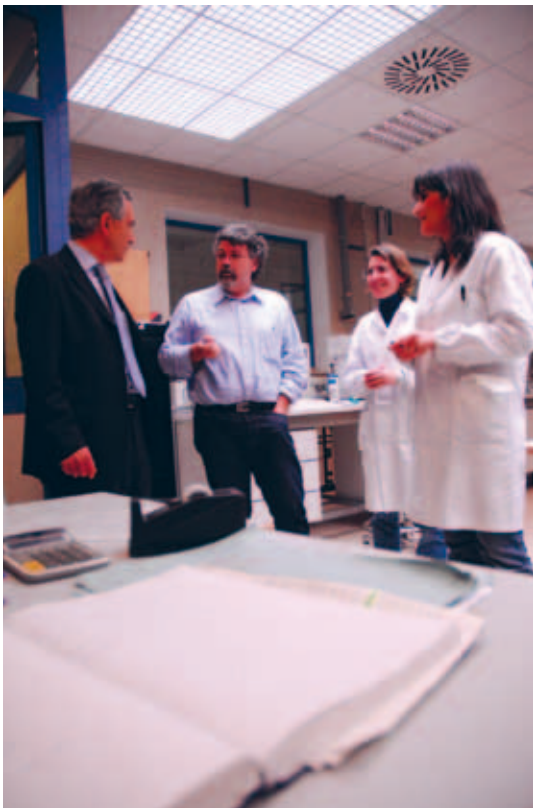
Other Group companies also consider it important to adopt an Occupational Health and Safety Management System to ensure the maximum safety of all their employees and those of subcontractors.

Sardeolica

Sardeolica adopted an Occupational Health and Safety Management System in accordance with the OHSAS 18001:2007 international standard. As part of this process, its Occupational Health and Safety Policy, containing the guiding principles and the company's commitments, was issued to all employees in June 2008; the subsequent drafting of the Manual for the Integrated Environmental and Safety Management System and the associated implementation procedures established a code of conduct for all of the company's staff.

Akhela

In September 2008, Akhela's Occupational Health and Safety Policy, containing the guiding principles and the company's commitments, was issued to all employees; the subsequent drafting of the Health and Safety Management System Manual and the associated implementation procedures established a code of conduct for all of the company's staff.



Sartec

In 2008, Sartec adopted an Occupational Health and Safety Management System (hereinafter OHSMS), which integrated health and safety objectives and policies in the design and management of work and production systems.

By adopting this OHSMS, the company aims to:

- reduce the possibility of the occurrence of any event resulting in injury to people or damage to the environment or property, and pursue continuous improvement in the working conditions and quality of work within the site
- progressively reduce the overall costs of occupational health and safety, including those resulting from work-related accidents, injuries and illnesses by minimising the risks to which employees or third parties (customers, suppliers, visitors, etc.) may be exposed
- increase the company's efficiency and performance
- improve the company's internal and external image.

The OHSMS defines methods for identifying, within the corporate organisational structure, the responsibilities, procedures, processes and resources to implement the company's accident prevention policy, in accordance with the health and safety legislation in force.

As part of this process, the Occupational Health and Safety Policy, containing the guiding principles and the company's commitments, was issued to all employees in October 2008.

Arcola

The drafting and dissemination at all levels of the Occupational Health and Safety Policy, containing the guiding principles and Arcola's commitments, and the revision of the Risk Assessment Document to bring it into line with the criteria set out in Legislative Decree 106/2009, supplement the statutory obligations regarding the risk of major accidents and are codified in the Health and Safety Management System and the related Manual.

The Health and Safety Management System is therefore integrated with the Management System for the Prevention of Major Accidents, in accordance with the Ministerial Decree of 9 August 2000.

This originates from the Major Accident Prevention Policy and is codified in the Policy Document for the prevention of major accidents and the protection of workers' health and safety (Art. 7 of Legislative Decree 334/99).

The education, communication and training activities supplemented by relevant internal and external audits, together with the revising and updating of the Safety Management System Manual, represent the cornerstones on which the concept of "continuous improvement" is based.

In order to make the training and communication process more effective and efficient, in March 2009 Arcola Petrolifera obtained a multimedia e-learning platform to support operator training and communication activities; the first planned and organised sessions were naturally dedicated to specific issues relating to major accident prevention and the protection of health and safety in the workplace (SICURPOINT).

Specific training courses dedicated to the following topics have been run

on this platform: Safety Management System, Consolidated Law on Safety (Legislative Decree 81/08, as subsequently amended) - (Legislative Decree 106), Chemical Risk, ATEX Regulations, and the Internal Emergency Plan (IEP). All storage facility staff successfully completed the entire training programme.
As well as these internal training activities, training sessions were held for all staff of subcontractors operating at the storage facility using an appropriate course developed on the SICURPOINT platform. Authorisation to access certain areas of the site depended on staff passing this course.
For the Arcola site, Arcola Petrolifera has produced a map of company areas where there is a risk of crimes being committed, part of which is very important in relation to occupational health and safety.
This activity is one of those covered by the "Organisation, Management and Control Model" document pursuant to Legislative Decree 231/01, adopted by the company, which describes the basic elements and management procedures that Arcola has implemented for the current internal control system, lists the actions carried out to date in relation to organisational and procedural compliance, and indicates the general measures put in place to prevent potential crimes from being committed.

Saras Energia

In line with the principles of its Code of Conduct, Saras Energia recognises *"...the importance of the ethical and social responsibility for safety and environmental protection in the conduct of the business and the company's activities ..."* and undertakes to *"... promote and defend the culture of safety and respect for the environment, raising awareness of risk management, promoting responsible behaviour and safeguarding the health and safety of all employees."*
Within this context, the acquisition of the ERG network and the consequent increase in headcount have provided the opportunity to strengthen and disseminate the concepts expressed in the Code of Conduct, through the revision and publication of the "Health, Safety and Environment Policy" and the "Major Accident Prevention Policy". The revision of these documents was highlighted at all company levels by a communication from the Chief Executive, following their publication in all workplaces.
Both the fuels storage facility and the biodiesel production plant in Cartagena are subject to the obligations set out by Royal Decree 1254/1999, as subsequently amended, which is the Spanish law implementing European legislation on the prevention of the major accidents.
In 2009, with the start-up of the biodiesel plant, Saras Energia designed and put into operation the Safety Management System, the related manual and the Internal Emergency Plan. At the fuels storage facility, operational since 2003, it was necessary to revise the risk assessment due to the change in use of a tank from gasoline to methanol. This of course necessitated the revision of the Internal Emergency Plan and the integration of certain procedures into the Safety Management System Manual.
The training plan and internal and external audits were completed during the year. Pursuant to Spanish legislation for the sector, an annual audit must be carried out on the Safety Management System, the related


saras

POLÍTICA DE SEGURIDAD, SALUD Y MEDIO AMBIENTE
(POLÍTICA H.S.E.)

Nuestro trabajo nunca es tan urgente o tan importante como para prescindir de la seguridad y el respeto al medio ambiente

En política de SARAS ENERGIA, S.A., ser conscientes de la importancia que tiene desarrollar nuestras actividades promoviendo la salud, el bienestar y la seguridad de nuestro personal, contratistas, clientes y vecinos, así como respetando y cuidando el medio ambiente.

Para conseguirlo, SARAS ENERGIA, S.A. se compromete a aplicar los siguientes principios básicos:

1. Cumplir la legislación aplicable.
2. Adoptar las recomendaciones de Organismos Oficiales y otras organizaciones de reconocido prestigio, relacionadas con nuestra actividad.
3. Identificar, evaluar y controlar todos los riesgos relevantes, especialmente aquellos que tengan relación con los accidentes graves.
4. Integrar la prevención de riesgos relativos a la seguridad y la salud de las personas y el respeto y cuidado a nuestro entorno, en todos los niveles de la organización y en todas las fases de nuestras tareas.
5. Asegurarse de que todos los que forman parte de Saras Energía, S.A., tienen la información y formación necesaria relacionada con H.S.E.
6. Establecer objetivos específicos en esta materia, proporcionando las herramientas necesarias para alcanzarlos y evaluando continuamente su fiel cumplimiento.
7. Exigir a nuestros contratistas que desarrollen y mantengan estándares adecuados relacionados con H.S.E.
8. Cooperar con las Autoridades y Organismos Públicos para mantener una capacidad de respuesta adecuada ante situaciones de emergencia.
9. Buscar la mejora continua en nuestra actuación y resultados, mediante la evaluación y revisión sistemática del sistema de prevención de riesgos relativos a la Seguridad, la Salud y el Medio Ambiente.

Consejero Delegado

manual, the IEP and any other activity related to the management of major accident risks. The companies authorised to carry out this type of check are indicated by the acronym "ECA" (Entidad Colaboradora de Administracìon) and take the place of, and to all effects and purposes represent, the public administration body with which they co-operate (in the case of major accident risks, the Ministry of Industry).
In 2009, the biodiesel production plant and the storage facility in Cartagena were audited by ECAs. The audits were supplemented by extended emergency drills. For both plants, the final report confirmed the suitability of the system in place.
Detailed recommendations on corrective measures to be implemented were used to formulate the relevant improvement plans.

Quality certification

Saras

Before obtaining environmental certification, the company took steps to adopt a Quality Management System (QMS), which established procedures for managing a series of internal areas and processes in the refinery.
The company's activities in the following areas are currently certified according to the ISO 9001:2000 quality standard (Figure 10):

- **Product Movement:** the preparation of products according to customers' contractual specifications
- **Shipping**: the distribution by land and sea of products requested by customers
- **Operational and Medium-Term Scheduling:** the supervision of the arrival of raw materials (crude oil), their processing, and the preparation and shipping of finished products requested by customers
- **Engineering:** involving the design of new plants and improvements to existing plants
- **Construction:** the management of the building of new plants and modifications to existing facilities.

Furthermore, the following processes, although not certified, are carried out within the QMS framework in accordance with the ISO 9001:2000 reference standard and QMS procedures, to protect customers and the market in which Saras operates:

- **Reception:** the supervision of the unloading of raw materials (crude oil) at the marine terminal
- **Analytical Control of Production**: by means of the chemical laboratory, which is responsible for verifying and monitoring the hydrocarbons produced; furthermore, in June 2008, the chemical laboratory obtained SINAL accreditation, in accordance with UNI CEI EN ISO/IEC 17025
- **Purchasing and Tenders:** the issuing and scheduling of orders for materials and tenders, and the selection and evaluation of suppliers
- **Human Resources and Organisation:** ensuring that employees meet company requirements, through careful staff selection and training aimed at the acquisition, development and transfer of professional expertise


saras

COMUNICADO
CONSEJERO DELEGADO
Nº 7

04/11/2009

ACTUALIZACIÓN DE LAS POLÍTICAS DE SEGURIDAD, SALUD Y MEDIO AMBIENTE (HSE) Y PREVENCIÓN DE ACCIDENTES GRAVES (PPAG)

Con el objeto de dar cumplimiento a la normativa legal y del Grupo Saras en materia de Prevención de Accidentes, les remito las Políticas de:

- Política de Seguridad, Salud y Medio Ambiente (HSE).
- Política de Prevención de Accidente Graves (PPAG),

que han sido actualizadas y aprobadas recientemente.

Aprovecho la oportunidad para resaltarles que el cumplimiento de ambas políticas debe estar presente en nuestras tareas diarias ya que nos ayudarán a la consecución de nuestro principal objetivo:

"CERO ACCIDENTES"

Para cualquier duda, aclaración, sugerencia o comentario que quieran realizar sobre estas políticas o sobre cualquier asunto relacionado con esta materia, pueden hacerlas a la dirección de e-mail que se ha creado para dicho fin:

coordinadorhse@sarasenergia.com

Próximamente recibirán en cada uno de los centros de trabajo la documentación que adjuntamos, que deberá ser colocada en sitios visibles tanto para el personal de Saras Energía como para el resto de personas que se relacionan con nosotros. De momento, imprimir los documentos que se adjuntan en la presente comunicación y colocarlos provisionalmente hasta recibir los documentos originales que los sustituirán.

Para cualquier duda relacionada con la adecuada ubicación de los carteles pueden solicitar información al personal que se detalla en el siguiente cuadro:

Centro de Trabajo	Contacto
Madrid	Rafael Hurtado
EESS	Desarrollo Ventas
Planta BIO	Rodrigo Romero
Terminal Almacenamiento	Miguel Angel Grau

Muchas gracias a todos por su colaboración.

Consejero Delegado


CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Conduzione Aziendale per la Qualità 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. LRC 180526

Approvazione Originale: 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

- **Supply and Trading:** the drafting of contracts for the supply of raw materials (through both purchasing and processing contracts) and the sale of products
- **Maintenance:** the supervision of activities necessary to keep the infrastructure and equipment used to make the products ordered by customers functioning and running efficiently
- **Warehousing and Materials:** the transport of materials to/from the refinery and related expediting, the reception and distribution of these materials (both physically and in accounting terms), and their storage in defined locations.

Group companies

Akhela

Akhela's mission is to provide the market with solutions for IT system security and consolidation, professional services for the design and development of complex software applications and for application life cycle management, and the design, provision and monitoring of IT services and infrastructure, all at extremely high quality standards and the utmost security.

To fulfil this mission, Akhela adopted a Quality Management System (QMS) for its Macchiareddu site, and in April 2004 achieved ISO 9001:2000 quality certification.

Akhela's QMS is intended to guarantee product and service quality. Its first objective is therefore to implement the Quality Policy set out by the management, with the involvement of all company departments.

Akhela's QMS applies to the processes for the design, development and provision of IT services, as well as to software development and maintenance processes, including those for embedded software. Specifically, the certification applies to:

- the design, development and provision of IT services on market standard and open source[1] infrastructure and platforms.
- the design, development and maintenance of:
  - application software
  - embedded software

The Quality Management System should also be considered as an appropriate tool to help the company acquire an integrated and high-level corporate culture.

Specifically, Akhela's QMS is organised according to processes, which are interrelated and interact with each other:

- Management processes
- Quality system management processes
- Resource management processes
- Product manufacture, provision and monitoring (delivery) processes
- Measurement and control processes
- Operations support processes

Nell'ottica di migliorare costantemente il livello dei propri prodotti e servizi, oltre alla certificazione di qualità secondo lo standard ISO 9001:2000,

CERTIFICATO DI ACCREDITAMENTO

Numero di Accreditamento

0813

Si attesta che

Il Laboratorio SARAS SpA

Strada Statale 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)

1 - *open source*: software whose authors allow it to be freely studied and amendments to be made by other independent programmers.

In order to constantly improve the quality of its products and services, in addition to ISO 9001:2000 quality certification, Akhela has implemented a programme to gain certification and comply with international quality standards for the sector. Of these, the CMMI (Capability Maturity Model Integration) has in recent years established itself on the international market as the benchmark model for business process requirements regarding software development. Akhela obtained Maturity Level 2 of CMMI ver. 1.2 in December 2008, and is one of the few Italian, and to date the only Sardinian, company to have achieved this rating.

This achievement raises Akhela's international professional profile, partly thanks to its inclusion in the list published on the Software Engineering Institute website (SEI)(http://sas.sei.cmu.edu/pars.aspx).

In the last few years, in order to constantly improve the quality of its services, Akhela has undertaken a programme to bring the company into line with international standards in software development and service provision. A fundamental step in this process is the recent achievement in December 2008 of Maturity Level 2 of CMMI® DEV (Capability Maturity Model Integration for Development) ver. 1.2. The CMMI, established by the Software Engineering Institute (SEI) of Carnegie Mellon University, has become one of the most authoritative standards at international level for business process requirements regarding software development.
ITIL stands for Information Technology Infrastructure Library, and is a set of guidelines inspired by best practice in the management of IT services. The ITIL guidelines were developed in the 1980s by the Central Computer and Telecommunications Agency (CCTA) of the UK government in response to the growing reliance on information technology. Unlike CMMI, compliance with ITIL standards may not be certified for a company or one of its department; instead, individuals working in service management must pass examinations, divided into several levels. Ten service managers at Akhela hold the Foundation certificate in IT Service Management.

Sartec

Sartec's Quality Management System achieved **ISO 9001:2000** certified in October 2001.

The Quality Management System applies to the following activities and processes:

- design and production of environmental and industrial analysis systems
- provision of technical assistance and maintenance, including global service, for analysis and measurement systems
- design and production of modular package plants for industry
- design, conFiguretion, testing and technical assistance for monitoring, control, decision-making support and optimisation systems for industrial and civil applications
- design, conFiguretion, testing and technical assistance for environmental monitoring systems for industrial and civil applications
- chemical-analytical activities for the company and third parties
- environmental services and advisory activities
- services and advisory activities within the oil industry.

The Quality Management System also applies to all business processes that help to guarantee the company's ability to provide products that meets customer requirements or other applicable requirements. No ISO 9001:2000 requirements are excluded.

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Gestione per la Qualità 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 quanto certificato è vincolata al certificato della stessa numero che elenca le ubicazioni oggetto dell'approvazione.

Certificato di Approvazione N.: IAC 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 site

The energy balance

Energy is brought into the site in the form of raw materials (crude and semi-finished products), electricity and water, as shown in the diagram in Figure 7. Crude oil is used in refining, from which fuels for internal use and feedstock for the IGCC plant are also obtained, while the imported electricity is needed to meet the energy requirements for processing. Taken together, the refinery and IGCC plant produce energy in the form of oil products, which are in daily use throughout the region and beyond, and electricity from the internal thermoelectric plant (CTE) and IGCC plant (Table 7). The thermoelectric energy produced is used internally for refining, while all power from the IGCC plant is fed into the national grid. In 2009, the Saras site recorded an energy requirement of 876,749 TOE.

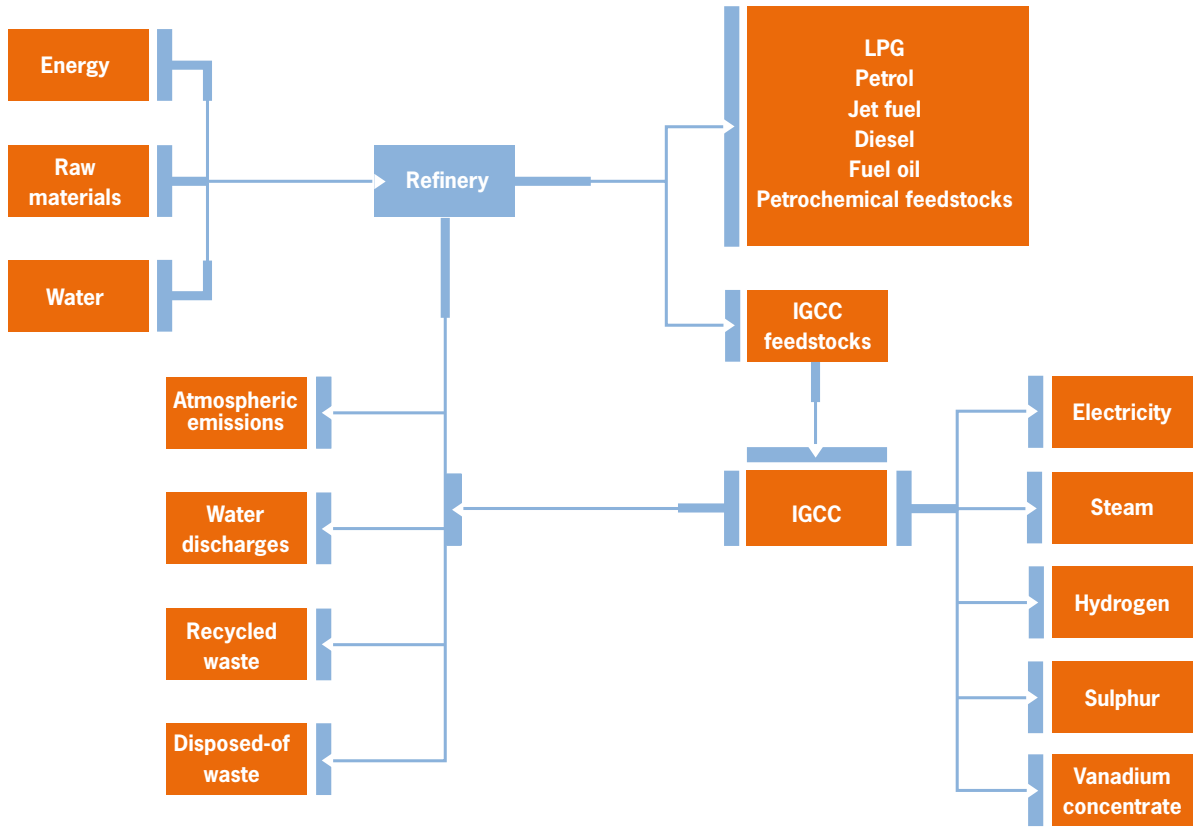


Table 6 – Energy in (TOE)

	2009
Crude and fuel oil	13,277,371
Power from external sources*	266,725
Total	**13,544,096**

*Converted into TOE using figures from the Italian Regulatory Authority for Electricity and Gas (AEEG)

Table 7 – Energy out (TOE)

	2009
Finished products	11,707,084
Electricity fed into the grid	750,679
Fuel gas	43,017
Totale	**12,500,780**

Refining

In 2009, the Sarroch refinery processed approximately 13.3 million tons of raw materials (crude oil and fuel oils). The low processing figure seen in the past year reflects the collapse of international consumption and the major maintenance operations carried out during the year. Between 2006 and 2009, some 57.7 million tons of raw materials were processed, an average of 14.4 million tons per year (Chart 3). In the last few years more light products have been produced, with fuel oil being kept to a minimum and heavy distillates from refining (TAR) being used to produce electricity.

Chart 3 – Crude oil refining (thousand tons/year)

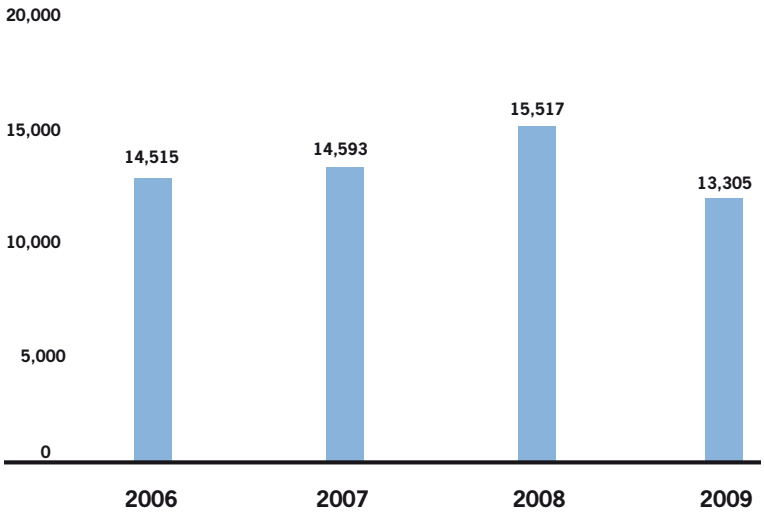


Table 8 – Products of the Saras plants (tons/year)

	2006	2007	2008	2009
LPG	341,000	323,000	359,000	242,000
Gasoline	2,945,000	3,110,000	3,184,000	2,532,000
Virgin Naphtha	936,000	916,000	862,000	799,000
Kerosene	388,000	467,000	544,000	358,000
Diesel	6,713,000	6,813,000	7,498,000	6,025,000
Fuel oil	1,033,000	788,000	896,000	1,155,000
Vanadium concentrate	1,227	1,700	1,199	1,633**
Electricity (TOE)	821,819*	823,870*	783,039*	750,679*
Sulphur	111,000	112,000	110,000	110,000
Heavy hydrocarbons to IGCC	1,217,391	1,190,195	1,179,604	1,076,783

*Figures recalculated on the basis of the real efficiency of the plant rather than the national coefficient (withdrawn in 2006).

** Including 877 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery.

Environmental quality of products

Sulphur content is a key factor in assessing the environmental quality of refinery products, and in recent years regulations have been introduced to set limits. Low sulphur content means that fuels perform better during combustion and have less of an impact on the atmosphere. The facility's sulphur balance (Figure 8 and Table 9) provides useful information on how much sulphur enters the refining cycle and the breakdown of the sulphur output. The data show that the amount of sulphur coming in with raw materials is flat.

In 2009, sulphur emissions were far lower than in previous years, due to the construction and start-up of the new TGTU (tail gas treatment unit). The sulphur content of products entering the market rose slightly, due to greater production of fuel oil than in 2008 (Chart 4). The percentage of sulphur sold as a product was very similar to the 2008 figure (Table 9).

This confirms the site's desulphurisation capacity, together with a marked reduction in the quantity of sulphur released into the atmosphere.

Chart 4 – Sulphur output produced

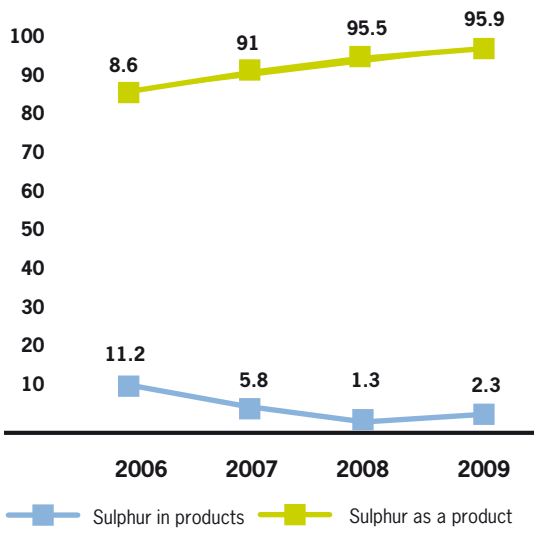


Figure 8 – Sulphur balance of plants - 2008

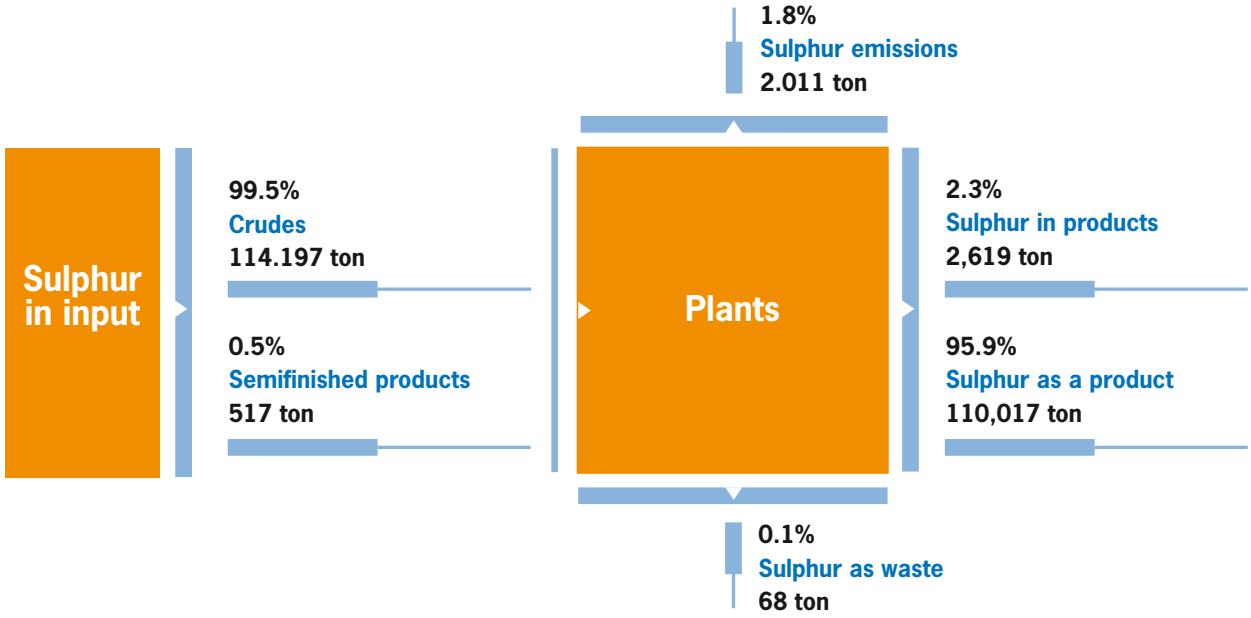


Table 9 – Sulphur balance of plants - 2009

	2006		2007		2008		2009	
	tons	% of total	tons	% of total	tons	% of total	tons	% of total
Sulphur input								
Raw materials	120,747	100,0	122,920	100	**115,141**	**100**	**114,714**	**100**
Sulphur output								
Atmospheric emissions	3,897	3,2	3,697	3,2	**3,568**	**3,1**	**2,011**	**1,8**
In products	13,512	11,2	7,148	5,8	**1,441**	**1,3**	**2,619**	**2,3**
As pure sulphur	103,312	85,6	111,815	91	**110,000**	**95,5**	**110,017**	**95,9**
As waste	27	0,02	260	0,2	**132**	**0,11**	**68**	**0,1**
Quantities not counted	-1	-0,0008	-	-	**-**	**-**	**-**	**-**

Electricity generation

Since 2005, the IGCC plant has operated extremely well, while exchanges with the refinery have also remained at significant levels.

The following tables show the 2009 figures compared with the three previous years.

Table 10 – IGCC consumption (tons/year)

	2006	2007	2008	2009
Heavy hydrocarbons for gasification	1,217,391	1,190,195	1,179,604	1,128,568
Syngas (obtained from gasification)	3,943,410	3,942,542	3,770,558	3,757,686
Diesel	10,256	7,068	4,370	18,904
Electricity from external sources (MWh)	379,463	369,491	380,508	378,700

Table 11 – IGCC products

	2006	2007	2008	2009
Electricity to external grid (MWh)	4,473,703	4,417,843	4,322,134	4,086,439
Medium-pressure steam (tons/year)	688,413	568,651	667,762	437,001
Low-pressure steam (tons/year)	597,339	556,828	545,148	572,368
Hydrogen (kNm^3)	360,220	307,083	322,226	359,108
Sulphur (tons/year)	48,184	42,589	49,753	48,405
Vanadium concentrate (tons/year)	1,250	1,700	1,199	1,633*

*Including 877 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery.

Group companies

Sardeolica

Table 12 shows the net electricity produced by the Ulassai wind farm and fed into the national grid (GSE).

This table also shows the CO_2, SO_2 and NO_x emissions avoided. The avoided emissions figure is particularly significant, because it highlights tons of pollutants not released due to the fact that the electricity was generated using wind rather than conventional fuels.

Similarly, the number of households that could be supplied with electricity using this type of power generation and the corresponding amounts of oil saved have also been estimated.

Table 12 – Electricity generated at the Ulassai wind farm

	2007	2008	2009
Production (MW/h)			
Net electricity	168,185	153,735	155,970
Indicators			
CO_2 emissions avoided (1)	139,257	127,292	129,143
SO_2 emissions avoided (2)	639	584	593
NO_x emissions avoided (3)	319	292	296
Equivalent households (4)	56,062	51,245	51,990
TOE saved (5)	14,375	13,140	13,331
Barrels of oil saved	104,936	95,920	97,315

(1) Emissions avoided were calculated using a specific emission coefficient of 828 gCO_2/kWh, as indicated in the Official Bulletin of the Autonomous Region of Sardinia, no. 26, Parts I and II, page 31 (30 August 2003).

(2) Emissions avoided were calculated using a specific emission coefficient of 3.8 gSO_2/kWh, as indicated in the Official Bulletin of the Autonomous Region of Sardinia, no. 26, Parts I and II, page 31 (30 August 2003).

(3) Emissions avoided were calculated using a specific emission coefficient of 1.9 gNO_x/kWh, as indicated in the Official Bulletin of the Autonomous Region of Sardinia, no. 26, Parts I and II, page 31 (30 August 2003).

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

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

N.B.: one barrel of oil is equal to 42 US gallons or 158.98 litres.

Akhela

Akhela provides two main types of services: information technology and embedded systems.

One of the historically important aspects of the company's IT services is security solutions, which the company divides into two main areas: logical security (infrastructure and applications) and physical security (video surveillance, perimeter security, industrial security). One of Akhela's strengths is that it can combine and integrate these disciplines. Furthermore, while the security services generally found on the market often focus on individual actions designed to remedy contingent situations, Akhela applies a methodological approach, according to which security is seen as a continuous process to be updated according to changes in vulnerability, and continually maintained.

Staying with IT, Akhela has also developed competencies in the design, creation and optimised management of complex, cutting-edge IT infrastructures. Through its partnership with leading US company Vmware, Akhela offers virtualisation solutions, the new frontier for the optimisation of IT infrastructures. It allows multiple virtual machines with different operating systems to be managed separately on a single, physical machine. Its various advantages include server consolidation, entailing the consolidation of applications and service infrastructure into a smaller number of servers, thereby simplifying systems management, cutting costs and reducing substantially the typical energy consumption of the data centres.

In embedded systems, Akhela has designed the software for the engine control systems used in the automotive sector by many car and motorcycle makers. In recent years, it has developed an advanced engine control system for motorcycles which is currently in production and used in the scooters produced by a leading manufacturer. The system enables compliance with Euro 4 legislation without the use of a lambda sensor, thereby ensuring greater reliability at a lower cost. It also has hybrid capacity, i.e. it can operate a conventional engine and an electric engine in the same vehicle.

Akhela's embedded systems division is taking part in another eco-sustainability project in the form of a car-sharing project. A pilot scheme is currently under way in one German and one US city. Car sharing, which aims to reduce traffic and car numbers, is seen as one of the most intelligent solutions for personal mobility in urban areas.

The environment

The environment

The Sarroch site

Commitment to continuous improvement

For many years, we have prepared an Environmental and Safety Report that provides detailed and up-to-date information on all aspects that directly or indirectly affect the Sarroch site's internal and external environments.

Some of these, such as atmospheric emissions or wastewater, are more immediately obvious because they relate to the environment in which people live and work every day; others, such as energy and water consumption and carbon dioxide (CO_2) emissions, relate to problems of more general concern, and have a more global impact without significant direct effects on the local environment.

The trend in emissions over a four-year period shows a picture of general improvement, with the exception of some small fluctuations that may occur from year to year relating to plant changes and extraordinary maintenance. The improvement in environmental data is due to a series of technical and management measures, which have gradually equipped the refinery with more efficient technology and resources to operate in a more environmentally friendly manner.

In particular, the trend in sulphur dioxide (SO_2), which is of special interest to the local community, has decreased sharply compared with previous levels, dropping substantially last year due to the start-up of the tail gas treatment unit at the sulphur recovery plant. Compared with the average figure for the three previous years, SO_2 emissions fell by about 46% last year.

EMAS registration

In 2009, the certifying body, Lloyd's Register Quality Assurance, continued its inspection activities, and the six-monthly inspection of the Environmental Management System was completed successfully. In July 2009, the certifying body approved the 2009 Environmental Declaration, which was then published, presenting figures updated to 31 December 2008, and Saras' EMAS registration was confirmed. This document, aimed at the company's internal and external community, is intended to establish a transparent relationship with the local population, local authorities and employees. It also illustrates Saras' activities, the direct and indirect environmental aspects associated with these activities and the environmental improvement targets that the company has set itself.

The AIA permit

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

The AIA permit, which applies from 9 April 2009, replaces all existing authorisations and fundamentally changes the way in which environmental issues are managed. The authorisation process was conducted by the assessment committee, which comprised representatives from the Italian

Environmental training

In order to achieve continual improvements in environmental protection, it is essential to provide ongoing training to personnel, both to update their skills and to raise awareness of the importance of their individual roles.

This is particularly true in complex systems with over 1,000 employees, which is why in 2009 Saras continued training its staff on environmental protection issues in relation to the activities carried out at the Sarroch site.

In 2009, specific training in HSE (health, safety and the environment) was provided to more than 200 employees. A special two-hour module on the Environmental Management System is also provided to new recruits as part of general orientation training.

Other special courses included: qualification by eight environmental inspectors, courses in accident scenarios, and courses on the environmental, safety and major accident prevention policies, in which the entire workforce took part.

Specific staff attended other, strictly technical courses (blowdown discharge management, the environmental non-compliance management system and safety data sheets) that applied to their area. Over 4,200 environmental training hours were delivered in 2009.

EMAS (Eco-Management and Audit Scheme)

EMAS (Eco-Management and Audit Scheme): established by EEC regulation 1836/93, updated by EC regulation 761/2001 (EMAS II), this is a voluntary scheme intended to promote continuous improvement in the environmental efficiency of industrial activities. Under the regulations, participating companies must adopt environmental management systems at their production sites based on policies, programmes, procedures and objectives aimed at improving the environment, and must publish an environmental declaration. Before a site can be added to the register set up by the European Commission, this declaration must be approved by an inspector accredited by an authorised national body. In Italy this body is the Ecolabel and Ecoaudit committee, which has been operational since 1997 and works with the technical support of ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale - Institute for Environmental Protection and Research).

AIA permit

The **integrated environmental authorisation (Autorizzazione Integrata Ambientale – AIA)** permit is a provision authorising operation of a plant, while imposing measures for the avoidance or reduction of emissions into the air, water or ground in order to effect a high level of overall environmental protection. The AIA permit replaces all other environmental permits, authorisations, approvals or opinions specified by law and in the implementation legislation. Measures relating to the control of major accident-hazards involving dangerous substances are governed by specific legislation (Seveso)

Ministry for the Environment, the Region of Sardinia, the Province of Cagliari, the Municipality of Sarroch, and engineers from ISPRA (formerly APAT) and ARPAS, Sardinia's regional environmental protection agency.

The permit consists of two sections: the preliminary assessment and the monitoring and control plan.
The preliminary assessment contains:

- limits on atmospheric emissions
- limits on discharges into water
- requirements assigned to Saras by the competent authority, with deadlines for their fulfilment

The monitoring and control plan sets out the methods for the managing, checking and disclosing environmental variables, as well as indicating how abnormal situations should be communicated and outlining the type of report that must be submitted to the authorities.
Saras is the first Italian refinery to receive an AIA permit.

Data

Energy consumption

The company is strongly committed to rationalising and optimising its energy consumption, which is closely related to the plant's environmental performance, both now and in the future. In the late 1970s and early 1980s, Saras invested heavily in heat and energy conservation, largely as a response to the energy crisis of the mid-1970s. Today, energy saving and energy efficiency are still strategic goals for overall environmental improvement at the refinery. As part of this commitment, important initiatives in thermal recovery were implemented in 2009 that will reduce annual consumption by about 40,000 TOE. One key step was the integration of the FCC with the desalinator, meaning that water can be desalinated without the use of steam. Table 13 and Chart 5, which show consumption of liquid and gas fuels (gas fuels are produced by the refinery itself) and the amount of electricity from external sources, indicate a broadly flat trend in energy consumption during the period under review.
Table 14 opposite shows the site's power requirement. The quantity of electricity generated by the refinery's thermoelectric plant (CTE) is shown under internal production, while electricity from external sources comes from the national grid.

BREF (Bat REFerence document)

The measures implemented for integrated pollution prevention and control, set out in the AIA permit, must specifically involve the use of best available techniques (BATs).

BATs include procedures, methods, technologies, operating standards, and efficiency and consumption standards, with industrial applications. The competent authority establishes conditions and limits according to what is achievable using BATs. They are therefore intended as a benchmark on which to base an assessment of a plant's efficiency.

Directive 91/61/EC established that the European Commission would effect **"an exchange of information between Member States and the industries concerned on best available techniques, associated monitoring, and developments in them"**, and would publish the results of this information exchange.

The exchange of information applies to all industrial activities within the scope of the Directive. **The results of the information exchange have been made public in the form of reference documents for the BATs, entitled BREF (Bat REFerence document).**

Table 13 – Total energy consumption (refinery + IGCC; TOE)

	2006	2007	2008	2009
Electricity	189,603	193,917	194,118	160,969
Fuel oil	198,546	192,254	205,367	185,270
Fuel gas	414,855	452,451	439,011	403,358
Flue gas	161,908	166,124	174,345	125,143
Total	**964,912**	**1,004,746**	**1,014,849**	**846,749**

Chart 5 – Total energy consumption (refinery + IGCC)

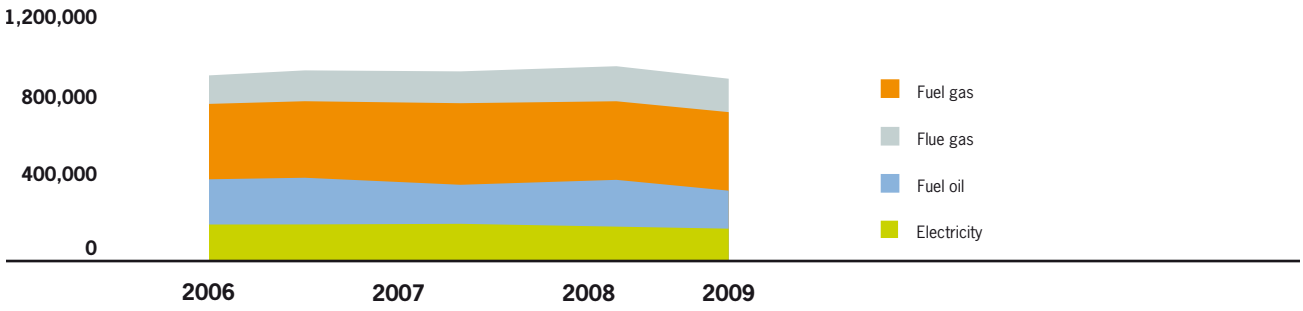
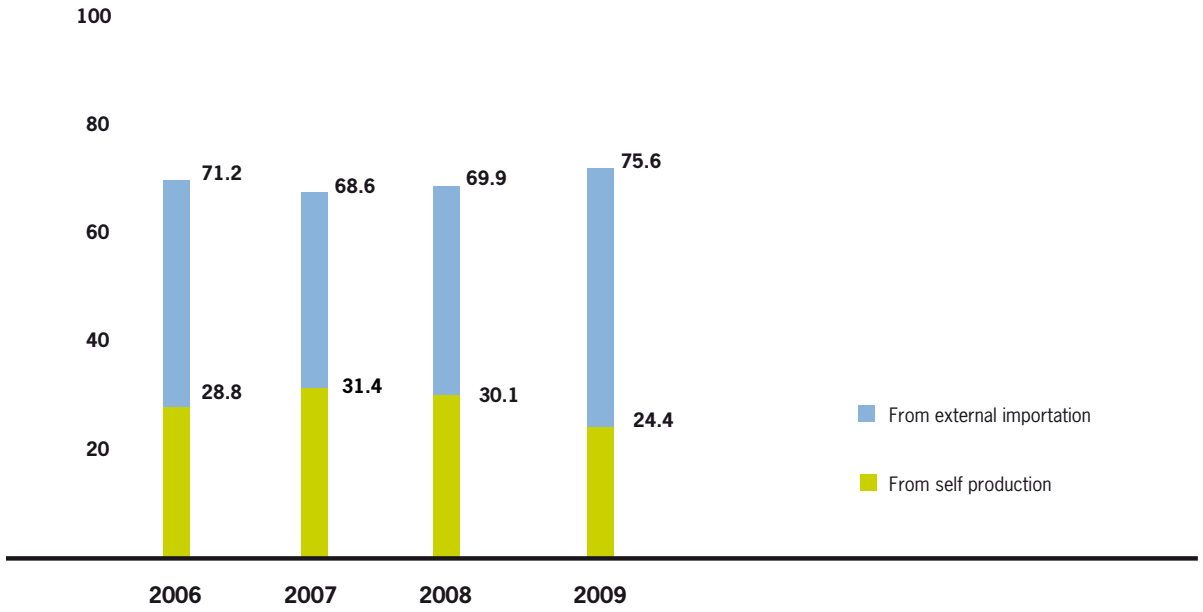


Table 14 – Electricity requirement and supply (refinery + IGCC; MWh

	2006	2007	2008	2009
Total requirement	1,104,148	1,166,208	1,170,341	1,137,842
- from internal production*	318,438	366,242	351,952	277,044
- external	785,710	799,966	818,389	860,798

*Production by the refinery's thermoelectric plant; all IGCC plant output goes to the national grid.

Chart 6 – Electricity requirement and supply (refinery + IGCC; %)



Water consumption

Water is a precious resource for the Sarroch facility, and its use is constantly monitored to optimise consumption and to promote recovery and desalination, instead of using fresh water supplied by CASIC (Cagliari Industrial Development Area Consortium), which manages the water supply to the Sarroch industrial district.

The water used for industrial purposes mainly supplies the boilers that produce steam for technological use (steam stripping, heat exchangers and power generation), to supply the fire prevention system, to replace cooling cycle losses and for civil use.

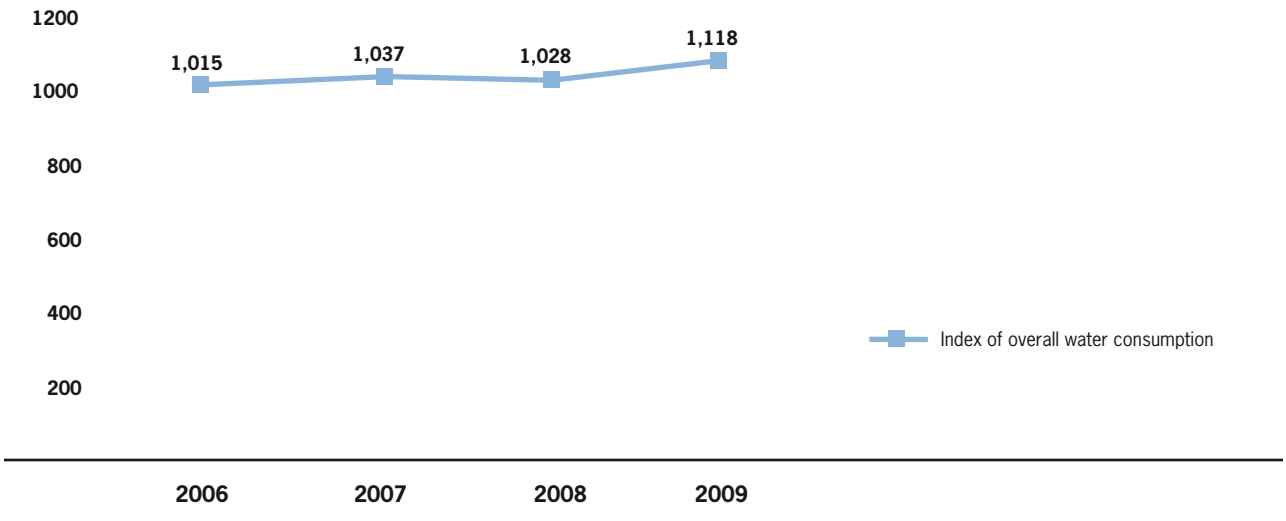
The water consumption data provided also include the quantities required for the IGCC plant which, for its own production, mainly makes use of water from dedicated desalinators and seawater, which is used in the cooling tower. The proportion of water used for refining is largely unchanged.

Supply sources in 2009 continued the trend seen in previous years, as shown in Table 15 and Chart 7.

Table 15 – Total water consumption by source of supply (refinery + IGCC; m^3/h)

	2006	2007	2008	2009
Desalination	685	600	612	546
CASIC	662	711	742	771
Internal recovery	335	416	457	447
Total	**1,682**	**1,727**	**1,821**	**1,674**

Chart 7 – Water requirement of site - specific values (m^3/thousands of tons processed)



In the period under review, internal recovery on average met approximately 26% of the total annual requirement, and desalination was also a source of supply, accounting for 28% of the total. Taken together, desalination and recovered water met approximately 54% of the requirement in 2009. This is a significant result for the plant, particularly since there is now an ongoing water crisis in Sardinia. It indicates that the best path to follow in future is rationalisation of consumption and increased recycling.

Atmospheric emissions

Saras has pursued its commitment to reducing atmospheric emissions by implementing a series of measures designed, over time, to improve its facilities and put in place procedures and management systems that can ensure its activities are environmentally compatible, as demonstrated by a reduction in pollutant emissions.

As part of these activities, the gasification plant has made a substantial contribution to reducing atmospheric emissions, as described on page 17. In 2009, one of the most significant projects in terms of reducing atmospheric emissions was the start-up of the Tail Gas Treatment Unit (TGTU), which processes tail gases, thereby increasing the plant's sulphur recovery and reducing SO_2 emissions.

The gasoline desulphurisation process has also been updated; as of 1 January 2009, it produces only gasoline and diesel with a sulphur concentration of 10 ppm (parts per million) for the European market, thus helping to reduce indirect SO_2 emissions.

Initiatives to improve furnace combustion and to reduce diffuse emissions (by installing double seals on gasoline pumps) have also been implemented.

In terms of legislation, meanwhile, the AIA permit came into force on 9 April 2009, imposing new, stricter limits in the area of atmospheric emissions. These have been fully respected, as shown in the following charts.

Water conservation

Aware of the problem of scarce water resources in Sardinia, Saras has adopted specific measures to reduce the use of primary water sources in the region, by:

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

The desalination plant has significantly reduced the use of fresh water from CASIC (Cagliari Industrial Development Area Consortium, which is responsible for managing the water system in the Sarroch industrial area) water system, without disrupting the marine ecosystem by the refinery.

In terms of water treatment systems, the refinery is equipped with a process-water purification (PWP) plant and a ballast water treatment (BWT) plant for oil tankers transporting crude oil and products to and from the refinery.

Both plants were built using the best technology available, and are equipped with pollutant-monitoring systems; both process water and ballast water are subject to an oil extraction process that separates hydrocarbon particles from the water, which is then treated.

Furthermore, part of the water treated in the PWP system (approximately 400 m^3/hr) is reused for industrial purposes in the refinery, thereby reducing the amount of water taken from primary sources such as the industrial water supplies and the seawater desalination system.

Table 16 – Total atmospheric emissions (thousand tons/year)

	2006		2007		2008		2009	
	Raffineria	IGCC	Raffineria	IGCC	Raffineria	IGCC	Raffineria	IGCC
SO_2	7.33	0.47	6.97	0.42	6.73	0.41	3.51	0.51
NO_x	3.80	0.98	3.16	0.997	3.13	0.86	2.42	0.58
DUST	0.45	0.003	0.52	0.005	0.45	0.004	0.28	0.03
CO	1.26	0.11	1.19	0.14	1.16	0.13	0.54	0.12
CO_2*	2.349	3.878	2.508	3.751	2.485	3.728	2.136	3.542

* as per emissions trading declaration (see box on page 63)

Sulphur dioxide (SO_2)

The site recorded its best ever year for total SO_2 emissions in 2009, confirming the downward trend under way for the past few years. This result is due to the ongoing improvement in the quality of fuels used, with a steady decrease in sulphur content (Chart 9) and to the start-up of the TGTU plant.

The emissions rate per ton of raw material processed (Chart 10) shows a substantial reduction due to a successful initiative to improve processing performance.

The 2009 figures, confirmed by the monitoring of the refinery smokestacks and the IGCC, show that all the values recorded were well below the new legal limits set for the refinery (Chart 11) and those for the IGCC (Chart 12).

Chart 8 – SO_2 emissions (thousand tons/year)

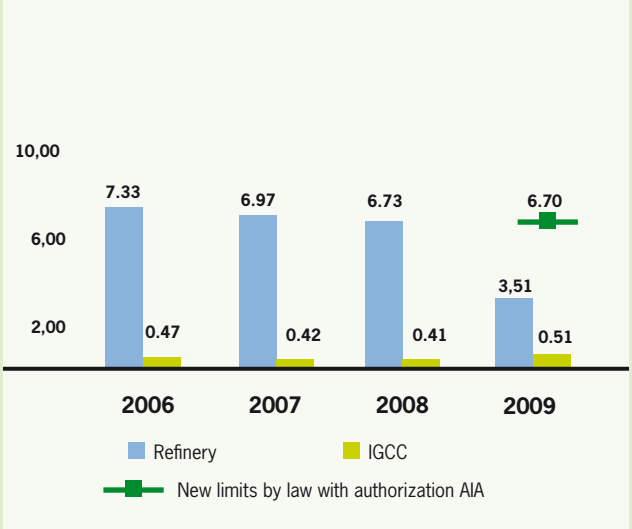


Chart 9 – Sulphur content (% in weight)

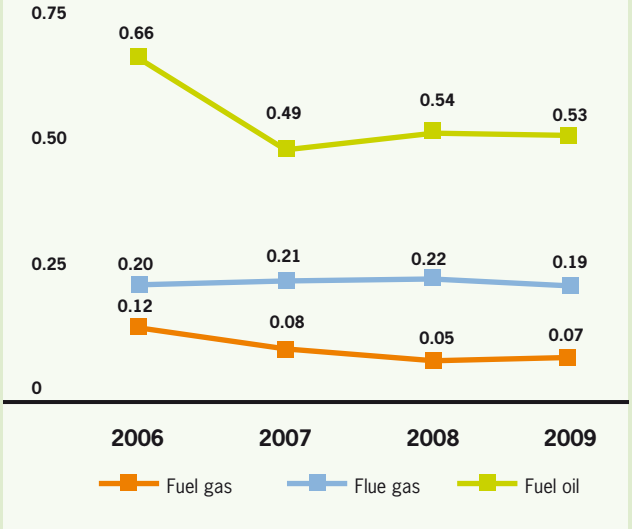


Chart 10 – Rate of SO_2 emissions (SO_2 tons/thousand tons processed)

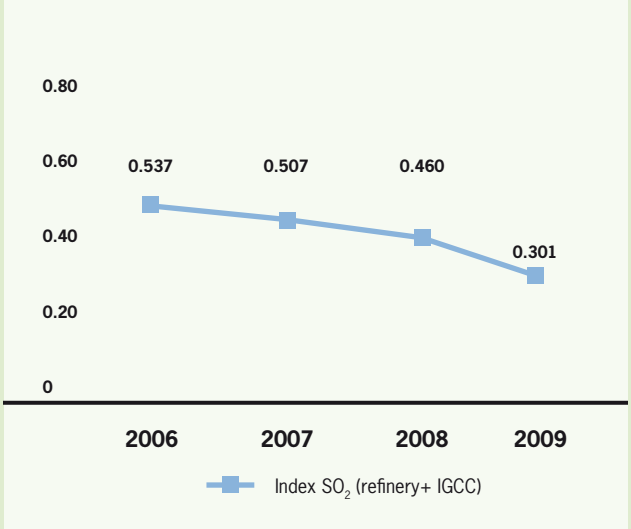


Chart 11 – SO_2 concentrations in refinery smokestacks (mg/Nm^3)

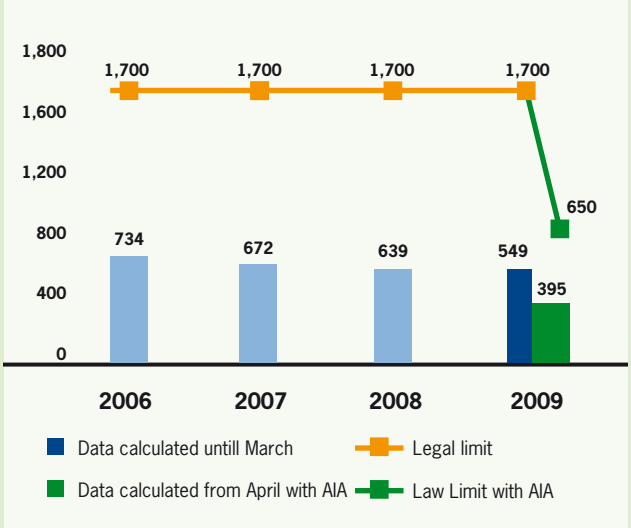
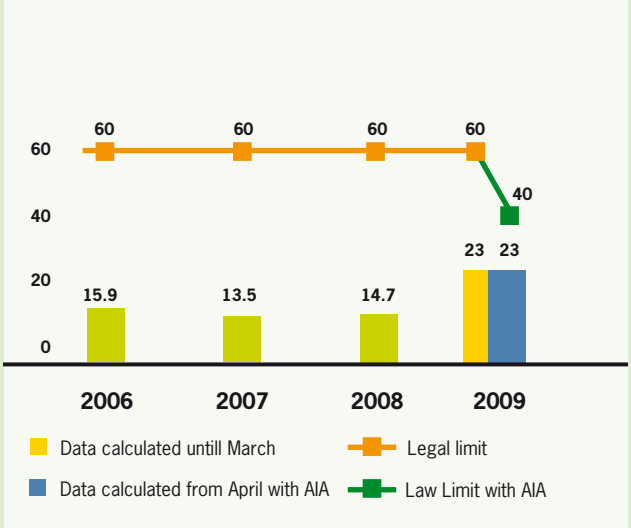


Chart 12– SO_2 concentrations in IGCC smokestack (mg/Nm^3)



Ossidi di Azoto (NO_x)

Overall, the Saras site has continued to curb its nitrogen oxide emissions.

These are only marginally affected by fuel quality, and largely depend on combustion techniques, which in turn are related to structural factors such as burner type.

With the IGCC plant coming fully on stream, the trend in NO_x emissions over the years continues (Chart 13). The figure for 2009 was the lowest of the past four years (Chart 14).
A comparison of concentrations with the regulatory limits confirms that the results are very positive and well below the limit (Charts 15 and 16).

Chart 13 – NO_x emissions (thousand tons/year)

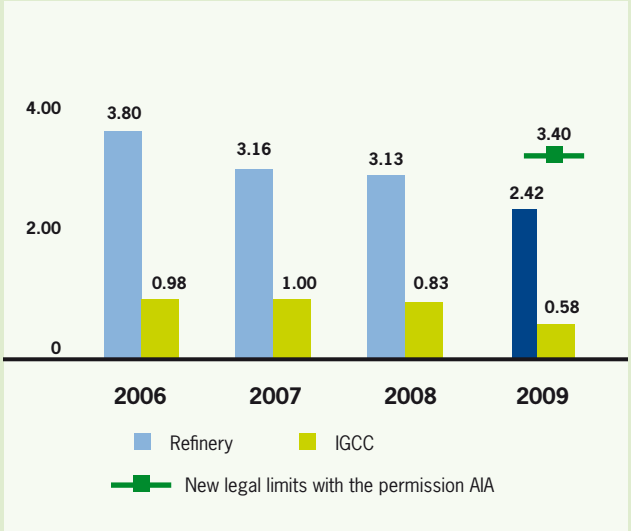


Chart 14 – Rate of NO_x emissions (NO_x tons/thousand tons processed)

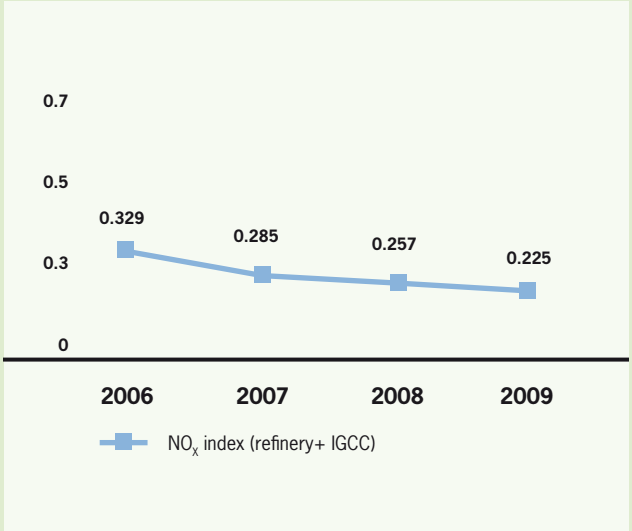


Chart 15 – NO_x concentrations in refinery smokestacks (mg/Nm^3)

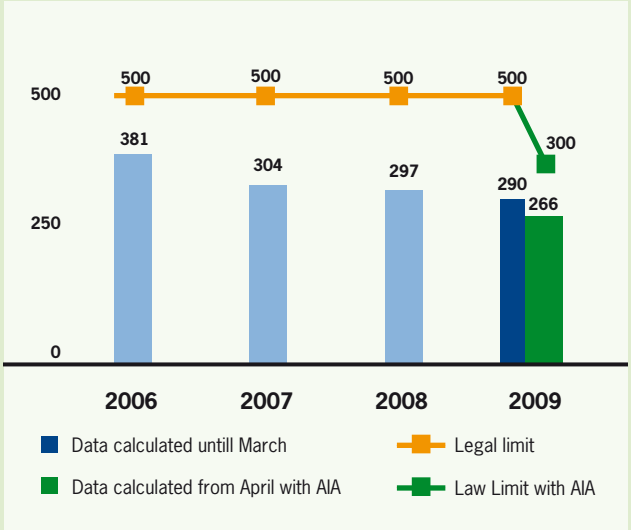
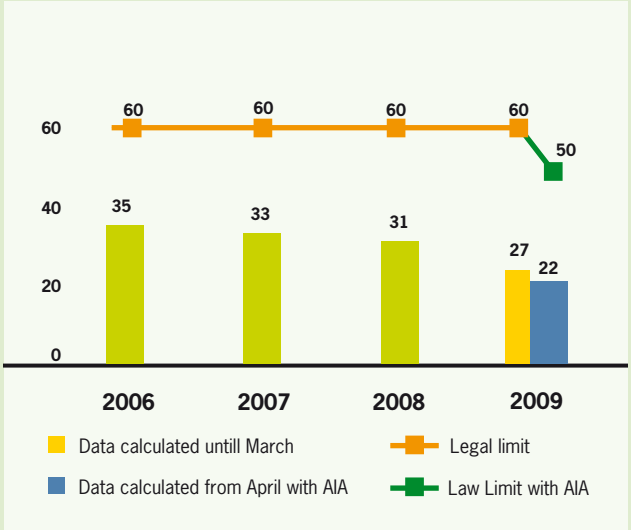


Chart 16 – NO_x concentrations in IGCC smokestack (mg/Nm^3)



Dust

The refinery's exclusive use of fuel oil with a low sulphur content (BTZ) since 2000 has kept dust emissions at low levels, and consistently below legal limits (Charts 19 and 20).

The trend can also be seen in the positive performance of the IGCC plant, which has negligible dust emissions, as seen in Chart 17 showing total emissions. Overall, levels at the site have been largely unchanged (Chart 18).

Chart 17 – Dust emissions (thousand tons/year)

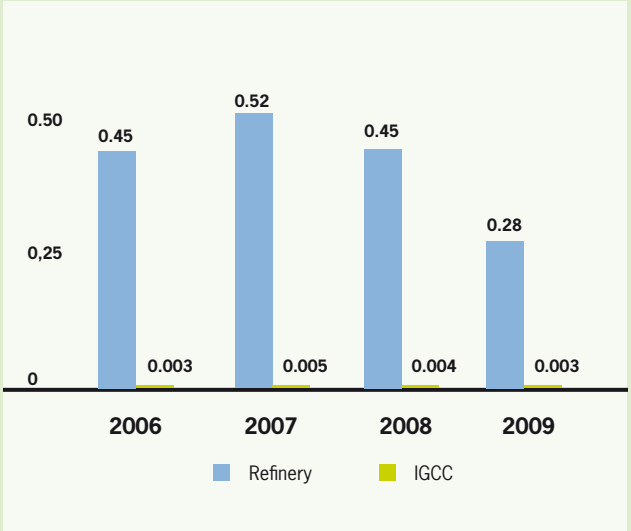


Chart 18 – IRate of dust emissions (dust tons/thousand tons processed)

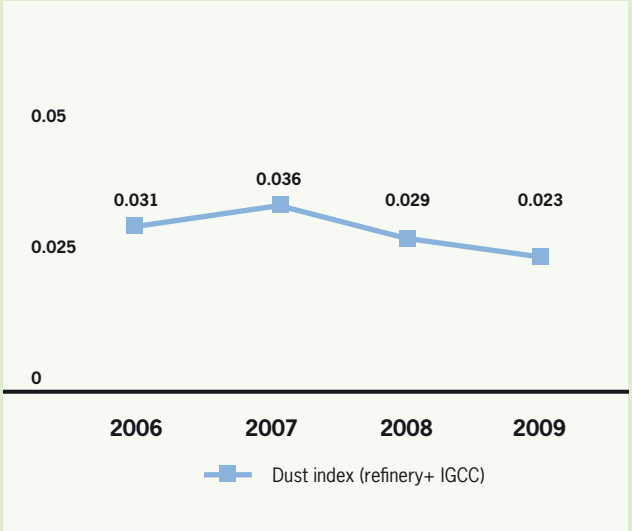


Chart 19 – Dust concentrations in refinery smokestacks (mg/Nm^3)

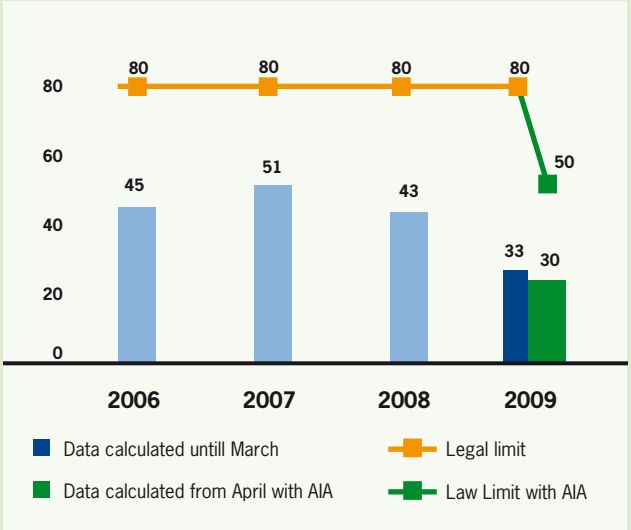
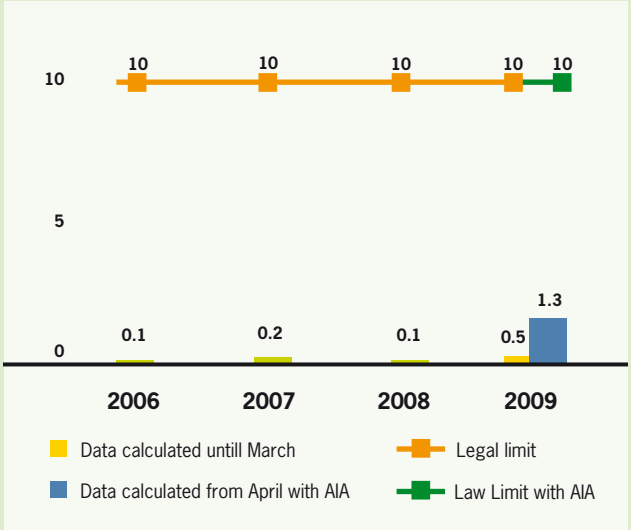


Chart 20 – Dust concentrations in IGCC smokestack (mg/Nm^3)



PM10

The refinery's exclusive use of fuel oil with a low sulphur content (BTZ) since 2000 has kept dust emissions at low levels, and consistently below legal limits.

This figure was first recorded in 2009, when the AIA permit came into effect and set the limit for this parameter.

Chart 21 – PM10 emissions (thousand tons/year)

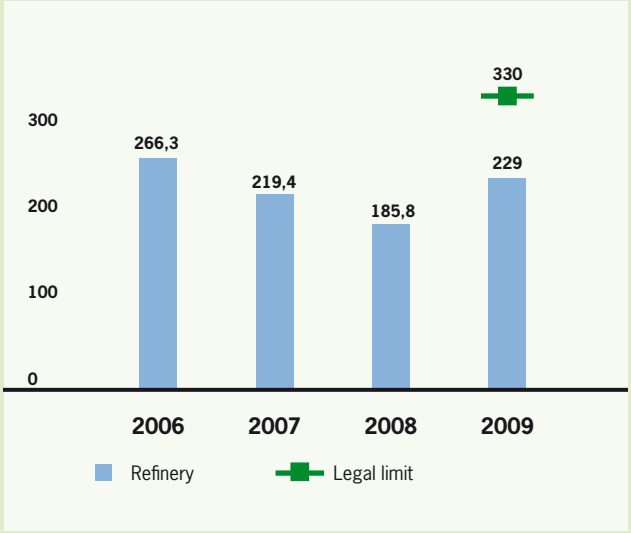


Chart 22 – Rate of PM10 emissions (dust tons/thousand tons processed)

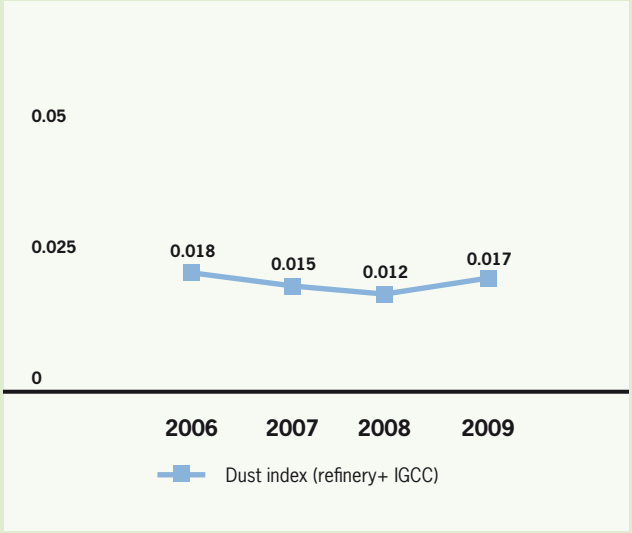
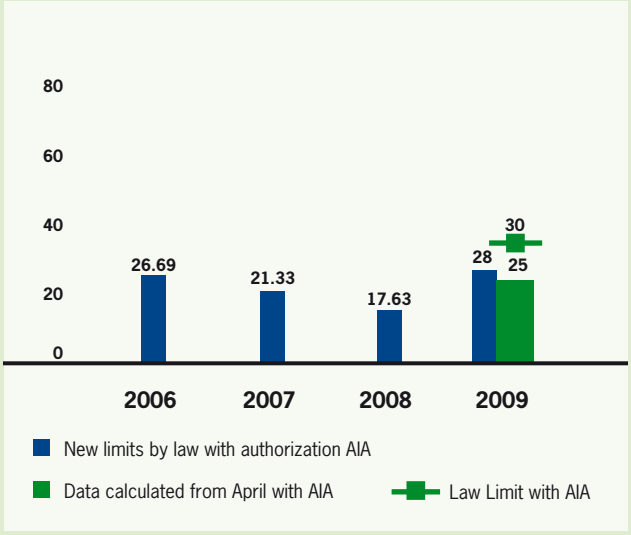


Chart 23 – PM10 concentrations in refinery smokestacks (mg/Nm^3)



Carbon monoxide (CO)

An ongoing positive trend can also be seen in carbon monoxide emissions. The IGCC figure has been relatively stable, while the figure for the refining plants has fallen, due to the optimisation of the combustion process in certain furnaces, and especially to the new contribution of the TGTU unit in 2009 (Chart 24). The rate for production is also heading in the right direction; in 2009 it was the lowest for the period under review.

All the values recorded are also well below legal limits.

Chart 24 – CO emissions (thousand tons/year)

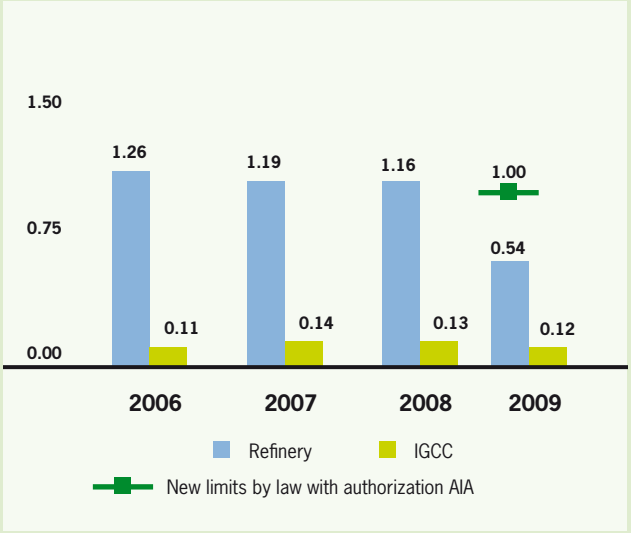


Chart 25 – Rate of CO emissions (CO tons/thousand tons processed)

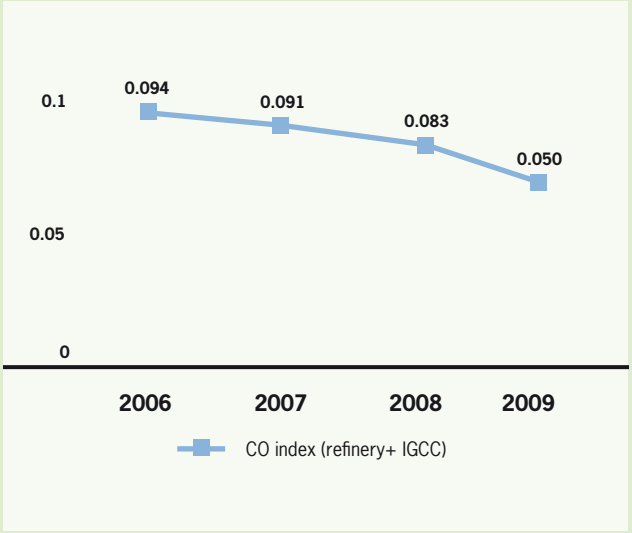


Chart 26 – CO concentrations in refinery smokestacks (mg/Nm^3)

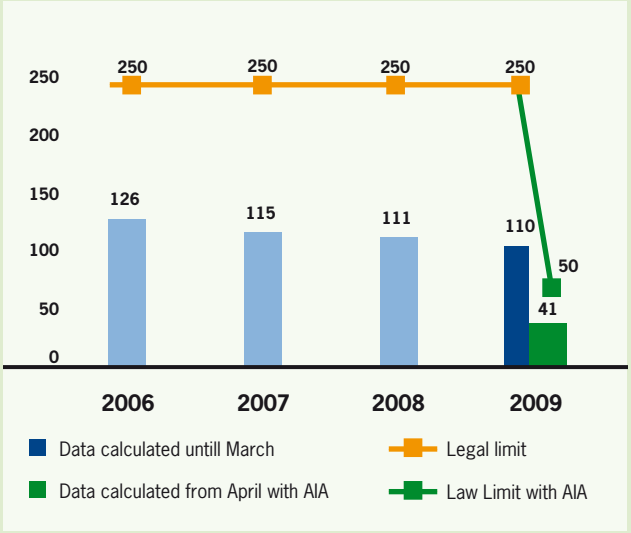
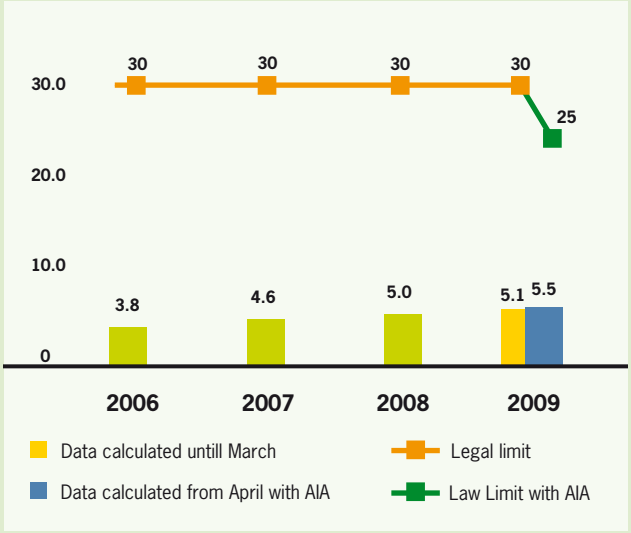


Chart 27 CO concentrations in IGCC smokestack (mg/Nm^3)



Greenhouse gas emissions

The two activities carried out by the Saras Group at the Sarroch site – the refinery (refining sector) and the IGCC plant (thermoelectric sector) – fall within the scope of the European Emissions Trading Directive. The directive was introduced across Europe to control and reduce carbon dioxide emissions as part of the fight against climate change. Carbon dioxide emissions do not have a direct impact at local level, particularly in terms of air quality around the site, but are connected to the global greenhouse effect. The emissions trading scheme was introduced in 2005 to help member states comply with the requirements of the Kyoto Protocol. It works by assigning an emissions allowance to each individual plant falling within the scope of the directive, set 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.

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

The reduction in CO_2 emissions in 2009 was mainly due to long shutdowns for plant maintenance during the year, which allowed the company to make significant investment in energy recovery. The results of this investment have partly filtered through to the year under review but the full benefits will not be seen until 2010.

The main method of controlling and reducing emissions is to use energy rationally and adopt efficient production systems; Saras has always been heavily committed to this strategy.

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

Emissions 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 of the directive are as follows:

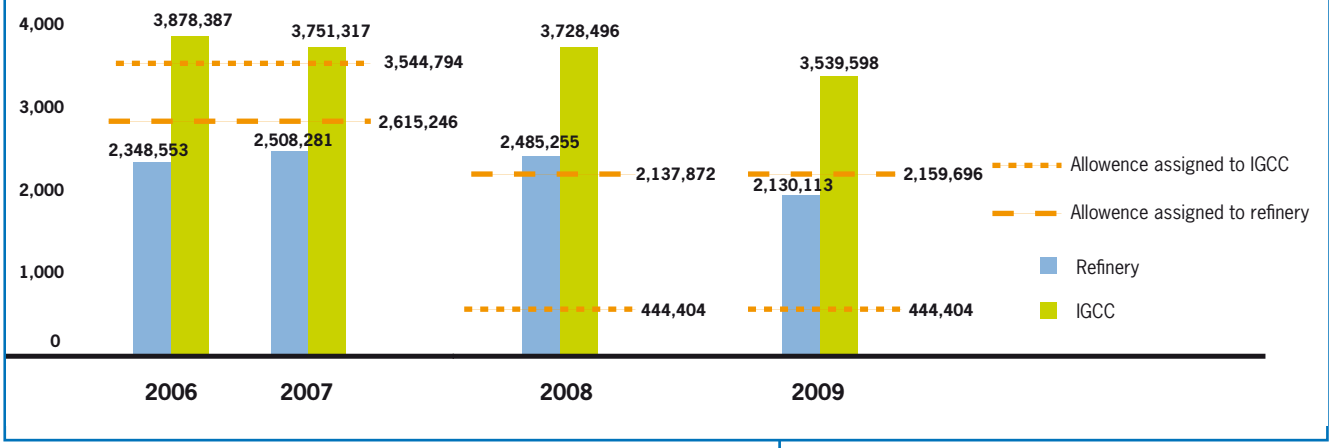
- as of 1 January 2005, no plant within the scope of the directive may emit CO_2 (i.e. continue to operate) without appropriate authorisation
- each year the operators of these plants must surrender CO_2 allowances equal to the CO_2 released into the atmosphere to the competent national authority
- maximum 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

Table 17 – CO_2 emitted by the site (refinery + IGCC; tons/year)

	2006	2007	2008	2009
Refinery	2,348,553	2,508,281	2,485,255	2,130,113
IGCC	3,878,387	3,751,317	3,728,496	3,539,598
Total	**6,226,941**	**6,259,598**	**6,213,751**	**5,669,711**
Total allowance (refinery + IGCC)	**6,160,040**	**6,160,040**	**2,582,276***	**2,604,100****

*This figure includes 489 tons/year allocated for 2008 for the start-up of the U800 plant.
**This figure includes 22,313 tons/year allocated for the period 2009-2012 for the start-up of the U800 plant.

Chart 28 – CO_2 emissions: absolute values and allowances (tons/year)



Air quality monitoring

The constant monitoring of air quality is a key element in a strong environmental protection policy. Saras has therefore, over time, acquired the tools and adopted the management procedures to achieve this aim. Air quality is currently monitored using bio-indicators and biodiversity studies as well as monitoring networks (detection stations).

- **Monitoring using bio-indicators and biodiversity studies**

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

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

  For some years, the Botanical Sciences Department of the Mathematical, Physical and Natural Sciences Faculty at Cagliari University has been monitoring the condition of the vegetation over a huge area covering the inland region of Sarroch, as illustrated in Figure 9. It also uses the epiphytic mosses methodology as a bio-monitor of air quality.

  Table 18 shows the key criteria for interpreting the categories of air quality and atmospheric purity, with reference to the Index of Atmospheric Purity (IAP)[1].

  The categories that include the indicator values measured in the stations being monitored are highlighted in Table 18.

  In 2009, air quality in the area studied again fell into category IAP3, with an assessment of "average" for air quality and atmospheric purity in eight out of the 11 monitoring stations, while the remaining three units fell into category IAP4 with an assessment of "mediocre" for air quality, "low" for atmospheric purity and "low" for pollution. The station closest to the industrial area is one of these three.

  As could be reasonably expected, air quality is generally higher in the stations further inland and lower in the one nearest to the Sarroch industrial area.

Figure 9 - Location of the air quality bio-monitoring stations.

1 - The IAP index was created by P.L. Nimis, "Linee guida per la bioindicazione degli effetti dell'inquinamento tramite la biodiversità dei muschi epifiti" ('Guidelines for the bio-indication of the effects of pollution through the biodiversity of epiphytic mosses'), Department of Biology, University of Trieste, 1999, and has been used in various air quality studies, as well as by the ARPAs (Regional Environmental Protection Agencies).

The picture that emerges from an analysis using bio-indicators shows, therefore, that the air quality falls in the mid-range of the IAP index. In the area under review, a survey is also carried out to monitor the condition of the vegetation.

The survey is conducted through visual checks of the condition of different species of vegetation and by monitoring the bioaccumulation of pollutants. According to the results of these field measurements, there was no critical threat in 2009 to the condition of the vegetation in the area studied.

Table 18 - Index of Atmospheric Purity (IAP): categories of air quality and atmospheric purity

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

1 - The IAP index was created by P.L. Nimis, 'Linee guida per la bioindicazione degli effetti dell'inquinamento tramite la biodiversità dei muschi epifiti' ('Guidelines for the bio-indication of the effects of pollution through the biodiversity of epiphytic mosses'), Department of Biology, University of Trieste, 1999, and has been used in various air quality studies, as well as by the ARPAs (Regional Environmental Protection Agencies).

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- **Monitoring networks**

  Air quality outside the Sarroch refinery (immission level) is checked by three monitoring systems, comprising a total of 14 monitoring stations, of which four belong to Saras and six to Polimeri Europa, while the other four are managed by ARPAS.

  The Saras network – managed alongside those of the local authorities and other companies in the region – provides real-time data on changes in parameters relating to air quality, to ensure that pollution concentration is kept below the minimum levels laid down by the laws in force and that immediate action can be taken when necessary.

  Each of the four Saras monitoring stations (Villa d'Orri, Sarroch, Porto Foxi and the national storage facility) is equipped with measurement devices that continuously gauge levels of the following pollutants in the air: SO_2, NO_2, CO, H_2S, PM10, ozone and hydrocarbons. The station located in the area of the national storage facility also has a weather station.

  The ARPAS network records average hourly concentrations of the following pollutants: SO_2, NO_2, dust, H_2S and PM10 at all monitoring stations; ozone and benzene at three stations; and CO at one station. In 2009, the station CENSA9 was relocated in order to monitor more closely the air quality of Sarroch's city centre (CENSA3).

  A dedicated monitoring system constantly checks emissions from the IGCC plant for SO_2, NO_X, PTS, CO and flue gas flow rate, guaranteeing a high degree of reliability, as shown by the data availability index (the

ratio between the device's operating hours and normal plant operating hours), which in 2009 was on average higher than 97%.
A similar system monitors emissions from the refinery's central smokestack, which collects approximately 30-35% of total emissions (Topping 1 and thermoelectric plant) and also monitors the parameters described above. In 2009, similar monitoring systems were also set up for the smokestacks of sulphur recovery plants Z3 and Z4. The remaining emissions are monitored periodically with samples taken manually.

The tables opposite show data on the concentrations of the main parameters measured by the Saras monitoring stations, compared with the limits set under current legislation.
The data show that the quality standard is met for all the pollutants monitored; the values measured by the monitoring stations are all below the emission limits (Table 19 on page 64).
This result is significant as it is closely connected with the health and environmental quality of the region, and these are the objectives behind initiatives to ensure that the management of production processes are constantly monitored from an environmental performance perspective. The reduction in emissions due to the start-up of the TGTU plant has also led to a marked improvement in ground-level effects, notably for SO_2, which in 2009 did not once exceed the limits.

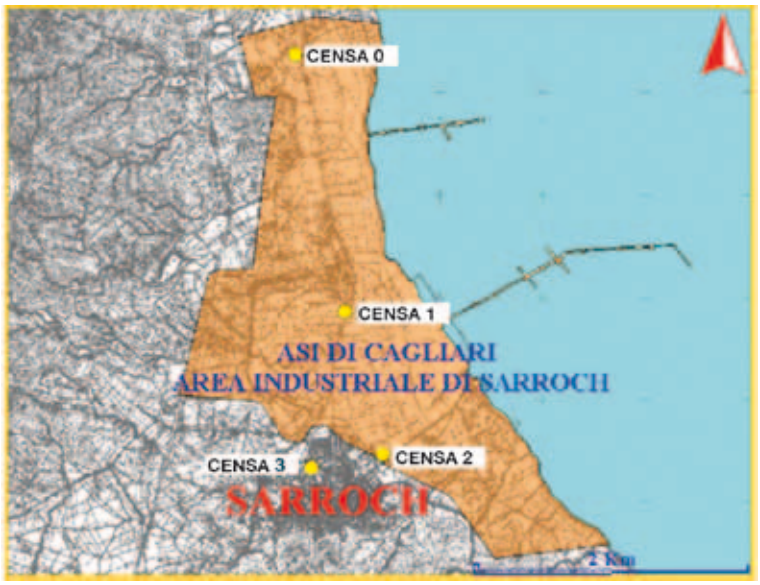


Figure 10 - Map showing the location of the air quality monitoring stations of the public network.

Table 19 – Data from the monitoring network and comparison with legal limits pursuant to Ministerial Decree 60/02 (µg/m3)

SO_2	Number of times that limits have been exceeded									
	Hourly limit[2]			Daily limit[3]			Ecosystems limit[4]			
	2007	2008	2009	2007	2008	2009	Valore limite	2007	2008	2009
Villa d'Orri	0	1	0	0	0	0	**20**	3	4	2
Porto Foxi[1]	21	2	0	5	0	0	**20**	16	10	7
Sarroch	8	2	0	0	0	0	**20**	13	11	8
National storage facility	1	0	0	0	0	0	**20**	8	6	3

1 - The Porto Foxi unit is located in an area designated for use as a "working area".
2 - Hourly limit must not be exceeded more than 24 times per calendar year (350 µg/m^3 since 2005).
3 - Daily limit must not be exceeded more than 3 times per calendar year (125 µg/m^3).
4 - Limit for the protection of ecosystems (20 µg/m^3).

NO_X	Number of times hourly limit was exceeded[1]			2007		2008		2009	
	2007	2008	2009	Registered value[3]	Limit[2]	Registered value[3]	Limit[2]	Registered value[3]	Limit[2]
Villa d'Orri	0	0	0	6	**48**	5	**46**	4	**42**
Porto Foxi	0	0	0	9	**48**	5	**46**	7	**42**
Sarroch	0	0	0	6	**48**	6	**46**	4	**42**
National storage facil.	0	0	0	10	**48**	7	**46**	5	**42**

1 - Hourly limit must not be exceeded more than 18 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).
2 - Annual limit.
3 - Annual average on an hourly basis.

PM10	Number of times daily limit was exceeded[1]			2007		2008		2009	
	2007	2008	2009	Registered value[2]	Limit	Registered value[2]	Limit	Registered value[2]	Limit
Villa d'Orri	-	-	-	-	**40**	-	**40**	-	**40**
Porto Foxi	15	13	5	24	**40**	24	**40**	24	**40**
Sarroch	14	12	2	27	**40**	25	**40**	23	**40**
National storage facil.	-	-	-	-	**40**	-	**40**	-	**40**

1 - Daily limit must not be exceeded more than 35 times per calendar year (50 µg/m^3 since 2005).
2 - Arithmetic mean of average daily concentrations in a one-year period.

CO	Number of times the average daily peak was exceeded[1]		
	2007	2008	2009
Villa d'Orri	0	0	0
Porto Foxi	0	0	0
Sarroch	0	0	0
National storage facility	0	0	0

1 - Average daily peak in 8 hours (10 µg/m^3 since 2005).

Wastewater

The site performed normally in the period 2006-2009, with slight variations due to maintenance work on the processing plants (Chart 30). To measure the environmental quality of wastewater, COD (a general index of water quality) and hydrocarbon (mineral oils) indicators were adopted as processing benchmarks (Table 20).

In accordance with requirements imposed by the AIA permit regarding the discharge of wastewater into the sea, monthly samples are taken by an accredited external laboratory, and the results of the analysis are sent to the competent authority.

Charts 35 and 36 are based on these figures and on information obtained from continuous hydrocarbon analysis. They show that all the concentration values measured during the period under review were consistently below the limits set by existing legislation.

Chart 29 – Total wastewater ($m^{3/h}$)

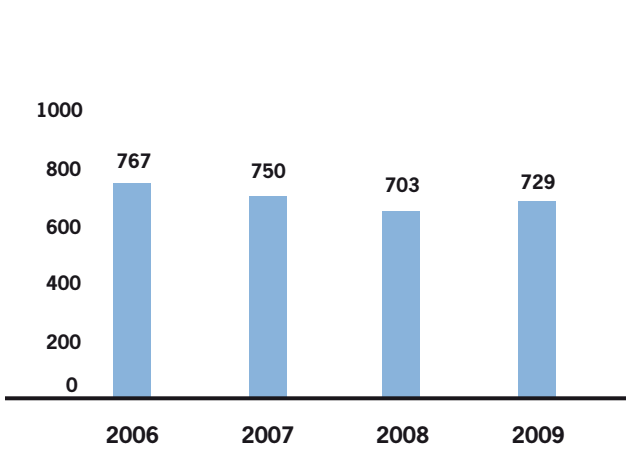


Chart 30 – ITotal wastewater rate (m3/thousand tons processed)

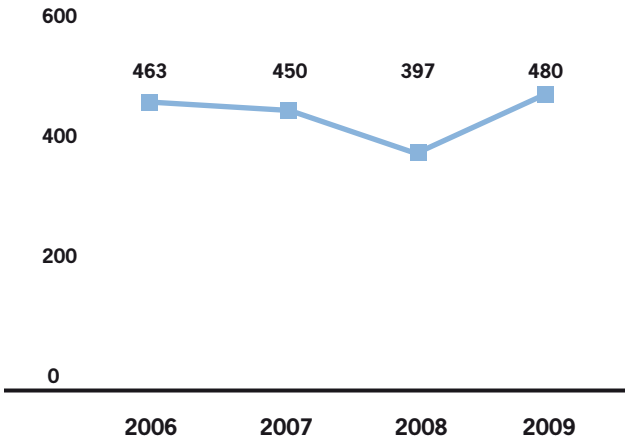


Table 20 – Main substances detected (tons/year)

	2006	2007	2008	2009
COD	368.0	472.0	368.6	396
Mineral oils	10.1	14.3	10.4	12.2

Chart 31 – COD emissions (tons/year)

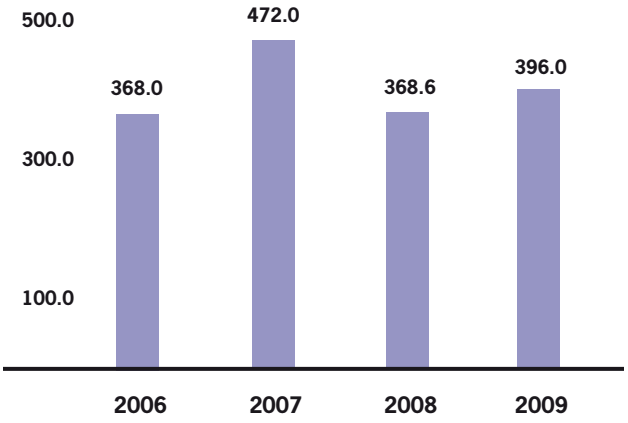


Chart 32 – Mineral oil emissions (tons/year)

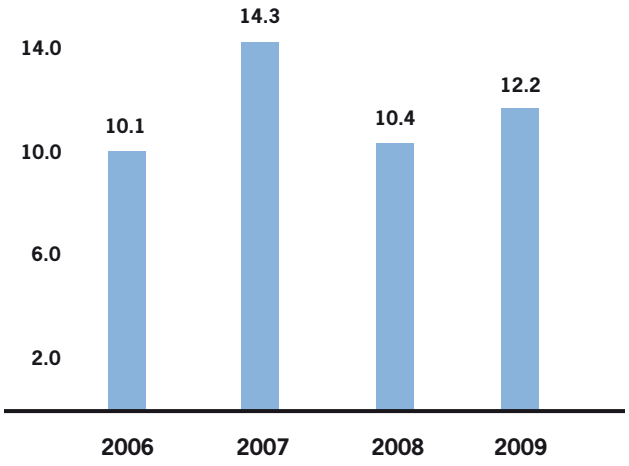


Chart 33 – Rate of COD emissions (tons/million tons processed))

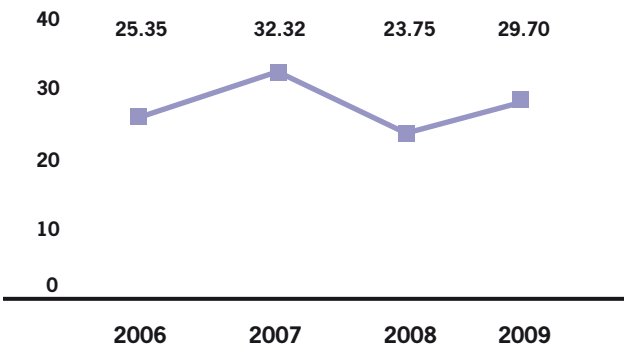


Chart 34 – Rate of mineral oil emissions (tons/million tons processed)

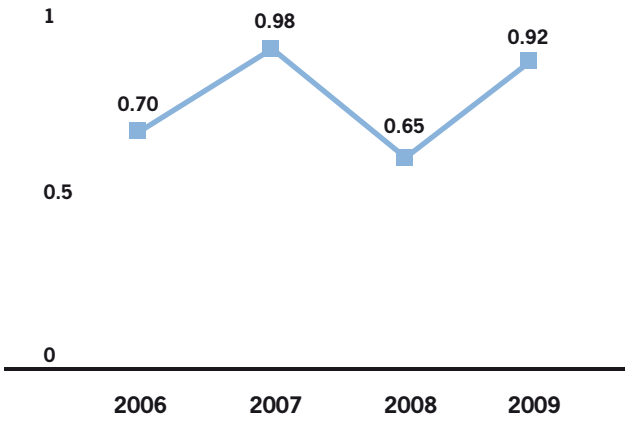


Chart 35 – COD concentration (mg/l)

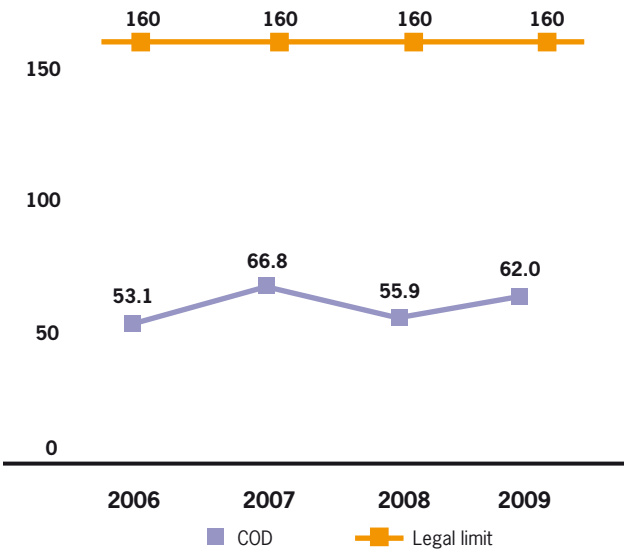
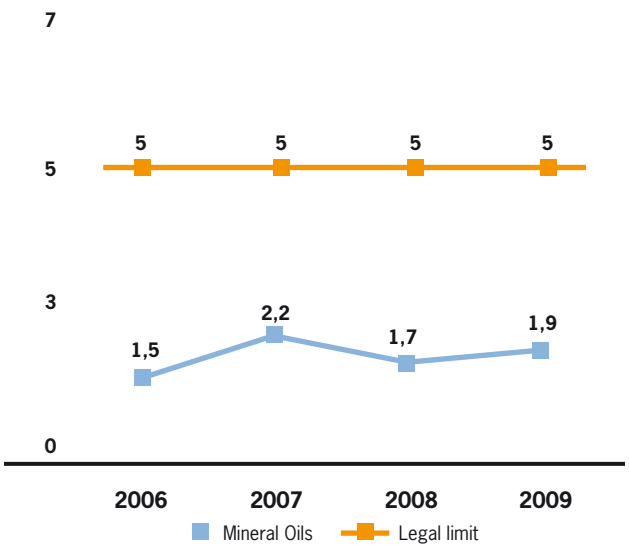


Chart 36 – Mineral oil concentration (mg/l)

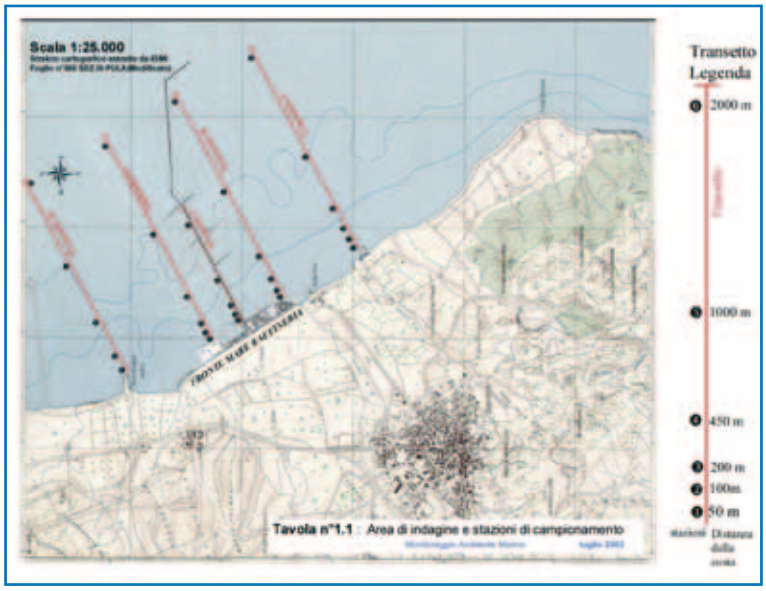


Monitoring the marine environment

For Saras, safeguarding the marine environment is a vital ongoing commitment, which is put into practice mainly by constantly checking the quality of wastewater and by monitoring the environmental parameters of the marine environment on a six-monthly basis. The area covered by the surveys is shown in Figure 11, and includes monitoring points from which surface and bottom water samples are taken.

These monitoring points, positioned along five lines perpendicular to the coastline, remain constant, to ensure that the results of the various surveys conducted over time are fully comparable.

Figure 11 - Seawater quality survey area



The continual monitoring of the parameters makes it possible to trace the trophic state of the sea close to the Sarroch plant. This is the main tool used to evaluate the seawater quality, shown by data on the following areas:

- hydrology (transparency, temperature, salinity, dissolved oxygen, pH balance)
- nutrients (nitrogen compounds, phosphorous)
- state of vegetation (chlorophyll, phytoplankton, posidonia oceanica, macroalgae)
- monitoring of sediment particles (deposited during the study period) and surface sediment
- monitoring of heavy metals in sediment.

Table 21 on page 71 summarises the results for the trophic state of the seawater based on surveys of the quality of the water off the coast near the refinery carried out over the past four years. Assessment of the trophic state is given for both surface and bottom water.

Table 21 – Trophic index (TRIX): seawater quality categories and results (2006-2009 survey)

	Surface water	Bottom
January 2006	good	good
July 2006	high	high
January 2007	high	high
July 2007	high	high
January 2008	high	high
July 2008	high	high
January 2009	**good**	**good**
July 2009	**good**	**good**

In recent years a new parameter, the CAM (classification of seawater) index, has been introduced to provide an assessment of the trophic state of water. This index is based on specific algorithms for the sea around Sardinia. Generally speaking, the CAM index produced an "average" rating for the quality of seawater in the entire survey area. The sole exception was 2009 when the quality of seawater was poor due to a particularly rainy period that started in the last quarter of 2008, causing a number of water courses to overflow into the Gulf of Cagliari with the resulting transport of sediment-forming nutrient substances. These immissions created a broad area of persistent turbidity with a significant effect on the quality of the water in the bay (Table 22). In any case, these indices are significant over long periods rather than in a single period.

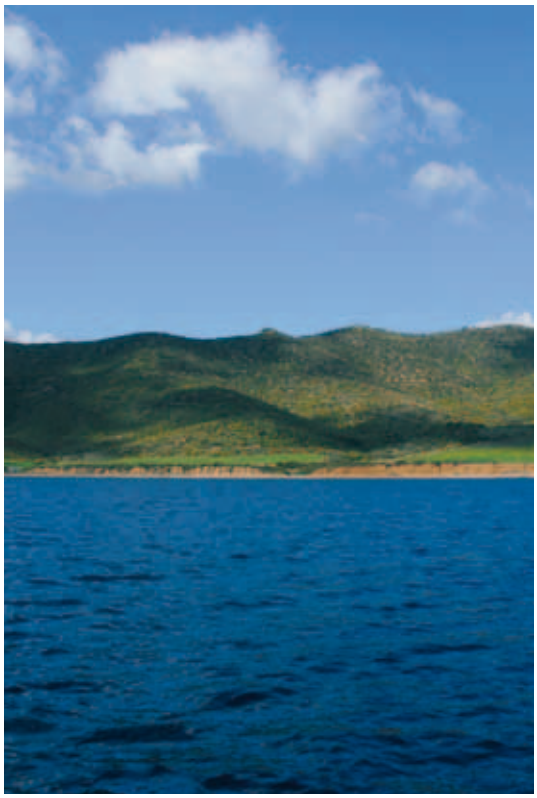
Table 22 - Trophic state of seawater (2006 -2009 survey)

	CAM index (specific to the sea around Sardinia)	
January 2006	low	low
July 2006	average	average
January 2007	average	average
July 2007	average	average
January 2008	average	average
July 2008	average	average
January 2009	**low**	**low**
July 2009	**low**	**low**

Measures to protect the sea and coastline

Since the early 1990s, Saras has launched various initiatives to protect the sea and coastline. The most significant are:

- adoption of the "Saras Minimum Safety Criteria" for ship screening and selection: this is a list of minimum safety requirements that ships must satisfy for inspection and authorisation to operate at the Saras marine terminal
- the implementation of the Safety Service, which involves the presence of qualified personnel on board ships at all times during operations, to verify technical and operational compliance in terms of safety and environmental protection. This measure is intended to mitigate and minimise the greater risk to the environment posed by ships



transporting particularly heavy and pollutant products (such as crude oil, fuel oil and some types of diesel)
- in 2009, in anticipation of legislative requirements, all incoming ships were double-hulled, and the Safety Service was extended to all unloading ships, ships carrying pollutant products and all ships 15 years old or over: this type of inspection was carried out on 290 ships, equivalent to 42% of maritime traffic
- the implementation of the automatic ESD (Emergency Shut Down) system, to prevent the spilling of products by automatically stopping the loading pumps and closing the interception valves for oil products in the event of a pressure surge
- a ban on the discharge of segregated ballast (seawater that does not come into contact with oil products) into the sea at night applied to ships carrying particularly pollutant products
- an agreement with a specialist company for the constant attendance of anti-pollution staff and equipment.

Every six months, a survey is carried out into the quality of the seawater in the stretch of coast adjacent to the refinery. In the event of a spill, vehicles and equipment are available to deal quickly with the incident, according to procedures laid down in the Internal Emergency Plan, which includes the Marine Pollution Prevention Plan (page 88).

Saras has also decided to increase the use of double-hulled ships to transport crude oil and oil products. Currently, on the basis of international agreements, all ships transporting fuel oil and heavy (high density) crude oil must have double hulls. To further safeguard the sea and coastline, Saras committed in 2008 to use at least 98% double-hulled ships to carry light crude oil (low density, not covered by the aforementioned agreements) and set a target of at least 95% of double-hulled ships to transport gasoline, kerosene and diesel. A check of these commitments showed that 100% of the ships used to carry light crude oil were double-hulled, as were 97.7% of ships used to transport gasoline, kerosene and diesel. Therefore, in 2009, as part of the objective of constant improvement, the company achieved its goal of using only double-hulled ships for both crude oil transport and gasoline, kerosene and diesel (see Table 23).

To further guarantee protection of the sea and coastline, all leasing contracts agreed by Saras for the supply of raw materials and shipment of finished products contain clauses prohibiting any ship from passing through the Strait of Bonifacio.

Refinery equipment for the protection of the sea and coastline

The Sarroch refinery has four vessels that operate 24 hours a day:
- the Neptune, an anti-pollution motorboat equipped with systems to recover and store heavy hydrocarbons
- the pilot boat Pegasus, used to transport people and equipment and assist in the positioning of floating booms
- the working boat Proteo, used for rapid identification, positioning of floating booms and operations in shallow water
- the motorboat Tripesce, used to position floating booms and carry out operations in shallow water

A wide range of equipment guarantees that the site is able to respond immediately and fully to contain and remove any product spills:
- skimmers to collect spillage floating on the surface of the water with a recovery capacity of up to 27 m^3/hour
- floating tanks, each with a 5 m^3 capacity, to collect any product recovered from the sea
- motor pumps to recover products, with a capacity of up to 48 m^3/hour
- 1,950 m of floating booms to contain floating product, equipped with inflation systems (three compressors and two blowers)
- radio buoys connected to the GPS system
- absorption systems

Table 23 – Commitments and results relating to the protection of the marine environment from shipping traffic - 2009

	Commitment for 2009	Result for 2009	Commitment for 2010
Double hull for light crude oil	100%	100%	100%
Gasoline/kerosene/diesel	100%	100%	100%

Chart 37 - Types of vessel (%)

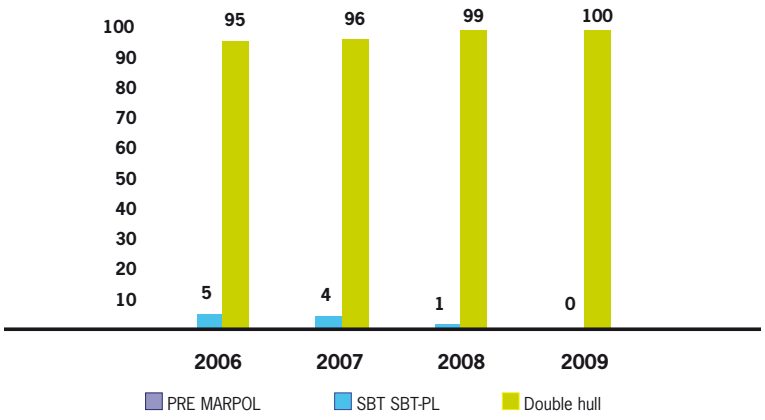
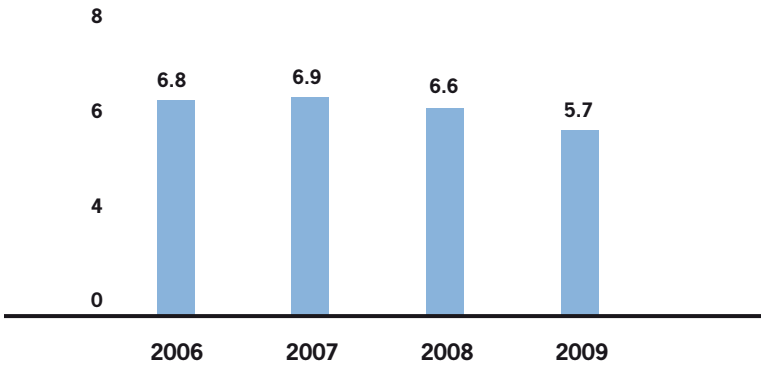


Chart 38 - Average age of tankers (years)



Waste

The facility manages waste according to its objectives of minimising the quantity produced and increasing the quantity recovered.
In 2009 there was a reduction in the total amount of waste from refining, and particularly non-hazardous waste, due to lower production of iron and excavated earth.

In 2009, around 106,515 tons of waste were recovered or recycled, a marked increase on earlier years, but flat compared with 2008. The rise was mainly due to site remediation activity and to the delivery of used catalysts from the desulphurisation process to companies specialising in metals recovery (Co, Mo, Ni).

New measures to protect our coastline: elimination of single-hulled oil tankers

In order to dramatically reduce the risk of environmental disasters, the law (no. 51 of 7 March 2001: "Measures for the prevention of pollution deriving from the maritime transportation of hydrocarbons and for the control of maritime traffic") requires oil tanker fleets to be modernised, promoting the use of tankers with low environmental impact and encouraging the elimination of single-hulled units, which do not conform to the latest navigational safety standards. These standards are instead met by double-hulled ships equipped with a double external structure in metal incorporating cavities, which, in the event of an accident, can absorb the impact and thus reduces the probability of cargo leaking into the sea.
The oldest and most vulnerable single-hulled tankers, built before 1982, were withdrawn from circulation before 2005. Other categories of large, single-hulled tankers must be withdrawn by 2010.

The three main categories of single-hulled tanker are those specified in EC Regulation 417/2002, namely:

- **Category 1:** the "**pre-MARPOL**" single-hulled tanker, which does not have segregated ballast tanks in protective locations (**SBT/PL**). These are the oldest and most vulnerable tankers, mostly built before 1982
- **Category 2**: the "**MARPOL**" single-hulled tanker, which is the same size as the Category 1 tanker, but is equipped with segregated ballast tanks in protective locations (SBT/PL). These were mostly built between 1982 and 1996
- **Category 3**: a single-hulled tanker, smaller than Category 1 and 2 tankers, but with over 5,000 tons of deadweight capacity. These smaller tankers are often used for regional transportation

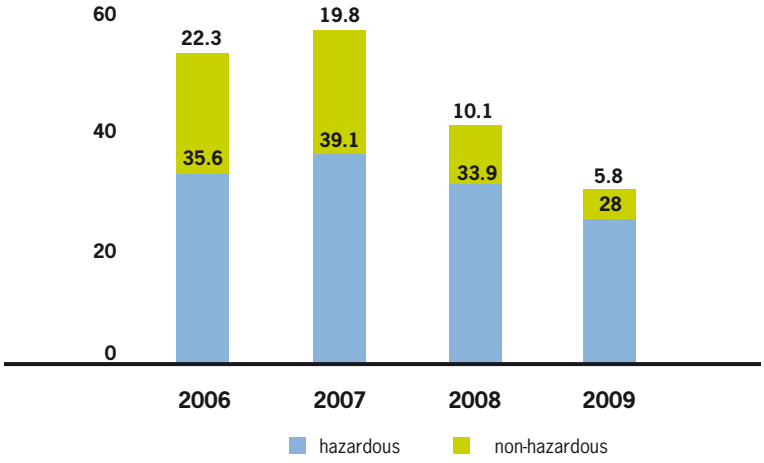
In the past few years, **Category 6** vessels, which have a **double hull**, have increasingly been used, with the aim of preventing accidents at sea or limiting their consequences. Saras has chosen to increase its use of this type of ship for the transportation of crude oil and oil products (Chart 34).

Table 24 – Waste produced by the site (thousand tons/year)

	2006	2007	2008	2009
Hazardous waste*	35.6	39.1	33.9	29.2
Non-hazardous waste	22.3	19.8	10.2	5.7
Total	**57.9**	**58.9**	**44.1**	**34.9**

*excludes waste deriving from the 2008 characterisation plan.

Chart 39 – Waste produced by the site (thousand tons/year)



Waste for chemical/physical treatment is processed on Saras' behalf by a specialist company working within the site. This activity is continually monitored in accordance with the internal evaluation procedures used for all subcontractors. Treated waste is transformed into non-hazardous waste that can then be sent to landfill (Table 27).

Table 25 - Remediation activity (thousand tons/year)

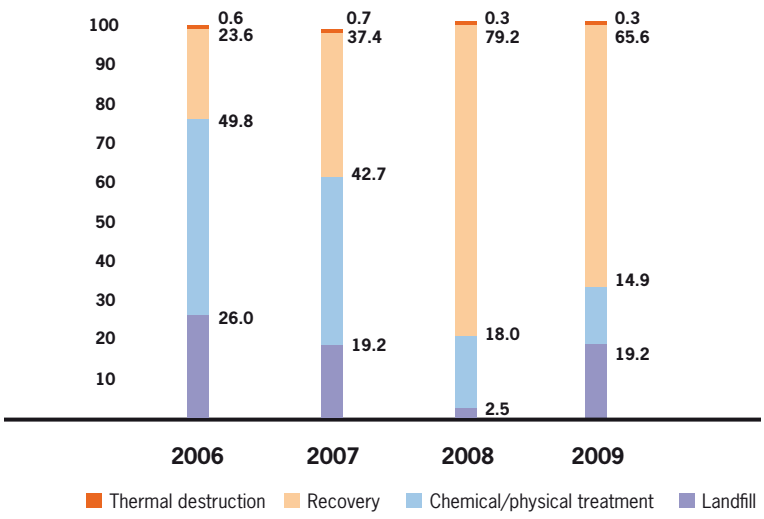
	2009
WATER	91,7
TEARTH	35,8

Table 26 – Final destination of waste (thousand tons/year)

	2006	2007	2008	2009
Landfill	15.04	11.32	3.38	31.25*
Recovery	13.63	22.06	107.34	106.54
Incineration	0.37	0.42	0.45	0.50
Internal chemical/physical treatment External chemical/physical treatment	28.77	25.16	22.95 1.46	24.06
Total	**57.81**	**58.96**	**135.57**	**162.35**

* The figure includes remediation activities of 25.9 tons/year.

Chart 40 – Final destination of waste (%)



Excavated earth from new operations and maintenance and remediation activities was sent off-site to a recovery plant, thus eliminating hydrocarbons and allowing them to be reused.
In 2009, the waste inertisation plant sent 10,608 tons of waste that had been rendered inert to controlled landfill on behalf of Saras.
Separated waste from offices and the canteen continued to be collected in 2009 by agreement with the Municipality of Sarroch. Table 28 shows the quantities of material sent for recovery; 74.6 tons of paper, 24.7 tons of plastic and 10.9 tons of glass and aluminium went for recycling. Wet waste collection was also introduced in 2008. In 2009, a total of 7.8 tons was collected.

Table 27 – Chemical/physical treatment of waste (thousand tons/year)

	2006	2007	2008	2009
Chemical/physical treatment, of which:	28.77	25.16	22.95	22.96
Rendered inert and sent to landfill	14.83	13.67	10.09	10.61
Internal recycling	13.94	11.49	12.86	12.35

Table 28 - Separated waste sent for recycling (tons)

	2008	2009
Paper	95,8	74,6
Plastic	14,9	24,7
Glass and aluminium	8,1	10,9
Wet waste (since 2008)	7,4	7,8

Soil, subsoil and underground water

In accordance with the provisions of Ministerial Decree 471 of 25 October 1999, as subsequently amended (regulations containing criteria, procedures and methods for the safety, remediation and environmental restoration of polluted sites), Saras, pursuant to Article 9 of the Decree, presented the competent authorities with its Site Characterisation Plan on the condition of the terrain and the layers of water beneath the refinery.
Subsequently, in 2004, in conjunction with the Italian Ministry for the Environment, the Region of Sardinia, the Province of Cagliari, Local Health Authority no. 8 and the Municipality of Sarroch, the company defined the procedures for implementing the Site Characterisation Plan, which set out a series of surveys to be carried out and proposed the measures needed to protect the environment and safeguard public health.
In July 2004, characterisation activities were initiated at the site using the following techniques:

- **surveys of the terrain** with extraction of core samples from 5 to 10 metres deep to establish the subsoil stratigraphy, ascertain whether any contaminants were present and measure their concentrations
- **piezometry,** or special surveys of the terrain with extraction of core samples from 10 to 20 metres deep that can monitor the water table. This type of survey not only takes a stratigraphy of the subsoil and its quality (as in the surveys), but also makes it possible to verify the condition of the water in the subsoil. Piezometry is carried out using a windowed tube 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 nearing completion. In

December 2009, 739 surveys, 140 piezometric readings and 539 gas survey control points were carried out.

Analysis of the surveys provided the following information:

- soil analysis showed only small areas in which the limits for hydrocarbon concentration had been exceeded (182 samples out of 3,164 analysed), mostly in the area of the West Tank Farm and the disused ST1 tank. Other parameters also marginally exceeded the limits (Cd, Co, Cr, Cu, Ni, Pb, V, Zn and IPA), for a total of 97 samples out of 3,164, in limited and non-adjoining areas, confirming that they were isolated cases rather than a widespread problem
- analysis of the groundwater indicated the present of hydrocarbons above the concentration limit in some cases. Hydrocarbons were also detected in the light non-aqueous (supernatant) phase liquid (LNAPL). Other parameters (Cd, Ni, Pb, IPA, BTEX, MTBE, sulphates) were also found to have marginally exceeded limits
- No abnormal readings were found in gas survey analysis of topsoil.

Based on the results of the characterisation activities, a plan was drawn up to make the groundwater safe in emergency and operational situations, which was approved at the Services Conference held at the Italian Ministry for the Environment in April 2007.

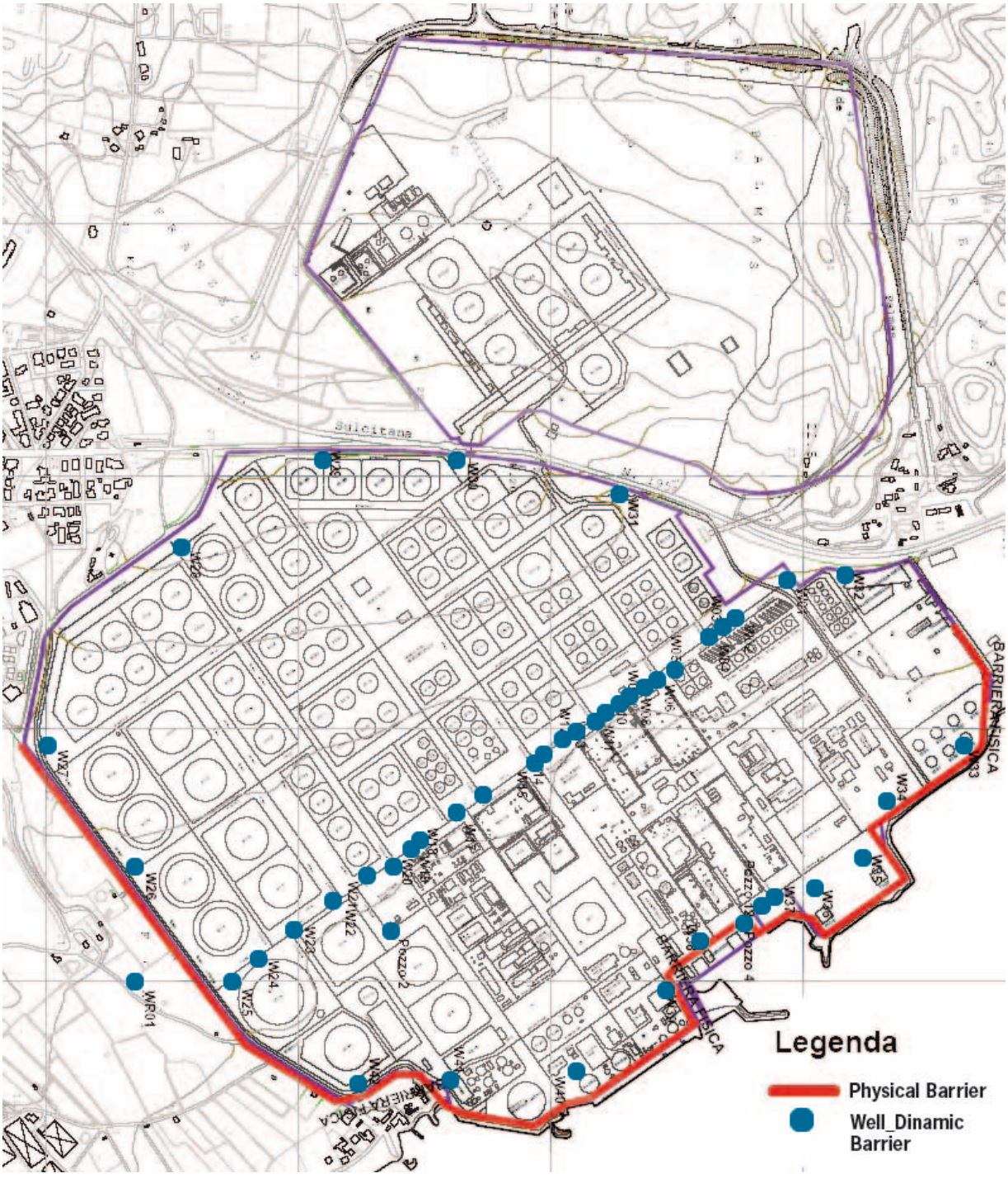
The project involves building a hydraulic barrier with supernatant recovery systems to protect the groundwater in emergency situations, and an integrated system containing both a hydraulic and a physical barrier to protect it in operational situations.

All 46 wells required for the hydraulic barrier have been dug. Of these, 26 are already operating on the mid-line, extracting contaminated water and recovering supernatants, while 13 are being used for groundwater replenishment on the sea side, including one outside the plant to the south, to prevent salt inflows. The remaining seven are hydrogeologically upstream, controlling groundwater levels. The upstream and replenishment wells are currently being brought into service. The physical barrier will extend over 3,050 m and will be made using jet grouting and waterproofing injections; plastic sheeting will also be used on the southern part. Field tests were carried out in 2009 to test operating and construction conditions in preparation for the executive project.

During 2008, Saras drew up projects for remediation of C>12 hydrocarbon hot spots in soil in the West Tank Farm area and for decontaminating soil in the area of the disused ST1 tank.

Since 2009, in line with the project schedules, the process of earth excavation, soil washing for removal of hydrocarbons and the subsequent restoration of washed soil to the original site has been ongoing at the West Tank Farm area, while contaminated soil in the ST1 area has been removed and delivered to authorised landfill. Both projects are nearing completion.

Figure 12 – Location of wells constituting the dynamic barrier and planned location of physical barrier



Noise monitoring

To monitor noise pollution, in 1999 Saras planned and implemented regular checks of noise levels in the local area, by means of phonometric surveys to establish the acoustic characteristics of the surrounding environment.
Monitoring units to measure noise levels were set up along roads close to the refinery, on roads leading to Sarroch city centre and in the city centre itself. These areas are shown on the aerial photographic map opposite (Figure 13 on page 81).

The phonometric testing showed that the refinery emits steady and continuous noise.
In the city centre, the noise level fluctuates more markedly, as it is affected by noise from vehicle traffic and other noises unrelated to the refinery. The L90 noise level attributable to the refinery (which allows traffic noise to be excluded), measured at night, is considerably lower in the recordings taken in Sarroch city centre. The latest measurements taken in 2009 confirm this trend (Charts 41 and 42, page 79).
Saras not only assesses noise levels outside the refinery, but has also pursued an ongoing programme of phonometric testing to create a complete acoustic map of the site itself, which was launched in 2006. This is one of the initiatives for the protection of employees from physical agents set out in Section VIII of Legislative Decree 81/2008. In 2009, the areas of the IGCC and API-PWP-BWT plants were mapped.

The aims of this mapping activity were:

- to precisely define the noise levels to which staff are exposed
- to identify higher-risk areas and outline appropriate preventative and protective measures
- to select appropriate ear protectors and identify measures to reduce loud noises at source.

An analysis of the phonometric data enabled the company to quantify the potential acoustic effects of the noise in the working environment under normal operational conditions.

Measurement of electromagnetic pollution

In 2001, in order to determine the possible existence of risk situations, Saras launched a study to analyse and assess this phenomenon inside and outside the refinery area.
The first phase of the study was completed in October 2001 with the aid of a rigorous measurement system. The results were completely satisfactory, confirming that the magnetic fields generated inside the site are well within the legal limits established to protect the population. In addition, it was found that no such fields existed outside the company perimeter.
This research was followed by a further study, completed in 2004, which assessed the exposure of workers to electromagnetic fields during working hours. In this case the levels detected were also well below regulatory limits.
In July of 2007, a follow-up study was carried out to verify the results obtained in 2001. Magnetic fields were again monitored, using the same criteria adopted in the 2001 study. The levels detected were in line with those seen previously, confirming that the electromagnetic fields generated within the site are well below the legal restrictions imposed to protect the population.
The study on worker exposure to electromagnetic fields was repeated in 2008. The legislative framework was even clearer than for the previous study, thanks to the introduction of Legislative Decree 81/2008.
The data confirmed the results of the 2004 study, with no detection of electromagnetic field levels higher than the specified thresholds.

Figure 13 – Location of noise monitoring units

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

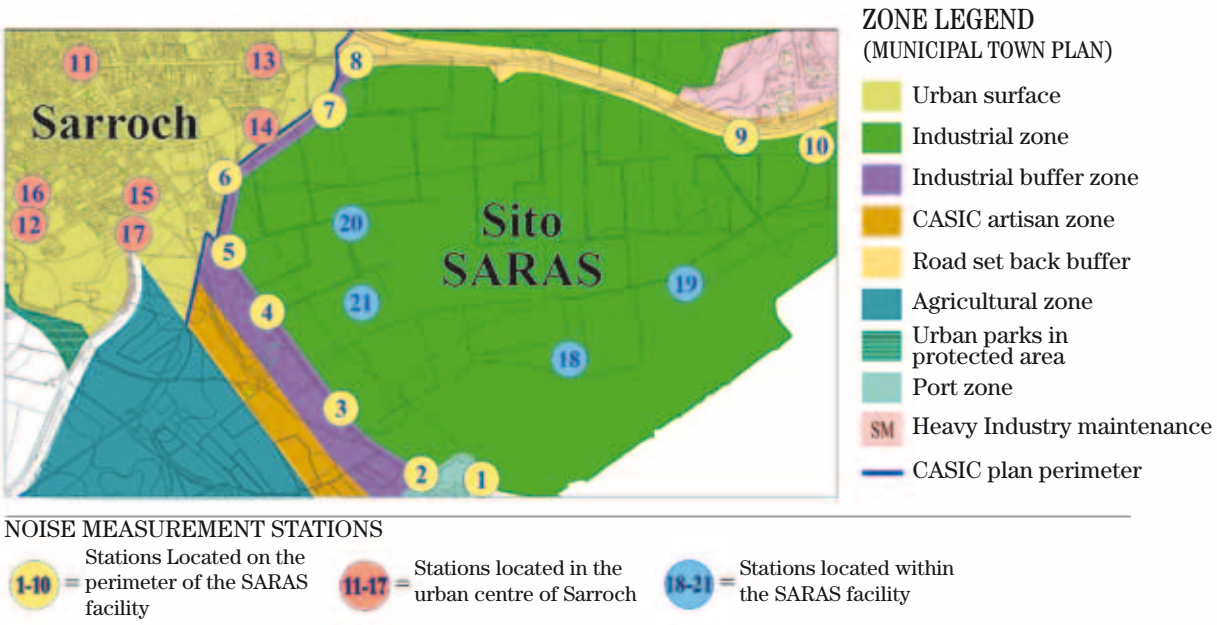


Chart 41 - External environmental immissions (dBA) - L90 levels - Daytime (Sarroch city centre)

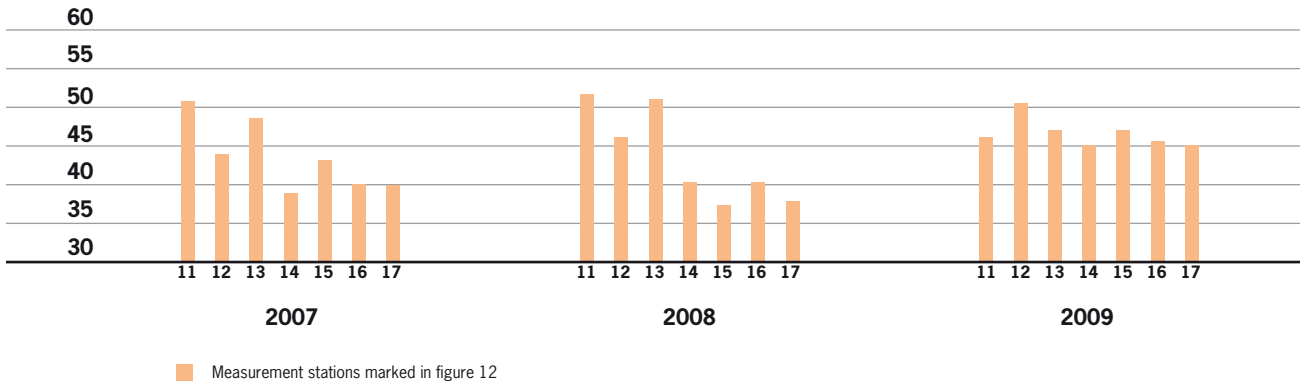
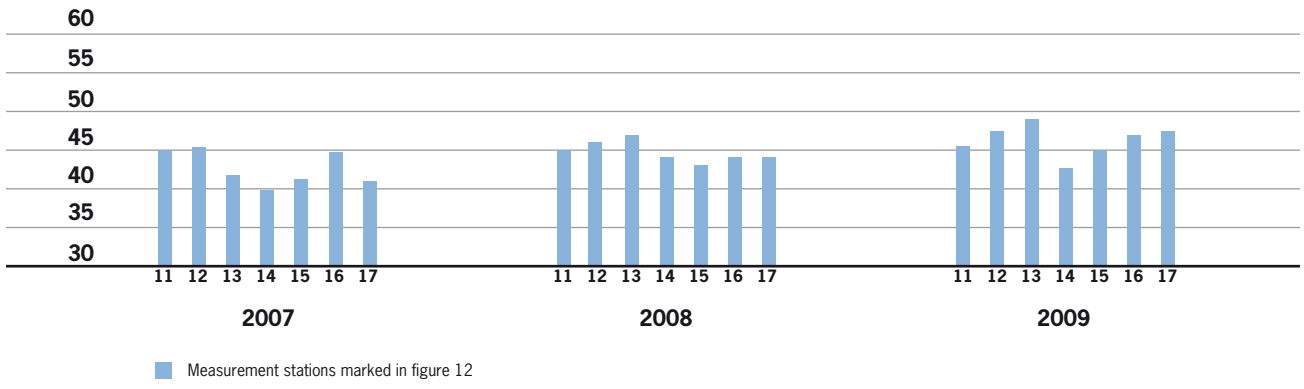


Chart 42 - External environmental immissions (dBA) - L90 levels - Night time (Sarroch city centre)



Improving the internal and external visual impact

Since 2000, the company has been increasingly committed to improving the visual impact of the site, both to offer a more pleasant working environment and to improve the way the refinery relates to its surroundings. The focus has been on improving perceptions of the refinery areas and structures, both internally and externally.

To achieve the first of these aims, the internal area has been renovated through the reorganisation of spaces and buildings, repainting, improvements to green areas, and the installation of images to raise awareness about environmental protection and safety and new signage. Several sculptures, created following suggestions from employees and external companies and made of scrap metal and other materials used in plant operations, have also been installed.

Structures and spaces in direct contact with the outside were also improved, with green areas established to provide continuity between the site and its surroundings. In particular, the junction on the S.S.195 was rebuilt and the green spaces in the car park were improved.

Work was completed in 2009 to prevent a steam plume from rising from the boilers in the combined-cycle section of the IGCC unit.

The new installation eliminated the visual impact of the steam plume, and also enabled heat to be recovered for use in process activities

Investment in the environment

Saras' commitment to continually improving environmental performance can also be measured and evaluated in terms of the financial investment devoted to this purpose.

The data in Table 29 show the company's strong commitment on this front, with total investment of more than EUR 50 million in the past four years.

In 2009, the main investments were as follows:

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

Of particular importance was the completion of work to build the treatment plant for tail gases emitted by the Claus units in order to reduce SO_2 emissions, which required a total investment of more than EUR 52 million between 2006 and 2008.

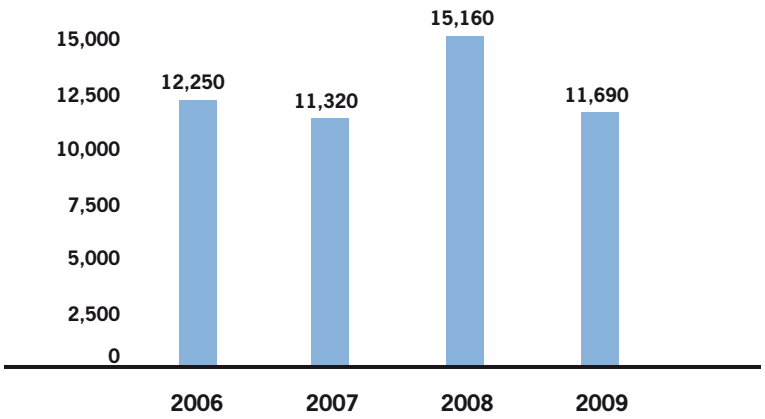
Table 29 – Investment in the environment (EUR thousands/year)

	2006	2007	2008	2009
Investments	12,250*	11,320**	15,160	11,690

* Adding in the investment for the TGTU (EUR 52,700 thousand), the total is EUR 64,950 thousand.

** Adding in the investment in heat recovery for the FCC plant (EUR 22,700 thousand), the total is EUR 34,020 thousand.

Chart 43 – Investment in the environment (EUR thousands/year)



Group companies

Arcola

The project to reclaim subsoil at the Arcola storage facility, currently at an advanced stage of implementation, completes a process that began in 2002 with the approval of the preliminary project and later of the operational plan drawn up by Arcola Petrolifera, in preparation for the programme of remediation and safety improvements at the Arcola storage facility. The project was designed to identify the best subsoil decontamination techniques to use at the Arcola site, taking into account the fact that the groundwater is used to obtain potable water.

The test phase then began, aimed at planning and drawing up a remediation project using the best available technologies appropriate for the site. The test project was developed with the assistance and scientific advice of the University of Cagliari.

A variety of biodegradation techniques were selected and tested in areas that were specifically identified and set up on the basis of the preliminary project and the subsequent operational plan.

A hydraulic barrier was kept in operation throughout the test phase, in order to protect the site. This comprised five extraction wells distributed at various points within the facility that were constantly monitored to check that they were working properly using groundwater quality checks. The test phase involved a substantial amount of work to identify and define optimum operational parameters based on the specific features and vulnerabilities of the site.

Many series of tests were carried out, incorporating coherent and coordinated variations in plant-related and operational components. The results were analysed on an individual basis as they emerged, with continuous monitoring supported by analytical field tests.

The field testing was integrated with research activities developed by the University of Cagliari aimed at identifying the microbiological features of the indigenous bacterial communities at the site, and determining their evolutionary process. Amongst other things, the research identified a particular biosurfactant micro-organism (already known in scientific

literature as the Gordonia bacterium), which specialises in biodegrading hydrocarbons, demonstrating that the indigenous microbiological communities are selectively evolving in favour of micro-organisms specific to the type of organic substratum that can be found at the site. On completion of this full raft of tests, field monitoring and laboratory research, the base technology – bioslurping – was developed further and refined to maximise its effectiveness in light of the specific features and vulnerabilities of the site. The field testing of remediation technologies was completed in December 2004.

The definitive remediation plan was the result of nearly three years of work, during which it was possible to perfect the most suitable techniques, ensuring that the required result could be achieved while taking into account all the environmental factors, particularly potable water resources. The definitive remediation project provides for the simultaneous and synergistic application of bioventing and skimming techniques (which were optimised during testing) in 60 newly equipped and installed piezometers. Arcola Petrolifera drew up and presented the definitive remediation project to the Services Conference, organised by the Municipality of Arcola, in 2005. The Conference approved the project at the end of the same year. In the early months of 2006, work began on installing and preparing equipment in the field; this was completed in April.

Developments in the project are constantly tracked via monitoring of specific indicators of efficiency and effectiveness and careful recording of surrounding environmental conditions. This is made possible by the use of special monitoring equipment, both fixed and portable, which registers changes in the process and measures its effectiveness. For example, the instruments installed allow for evaluation of the activity of indigenous aerobic plant life by measuring oxygen and carbon dioxide in the subsoil. This information is supplemented with periodical analysis of subsoil samples, taken using microprobing. The results of monitoring activity are collected, interpreted and commented on in the form of regular technical reports, which are passed on to the relevant authorities.

The fifth technical report was drawn up and submitted in December 2008, covering remediation activity between June and November of that year. The key data confirm the effectiveness of the techniques adopted, which enabled a sizeable part of the unsaturated area of the area for remediation to be decontaminated. As expected, the focus is still on the capillary fringe, which remains a contaminated layer due to groundwater dynamics. In 2009, a new phase of testing was launched on additional techniques designed to maximise the degradative capacity of the capillary fringe. This involved ascertaining whether the administration of oxygenated water would supplement the biodegradative processes. The relevant testing area had been set up by the end of June, when testing with oxygenated water began. The tests continued until mid-October. The data collected are currently being analysed, prior to preparation of the report to be presented to the Services Conference in early 2010.

Figure 14 – Remediation project for the Arcola site

Saras Energia

The former ERG service stations

In 2009, the company completed the acquisition of ERG's chain of Spanish service stations. The service stations underwent specific preliminary inspections, in order to identify any possible environmental contamination. According to the terms of one of the clauses in the contract to acquire these assets, the vendor is responsible for any environmental liabilities associated with them.

The inspection involved 88 facilities, 18 of which were found to be affected by subsoil contamination problems. In 2009, an individual remediation plan was drawn up and initiated for each of these facilities. These plans are currently being executed. The remediation work, which is being carried out by specialist companies in the sector, is being overseen by Saras Energia and paid for by the vendor.

Biodiesel production plant

The Directorate General for Environmental Quality has issued Saras Energia with an AIA permit to operate the biodiesel plant, with the condition that the company follow precise technical prescriptions for monitoring the environmental effects of wastewater, amongst other things. In addition to the monitoring of the quality of gas and wastewater emissions, a special monitoring initiative was set up for the stretch of sea into which the plant discharges its wastewater, which the Autonomous Community of Murcia defines as an "Area of Average Ecological Sensitivity".

In November, a study of the marine environment and its effects on benthic and planktonic communities was drawn up in the context of discharges into the sea by the Saras Energia plant. The study assesses the biological and environmental impact of the discharges via the monitoring of numerous physical and biological markers.

Safety

Safety

The Sarroch site

One of the company's key priorities is to constantly foster a culture of safety, as this helps to create working conditions appropriate to the needs of employees and to achieve a progressive reduction in the number of emergencies and accidents.

As is the case with other measurable objectives, such as product quality and competitiveness, the promotion and maintenance of high safety standards are shown in this part of the 2009 report using precise and detailed data.

The decisions made by the company in terms of safety cannot be properly evaluated except by detailed analysis of data on suitable indicators.

The indicators examined confirm that, while substantial progress has been made in terms of ongoing improvements to employee safety, there is still room for further improvement, which the company sees as reasonable and achievable.

The Saras Safety Project

In 2009, Saras launched the operational phase of its Safety Project, which was developed in partnership with Du Pont, a world leader in safety solutions.

This three-year project was initiated in 2008, with the aim of improving safety management. It is divided into three phases:

- PHASE I: Assessment and Future Objectives (completed in 2008)
- PHASE II: Implementation
- PHASE III: Continuous Improvement.

The current progress of the project is broadly in line with the work plan originally outlined.

The project involves all staff working at the site, on the basis that safety should be a concern for everybody. Saras offers a concise but powerful summary of its vision of safety:

Safety is our energy

We strive to identify ourselves
and be recognized
as an industrial reality
made of people
living and spreading
the culture of safety
in every day activities

The site's Safety Report

The Saras refinery drew up its first Safety Report in 1989, and since then the document has been continually updated to reflect all changes made to the plant over the years, which had to be integrated into the existing system.

An analysis of potential accident scenarios has ruled out any significant consequences outside the site for the time being; if an accident did occur, its impact would be felt in the direction of the S.S. 195, an uninhabited area.

In drawing up the Safety Report for the site, the company conducted

Safety training

Each employee plays an essential role in achieving the objectives of improving reliability and safety, so Saras attaches great importance to ongoing staff training through specific sessions on safety.

The training programme involves all of the facility's employees and is geared to the various tasks which they perform.

Training begins when staff first join the company and continues throughout their working lives with Saras, with theoretical instruction and practical exercises. In addition, staff assigned to fire-fighting teams participate in a series of special training exercises.

2009 saw the start of training activities linked to the Du Pont project, with the aim of continuously promoting a culture of safe conduct on the part of Saras' employees. Operational, maintenance and service personnel took part in the training sessions. The training will be completed in 2010, when the sessions are extended to the remainder of the workforce.

In 2009, new initiatives were launched for staff from external companies that work in partnership with the refinery. The pilot phase for some of these initiatives was completed in 2009, while others required planning during the year, for full implementation at the start of 2010. The staff of these external companies take part in two levels of training. The first level is a general orientation for anyone entering the site for the first time. It aims to provide basic information on how to move about safely and to increase awareness of what is involved when entering a site where there are major-accident hazards. The (highly reliable) organisation typical of the site necessitates the development of risk awareness, prompting people to abide by the rules and conduct themselves in a safe manner.

The second level of training provided for subcontracted employees aims to increase awareness of specific risks. At this level, the courses offered to staff include how to operate in the alkalisation area and the management of work permits. In November 2009, the course on confined spaces was also added. Planning for this course involved the seamless combination of technical and behavioural aspects, based on the latest research into human behaviour, which indicates that knowledge should be actively formed by those taking part in the training process, rather than passively transmitted.

A total of some 20,000 training hours were delivered in 2009, involving instruction in roles, positions and continual updates on safety and environmental policy, including 2,000 hours of training for new operational and technical staff.

In 2009, the Prevention and Protection department delivered 8,975 hours of training strictly relating to safety, including 2,100 hours of fire-fighting exercises and 6,876 hours for the courses on alkalisation and work permit management.

Overall, 4,006 people took part in training, including both employees from Saras and those of subcontractors.

a precise and in-depth analysis of its activities and the risks associated with them in relation to the refining process, the materials used and all the procedures involved in running a complex operation such as an oil refinery.
The Safety Report was revised during 2005 and sent to the competent authorities in October of that year. The revised version included an in-depth analysis of the situation at the plant and its management; risk scenarios and hypothetical accidents were reviewed, together with the possible consequences for staff, the area inside the site and the surrounding area.
The analysis was carried out with the active involvement of operational and service personnel (processes, maintenance, engineering, maintenance engineering, etc.), who all contributed their expertise to assist in achieving the prevention targets. The Safety Report is therefore an invaluable tool for preventing risk situations from arising, through the examination of all possible prevention measures, and for identifying and adopting the technological solutions, equipment and safety systems that will enable any accident to be dealt with effectively, thereby minimising the impact on people, the environment and the facility. In 2006, pursuant to Legislative Decree 238/2005, the Safety Report and the documents required for the External Emergency Plan (the "Notice" and "Information Sheets" for the general public) were updated.
Subsequently, in July 2007, the Sardinian Regional Technical Committee for Fire Prevention completed its examination of the Safety Report and issued its final technical assessment. The Safety Report and the above-mentioned process refer to the Sarroch site as a whole. The conclusions, reported by the Committee in its detailed minutes, record the positive outcome of the assessment and endorse the continuous improvement activities undertaken by the site operator. In relation to continuous improvement, the Committee suggested a number of areas for further examination and possible implementation. In August 2009, in line with legislative requirements, work began on updating the Safety Report, which is scheduled to be completed in October 2010.

Safety systems at the refinery

The Sarroch site has a complex safety system designed to detect potentially dangerous situations immediately. The fire protection water distribution system comprises an extensive network that covers the whole plant.
All the storage tanks are protected by cooling systems; the most important of these are activated automatically if a tank overheats. Similar systems are installed on all the pressure tanks, LPG storage and loading equipment and any other piece of equipment for which a rise in temperature could compromise safety. The 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 installed systems. Safety equipment and systems are regularly checked, and carefully and routinely maintained.

The Internal Emergency Plan (IEP)

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

- preventing and minimising injury and providing assistance to any casualties
- bringing accidents under control and limiting their effects
- preventing and minimising environmental damage
- preventing and minimising damage to company property

As mentioned earlier, the IEP, which is regularly revised to take account of changes in operating and plant conditions, also includes the Marine Pollution Prevention Plan, drawn up to deal with emergencies resulting from spills into the sea from the refinery 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 classifying reportable accidents, and distinguishes between three types (i.e. levels) of emergency:

- limited emergency
- general emergency
- near accident

A limited emergency refers to an accident affecting a distinct area of the plant that can be quickly handled using locally-available resources. This generally means that a fire is not involved. A general emergency is an accident that, due to its nature or because of particular environmental conditions, risks spreading to other parts of the plant or areas outside the refinery. Lastly, near accidents are situations that could potentially have led to an accident. Analysis and assessment of such events is essential to the continuous improvement of site safety.
To ensure that accidents are dealt with quickly and efficiently, it is crucial to have reliable procedures for raising the alarm and alerting all personnel concerned, according to the type of event. Another important requirement of the IEP is to have clear and direct lines of communication to alert those involved in executing the plan, all personnel within the plant, the emergency services and the general public.
Communication and alarm devices (fire alarm buttons, telephones, fixed and mobile intercom units at various plant locations or in the possession of key personnel) are widely available throughout the refinery, so that personnel and equipment can be mobilised immediately. Following a list of priorities, the refinery's Emergency Co-ordination Centre (Figure 15, page 89) distributes information and provides updates on the management of accidents to certain organisations, depending on the type of incident involved, namely:

- the fire service
- the prefecture
- nearby industrial sites

Other relevant organisations include the Sarroch municipal authorities, the Sarroch carabinieri, the police and the port authority. Continual updates are provided to these organisations until the emergency is fully resolved, so that the local community can be kept informed.

Figure 15 – Location of the refinery's Emergency Co-ordination Centre

Data

Accidents

Saras personnel. The policy of continuous improvement that Saras has adopted in a number of areas, such as the environment, technology and training, can also be applied to safety. This is why 2009 saw the continuation of the company's collaboration with Du Pont, the world leader in occupational safety, as part of the Safety Project.

The INAIL indices recorded for Saras in 2009 (Charts on page 90) do not yet show the improvement expected from the Safety Project.

The fact that this development is largely due to behavioural factors underlines the need to continue involving employees in the issue of "safe working", including through more intensive training and communication.

The External Emergency Plan (EEP)

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

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

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

Procedures have been defined for executing and managing the EEP, from raising the alarm to the intervention of all company and external personnel responsible for particular action in accordance with the various roles assigned to them, including direct management of accidents at the site, monitoring of the surrounding area and provision of information and assistance for local residents (road management, health services, media, etc.).

The organisations concerned (prefecture, police headquarters, fire service, traffic police, carabinieri, financial police, forestry authority, port authority, health authority, ARPAS, regional and provincial authorities, Sarroch municipal authorities) will be involved in various ways to ensure that accidents with potential consequences outside a production facility are managed quickly and effectively.

The effectiveness of the EEP and its implementation is monitored via regular drills involving the companies and all other responsible organisations.

Table 30 – Saras employees – Accident indices

	2006	2007	2008	2009
Total frequency index	12.0	12.2	11.6	13.2
INAIL frequency index	5.7	7.5	6.4	7.5
Severity index	0.120	0.123	0.172	0.376
Average duration	21.3	16.5	26.7	49.9

Chart 44 – Saras employees – Total frequency index

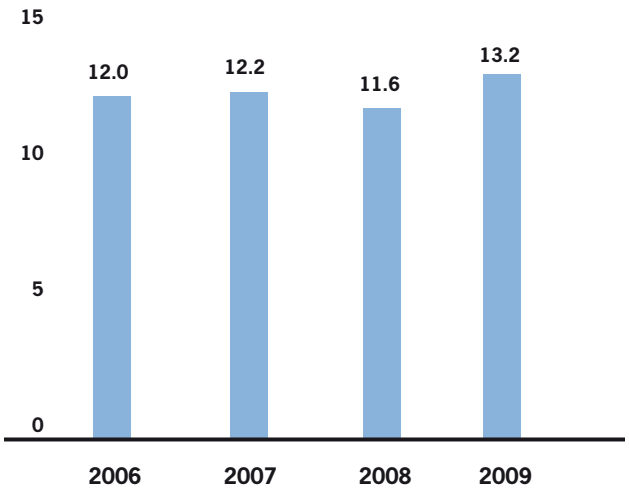


Chart 45 – Saras employees – INAIL frequency index

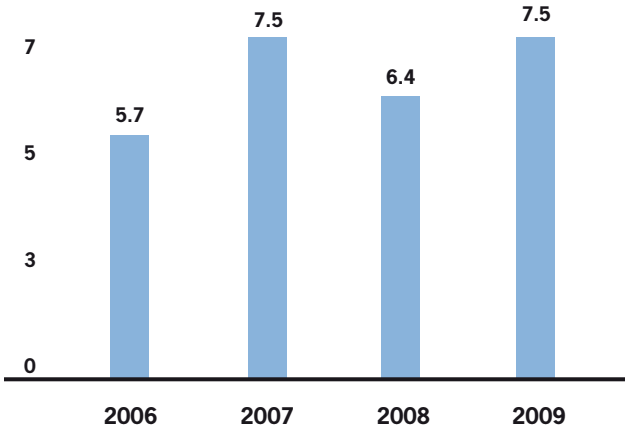


Chart 46 – Saras employees – Accident severity index

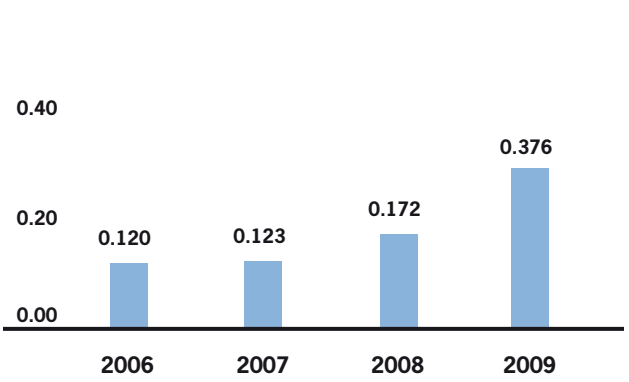
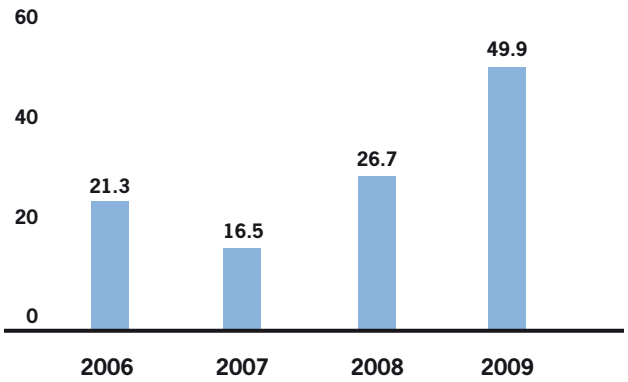


Chart 47 – Saras employees – Average accident duration (days)



External companies. Saras also records and analyses data on accidents at work involving staff employed by external companies. In 2009 a particularly serious fatal accident occurred within the site, involving three employees of a subcontractor, during general refinery maintenance work. As a result the INAIL indices also show a negative trend, mainly due to behavioural factors. These figures confirm the need to continue to involve staff in issues of "safe working", including through more intensive training and communication. In 2009, the Prevention and Protection department also stepped up its meetings with Saras employee representatives for safety and the environment and the staff safety representatives of contractors/site

managers. These sessions were used to provide staff of external companies with regular information on performance in terms of accidents and near accidents and on safety policies implemented by Saras, as well as to receive constructive feedback on how this might be improved.

Table 31 – External staff – Accident indices

	2006	2007	2008	2009
Total frequency index	13.37	10.93	5.77	8.50
INAIL frequency index	8.14	5.75	2.26	4.90
Severity index	0.170	4.58	0.061	4.939
Average duration	15.6	39.8*	26.7	30.5*

* This figure does not include the fatal accident

Chart 48 – External staff – Total frequency index

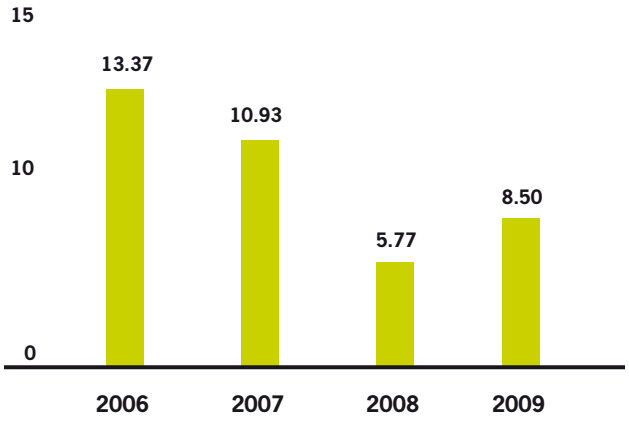


Chart 49 – External staff – INAIL frequency index

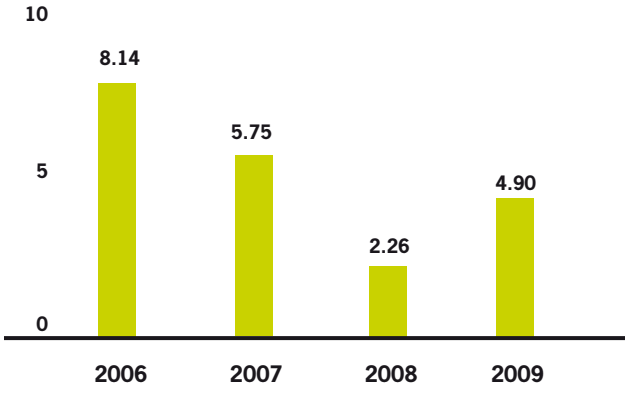


Chart 50 – External staff – Accident severity index

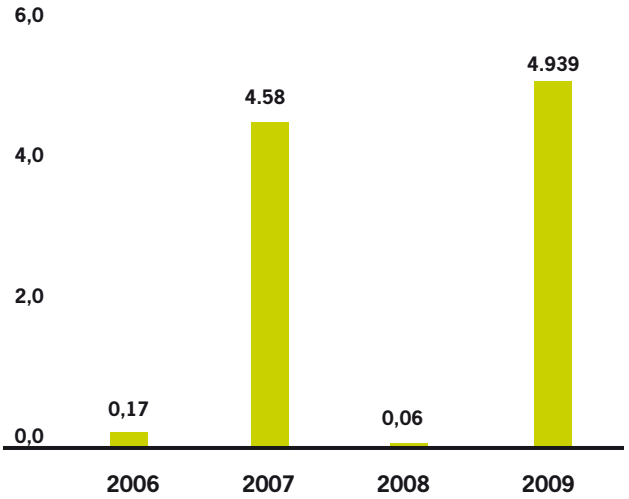
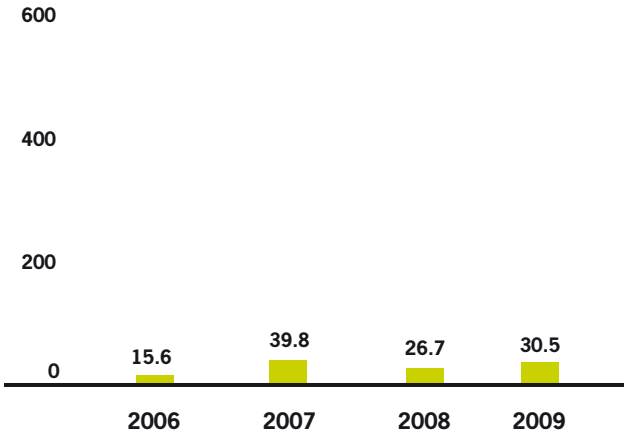


Chart 51 – External staff – Average accident duration



Emergencies

The rate of general emergencies declined by more than 50% in 2009 compared with the previous year, continuing a trend of steady reduction, as shown in Table 32. However, the figure for limited emergencies increased substantially, which indicates that even minor events managed as emergencies were reported. With regard to near accidents (Chart 51), 20 incidents were reported in 2009, continuing the growth trend seen in recent years. The figures confirm the need to continue to raise awareness of the importance of these issues among Saras' employees and those of subcontractors.

The charts opposite show the number of plant shutdowns due to emergencies and the number of days plants were shutdown due to these incidents (Charts 55 and 56).

Table 32 – Emergencies – Number of events

	2006	2007	2008	2009
Limited emergencies	27	21	18	32
General emergencies	4	6	7	3
Near accidents	1	10	11	20

Chart 49 – Limited emergencies

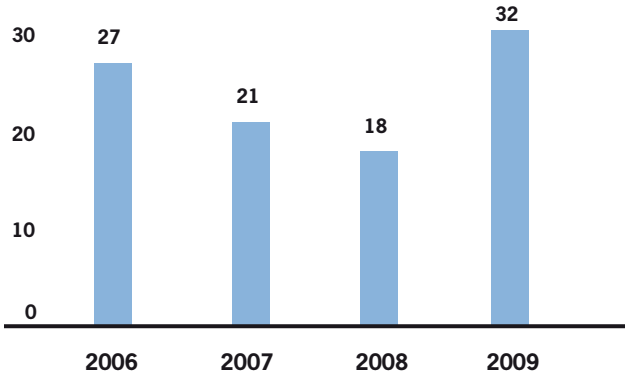


Chart 50 – General emergencies

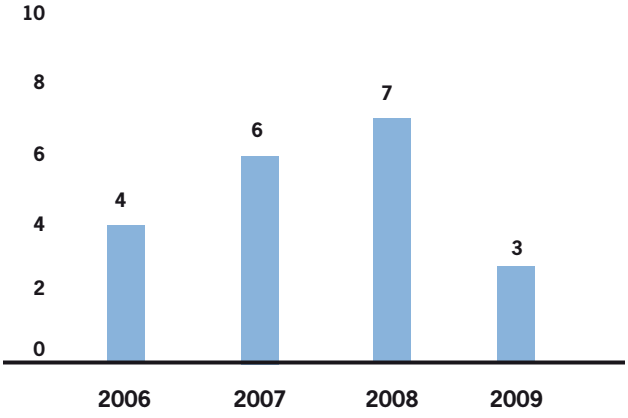


Chart 51 – Near accidents

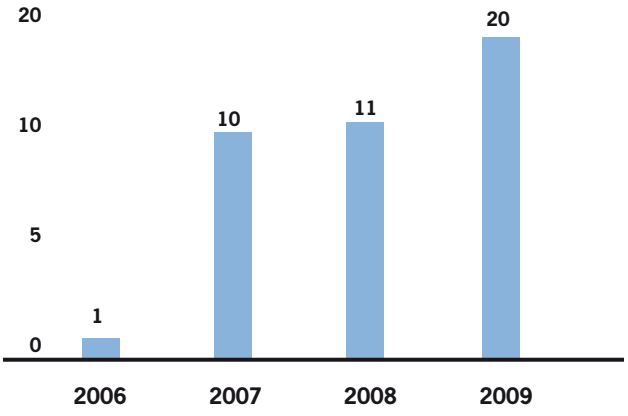


Table 33 – Shutdowns following an emergency

	2006	2007	2008	2009
Number of shutdowns	2	2	1	3
Number of days of shutdown	11	1	3	7

Chart 55 – Shutdowns

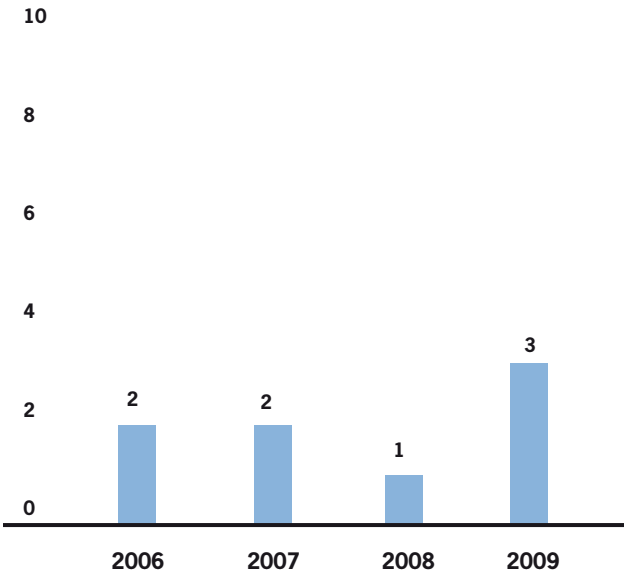
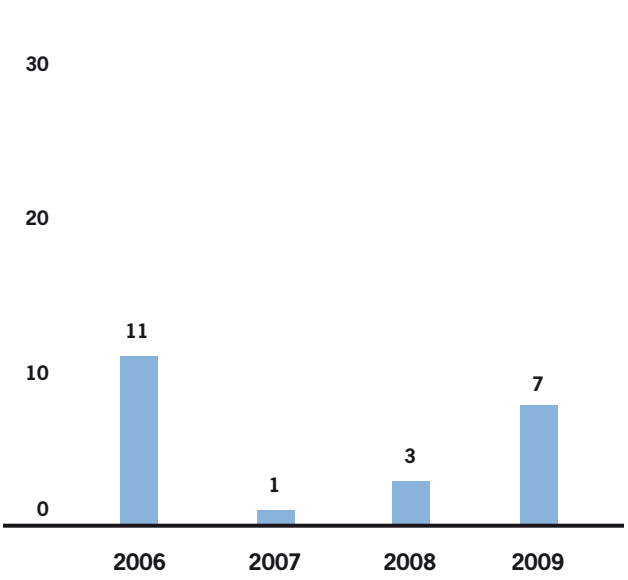


Chart 56 – Days of shutdown



Investment in safety

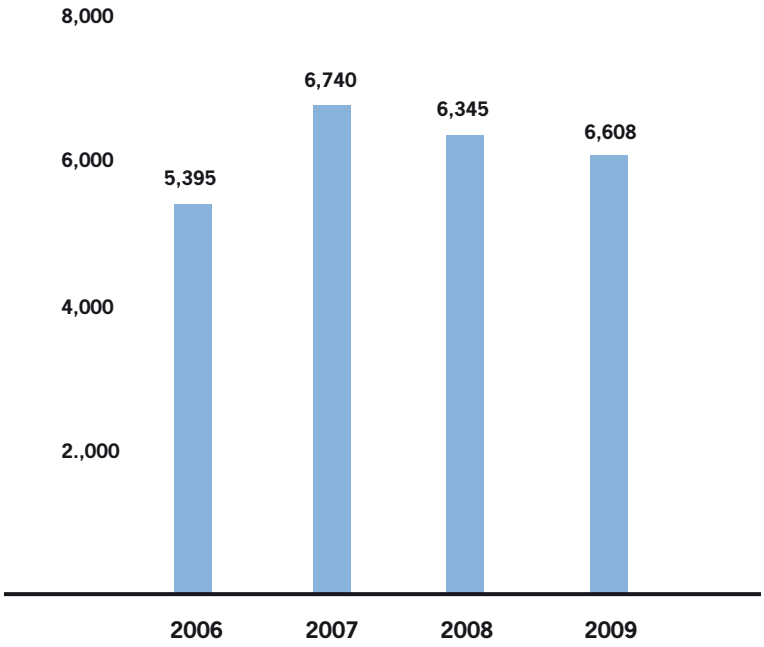
Between 2006 and 2009 Saras invested over EUR 24 million in projects and policies to continually upgrade safety levels at its refinery, spending on average around EUR 6 million a year. The main measures funded in 2009 involved both the improvement of existing safety equipment and modifications to plant and product movement systems, as follows:

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

Table 34 – Investment in safety (EUR thousands/year)

	2006	2007	2008	2009
Investments	5,395	6,740	6,345	6,608

Chart 57 – Investment in safety (EUR thousands/year)



Group companies

The charts opposite show the results of the main accident indices for Group companies.

Data for the Sarroch site have already been provided.

Neither the Saras head office in Milan, nor Arcola, Sarlux and Sardeolica, have reported any accidents entailing a loss of working days, either in the case of their employees or the staff of external companies.

Akhela reported an accident among the staff of an external company, and the high value of the index is the result of the small number of hours worked by external companies. Sartec reported an accident among its own staff and the index value of 3.46, when scaled to working hours, is less than the Group average.

The total frequency index (Chart 55) and total severity index (Chart 57 on page 94) show the same trend.

In the following charts, the "Total" column shows the figure for the sum of accidents among direct and indirect employees compared with the sum of hours worked by those employees.

Employees at the Sarroch site have a greater influence on the Group's figures, since the hours they work represent 57% of the total in the case of direct employees and 91% in the case of the staff of external companies.

Chart 58 – Total frequency index

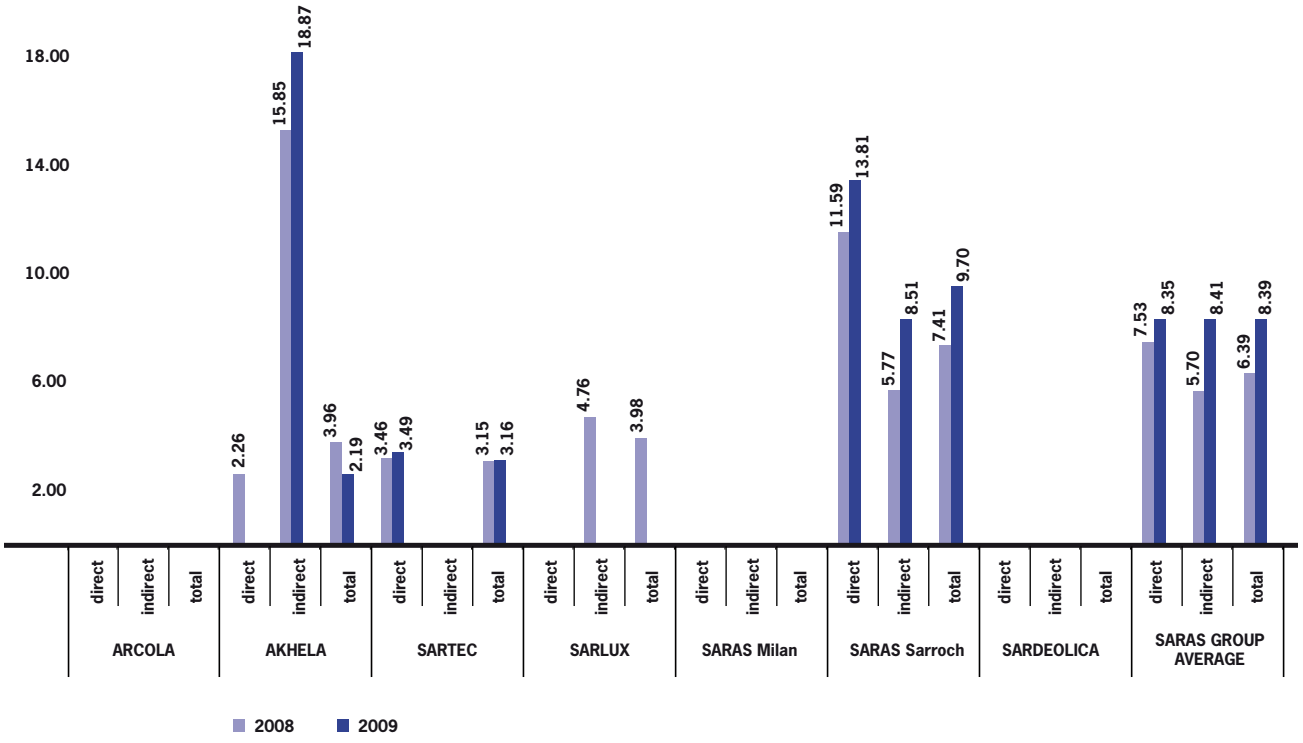


Chart 59 – INAIL frequency index

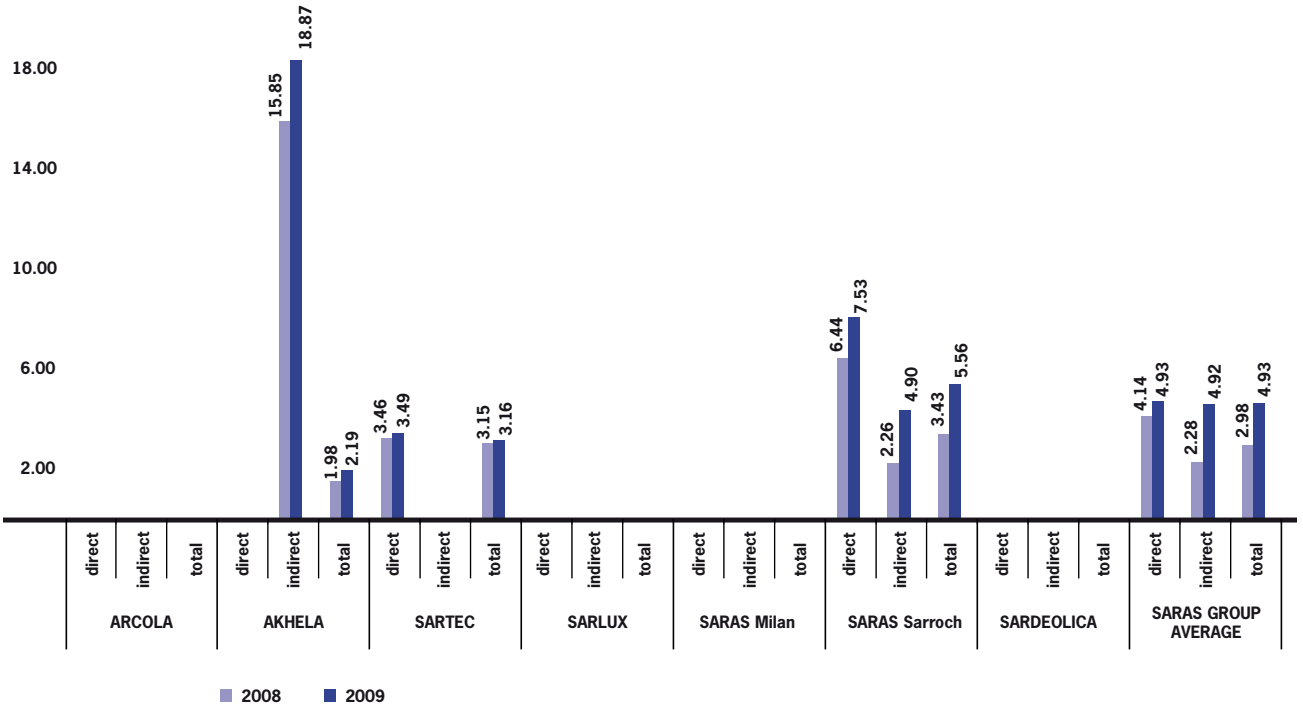
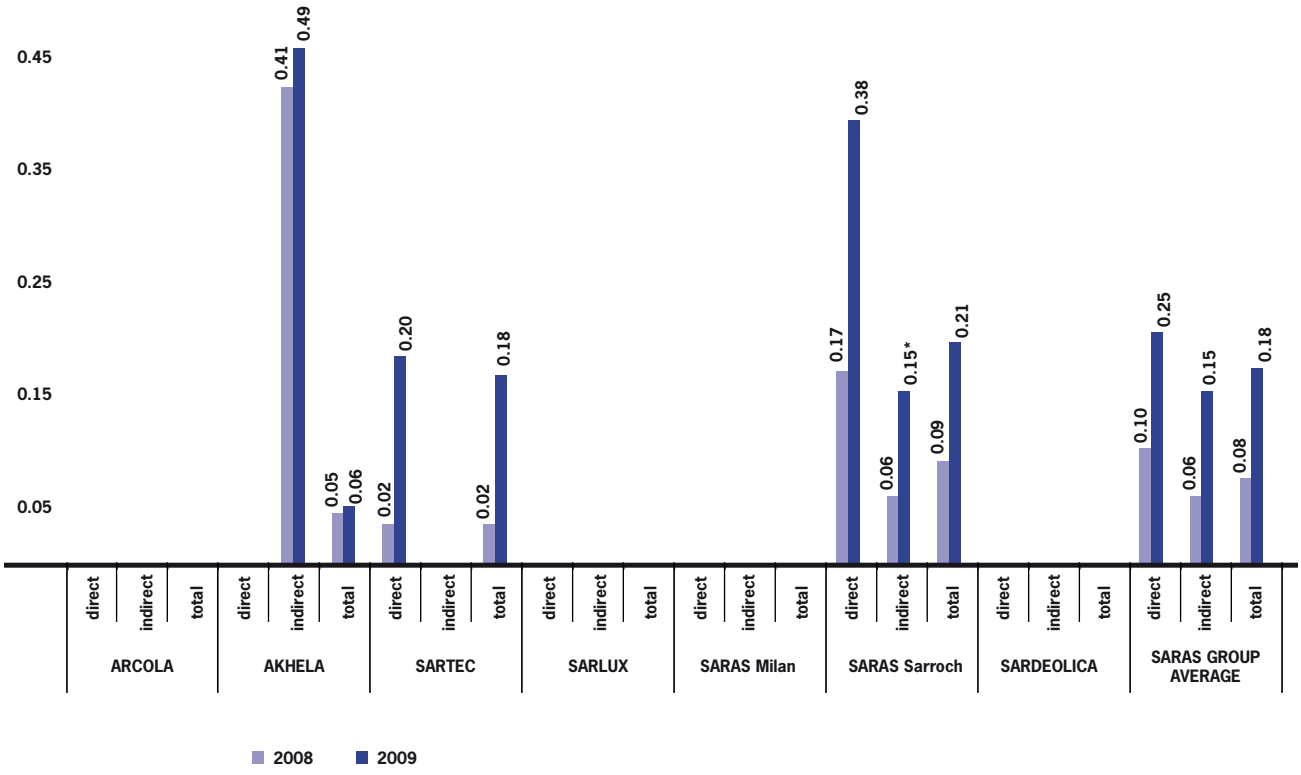


Chart 60 – Accident severity index



* The severity index does not include fatal accidents involving indirect employees of Saras Sarroch.

Chart 61 – Hours worked by direct employees

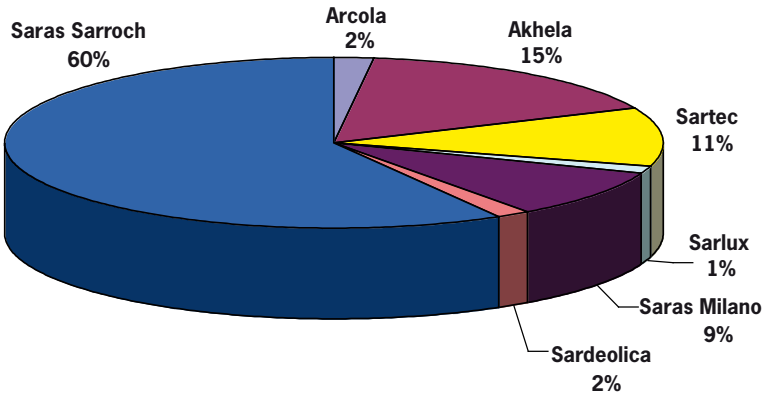
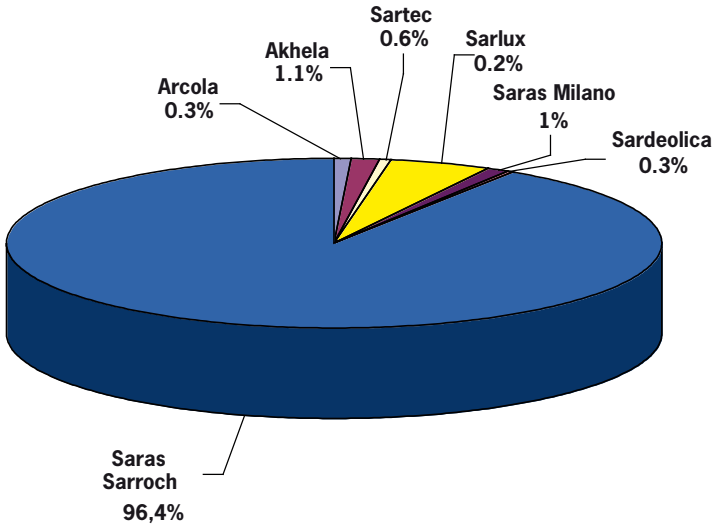
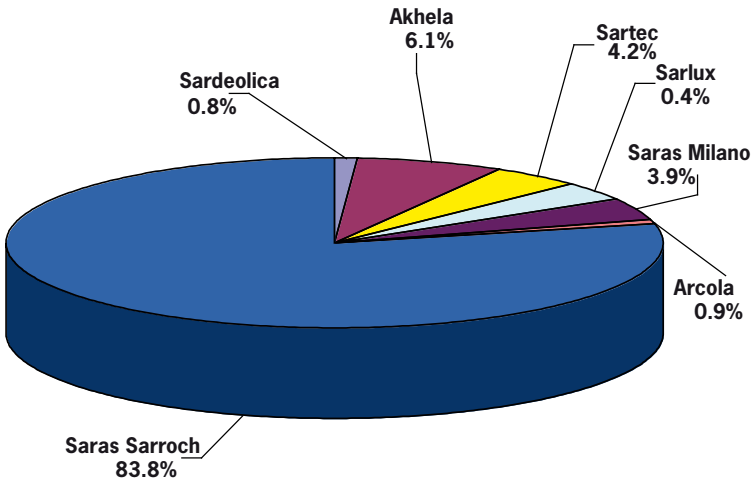


Chart 62 – Hours worked by staff of external companies



Employees at the Sarroch site have a greater influence on the Group's figures, since the hours they work represent 57% of the total in the case of direct employees (Chart 61) and 91% in the case of the staff of external companies (Chart 62).

Chart 63 – Total hours worked



Glossary

Glossary

BALLAST WATER

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

RELIABILITY

The reliability of a piece of equipment is defined as the probability that it will function correctly, for a specific period of time, under certain conditions.

AIA PERMIT

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

ARPAs (Agenzie Regionali Protezione Ambiente - Regional Environmental Protection Agencies)

These are regional agencies tasked with environmental monitoring and control at local level. They were established under Law 61 of 1994, together with ANPA (Agenzia Nazionale per la Protezione dell'Ambiente - the Italian Agency for Environmental Protection and Technical Services), now ISPRA and formerly also known as APAT, which directs and co-ordinates the regional agencies and those based in Italy's autonomous provinces. In the years that followed, all of Italy's regions and autonomous provinces set up their own agencies. ARPA Sardinia (ARPAS) was created under Regional Law 6 of 18 May 2006.

AUDIT

A term used in various contexts to mean verification by inspection or assessment. It indicates a systematic, independent and documented process to obtain evidence (registrations, declarations of fact or other information) and to assess it objectively, with the aim of determining the extent to which the criteria of the verification by inspection (policies, procedures or requirements) have been met.

GASOLINE

A mixture of hydrocarbons made up of fractions from various refining processes. In ambient temperature and pressure conditions it takes a liquid form.

REMEDIATION

Any action, whether physical, chemical or biological, to sanitise situations of contamination or to remove disused plants in order to eliminate or limit risks to human health and/or to the environment.

CO (carbon monoxide)

A gas produced by the incomplete combustion of vehicle fuels and fossil fuels. The main source is gasoline engines that do not have catalytic converters.

CO_2 (carbon dioxide)

An odourless, colourless, flavourless gas produced from the combustion, respiration and decomposition of organic material. Its characteristics include the ability to absorb infrared radiation emitted by the Earth's surface, thereby contributing to the greenhouse effect.

COD (chemical oxygen demand)

The quantity of oxygen needed to oxidise the organic content of waste, including non-biodegradable matter.

COGENERATION

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

DESULPHURISATION

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

DISTILLATION

The process of progressive separation of crude oil components in the distillation column – into the base of which the crude oil is injected – via the counterflow of liquid and gas, which respectively absorb the heavier and lighter components.

GREENHOUSE EFFECT

A 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 (CFCs), carbon dioxide (CO_2), methane (CH_4), nitrogen oxides (NO_X) and sulphur hexafluoride (SF_6).

EMAS (Eco-Management and Audit Scheme)

Established by EEC Regulation 1836/93, updated by EC Regulation 761/2001 (EMAS II), this is a voluntary scheme intended to promote continuous improvement in the environmental efficiency of industrial activities. Under the regulations, participating companies must adopt environmental management systems at their production sites based on policies, programmes, procedures and objectives aimed at improving the environment, and must publish an environmental declaration. Before a site can be added to the register set up by the European Commission, this declaration must be approved by an inspector accredited by an authorised national body. In Italy, this body is the Ecolabel and Ecoaudit committee, which has been operational since 1997 and works with the technical support of ISPRA.

EMISSIONS TRADING

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

EMISSION

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

EPER (European Pollutant Emission Register)

The European Pollutant Emission Register was set up by the European Commission with its decision of 17 July 2000 (2000/479/EC) in accordance with Article 15 of European Council Directive 96/61/EC on integrated pollution prevention and control. It is the EU's first and most wide-ranging record of emissions into the air and water from industrial plants.

WHOLESALE

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

FILTER CAKE

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

DIESEL

A mix of hydrocarbons principally obtained from the primary distillation of crude oil.

IGCC (integrated gasification combined cycle)

A plant that allows for production of synthesis gas (syngas) from heavy hydrocarbons and subsequent combined-cycle production of electricity and heat.

IMMISSION

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

ENVIRONMENTAL IMPACT

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

CAM INDEX (classification of seawater)

This index is used to monitor the coastal marine environment, interpreting the values measured and placing them in one of three categories of seawater quality, assessed according to the degree of eutrophication of coastal systems and potential health and hygiene risks:
High quality - uncontaminated water
Average quality - water with varying degrees of eutrophication, but ecologically intact
Low quality - eutrophic water with evidence of environmental changes that are partly due to human activity

INAIL FREQUENCY INDEX

Calculated using the number of accidents reported by the company to the work accident compensation authority (INAIL) and the number of hours worked (calculated using the formula: number of accidents reported to INAIL x 10^6/hours worked).

TOTAL FREQUENCY INDEX

Calculated using the total number of verified events (accidents reported to INAIL and medication) and the number of hours worked (calculated using the formula: number of events x 10^6/hours worked).

SEVERITY INDEX

Expresses, with reference to a given period of time, the ratio of the number of days' sick leave due to accidents to the number of hours worked (calculated using the formula: number of working days lost x 10^3/hours worked).

INES (National Inventory of Emissions and their Sources)

The inventory set up pursuant to Legislative Decree 372 of 4 August 1999 (implementing Directive 96/61/EC) and to decrees issued by the Ministry for the Environment on 23 November 2001 and 26 April 2002. The register contains information on the emissions of Italian industrial sites that are subject to IPPC legislation. The legislation states 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 Ministry for the Environment for forwarding to the European Commission and inclusion in the EPER register.

IPPC (Integrated Pollution Prevention and Control)

A 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 (Institute for Environmental Protection and Research)

An Italian research body, created in 2008 through the merger of three entities controlled by the Ministry for the Environment – APAT (Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici - Agency for Environmental Protection and Technical Services), ICRAM (Istituto Centrale per la Ricerca Scientifica e Tecnologica Applicata al Mare - Central Institute for Scientific and Technological Research Applied to the Sea) and INFS (Istituto Nazionale per la Fauna Selvatica - National Institute for Wildlife) – in order to streamline the work done by these three bodies and ensure greater efficiency in environmental protection while helping to contain public spending.

kWh (kilowatt-hour)

A unit of measurement of electricity generated or consumed, equal to the power generated by 1 kW in one hour.

MW (Megawatt)

A multiple of kW (kilowatt), the unit of measurement of a power station's power, i.e. its energy-generating capacity. It also measures the power consumed by an item of electrical equipment. 1 MW = 1,000 kW.

MWh (megawatt-hour)

Unit of measurement of electricity generated 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.

FUEL OIL

A heavy fraction obtained in oil refining and used as a fuel, increasingly in a form with low sulphur content, in order to limit negative effects on the environment in terms of atmospheric emissions (chiefly SO_2 and particles).

PIEZOMETER

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

PM10

Particulates with a diameter of less than 10 μm (1 μm = 1 micrometre), which can pass through the airways and reach the lungs and are a potential health hazard, depending on the substances which they contain.

PPM (parts per million)

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

KYOTO PROTOCOL

An agreement approved by the Conference of the Parties in Kyoto, 1-10 December 1997, containing the initial decisions on the implementation of some commitments of the United Nations Framework Convention on Climate Change (UN-FCCC), which was approved in 1992 and ratified by Italy in 1994. The agreement came into force on 16 February 2005, following ratification by Russia. For the protocol to become mandatory at international level, it had to be ratified by at least 55 countries. The protocol's key points include a commitment by the industrialised countries (including Italy) to cut emissions of greenhouse gases (carbon dioxide, methane, nitrogen oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) by at least 5% compared to 1990 levels during the commitment period 2008-2012. The same countries must also draw up projects for the protection of woodland, forests and agricultural land which absorb carbon dioxide and each create a national system for assessment of gas emissions. They may gain carbon credits by assisting developing countries to avoid pollutant emissions. The signatory countries will be subject to sanction if they fail to meet the targets set. The rules for developing countries are more flexible.

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.

REFINING

Processes for the transformation of crude oil into derivatives with various qualities (principally LPG, light gasoline, naphtha, kerosene, diesel and residues).

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.

REVAMPING

Measures taken at industrial plants to improve or increase processing capacity.

MAJOR-ACCIDENT HAZARD

The probability that an event linked to an uncontrolled development in an industrial activity could give rise to serious danger, either immediately 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, achieve, review and maintain control, where possible, over all the internal and external variables of an organisation.

SO_2 (sulphur dioxide)

A colourless gas with a pungent odour released when fossil fuels containing sulphur are burnt. In the atmosphere high concentrations of SO_2 are the main cause of acid rain.

TOE (ton of oil equivalent)

A unit of measurement conventionally used to determine the energy contained in various sources taking into account their calorific value..

SULPHUR

A chemical element present in crude oil in the form of sulphur compounds. Following recovery via desulphurisation processes, sulphur is sold for use by the chemicals industry.

Note

Note

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