Environmental, Health and Safety Report 2012

SARAS


SARAS

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Foreword

Welcome to the Saras Group Environmental, Health and Safety Report 2012.

In 2012, we have clearly seen positive results from the actions started in 2010 with the **"Safety is our energy"** project, designed to disseminate a "culture of safety" and to promote safe behaviour at work and elsewhere in all of our lives. As our vision states: *"We want to 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"*.

In particular, we developed a means of spreading these messages through "safety talks" to involve and motivate all our staff to adopt these values.

Further impetus was given to our monitoring activities with "Safety Tours" – dedicated inspections of the workspaces, equipment and plant.

It is a long-term commitment for all of us to raise our own awareness of how we act and to behave safely while at work.

On the environmental front, we have, over the last three years, halted and then further reduced emissions compared with the values measured in 2009, the first year that the AIA permit came into force. We also saw a further improvement in the figures for the quality of air outside the plant, which is the primary objective for sustainable development.

Under current market conditions, improving productive efficiency, the effectiveness of industrial operations and the reliability of equipment take priority, and cannot be separated from safety and environmental compatibility.

With this in mind, the Saras Group's strategy has, since 2010, focused on implementing the "Project **Focus**" improvement programme. Of particular relevance in this regard are the ongoing initiatives and activities aimed at improving "energy efficiency" in order to ensure Saras' future competitiveness and sustainability.

Francesco Marini
Operations Management Director, Saras S.p.A.


Milan
Arcola
Rome
Madrid
Cartagena
Ulassai
Macchiareddu
Sarroch
saras

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 oil refiners in Italy and Europe. It is active in the following areas:

- the sale and distribution of oil products on the Italian and international markets, both directly and through its subsidiaries Saras Energia SA in Spain and Arcola Petrolifera S.p.A. in Italy
- the generation and sale of electricity through Sarlux S.r.l. and Parchi Eolici Ulassai S.r.l.
- industrial engineering services and scientific research for the oil, petrochemical, energy and environmental sectors through Sartec

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

Arcola Petrolifera sells oil products on the domestic wholesale market, in Sardinia and the rest of Italy.

Deposito di Arcola srl provides reception, storage and land or sea redelivery services for oil products.

Sarlux - a wholly-owned subsidiary of Saras - owns the IGCC plant and manages only the 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 in the Spanish retail and wholesale market and manages a biodiesel production plant, a hydrocarbon storage facility in Murcia and 112 service stations.

Sardeolica owns the wind farm, with installed capacity of 96 MW, located in the municipality of Ulassai (Province of Ogliastra).

Sartec (Saras Ricerche e Tecnologie) develops and supplies, both at the national and international levels, advanced solutions in the fields of environmental protection, industrial efficiency and energy savings, industrial engineering services, and analyses of oil, water, soil and emissions.

SARAS

Saras has **1,267 employees**. Its registered office is in Sarroch, its administrative office in Milan and it has a sales office in Rome.

Strategy and investment

Given the ongoing economic crisis, especially in Europe, and a market context of low demand for oil products and tight refining margins, the Saras Group has chosen to focus its industrial strategy on the pursuit of optimal operating performance.

In the Refining sector, the Group implemented "Project Focus" in 2012, an asset management programme aimed at reducing costs and improving manufacturing efficiency, the effectiveness of industrial operations, and coordination between the planning of refinery processes and commercial operations.

In addition, an important stage in the project to revamp the MildHydroCracking2 (MHC2) plant was completed during the maintenance shutdown in the first quarter of 2012. The final stage of the project will be completed as planned during the programmed shutdown in the first half of 2013. Once the revamping is completed, it is expected to generate benefits quantifiable at approximately 600,000 tons in greater diesel production at the expense of heating oil, and an increase in refinery processing of approximately 650,000 tons a year.

Moving on to the wind segment, in Sardinia, the Group is moving ahead with development work on two projects with a total capacity of some 100 MW, for which an environmental impact assessment (EIA) is currently in progress. Moreover, as regards the work in the foreign "pipeline", the Group has recently obtained authorisation to embark on construction work for a wind farm with capacity of approximately 100 MW in Romania.

Lastly, on the gas exploration and research front, the Group is currently going through the process to gain authorisation to begin drilling activities in an area of Oristanese ("Eleonora" permit), for which annual production is cautiously estimated at between EUR 70 and 170 million cubic metres of gas, with a production period of more than 20 years. The estimated time required to drill the exploratory well ranges from four to six months following completion of the authorisation process for which – in accordance with the procedures laid down by the competent regional authorities – the environmental impact assessment (EIA) is the last stage.

Investiments made in 2012

Investimentsin 2012 totalled EUR 119.3 million, which breaks, down as shown in the table. This confirms the Group's commitment to keeping its plant fully efficient and to meeting al HSE requirements. At the same time, the decision was taken to make a number of investimets to expand the business whlist not abandoning its prudent approach to maintaining the Group's sound financial position, given the ongoing very difficult economic situation.

EUR million	2012	2011
REFINING	97.0	64.6
ELECTRICITY GENERATION	8.7	31.2
MARKETING	8.2	4.8
WIND POWER	3.8	2.5
OTHER ACTIVITIES	1.6	1.9
Total	**119.3**	**105.0**

The Group invested EUR 97 million in refinign activities in 2012, some 30% of which was for the revamping of the MildHydroCracking-2 (MHC2) plant. Work on this is proceeding perfectly according to plan, with all the technological improvements associated with all the technological improvements associated with this project expected to be fully operational from as early as the second half of 2013.

The Sarroch site: refining and electricity generation

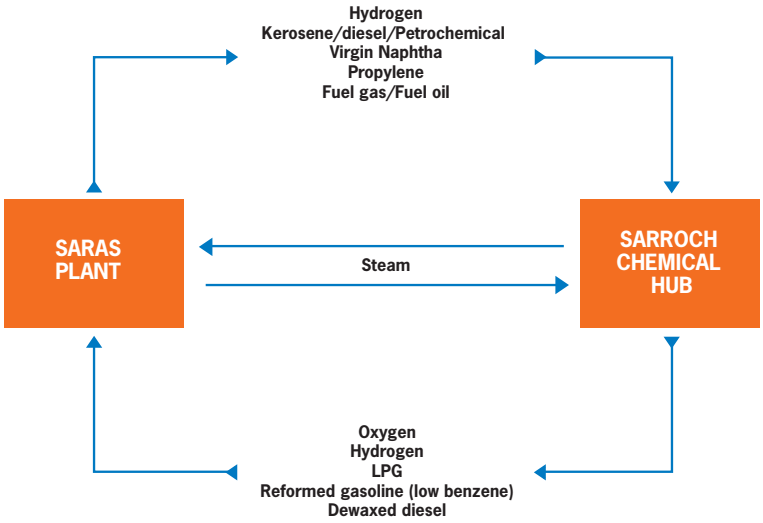
Saras conducts its refining activity at its plant in Sarroch (Cagliari), on the southern coast of Sardinia. This is the largest refinery in the Mediterranean region in terms of production capacity and the most complex in western Europe. The refining cycle is integrated with the IGCC plant, which generates 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 IGCC electricity generation plant has installed capacity of 575 megawatts and annual production in excess of 4 billion KWh, sold entirely to national grid operator GSE (Gestore Servizi Elettrici).

Table 1 – Raw materials processed (kt/year)

2009	2010	2011	2012
13,305	14,340	14,006	13,309

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 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 Versalis, Air Liquide and Sasol Italy allows its refinery operations to be integrated with petrochemical production (Figure 1).

The Sarroch industrial hub

The production hub that was 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, Versalis, Sasol Italy, Air Liquide, and Liquigas – to build and maintain the plants of the larger firms, thus representing a significant satellite industry. Saras maintains mutually beneficial industrial relations with all these production companies.

The site shared by Versalis 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 Versalis and Sasol Italy. The Versalis 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.

Refining

Saras' connection with Sarroch dates back to 1962, when Angelo Moratti identified it as a strategic location for an oil refinery. Construction of the refinery facilities began in 1963, and refining activity began in 1965. Until the end of the 1980s, Saras mainly provided refining services for third parties (i.e. it refined crude oil owned by other oil companies that provided Saras with the raw materials to produce oil products). In the mid-1990s, following a significant downturn in demand for high-sulphur fuel oil, Saras launched a major industrial project to build a plant for the gasification of heavy distillates from the refining process and the subsequent combined-cycle cogeneration of electricity and thermal power (IGCC plant). 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.

Plant description

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, warehouses;
- activities of subcontractors

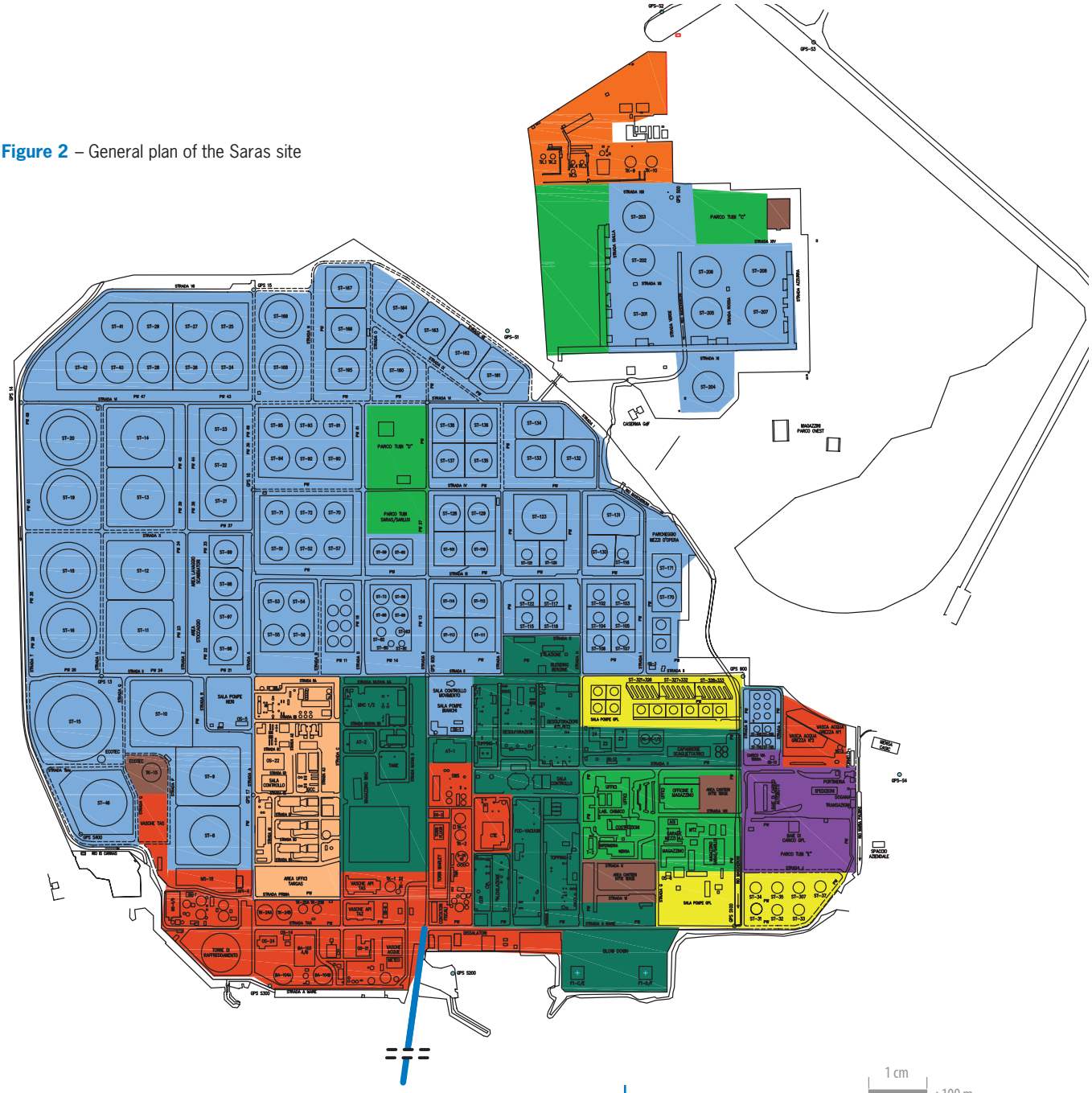
Figure 2 on page 15 shows the areas used for the different types of activity performed within the facility, summarised below.

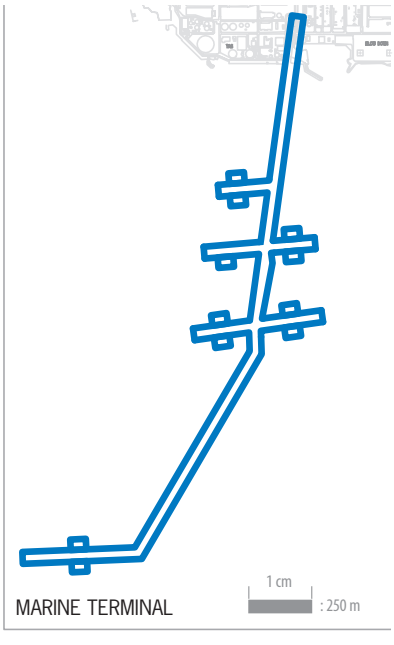
Receipt of raw materials and shipping of products through the marine terminal

The marine terminal linked to the refinery has a 1,600m-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 2012, around 82% 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

Figure 2 – General plan of the Saras site





docking and mooring of ships and the connection between the ship and the loading arms transferring raw materials to the shore and finished products to the ship are carried out under continuous surveillance. In order to be admitted to the Saras marine terminal, all incoming ships must comply with rigorous safety standards that conform to internationally recognised criteria as well as additional requirements laid down by Saras. A dedicated control room, which has been completely renovated and upgraded with the latest monitoring technology, 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
- the tail gas treatment unit (TGTU) downstream of the sulphur recovery plant, which increases the sulphur recovery yield, thereby reducing SO2 emissions
- the U800 unit at the catalytic cracking plant, which produces low-sulphur gasoline
- the U600 unit, which produces hydrogen used in the desulphurisation of motor diesel, with a very low sulphur content

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

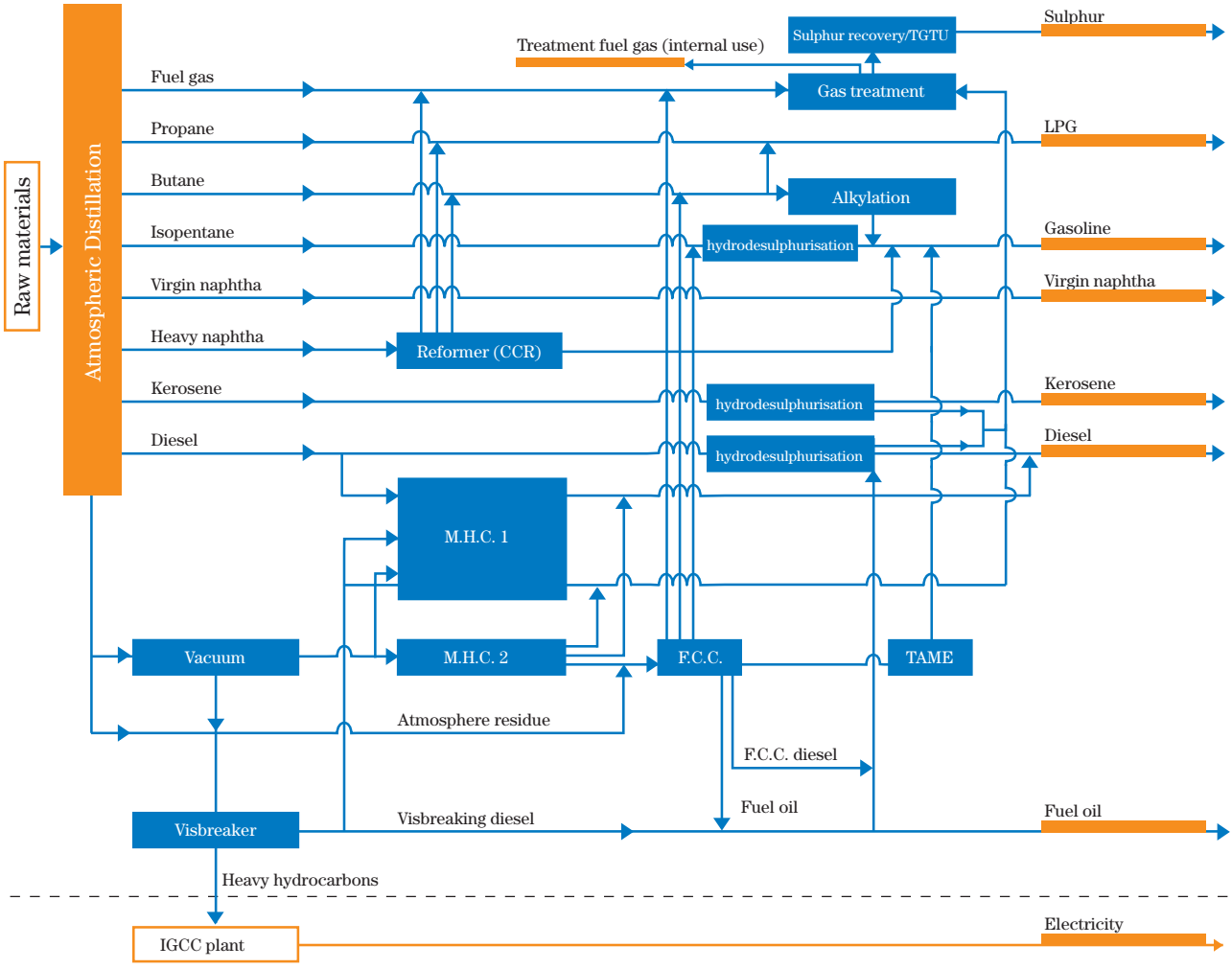


Chart 1 – Refinery products and consumption

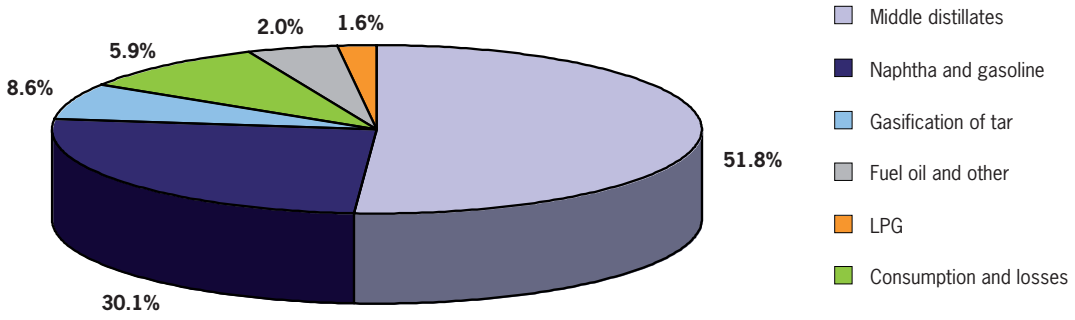


Table 2 – Oil products (tons/year)

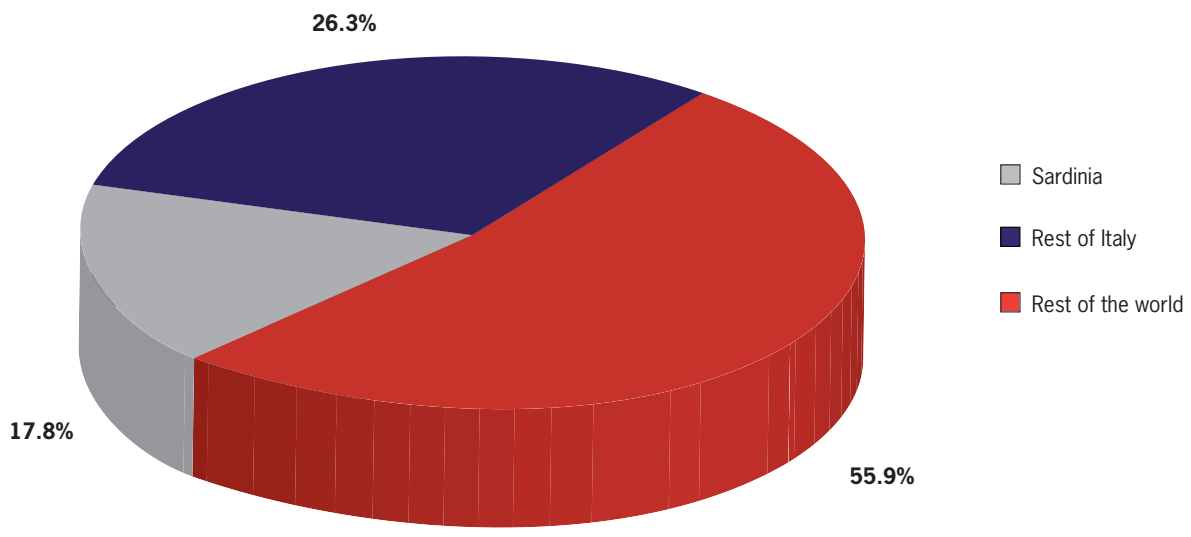
	2009	2010	2011	2012
LPG	221,000	323,000	238,000	205,000
Gasoline and virgin naphtha	3,343,000	4,024,000	3,824,000	4,002,000
Middle distillates (gasoil, kerosene)	6,769,000	7,517,000	7,415,000	6,891,000
Fuel oil and other	1,119,000	463,000	623,000	272,000
Sulphur*	110,000	130,000	113,000	122,000
TAR	1,077,000	1,166,000	1,075,000	1,146,000

* Includes sulphur recovered both from refining and the IGCC.

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

	2009	2010	2011	2012
Africa: North West	43	38	15 16	35
Middle East	12	7	20	18
Russia and Caspian Sea	29	30	42	39
North Sea	16	11	3	2
Other	0	14	4	6
Total	100	100	100	100

Chart 2 – Total shipping, 2012



The Sarroch plant has a high output of medium oil products (diesel) and light oil products (LPG, naphtha and gasoline), which in 2012 accounted for around 88% of total production, as summarised in Chart 1 and shown in detail in Table 2, which sets out production data relating to the four-year period 2009–2012.
Raw materials mainly come from the Mediterranean area (North Africa and the Middle East), the former Soviet Union, western Africa and northern Europe (Table 3). The primary, but not sole, destination of refinery products is the central and western Mediterranean region.
Specifically, in 2012, approximately 18% of total production of oil products was absorbed by the local Sardinian market (Chart 2).

Electricity generation

The IGCC (Integrated Gasification Combined Cycle) plant generates electricity, hydrogen and steam from the heavy hydrocarbons resulting from the refining process, a technique generally recognised as one of the best 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.

Electricity – produced in three identical lines, each comprising a gas turbine, a steam recovery boiler and a steam turbine – is sold to the national grid operator, GSE. Part of the steam produced and not used to generate electricity is sent to the refinery for use in refining processes, along with the hydrogen produced by the gasification section.

SARLUX

Sarlux, which owns the plant, has its registered office in Sarroch and its administrative office in Milan

Figure 4 – Flow chart of the IGCC plant

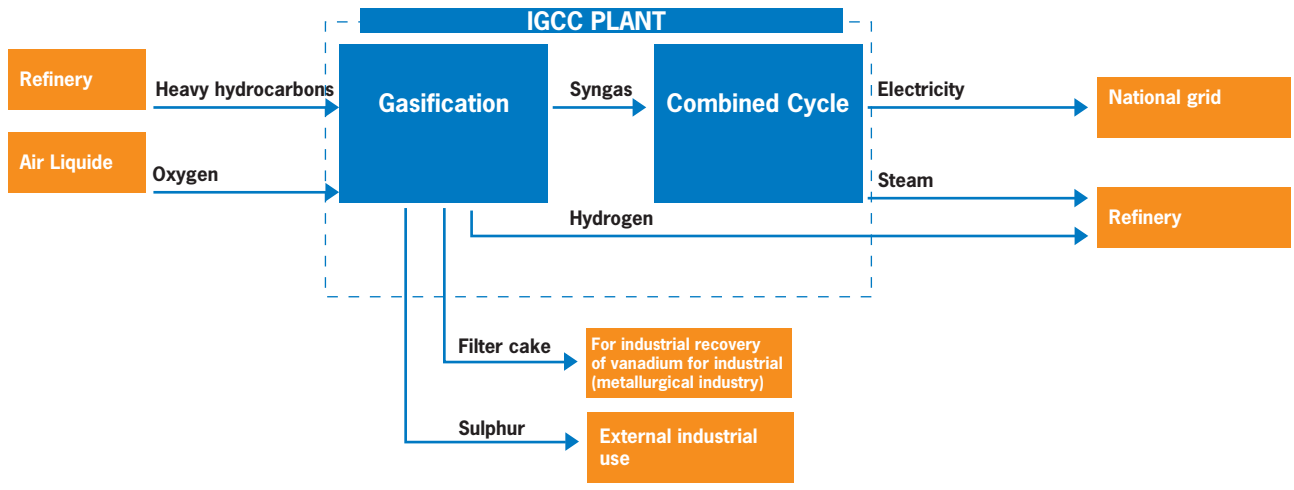


Table 4 – IGCC products

	2009	2010	2011	2012
Gross electricity (MWh)	4,086,439	4,339,335	4,034,163	4,211,290
Low pressure steam (tons/yr)	437,003	586,626	555,647	582,843
Medium pressure steam (tons/yr)	570,754	737,033	699,486	743,660
Hydrogen (tons/yr)	37,939	39,731	35,809	36,214
Sulphur (tons/yr)	48,405	52,666	37,872	43,196
Vanadium concentrate (tons/yr)	1,633*	1,122**	1,494***	1,142

* Including 877 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery
** Including 181 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery
*** Including 44 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery

As with the sulphur recovered from the refining cycle, the sulphur recovered through the removal of hydrogen sulphide from the syngas is also sold (see figures 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.

A reduction in emissions produced by the Sarroch refinery 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.

Table 5 – Efficiency comparison of power-generating plants

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%

Filter Cake

Named on account of its consistency, 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 be able to do this, 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 in part from sea water, which is desalinated and then demineralised in specific processing 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) and in part through a new plant producing demineralised water from the water discharged from the treatment system.

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 (45 tanks), or earthworks (116 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 diesel and fuel oil, 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 logistics bases 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 homogenous area south-west of Cagliari.

The region has two main types of economic activity: activities connected with the energy and petro-chemical hub around Sarroch and the Macchiareddu industrial area; and activities connected with natural resources in the region, such as agriculture, livestock farming and tourism, particularly in Pula.

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 beginning its operations, the company has increased

its workforce from 100 to 1,267, divided between the Sarroch site, which employs more than 87% of the total, 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.

Communication with the local community

Work also began in 2012 on strengthening relations with external parties, in particular with the local communities around the production facility, in line with the commitments made in the context of EMAS (Eco Management Audit Schemes) registration.

These initiatives, undertaken as part of the Group's drive for transparency, integration and co-operation with the region in which it operates, testify to the company's commitment to continuously improve the environment and to sustainable development, not least through the involvement of all its main stakeholders.

Over the course of the year, a communications and external relations plan has been devised, aimed particularly at institutions, corporate bodies, associations, schools and the media, involving the running of joint projects and events.

In this regard, various meetings were held with local authorities, which presented opportunities for discussion, the exchange of information and communication on issues of common interest, such as safety, environmental protection and regional development.

These occasions gave an opportunity to demonstrate the results already achieved and to showcase Saras' environmental programmes and goals for further improvements.

Within the general external relations policy, a special space is set aside for relations with schools.

Over the years, the company has pressed on with specific projects in this area which have afforded valuable opportunities for meeting with schools and exchanging information with them. During 2012, always alert to environmental and safety issues, Saras, in partnership with Sarroch's Istituto Comprensivo Statale (unified school), and the municipalities of Sarroch and Villa San Pietro, and with the backing of UNICEF, supported the 'Safe School' project run by the Cagliari fire brigade. This safety campaign, specifically designed for the region's elementary and middle school pupils, aims to make the children aware of the risks around them in their daily life and to share with them experience and suggestions on positive steps that can be taken to prevent and avoid accidents associated with the four main causes of accidents at home, namely fire, electricity,

falls and toxic substances. The programme of activities, run throughout the school year, involved, among other things, the distribution and use of five colouring albums, each focusing on a specific theme, and the showing of animated cartoons on these themes to communicate them in a simple and immediate way.
The project culminated in a final show involving participation by all the schools concerned, which took the form of a party and prize-giving featuring, among other things, a safety exercise run by the Cagliari fire brigade film unit.

Group companies

Sartec: environmental research and innovation

Sartec is the Saras Group's environmental and industrial technology and research company. 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, the services are strengthened by a special focus on Sartec's key values, which add value for its customers: environmental sustainability, innovation and quality.
In order to offer the best technological solutions, Sartec not only applies the most advanced technologies available on the market and the results of studies from the world of research or conducted at its own behest, but also draws on 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 (IEA) 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 and 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 Electricity and Gas (AEEG) as an ESCO (Energy Service Company) in order to offer energy consultancy services aimed at obtaining energy efficiency credits (EECs), 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
SARAS RICERCHE E TECNOLOGIE

With **136 employees**, Sartec has two locations in Italy: Cagliari, in the industrial zone of Macchiareddu (registered office, facilities and laboratories) and Milan (sales office).

Sardeolica: wind energy generation

Sardeolica's activities are fully in line with the corporate strategy of the Saras Group, which has designated the protection of its workers' health and safety and of the environment as its top priorities. In 2012, Sardeolica gained certification for its integrated safety, environment and quality management system under the international standards OHSAS 18001:2007, ISO 14001:2004 and ISO 9001:2008.

From the outset, the Ulassai wind farm has produced some 175 GWh/year, which corresponds to the annual power requirement of around 60,000 families. The power generated is fed directly onto the national grid, and sold to the GSE at the conditions laid down in the framework agreement drawn up by energy regulator, the AEEG. The plant has green certificates for 15 years from its initial start-up.

The Ulassai wind farm is set in one of the windiest locations in the region. These conditions enable power to be generated throughout much of the year at a higher rate than the national average.

In 2012, it generated around 171 GWh, taking the total power generated from its inception to some 1,200 GWh.

Arcola Petrolifera, Deposito di Arcola and Saras Energia (Spain): distribution network

Arcola Petrolifera

Arcola Petrolifera 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, in 2011 Arcola transported approximately 2,300,000 tons of products for the retail and wholesale market. Arcola has 11 employees and its registered office is in Sarroch; it has agreed transit contracts at third-party bases (Sarroch, Arcola, Civitavecchia, Livorno, Ravenna, Torre Annunziata, Marghera, the SI.GE.MI. and SI.LO.NE. systems, etc.), thus covering a distribution area corresponding to much of Italy.

The spin-off of Deposito di Arcola S.r.l. from Arcola Petrolifera was completed in September 2011. Owing to the above-mentioned spin-off, effective from 1 October, Deposito di Arcola S.r.l. took over the ownership of the industrial assets, previously held by Arcola Petrolifera, relating to Arcola's fuel storage facility and the related logistical equipment.

Deposito di Arcola

Deposito di Arcola S.r.l. provides leading operators with reception, storage and land or sea redelivery services for oil products for the fuel distribution network and maritime bunkering. It has a storage capacity of approximately 200,000m³, which the company uses to store more than 500,000m³ of fuel on behalf of third parties; the facility is able to receive on average 30 tankers a year, and load approximately 100 barges and more than 15,000 tanker trucks.

Sardeolica

Sardeolica, a company founded in 2001, manages the Ulassai wind farm.

Environmental benefits

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 from sensitive points in the area.
- 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 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, but its installations occupy less than 1% of this area. Furthermore, optimal technological solutions, such as the burying of electric cables, have been adopted in order to minimise the visual impact and prevent electromagnetic interference with telecommunications.

SARDEOLICA

Sardeolica has **25 employees** and its registered office is in Uta, in the industrial zone of Macchiareddu.

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. In 2012, the company maintained a strong position on the Spanish market for retail and wholesale oil products. The company operates across Spain through its own sales structure endowed with a high degree of expertise, professionalism and knowledge of the market. Products are distributed nationwide using a logistics network comprising the terminal owned by Cartagena, supplemented by the CLH system and independent storage facilities.

Saras Energia acquired most of ERG's network of service stations during 2009. Work was carried out in 2010 and 2011 to change the image of some of these former ERG service stations and modernise them, in order to integrate them with the Saras Energia network; this was followed by a process to develop co-ordinated management based on a commercial management model in which "customer focus", health, safety and the environment (HSE) were fundamental.

Saras Energia's network currently consists of 112 service stations, including 69 directly managed COCO (Company Owned Company Operated) stations, 16 CODO (Company Owned Dealer Operated) stations and 27 DODO (Dealer Owned Dealer Operated) stations. In 2012, Saras Energia sought to optimise its own network of service stations by modifying its management model. During 2012, the company operated under difficult macro-economic conditions, with domestic demand and fuel consumption continuing to fall (by 25%, compared with 2010)

The priority for 2012 was to improve the average margin across the whole network by reducing and closely monitoring costs and by making significant changes to marketing and operations policies, while constantly maintaining the most stringent control on HSE issues on the network and on product and service quality.

December 2012 saw the launch of a project to fully automate some stations; we wanted to describe it as 'low cost', in other words, to offer consumers a highly competitive end price by providing them with high-quality ongoing customer service through the use of innovative high-tech solutions.

By means of "online" connections, managers can monitor in real time all HSE conditions in installations and provide customers with support.

The first stage was completed in Lugo, in Galicia, and the project will continue through 2013 in Catalonia with the aim of automating at least 15 stations by June.

In 2009, Saras Energia also strengthened its logistical structure at the Cartagena industrial centre, starting up a new biodiesel production plant with a potential capacity of 200,000 t/year. The biodiesel plant is linked by a pipeline to the fuels storage facility, with which it shares sea loading and unloading equipment. In 2012, it produced no more than 69,100 tons of biodiesel for the Spanish and Italian markets, to be mixed with motor diesel pursuant to European legislation on the release of biofuels for sale to consumers. This production level, much lower than its real capacity, is

Figure 5 – Storage facilities - loading bases

Own deposit: Arcola and Cagliari

ARCOLA

Arcola has 11 **employees** and its registered office is in Sarroch; it has agreed transit contracts at third-party bases (Sarroch, Arcola, Civitavecchia, Livorno, Ravenna, Torre Annunziata, Marghera, the SI.GE.MI. and SI.LO. NE. systems, etc.), thus covering a distribution area corresponding to much of Italy.

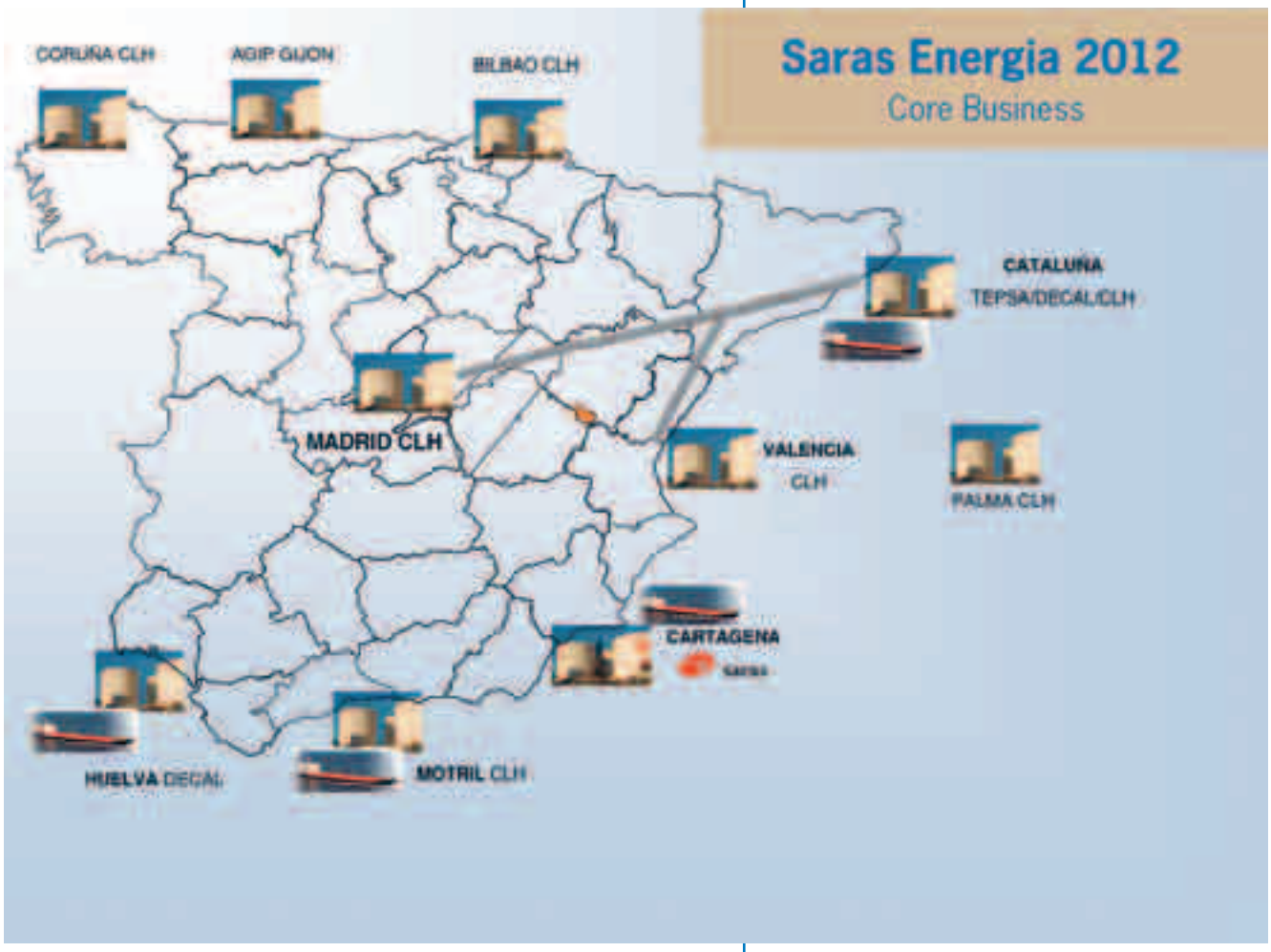
With 24 **employees**, Deposito di Arcola has its registered and operational office in Arcola; it provides reception, storage and land or sea redelivery services for oil products.

due to the closure of the facility for several months owing to the difficult situation on the market, which made it cheaper to buy biodiesel than to produce it.

We carried out an in-depth analysis of the wholesale market and defined a process that would enable us to maintain a strategic role and offer a quality alternative with other providers, as well as to act as a market regulator responding to the fall in consumption by concentrating on exports and making considerable investments in Spanish refineries in order to increase the output of diesel.
In April, Saras Energia relaunched its SAP project.

With **388 employees**, Saras Energia has its registered office in Madrid and a biodiesel plant and storage facility in Cartagena.

Figure 6 - Saras Energia's logistics network



Policies

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 checked and updated annually
- internal audit activities have therefore been put in place to periodically check that the EMS is being applied correctly
- in June 2004, Saras achieved EMS certification pursuant to ISO 14001:1996; this was then updated to ISO 14001:2004 certification in May 2006 (Figure 6)
- in June 2007, the first three-year EMS audit for the renewal of the environmental certification was carried out, followed by the second three-year audit in June 2010, resulting in the renewal and retention of Saras' ISO 14001:2004 certification; the certifying body, Lloyd's Register Quality Assurance (LRQA), also conducts six-monthly inspections as part of its planned assessment activities
- in May 2008, the Environmental Policy was revised and issued to all the company's direct employees and to employees of subcontractors working on the site, thus concluding the process of developing the Environmental Management System and 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. 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, and illustrates Saras' activities, the direct and indirect environmental aspects associated with these activities and the environmental improvement targets that the company has set itself
- 2010 saw the full implementation of the new organisational structure for the business units involved in HSE (Health, Safety and the Environment) issues, which established a central department dedicated to obtaining and maintaining environmental and safety

certification, as well as four new HSEQ (Health, Safety, Environment and Quality) positions, one for each area of production, with a specific focus on environmental, health, safety and quality issues

- In June 2010, Saras obtained the second renewal of its EMS certification, pursuant to ISO 14001:2004. Subsequently, the Environmental Declaration 2010, drawn up pursuant to the new EC Regulation 1221/2009, was validated, again by LRQA, and published, while Saras' EMAS registration was confirmed at the same time
- LRQA continued its half-yearly inspections of the Environmental Management System during 2011, with positive results. The certifying body also, in July 2011, conducted its three-year audit of the EMAS registration, validating the 2011 Environmental Declaration and recommending to the ECOLABEL Control Body that Saras' three-year registration be renewed
- During 2012, the process of integrating the management systems began with the approval and publication of the new complete Environment, Safety and Quality Management systems manual, and of the environment policy, now including Health and Safety and accident prevention
- LRQA continued its half-yearly inspections of the Environmental Management System during the year, with positive results

Group companies

Sardeolica

Sardeolica generates electricity from wind power at its production unit in the municipality of Ulassai (Province of Ogliastra). 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. In 2006, Sardeolica obtained ISO 14001:2004 environmental certification for its Environmental Management System (EMS), which was successfully renewed in July 2012 by the certifying body Tüv Austria. The same body also makes inspection visits on an annual basis. In June 2012, following the integration of the environmental management system with the safety systems (to conform with the OHSAS 18001:2007 standard) and with the quality system (to conform with the ISO 9001:2008 standard), the company's Safety, Environment and Quality policy, containing, among other things, the guiding principles and the company's environmental management commitments, was issued to all the workforce. Procedures for implementing the Integrated Management System were also drafted setting out the actions and conduct required of all the company's staff.

Sartec

In April 2011, Sartec adopted an environmental management system, certified in accordance with EN ISO 14001:2004, supplemented with Safety and Quality management systems. The aim of this is to prevent

pollution and implement every reasonable solution to reduce the significant environmental impacts of its activities; to promote the rational use of natural resources, energy and materials, where possible reducing consumption thereof; to adequately maintain its plant, machinery and equipment and any measures deemed necessary to ensure its workers' health and safety; to improve energy efficiency and environmental protection; and to maintain the offer of its products and services relating to environmental protection, industrial efficiency and energy saving, identifying its customers' requirements and proposing integrated solutions. Senior management has issued a new integrated company policy, containing the company's guiding principles and commitments on environmental protection, the health and safety of employees, and the quality of products and services relating to its activities.

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, between 2009 and 2011, Saras implemented the "Saras Safety" project in support of safety management, designed in co-operation with Du Pont, itself a global leader in issues relating to safety at work.

Saras sees the protection of health and the prevention of any kind of accident or mishap (whether to its own employees or to persons working for subcontractors), together with care for, and protection of, the environment, as core values. This is confirmed not least by the new policy document on the environment, workers' health and safety, and the prevention of major accidents, approved and published on 30 May 2012.

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. In 2011, Saras' OHSMS was subject to another audit, through an in-depth inspection procedure conducted by certification body TÜV Austria, which confirmed it met the BS OHSAS 18001:2007 standard and renewed its certification for a further three years. Compliance with that standard was also confirmed after the scheduled inspection visit

carried out in December 2012. Saras' commitment to safety management has always had as its primary object the prevention of accidents 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, also covering electricity generation at the IGCC plant. In 2012, the Saras SGS, integrated with the Management System for the Prevention of Major Accidents in accordance with Ministerial Decree of 9 August 2000, was combined with both the Environmental Management System and the Quality Management System in order to exploit synergies from the common parts of the management systems. The manual for the management system was approved and published during 2012.

The subsidiaries and the Occupational Health and Safety Management System

The other Group companies have also considered 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 in order to ensure continuous improvement in the protection of health and safety, using all the tools necessary to prevent injury, accidents and occupational illness. In June 2012, following the integration of the environmental management system with the safety systems (to conform with the OHSAS 18001:2007 standard) and with the quality system (to conform with the ISO 9001:2008 standard), the company's Safety, Environment and Quality policy, containing the guiding principles and the company's commitments was issued to all the workforce. Procedures for implementing the Integrated Management System were also drafted setting out the actions and conduct required of all the company's staff.

Sartec

Sartec aims to control occupational health and safety risks to its employees in the workplace and to improve its performance in order to eliminate or minimise risks for employees and other interested parties who might be exposed to risks associated with the company's activities in respect of work performed by internal employees or those supervised by the company. In line with the requirements of the current legislative framework, which are increasingly specific and stringent, and the company's own awareness of the strategic importance of the health and safety of its employees, in 2011 Sartec gained certification, pursuant to BS OHSAS 18001:2007, for its Safety Management System, in place since 2008, and integrated it with its certified Quality and Environmental Management Systems.

By adopting an Integrated Management System (IMS), Sartec 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 (e.g. customers, suppliers and visitors) may be exposed
- increase the company's efficiency and performance
- improve the company's internal and external image

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

Deposito di Arcola srl

The drafting and dissemination at all levels of the Occupational Health and Safety Policy, containing the guiding principles and the company'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 (HSMS) and the related Manual. The HSMS is therefore integrated with the Management System for the Prevention of Major Accidents, pursuant to 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 (Article 7 of Legislative Decree 334/99). The education, communication and training activities supplemented by relevant internal and external audits, together with the review 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 information process more effective and efficient, in March 2009 Arcola Petrolifera/Deposito di Arcola S.r.l. acquired a multimedia e-learning platform to support operator training and information activities; the first sessions planned and organised 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. In 2010, further training programmes were added to the multimedia e-learning platform:

- Personal Protection Measures (PPMs)
- Emergency plan at the marine terminal

The following new training courses were added to the multimedia e-learning platform during 2011:

- CLP (legislation regarding the classification of hazardous substances)
- MAH (Major accident hazard)

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 depends on staff passing this course. Deposito di Arcola 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". In 2012, the map was completed by the addition of a part relating to environmental offences following the drafting of the document "Documented map of the analysis of company areas potentially at risk of crime". 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 it 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. The above-mentioned analysis and training activities have been extended to include Società Arcola Petrolifera S.p.A. personnel working permanently at Deposito di Arcola.


saras

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

Saras Energia

In line with the principles of its health, safety and environment policy, Saras Energia has revised its risk assessment documents for all its sites and successfully implemented a training programme that offered all staff the necessary training to identify and avoid risks connected with activities at the various facilities. Amongst other things, the programme provided training in specific safety procedures for unloading fuel, the mechanical systems of the service stations, environmental protection measures and fire prevention systems. To implement the principles established in its health, safety and environmental policy and to monitor the health of its workers, the company has carried out a programme of medical checks to individually assess employee exposure to hazardous chemicals and to noise.

To meet the need for a tool to disseminate information on health, safety and the environment simply and efficiently, a dedicated area has been set up on the group's intranet specifically to address these issues. To adequately develop the concept of continuous improvement, a safety audit programme has been established for all company areas. The results of the audit have been used to design subsequent training activities. Saras Energy owns two sites subject to Directive 96/82/EC of the European Council, issued on 9 December 1996, which governs the control of major-accident hazards (Seveso II), namely the hydrocarbon storage facility and the biodiesel production plant. The Safety Management System for each site has therefore been revised, with the necessary changes made and action taken

to make the improvements indicated by the audit process. The company also launched a review of the emergency plan for the biodiesel plant to ensure, in the event of a stoppage, the presence of personnel necessary to ensure plant safety.

To ensure proper implementation of the Internal Emergency Plan for the two sites, a programme of emergency drills was drawn up and successfully put into practice over the year, guaranteeing that staff designated to deal with emergency situations are adequately prepared and that the equipment provided for use in emergencies is suitable. In accordance with the Spanish legislation transposing Directive 96/82/EC (Seveso II), both sites have been inspected by the Department of Industry, Energy and Mining, through an accredited auditing body. The result of these inspections was positive and confirmed that both sites have adopted suitable measures for major accident prevention and for mitigation of the consequences both inside and outside the site.


CERTIFICATO DI ACCREDITAMENTO

Quality certification

Saras

Before obtaining environmental certification, the company took steps to adopt a Quality Management System (QMS), which established procedures for managing a range of internal areas and processes in the refinery. The company's activities in the following areas are currently certified according to the ISO 9001:2008 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) from tankers 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


LRQA

CERTIFICATO DI APPROVAZIONE

SARAS S.p.A.
S.S. Sulcitana km.19.5
09018 Sarroch (Cagliari) - Italia

ISO 9001:2008

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 acquiring, developing and transferring professional expertise
- **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 (materials management),** 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.

ICT management, management of a range of interconnected software applications, in order to collect, process and distribute information to support the company's decision-making, management and business control activities.

Sustainability

European Directive 2009/28/EC laid down rules and criteria for sustainability and imposed a requirement that it be certified; Saras, as the business operator obtained on 31 August 2012 from the certifying body Bureau Veritas a certificate of the company's compliance in accordance with the Italian national system for the certification of the sustainability of biofuels and bioliquids. This means that Saras S.p.A. can blend and market biofuels.

Group companies

Sartec

The Quality Management System applies to the following activities and processes:
- multi-disciplinary design of industrial plants in the oil, petrochemicals, chemicals and energy sectors
- design, installation, testing and start-up assistance for package plants for the oil and petrochemicals sector
- design, conFiguretion, testing and supply of automation, control, process optimisation and decision-making support systems, training activities and installation assistance for industrial applications in the oil and energy sector
- design, installation, testing, start-up, after-sales assistance and maintenance of analysis systems for measuring air and water pollutants, atmospheric emissions and the characteristics of fluids in chemical processes
- maintenance and inspection of oil product measuring systems
- applied research and consultancy services in the area of the environment and oil, specifically:
  - characterisation of contaminated sites, planning of measures to

make safe and reclaim contaminated sites
- environmental impact studies (EIS) and strategic environmental assessment (SEA); assistance and consultancy during the environmental authorisation process
- research and development in the oil and biofuel refining sector
- studies of catalysts and catalytic processes through pilot plant and modelling
- studies of processes in the oil refining sector through modelling
- development of on-line control of processing/preparation of oil products
- analytical and modelling studies of atypical crude oil behaviour
- chemical analysis services in the area of commodities and the environment
- resale of measuring instruments and spare parts for environmental monitoring
- The Quality Management System also applies to all business processes (support processes) that help to guarantee the company's ability to provide products that meet customer requirements and/or other applicable requirements.

No ISO 9001:2008 requirements are excluded.

Saras Energia

European Directive 2009/28/EC laid down rules and criteria for sustainability and imposed a requirement that it be certified; on 28 June 2012, the SARAS ENERGIA S.A. plant at Cartagena obtained from the certifying body SGS Germany GmbH a certificate of the company's compliance in accordance with the voluntary, internationally recognised ISCC/EU (International Sustainability and Carbon Certification) scheme. This scheme, the most widespread of the voluntary certification systems, is recognised by the EU and valid in all 27 of its Member States. This means that SARAS ENERGÍA S.A. can buy and sell biofuels that meet the required sustainability criteria.


12
10

Production

Production

The Sarroch site

The energy balance

Energy input into the site is in the form of raw materials (crude and semi-finished products), electricity and water, as shown 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 2012, the Saras site recorded an energy requirement of 959,450 TOE.

Figure 7 – The Sarroch site: flow chart

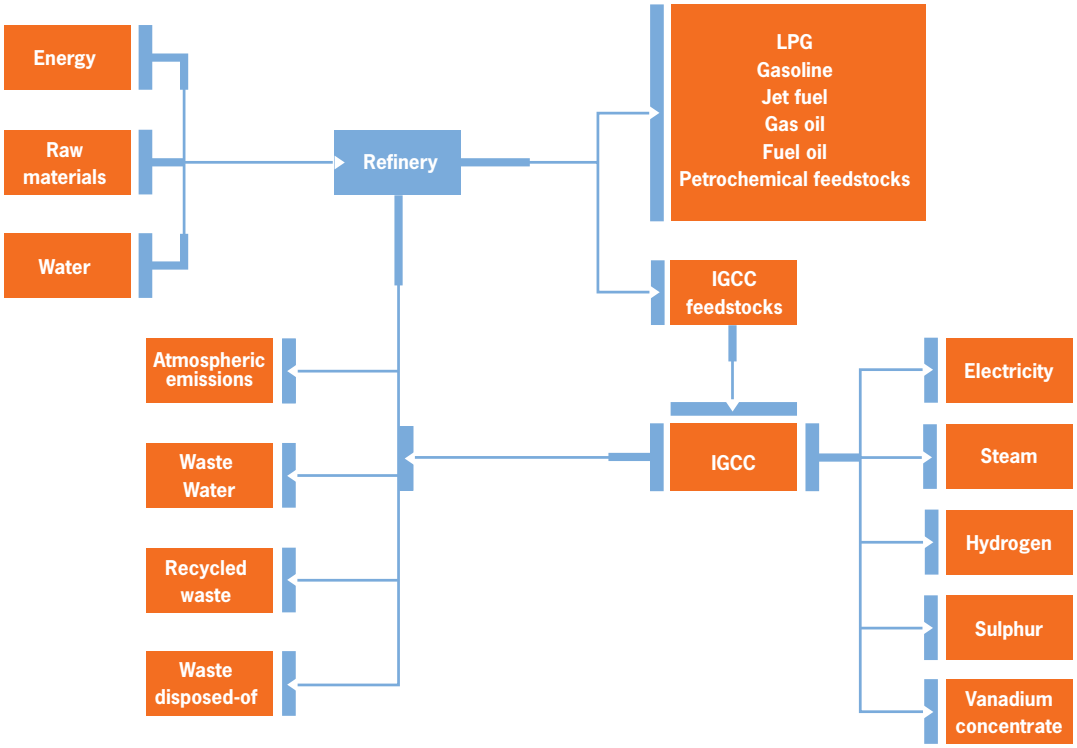


Table 6 – Energy in (TOE)

	2012
Crude and fuel oil	13,309,000
Power from external sources*	256,073
Total	**13,565,073**

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

Table 7 – Energy out (TOE)

	2012
Finished products	11,597,400
Electricity fed into the grid	773,614
Fuel gas	33,175
Total	12,404,189

Refining

In 2012, the Sarroch refinery processed approximately 13.3 million tons (Mton) of raw materials (crude oil and fuel oils), which is an average figure for recent years. Between 2009 and 2012, a total of 54.96 Mton of raw materials were processed, with an average of 13.74 Mton/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 generate electricity.

Chart 3 – Crude oil refining (thousands of tons/year)

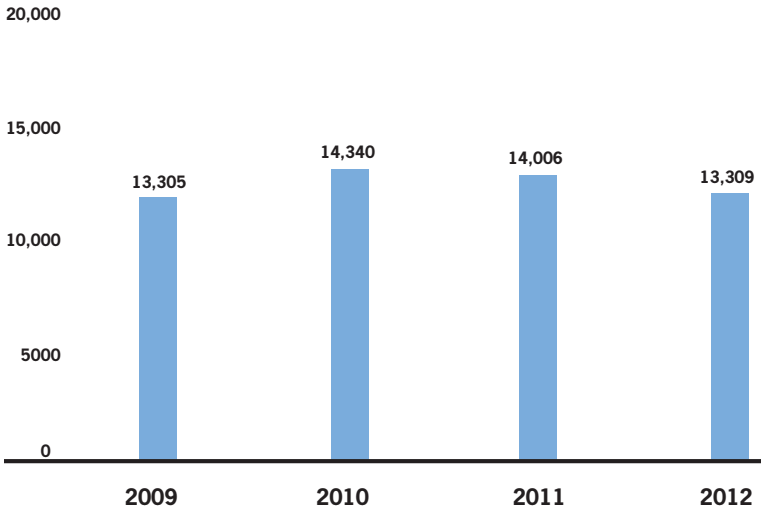


Table 8 – Products of the Saras plants (tons/year)

	2009	2010	2011	2012
LPG	221,000	323,000	238,000	205,000
Gasoline and virgin naphtha	3,343,000	4,024,000	3,824,000	4,002,000
Middle distillates (gasoil, kerosene)	6,769,000	7,517,000	7,415,000	6,891,000
Fuel oil and other	1,119,000	463,000	623,000	272,000
Vanadium concentrate	1633*	1,122**	1,494***	1,142
Electricity (TOE)	750,679	797,136	759,386	782,972
Sulphur	110,000	130,000	113,000	122,000
Heavy hydrocarbons to IGCC	1,077,000	1,166,000	1,121,000	1,146,000

* Including 877 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery.
** Including 181 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery.
*** Including 44 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 a breakdown of sulphur output. An analysis of the data shows that the amount of sulphur coming in with raw materials is broadly stable. Throughout the entire process, from selecting raw materials to fitting efficient desulphurisation systems (U800 for gasoline and DEA4 for better removal of H2S from the fuel gas used on-site) and treating Claus tail gases (TGTU), the choices made and projects implemented at the site have produced impressive results. The 2012 figure, which shows further improvement on the figure for the previous two years, especially as regards sulphur in emissions, validates the technical decisions made over the years. 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

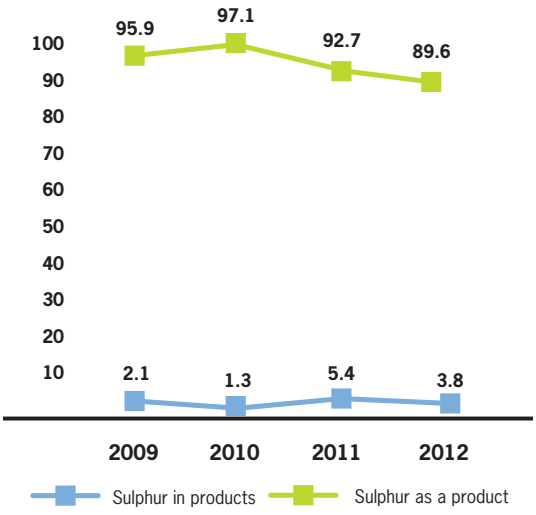


Figure 8 – Sulphur balance of plants – 2012

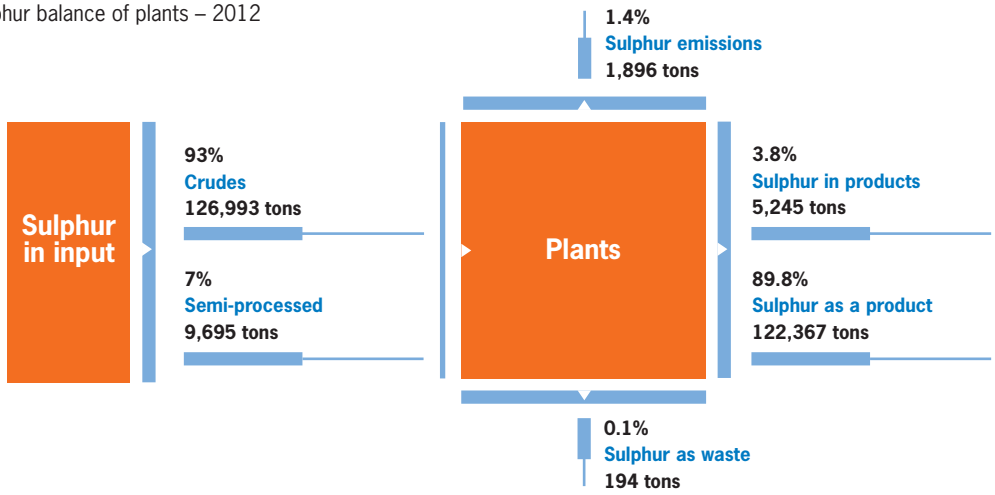


Table 9 – Sulphur balance of plants

	2009		2010		2011		2012(*)	
	Tons	% of total	Tons	% of total	Tons	% of total	Tons	% of total
Sulphur input								
Raw materials	114,714	100	133,634	100	121,686	100	136,628	100
Sulphur output								
Atmospheric emissions	2,200	1.92	2,086	1.55	1,990	1.64	1,896	1.4
In products	2,430	2.12	1,767	1.3	6,554	5.39	5,245	3.8
As pure sulphur	110,017	95.9	129,718	97.1	112,773	92.68	122,367	89.6
As waste	68	0.06	63	0.05	369	0.3	194	0.1

*The total does not add up to 100% due to differences in internal stocks of 6,926 tons of sulphur (5.1%), both as pure sulphur and in stocks of crudes and products.

Electricity generation

The production performance of the IGCC plant and its exchanges with the refinery are reported below. Data for 2012 and comparison with the previous three years.

Table 10 – IGCC consumption (tons/year)

	2009	2010	2011	2012
Heavy hydrocarbons for gasification	1,128,568	1,222,328	1,121,249	1,191,011
Syngas (obtained from gasification)	3,757,686	4,021,014	3,676,704	3,877,697
Gasoil	18,904	3,440	13,994	2,614
Electricity from external sources (MWh)	378,700	379,495	349,658	369,202

Table 11 – IGCC products

	2009	2010	2011	2012
Electricity to external grid (MWh)	4,066,306	4,336,730	4,012,325	4,194,000
Medium-pressure steam (tons/year)	572,368	741,905	699,486	743,660
Low-pressure steam (tons/year)	437,003	613,911	555,647	582,843
Hydrogen (tons/year)	37,939	39,731	35,809	36,214
Sulphur (tons/year)	48,405	52,666	37,872	43,196
Vanadium concentrate (tons/year)	1,633*	1,122**	1,494***	1,142

* Including 877 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery.
** Including 181 tons/year that do not meet the specification, which are therefore sent for disposal rather than recovery.
*** Including 44 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 distributed on the national grid (GSE).

This table also shows the CO2, SO2 and NOx emissions avoided. The avoided emissions figure is particularly significant because it highlights tons of pollutants not emitted due to the fact that the electricity was generated using wind rather than conventional fuels.

The number of households that could be supplied with electricity using this type of generation, and the corresponding TOE saved, have been estimated.

Table 12 – Electricity generated at the Ulassai wind farm

	2009	2010	2011	2012
Production (GW/h)				
Net electricity	156	176	141	171
Indicators				
CO_2 emissions avoided (1)	129,143	145,674	116,697	141,697
SO_2 emissions avoided (2)	593	669	536	650
NO_x emissions avoided (3)	296	334	268	325
Equivalent households (4)	51,990	58,645	46,979	57044
TOE saved (5)	13,331	15,037	12,046	14,626
Barrels of oil saved	97,315	109,771	87,936	106,774

(1) Emissions avoided were calculated using a specific emission coefficient of 828 gCO2/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 gSO2/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 gNO2/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: 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.

Sartec

Sartec has developed major new environmental projects in recent years. These include a project to monitor fugitive emissions of volatile organic compounds due to leaks of industrial plant process components. 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 a FID. Another innovative project was designed to monitor odour emissions using an integrated approach based on speciation of odour emissions through chemical analysis, to identify and quantify the compounds making up the odour mix, quantification of the odour impact using olfactometric analysis and assessment of the impact using dispersion models.

Other projects are geared towards identifying sources of contamination and their possible development over time, based on a forensic chemical approach using a wide range of high-tech analytical tools. These methods, in combination with modelling and risk analysis, enable the development of environmental due diligence services geared towards the assessment, including economic assessment, of environmental damage and the determination of possible remediation measures. The key projects implemented by Sartec in the area of contaminated site remediation are the design of hydraulic barriers to render contaminated groundwater safe, excavation projects, soil washing projects and support for the design and construction of physical barriers.

The ten-yearly provision and management of air quality measurement systems has also continued, notably the management of monitoring networks in Valle d'Aosta and the supplementary network for the city of Cagliari, and the provision of a wide range of goods and services for monitoring networks for third-party industrial sites.

In the field of energy efficiency, Sartec designs and builds energy-saving systems and renewable energy plants for special applications.

Its work with the Sardinia Forestry Commission is particularly impressive, culminating, in the last period, in the supply of portable photovoltaic kits produced by Sartec. These kits, equipped with photovoltaic generators and accumulator batteries, are also ideal for use in places that are hard to get to and where there is no power.

In its capacity as an energy service company (ESCo), Sartec offers energy advisory services geared towards achieving energy savings and obtaining energy efficiency credits (TEE).

Saras is currently in the process of finalising eight projects, which have enabled the Group to obtain over 143,000 credits worth an average of around EUR 100.00 each, since September 2011.

Saras Energía

The service station network belonging to Saras Energia closed 2012 with total turnover of more than 175 million litres.
Table 13 shows the trend in the fuel sales of our motorway network.

Table 13 – Fuel sold by the Saras Energia network in litres

	2010	2011	2012
Fuel sold (litres/year)	233,326,098	222,663,614	175,745,249

Similarly, incoming and outgoing traffic at the fuel storage facility was more than 454,000 tons. Table 14 shows changes in storage facility traffic in the three-year period 2009-2012.

Table 14 – Movement of products at the Cartagena storage facility.

Incoming + outgoing (metric tons)

	2010	2011	2012
DIESEL	958,402	534,725	352,000
GASOLINE	99,334	96,212	77,000
BIOFUEL	27,398	25,410	10,000
METHANE	21,018	15,923	15,000
Total	1,106,147	672,270	454,000

Environment

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 (CO2) 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 generally improving picture 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, organisational 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, emissions of sulphur dioxide (SO2), an issue that is of considerable interest to the local community, have decreased sharply compared with previous levels, dropping substantially in the last three years following the start-up of the tail gas treatment unit at the sulphur recovery plant. Compared with the average figure for previous periods, SO2 emissions have fallen by about 50% in the past three years.

EMAS registration

In June 2012, the certifying body, Lloyd's Register Quality Assurance (LRQA), validated Saras' 2012 Environmental Declaration, which was prepared pursuant to new EC Regulation 1221/2009, recommending the annual renewal of its registration with the EC Control Body, ECOLABEL.

On 13 September 2012, the same body approved the renewal of the three-yearly certification, EMAS, at the end of a process started in June 2012.

The 2012 Environmental Declaration was subsequently published and disseminated. Aimed at the company's external and internal community, the document is designed to establish a transparent relationship with the local population, local authorities and employees and to explain the activities carried out by Saras, the direct and indirect environmental aspects of these activities and targets for environmental improvement set by the company.

AIA permit

The refinery has held the AIA permit for around four years, following its issue to the Refinery and the IGCC on 24 March 2009.

The AIA Permit was issued pursuant to Legislative Decree 59/05, now included in the Consolidated Law on the Environment, transposing into Italian law Directive 91/61/EC, better known as the IPPC Directive, which governs integrated pollution prevention and control.

Environmental training

In order to achieve ongoing environmental improvements, it is essential to provide training to personnel, both to bring them up to date and to raise awareness of the importance of their individual roles.

As well as continuous dedicated training on environmental conservation and protection, which takes place every year, 2012 saw the completion of a training course on Saras' AIA permit. This focused in particular on the opportunities that the permit offers in managing and optimising resources, and the contribution that everyone can make to reducing environmental impact.

A special two-hour module on the Environmental Management System was also provided to new recruits as part of general orientation training.

In total, 4,604 hours of environmental training were delivered, an increase of 55% compared with 2011.

EMAS (EcoManagement and Audit Scheme)

EMAS (EcoManagement and Audit Scheme): established by EEC Regulation 1836/93, updated by EC regulation 761/2001 (EMAS II) and by EC Regulation 1221/2009 (EMAS III), this is a voluntary scheme intended to promote continuous improvement in the environmental efficiency of industrial activities. Under the regulations, participating companies must adopt environmental management systems at their production sites based on policies, programmes, procedures and objectives aimed at improving the environment, and must publish an environmental declaration. Before a site can be added to the register set up by the European Commission, this declaration must be approved by an inspector accredited by an authorised national body. In Italy this body is the Ecolabel and Ecoaudit committee, which has been operational since 1997 and works with the technical support of ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale - Institute for Environmental Protection and Research).

AIA permit

The AIA (integrated environmental authorisation) permit is a provision authorising operation of a plant, while imposing measures to prevent or reduce 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. Measures relating to the control of major accident hazards involving dangerous substances are governed by specific legislation (Seveso)

LIPPC (Integrated Pollution Prevention and Control) is a new strategy in place throughout the European Union, aimed at enhancing the "environmental performance" of authorised industrial complexes. The key aim of the Directive is to make a comparative assessment of the various environmental segments and to unify authorisation procedures, so that separate approaches to the control of air, water and soil emissions do not encourage the transfer of pollution from one environmental category to another, and to protect the environment as a whole. This also introduces the requirement to assess the various solutions to prevent an improvement in one environmental area from creating an unacceptable deterioration in another. The AIA permit replaced all existing authorisations and fundamentally changed the way in which environmental issues are managed. Fine-tuning of the monitoring and control plan continued in 2012: specific meetings took place with ISPRA and ARPAS (Cagliari) technicians, while, in the oil segment, AIA permits are close to being issued for the Italian refineries. Regarding the requirements of the preliminary assessment, in the year under review in this report, implementation and research activities continued in relation to measuring flare temperatures and measuring dust on the CO-boiler smokestack.

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 relating to overall environmental improvement at the refinery. As part of this commitment, important initiatives in thermal recovery implemented in 2009, together with the management activities identified in the FOCUS project (including the reduction of over-consumption in kilns and the maximisation of thermal integration between plants), reduced consumption by about 40,000 TOE in 2012. For these significant investments, applications were filed with the AEEG for the certification of energy savings and for energy efficiency credits (also known as white certificates), which are an incentive towards making and maintaining investments to improve energy efficiency. One key step was the integration of the FCC with the desalinator, meaning that water can be desalinated without the use of steam. Table 15 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, with a slight reduction, due to the raw material processed, in 2010.

Table 16 on the next page 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.

BREFs (Bat REFerence documents)

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 the best available techniques, associated emissions monitoring, and developments in this regard", 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 BREFs (Bat REFerence documents).

Table 15 – Total energy consumption (refinery + IGCC; TOE)

	2009	2010	2011	2012
Electricity	160,969	168,159	167,918	178,710
Fuel oil	185,270	183,450	174,786	152,009
Fuel gas	403,358	446,345	459,213	450,739
Flue gas	125,143	183,564	187,298	177,992
Total	**874,740**	**981,518**	**989,215**	**959,450**

Chart 5 – Total energy consumption (refinery + IGCC)

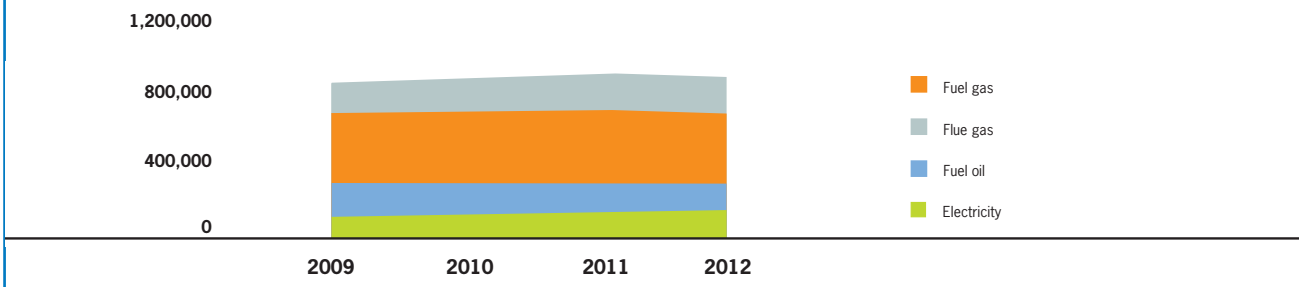
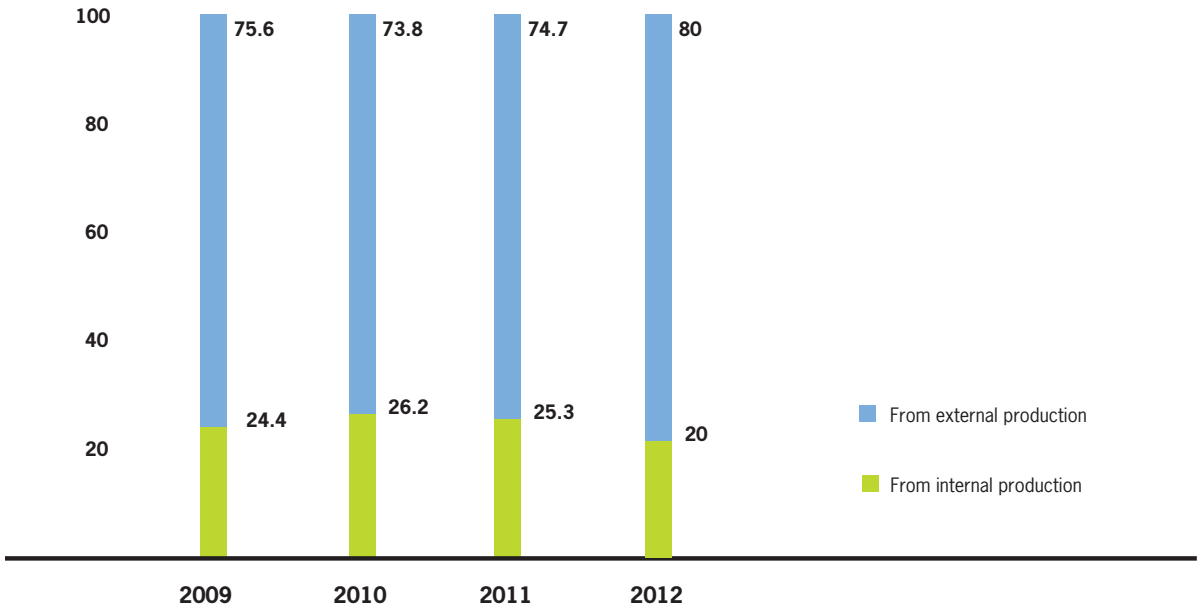


Table 16 – Electricity requirement and supply (refinery + IGCC; MWh)

	2009	2010	2011	2012
Total demand	1,137,842	1,218,295	1,202,358	1,194,495
- from internal production*	277,044	319,049	304,402	238,829
- external	860,798	899,246	897,956	955,666

* Production by the refinery's thrmoeletric plant; all IGCC plant output is sold to the national grid.

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



Water consumption

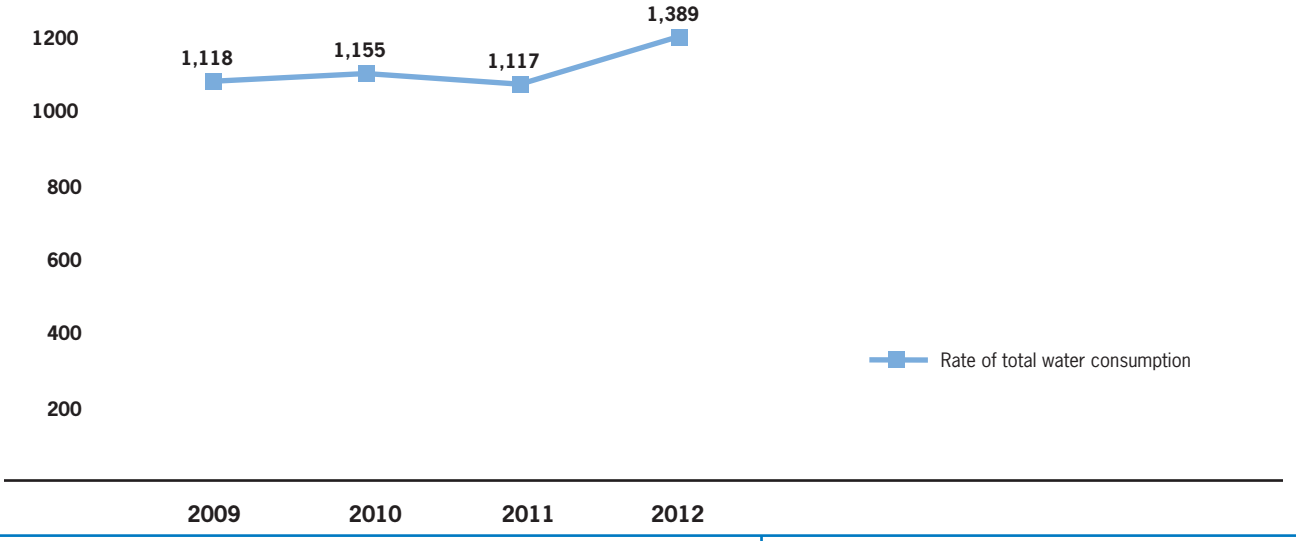
Water is a valuable resource for the Sarroch facility, and its use is constantly monitored to optimise consumption and to promote recovery and desalination, instead of using fresh water supplied by CACIP (Cagliari Industrial Development Area Consortium), which manages the water supply to the Sarroch industrial district. Water for industrial purposes is mainly used to supply 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 in civil applications. 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 remains broadly stable. Supply sources in 2012 continued the trend seen in previous years, with an increase in the internally recovered portion (purified water from the biological plant that is no longer discharged into the sea) at the expense of desalinated seawater, as shown in Table 17 and Chart 7.

In the period under review, internal recovery on average met approximately 30% of the total annual requirement, and desalination was also a source of supply, accounting for 20.6% of the total. Taken together, desalination and recovered water met approximately 50% of the requirement in 2012. This is a significant result for the site, confirming the results of rationalising consumption and internal recycling. With a view to increasing recycling, a new "filtration, ultra-filtration and reverse osmosis" plant (known as the BE-5, with a capacity of 230 m^3/h of demineralised water) was introduced

Table 17 – Total water consumption by source of supply (refinery + IGCC; m^3/h)

	2009	2010	2011	2012
Desalination	546	540	464	381
CASIC	771	905	885	927
Internal recovery	447	446	438	541
Total	**1,764**	**1,891**	**1,787**	**1,849**

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



in 2012. This innovative system for producing demineralised water has enabled the Group to further increase the percentage of wastewater reused after purification by the wastewater treatment plant (TAS).

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 to ensure its activities are environmentally compatible, as demonstrated by the 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. Since 2009, one of the most significant projects in terms of reducing atmospheric emissions has been the start-up of the Tail Gas Treatment Unit (TGTU), which has increased the plant's sulphur recovery and thereby reduced SO2 emissions. The process of desulphurising gasoline and diesel for the European market has been consolidated and updated. Production of gasoline and diesel with a sulphur concentration of 10 ppm (parts per million) helps to reduce indirect SO2 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 complied with, and have contributed to the reduction in indirect SO2 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 complied with, as shown in the following charts. The process of desulphurising gasoline and diesel for the European market has been consolidated and updated. Production of gasoline and diesel with a sulphur concentration of 10 ppm (parts per million) helps to reduce indirect SO2 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 complied with, 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, including:

- procuring water from different sources
- installing a first desalinator in 1994 with a capacity of 300 m3/hr, followed by the installation of six desalination modules for the IGCC in 1999, with a total capacity of approximately 600 m3/hour
- 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 the water system run by CACIP (Cagliari Industrial Development Area Consortium, responsible for managing the water system in the Sarroch industrial area) without disrupting the marine ecosystem near 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.

Moreover, a portion of the water treated by the process-water purification plant (approximately 540 m3/hr) is reused for industrial purposes in the refinery. In 2012, the new reverse osmosis plant for producing deionised water was launched and became fully operational, which reduced the amount of water drawn from primary sources such as aqueducts and the seawater desalination process.

Table 18 – Total atmospheric emissions (thousand tons/year)

	2009		2010		2011		2012	
	Refinery	IGCC	Refinery	IGCC	Refinery	IGCC	Refinery	IGCC
SO_2	3.89	0.51	3.71	0.46	3.57	0.39	3.35	0.44
NO_x	2.43	0.58	2.85	0.60	2.13	0.56	1.91	0.52
DUST	0.28	0.03	0.35	0.03	0.32	0.03	0.33	0.03
CO	0.54	0.12	0.36	0.16	0.26	0.17	0.25	0.20
CO_2*	2,130	3,540	2,369	3,783	2,354	3,519	2,239	3,690

* as per emissions trading declaration (see box on page 65)

Sulphur dioxide (SO_2)

The site recorded its best ever year for total SO2 emissions in 2012, confirming the downward trend under way for several years. This result is due to both steady improvement in the quality of the fuels used and the stability of the TGTU.
In particular, the emissions rate per ton of raw materials processed (Chart 10) confirms the improvement in process performance seen in recent years.
The 2012 figures, confirmed by the monitoring of the refinery smokestacks and the IGCC, show that all the values recorded were well below the legal limits set for the refinery (Chart 11) and those for the IGCC (Chart 12).

Chart 8 – SO_2 emissions (thousands of tons/year)

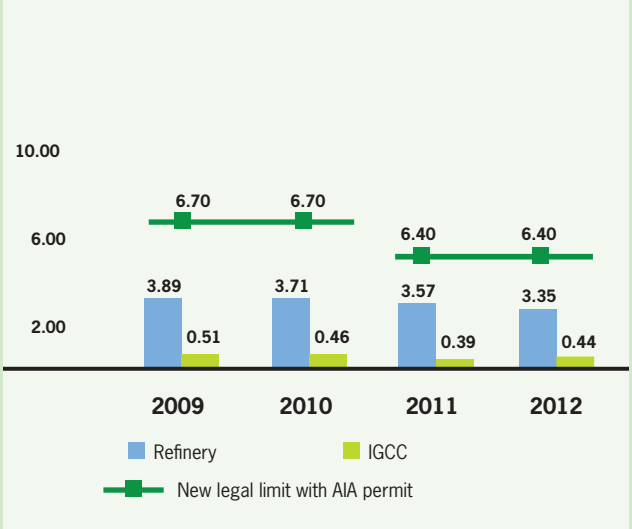


Chart 9 – Sulphur content (% in weight)

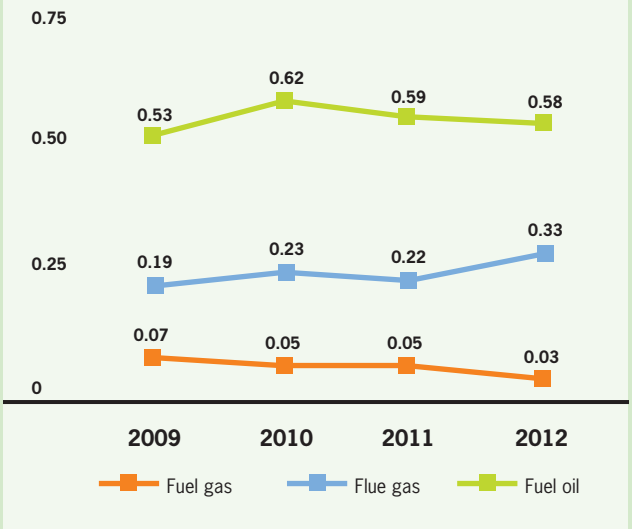


Chart 10 – SO_2 emissions index (tons of SO_2 /thousands of tons processed)

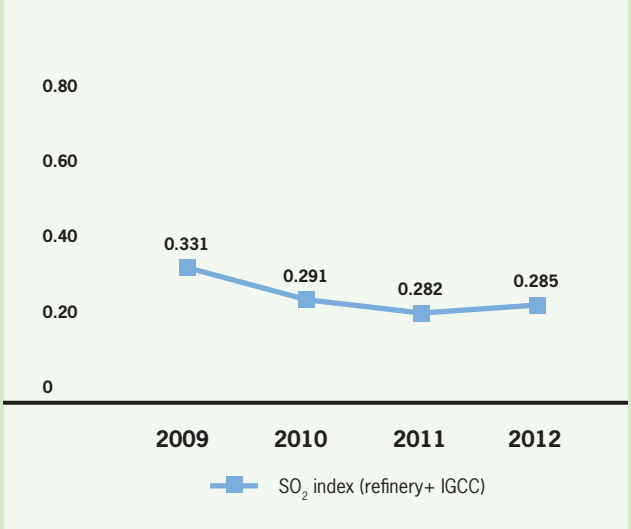


Chart 11 – Concentrations of SO_2 from the refinery smokestacks (mg/Nm_3)

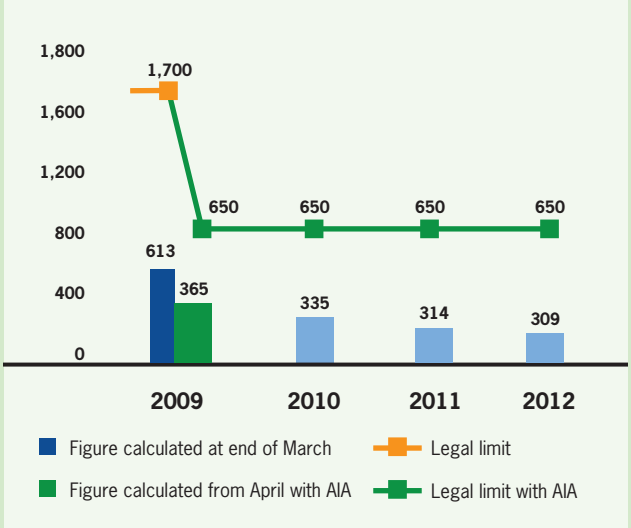
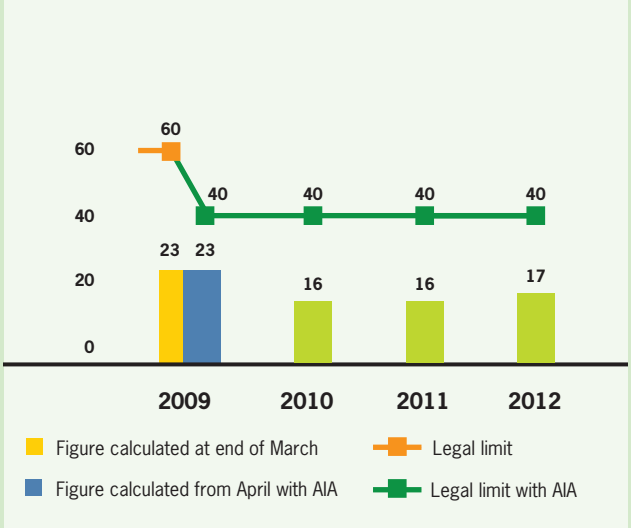


Chart 12– Concentrations of SO_2 from the IGCC smokestacks (mg/Nm_3)



Nitrogen oxide (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.
In terms of NOx emissions, the Group's best ever result was recorded in 2012 (Chart 13). The emissions index is also in line with the improving trend (Chart 14). The trend in emissions concentrations in 2012 confirmed that of previous years. A comparison of concentrations with the regulatory limits confirms that the results are positive and below the limit (Charts 15 and 16).

Chart 13 – NOx emissions (thousands of tons/year)

Chart 14 – Index of NOx emissions (tons of NOx /thousands of tons processed)

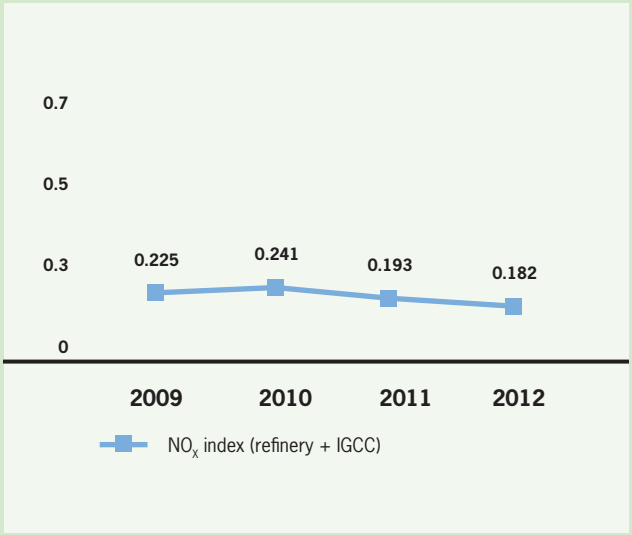


Chart 15 – Concentrations of NO_x from the refinery smokestacks (mg/Nm_3)

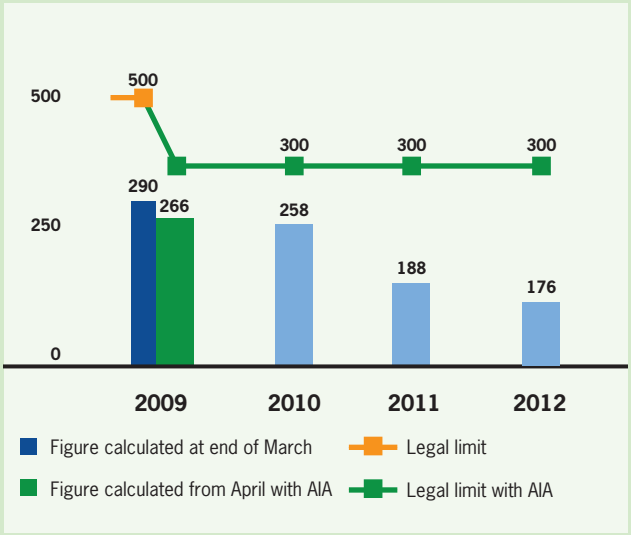
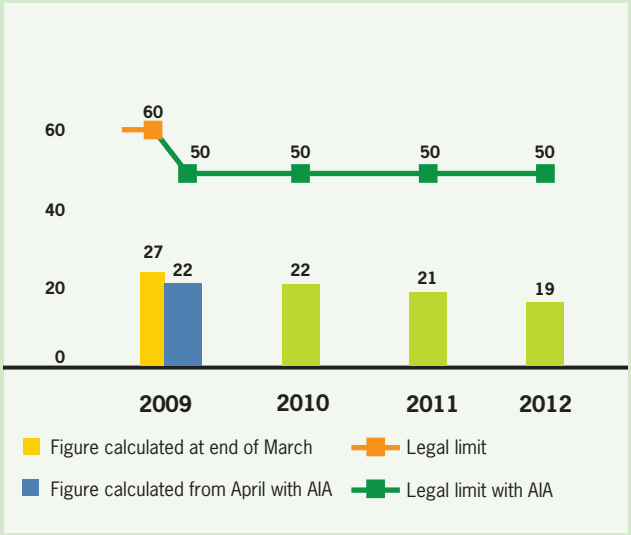


Chart 16 – Concentrations of NOx from the refinery smokestacks (mg/Nm_3)



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 remained largely unchanged (Chart 18).

Chart 17 – Dust emissions (thousands of tons/year)

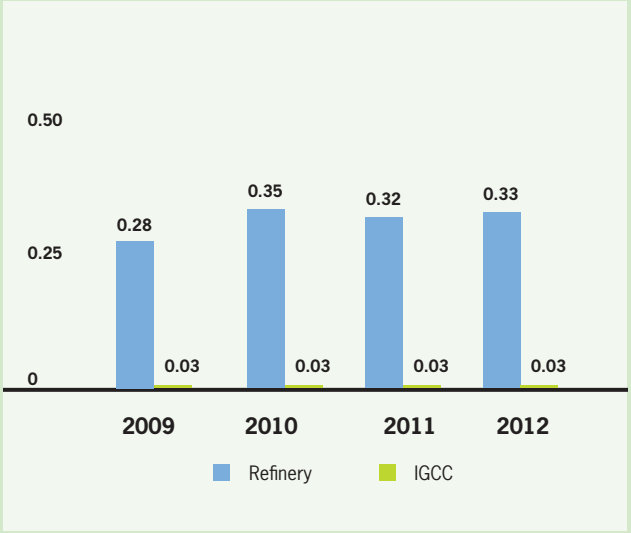


Chart 18 – Dust emissions index (tons of dust/thousand tons processed)

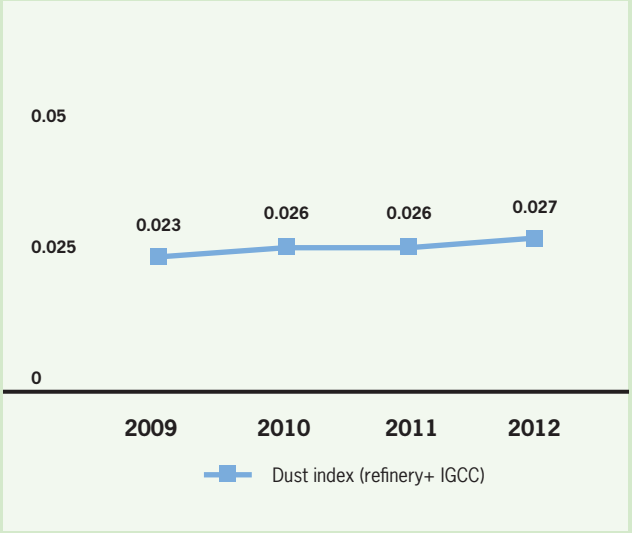


Chart 19 – Concentrations of dust from the refinery smokestacks (mg/Nm_3)

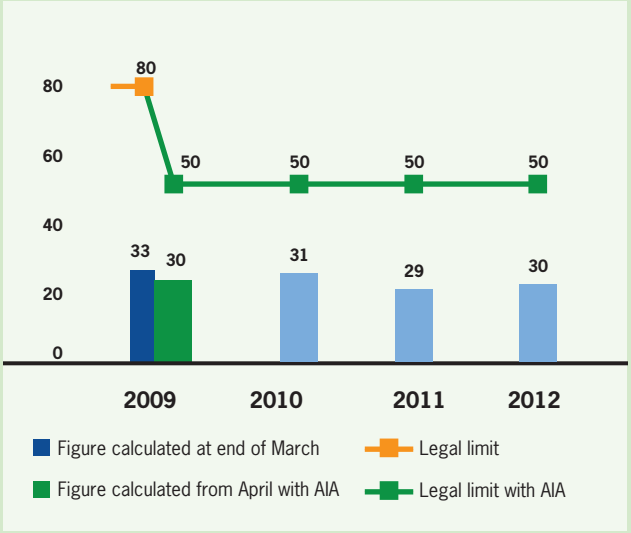
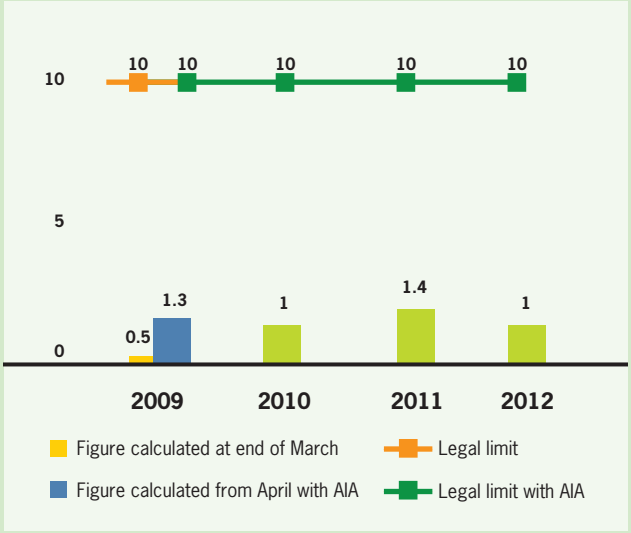


Chart 20 – Concentrations of dust from the IGCC smokestack (mg/Nm_3)



PM10

Legislation prior to 2009 did not stipulate limits for this parameter.
The authorised PM10 limits apply only to the refinery and were introduced on 9 April 2009 by the AIA permit. The values were calculated using the US-EPA 1998 method.
The emissions index has been stable since 2009.

Chart 21 – PM10 emissions (thousands of tons/year)

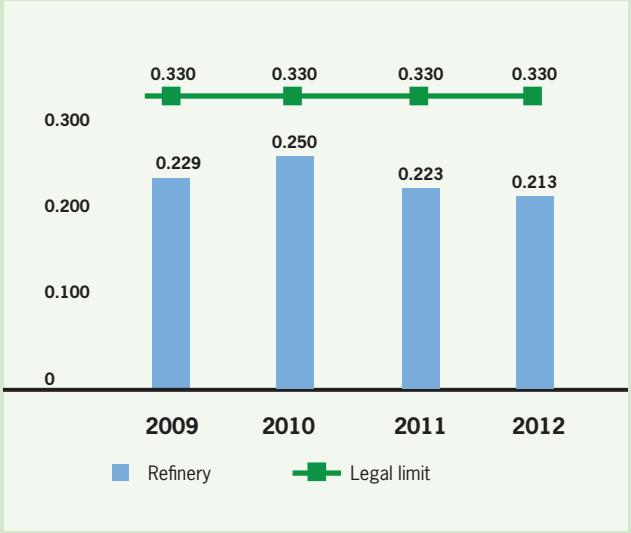


Chart 22 – PM10 emissions index (tons of PM10/thousand tons processed)

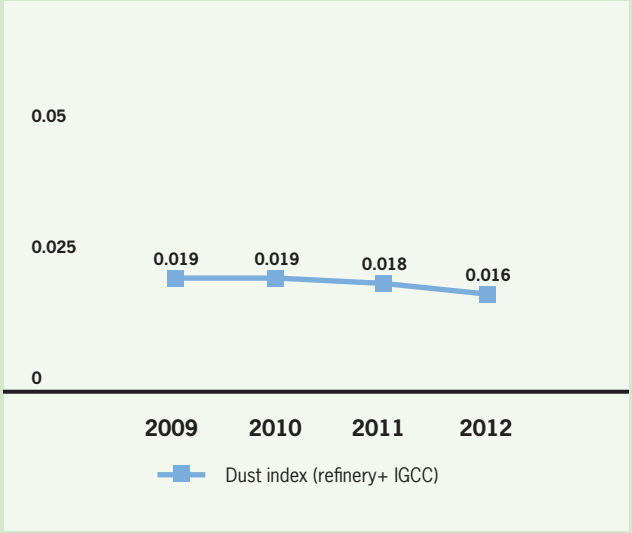
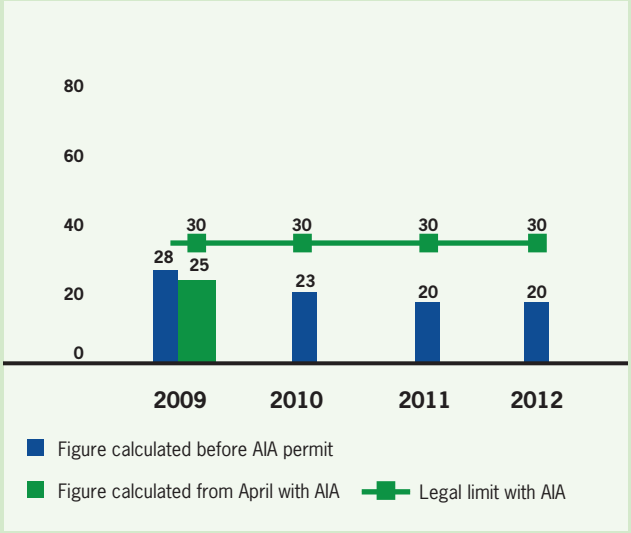


Chart 23 – Concentrations of PM10 from the refinery smokestacks (mg/Nm_3)



Carbon monoxide (CO)

An ongoing positive trend can also be seen in carbon monoxide emissions: The IGCC figure has been broadly in line with the trend, while the figure for the refining plants has been stable due to the optimisation of certain furnaces, and especially to the contribution of the TGTU unit since 2009 (Chart 24). The emissions index figure is also positive, recording performance in 2012 in line with recent years.

All the values recorded are also well below legal limits.

Chart 24 – CO emissions (thousands of tons/year)

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

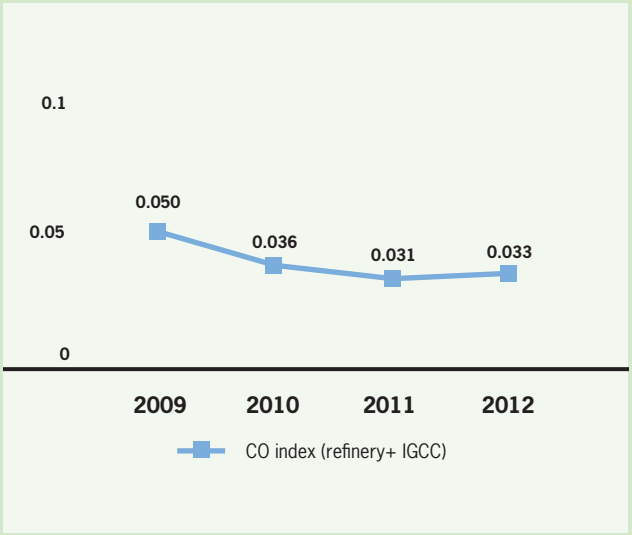
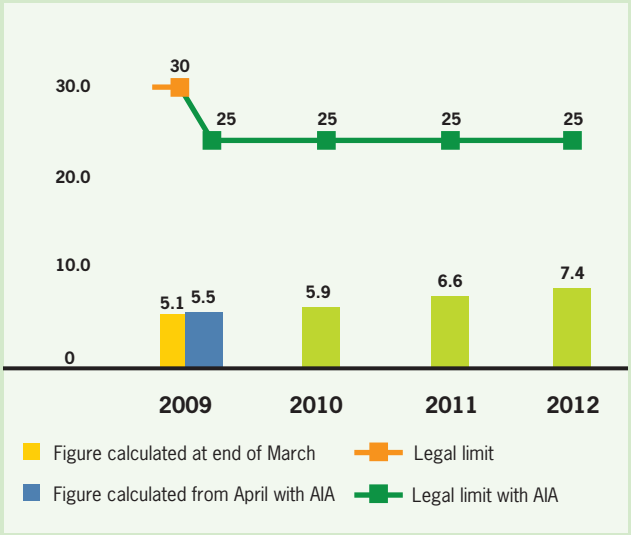


Chart 26 – Concentrations of CO from the refinery smokestacks (mg/Nm_3)

Chart 27 – Concentrations of CO from the refinery smokestacks (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 purchasing 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. The year 2012 marked the end of the second period of application of the ETS Directive.

The rules for assigning quotas will be changed for the period 2013-2020: EC Directive 2003/87/EC, amended by EC Directive 2009/29/EC, also provides the option, in the period after 2012, to assign, free of charge, a certain quantity of CO_2 emissions quotas based on harmonised European Community regulations.

Emissions by the IGCC in 2012 were also in line with previous figures. The data for the refinery show, however, that CO_2 emissions are continuing the downward trend under way since 2010, q reduction that is due to investments in energy saving. The figures for 2012 also demonstrate that the route taken by Saras, involving rational energy use and the adoption of efficient production systems, is the key approach for controlling and reducing CO_2 emissions. The 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 based on the total emissions from all 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 established by the directive are as follows:

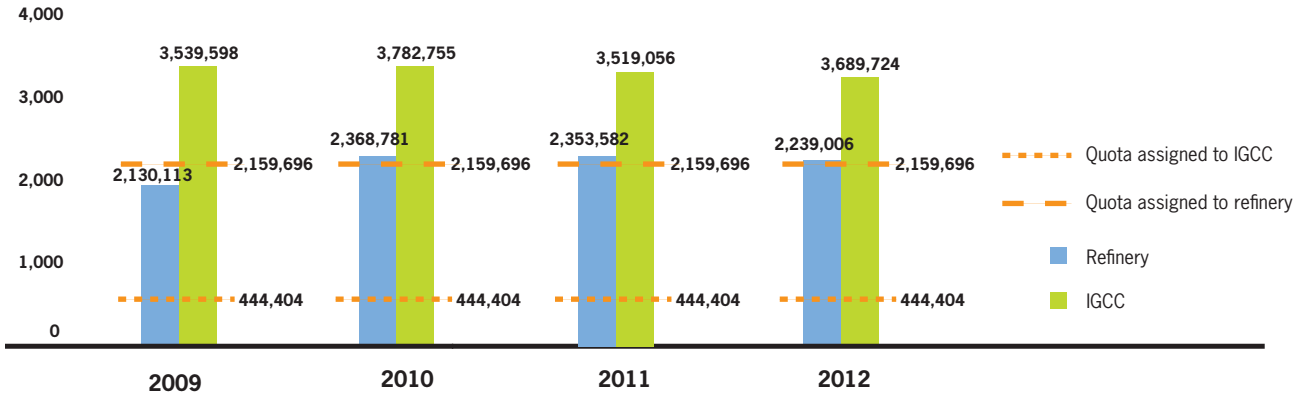
- as of 1 January 2005, no plant within the scope of the directive may emit CO_2 (i.e. continue to operate) without appropriate authorisation
- each year the operators of these plants must surrender CO_2 allowances equal to the CO_2 released into the atmosphere to the competent national authority
- maximum CO_2 allowances have been set for every plant regulated by the directive
- CO_2 emissions actually released into the atmosphere are monitored in accordance with the requirements of the competent national authority and certified by an accredited inspector.

Table 19 – CO_2 emitted by the site (refinery + IGCC; ton/year)

	2009	2010	2011	2012
Refinery	2,130,113	2,368,781	2,353,582	2,239,006
IGCC	3,539,598	3,782,755	3,519,056	3,689,724
Total	**5,669,711**	6,151,536	5,872,638	5,928,730
Quota assegnata complessiva (Raffineria + IGCC)	**2,604,100****	**2,604,100****	**2,604,100****	**2,604,100****

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

Chart 28 – CO2 emissions: absolute values and allowances (tons/year)



Air quality monitoring

Constant monitoring and ongoing control of air quality are the key elements 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 very wide 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 20 shows the key

Table 20 - Index of Atmospheric Purity (I.A.P.): categories of air quality and atmospheric purity

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

Figure 9 - Location of air quality biomonitoring units.

1 – The I.A.P. 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).

criteria for interpreting the categories of air quality and atmospheric purity, with reference to the Index of Atmospheric Purity (I.A.P.).
Table 20 also shows the categories that include the index values recorded at the monitoring stations. In 2012, the air quality in the area studied again fell into category I.A.P.3, 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 I.A.P.4 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. The picture that emerges from an analysis using bio-indicators shows, therefore, that the air quality falls in the mid-range of the I.A.P. index.

- Monitoring networks

  Air quality outside the Sarroch refinery (emissions) is checked by three monitoring networks. Saras manages its own air quality measurement sensors (four), while Polimeri Europa is currently restructuring its own monitoring network and ARPA Sardegna (ARPAS) operates the three sensors owned by the Sardinian regional authorities; the CENSA9 station, Sarroch Villa d'Orri, was dismantled in May 2011 to be used in another location.

  The Saras network – managed alongside those of the local authorities and other companies in the region – provides data on changes in parameters relevant to air quality in real time, to ensure that pollution is kept below the minimum levels set out by the laws in force and that immediate steps 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 PM10 in 2012 was available only for the Porto Foxi station due to an update of the management software; the work has since been completed and in 2013 the other data will also be available). The station in the area of the national storage facility also has a weather station. In the second half of 2010, two stations, Sarroch and the national storage facility, were also fitted with PM2.5 continuous analysis equipment. 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 two stations; and CO at two stations. A dedicated monitoring system constantly checks emissions from the IGCC plant for SO_2, NOX, PTS, CO and smoke load, 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 2012 was around 98%. A similar system monitors emissions from the refinery's central smokestack, which collects approximately 30-35% of total emissions (Topping 1 and thermoelectric plant), monitoring the same parameters as described above. In 2009, similar monitoring systems were also installed for emissions from the smokestacks of the Z3 and Z4 sulphur

recovery plants, and since September 2010, monitoring systems for the smokestacks of the Topping 2, Reformer/Alkalisation (CCR/Alky) and CO Boiler plants have also been on stream. The remaining emissions are monitored periodically through half-yearly sampling. The tables on the next page 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 21 on page 69).

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 is constantly monitored from an environmental performance perspective. The reduction in emissions due to the start-up of the TGTU plant in 2009 has also led to a marked improvement in air quality, notably for SO_2, a trend that was confirmed in 2012.

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

Table 21 – Data from the monitoring network and comparison with legal limits pursuant to Ministerial Decree 60/02 (µg/m^3)

SO_2	Number of times limit exceeded									
	Hourly limit[1]			24-hour limit[2]			Limit for ecosystems[3]			
	2010	2011	2012	2010	2011	2012	Limit	2010	2011	2012
Villa d'Orri	0	0	0	0	0	0	**20**	3	4	4
Porto Foxi	0	0	0	0	0	0	**20**	7	7	8
Sarroch	0	0	0	0	0	0	**20**	6	3	5
National storage facility	0	0	0	0	0	0	**20**	4	1	3

1 – Hourly limit must not be exceeded more than 24 times per calendar year (350 µg/m^3 since 2005)
2 – 24-hour limit must not be exceeded more than three times per calendar year (125 pg/m^3).
3 – Limit for the protection of ecosystems (20 pg/m^3).

NO_2	Number of times hourly limit exceeded[1]			2010		2011		2012	
	2010	2011	2012	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]
Villa d'Orri	0	0	0	5	**40**	4	**40**	3	**40**
Porto Foxi	0	0	0	4	**40**	3	**40**	6	**40**
Sarroch	0	0	0	6	**40**	5	**40**	4	**40**
National storage facility	0	0	0	6	**40**	5	**40**	5	**40**

1 – Hourly limit must not be exceeded more than 18 times per calendar year (250 µg/m^3 since 2010)
2 – Annual limit.
3 – Annual average on an hourly basis.

PM10	Number of times 24-hour limit exceeded[1]			2010		2011		2012	
	2010	2011	2012	Value recorded[2]	Limit	Value recorded[2]	Limit	Value recorded[2]	Limit
Villa d'Orri	-	-	N.A.	-	**40**	-	**40**	N.A.	**40**
Porto Foxi	N.A.	4	0	17	**40**	19	**40**	16	**40**
Sarroch	N.A.	N.A.	N.A.	14	**40**	N.A.	**40**	N.A.	**40**
National storage facility	-	-	N.A.	-	**40**	-	**40**	N.A.	**40**

1 – 24-hour limit must not be exceeded more than 35 times per calendar year (50 pg/m^3 since 2005).
2 – Arithmetic mean of average daily concentrations in a one-year period.
N.A.: figure not available, data acquisition system being replaced

CO	Number of times average daily peek exceeded[1]		
	2010	2011	2012
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

A new plant using reverse osmosis technology was launched in 2012 and became fully operational in the third quarter of the year. Using purified wastewater, it produces around 230 mc/hr of pure, demineralised water to feed the refinery's boilers. Purified water discharged into the sea is therefore reduced by the entire amount of demineralised water produced through reverse osmosis, leading to a real reduction in annual average flows. As a result, total wastewater decreased in 2012 compared with previous values (Charts 29 and 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 22).

In line with the provisions of the AIA permit, monthly samples are taken from discharges of wastewater into the sea and sent for analysis by an accredited external laboratory, while daily samples are analysed by the Saras in-house laboratory.

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 well below the limits set by existing legislation. Total CODs in 2012 decreased compared with previous years. This figure is consistent – and even more than expected – with the increased reuse of purified water, which was previously discharged into the sea. The portion of purified water that is no longer discharged to the sea is completely filtered by the reverse osmosis plant. As a result, the organic material is recovered and retreated, leading to a concrete reduction in COD emissions.

Chart 29 – Total wastewater (m^3/h)

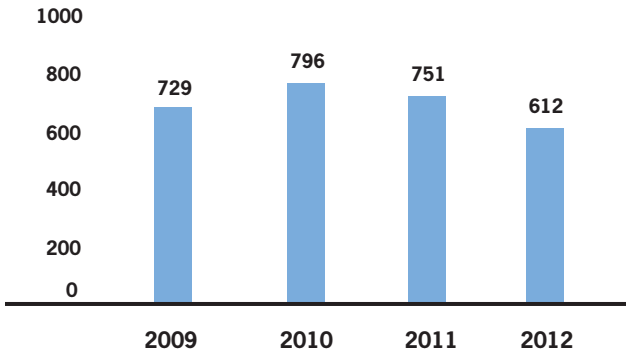


Chart 30 – Total wastewater index (m^3/thousand tons processed)

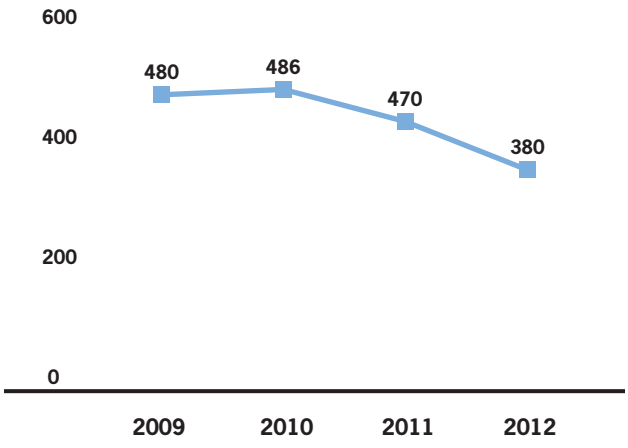


Table 22 – Main substances detected (tons/year)

	2009	2010	2011	2012
COD	561	673	571	363
Mineral oil	12.2	13.8	14.6	13.5

The difference in the figures registered for COD from 2009 onwards is due to a new calculation criterion stipulated by the AIA permit, rather than to a real change in the emission content.

Chart 31 – COD emissions (thousands of tons/year)

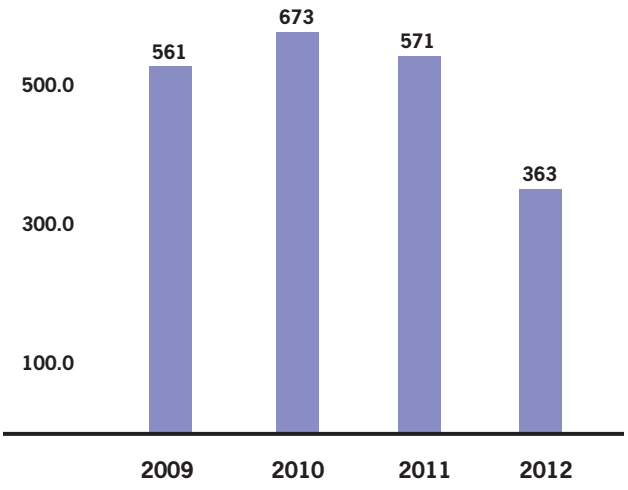


Chart 32 – Mineral oil emissions (tons/year)

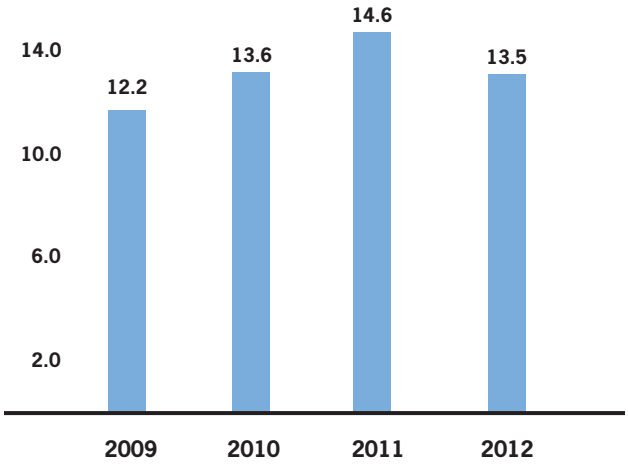


Chart 33 – COD emissions index (tons of COD/million tons processed)

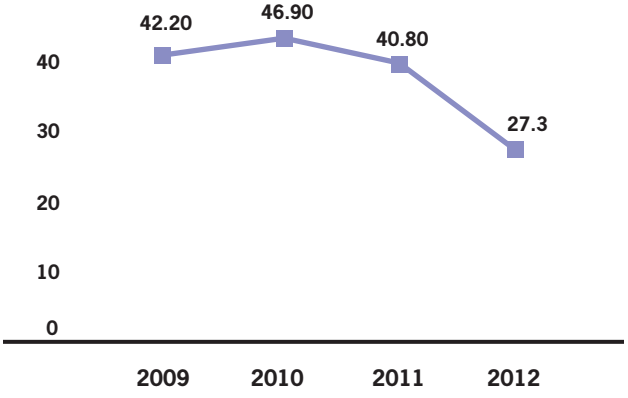


Chart 34 – Mineral oil emissions index (tons/million tons)

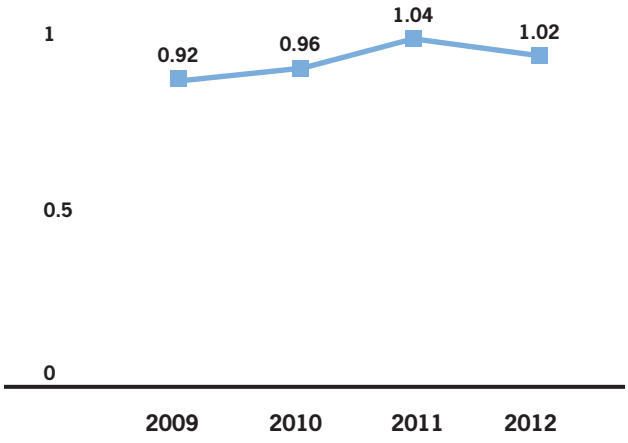


Chart 35 – COD concentration (mg/l)

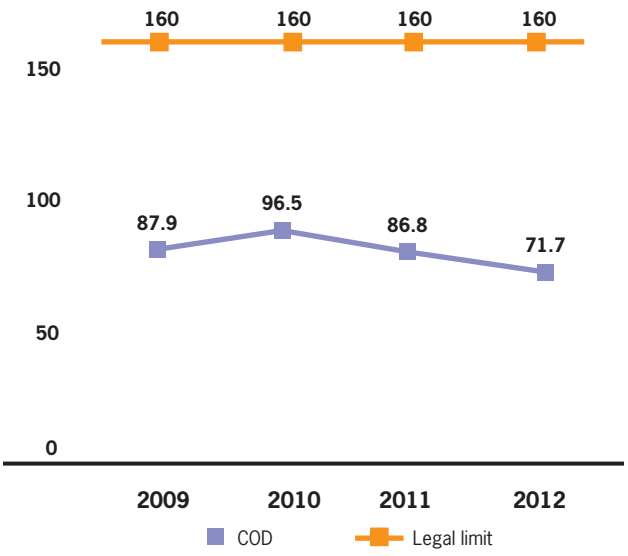
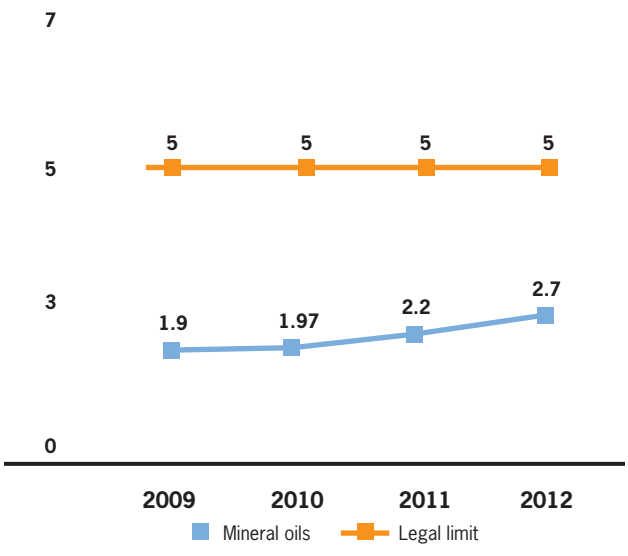


Chart 36 – Mineral oil concentration (mg/l)



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. 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 survey period) and surface sediment
- monitoring of heavy metals in sediment

Table 23 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.

Figure 11 - Seawater quality survey area

Table 23 – Trophic index (TRIX): seawater quality categories and results (2009-2012 survey)

	Surface water	Bottom water
January 2009	good	good
July 2009	good	good
January 2010	**good**	**good**
July 2010	**good**	**high**
January 2011	**high**	**high**
July 2011	**high**	**high**
January 2012	**high**	**high**
July 2012	**high**	**high**

Several years ago a new parameter, the CAM (classification of seawater) index, was introduced to assess 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 whole 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 transportation 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 24). In any case, these indices are significant over long periods rather than in a single period. In 2012, the parameter showed a continuation of the trend seen in previous years.

Table 24 - Trophic state of seawater (2009-2012 survey) CAM Index (specific to the seas surrounding Sardinia)

	Surface water	Bottom water
January 2009	low	low
July 2009	low	low
January 2010	average	average
July 2010	low	low
January 2011	**average**	**average**
July 2011	**high**	**high**
January 2012	**average**	**average**
July 2012	**average**	**average**

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 ones are:

- the 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 en-

vironmental 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)

- the implementation of the automatic ESD (Emergency Shut Down) system, to prevent the spillage 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

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 74).
For several years, Saras has also been stepping up its use of double-hulled ships to transport crude oil and oil products, with the result that the goal of using only double-hulled ships for transportation of gasoline, kerosene and diesel (Table 25) was achieved in 2009. 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.

Waste

With Ministerial Decree of 17 December 2009, as subsequently amended, the Ministry for the Environment set out a series of new requirements for businesses, largely consisting of registration with SISTRI (waste traceability control system) and the use of new IT procedures in waste management. These IT procedures must replace the current paper-based system (registers, forms and MUDs (unified environmental declarations).
Saras registered with SISTRI in February 2010 and now uses the new IT system alongside the paper-based documentation still in use. It has also taken part in SISTRI test days organised by the Ministry for the Environment. SISTRI was scheduled to take effect on 30 June 2012 but art. 52 of Legislative Decree 83 of 26 June 2012 suspended its entry into force until 30 June 2013. The facility manages waste according to its objectives of minimising the quantity produced and increasing the quantity recovered. In 2012, the total amount of waste from refining was in line with previous years.
Around 108,280 tons of waste were recovered or recycled in 2012, in line

Refinery equipment to protect 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 25 – Commitments and results relating to the protection of the marine environment from shipping traffic - 2012

	Committment for 2012	Result for 2012	Committment for 2013
Double hull for light crude oil	100%	100%	100%
Gasoline/kerosene/diesel	100%	100%	100%

Chart 37 - Types of vessel (%)

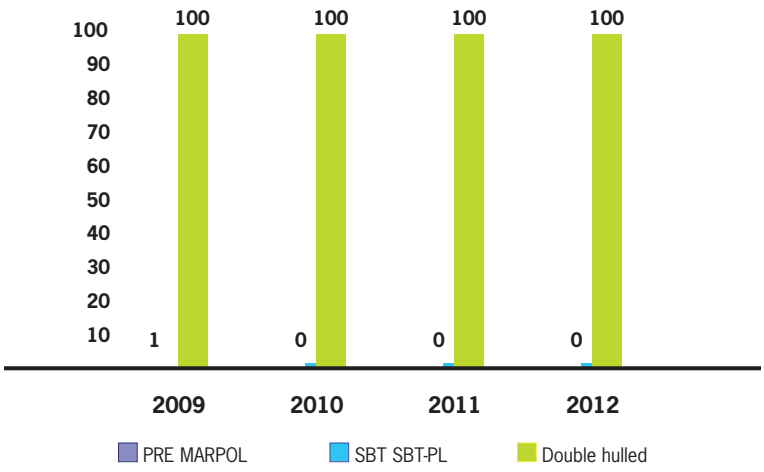
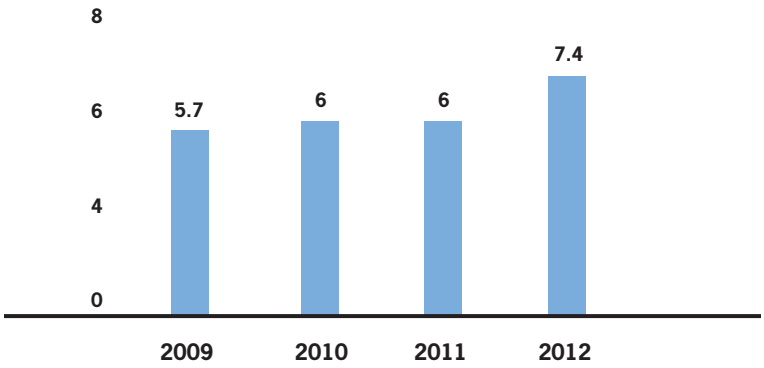


Chart 38 - Average age of tankers (years)



with recent years. This was mainly due to site remediation activity and to the delivery of used catalysts to companies specialising in the recovery of metals (CO, MO, Ni). 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 converted into non-hazardous waste that can then be sent to landfill (Table 29). In 2012, the waste inertisation plant sent about 11,290 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 2012 by agreement with the Municipality of Sarroch. The quantities of material sent for recycling are shown in Table 30.

New measures to protect our coastlines: 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 reduce 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 had to 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).

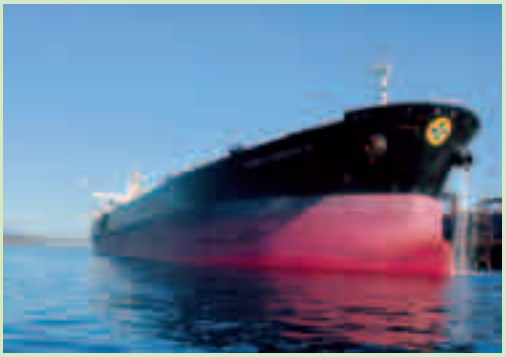


Table 26 – Waste produced by the site (thousand tons/year)

	2009	2010	2011	2012
Hazardous waste*	29.2	25.5	19.7	20.9
Non-hazardous waste	5.7	7.2	5.3	6.8
Total	**34.9**	**32.7**	**25.0**	**27.7**

*excludes waste deriving from the 2008 characterisation plan.

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

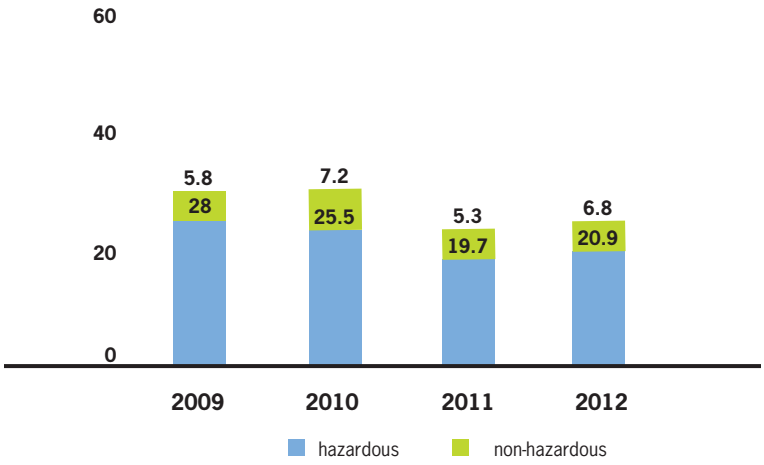


Table 27 - Remediation activity (thousand tons/year)

	2010	2011	2012
WATER	105	103	103
EARTH	2.8	0	0

Table 28 – End destination of waste (thousand tons/year)

	2009	2010	2011	2012
Landfill	31.25*	0.75	1.0	2.57
Recovery	106.54	112.35	106.53	108.28
Incineration	0.50	0.37	0.31	0.01
Internal chemical/physical treatment External chemical/physical treatment	24.06	27.09	19.79	19.55
Total	**162.35**	**140.56**	**127.63**	**130.42**

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

Chart 40 – Final destination of waste (%)

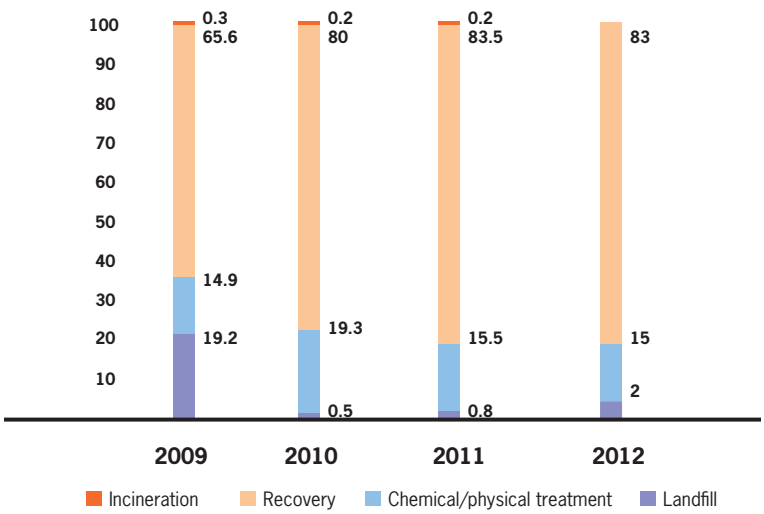


Table 29 – Chemical or physical treatment of waste (thousand tons/year)

	2009	2010	2011	2012
Chemical/physical treatment, of which:	22.96	27.09	19.79	19.55
Rendered inert and sent to landfill	10.61	13.1	9.3	11.29
Internal recycling	12.35	13.9	10.49	8.26

Table 30 - Separated waste sent for recycling (tons)

	2009	2010	2011	2012
Paper	74.6	81.7	82.4	111.5
Plastic	24.7	20.8	17.5	21.8
Glass and aluminium	10.9	14.4	12.1	14.6
Wet waste (since 2008)	7.8	12.6	22	22.2
RSU	498.5	373	307.1	332.9

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 presented, pursuant to Article 9 of the Decree, 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 are 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 above), 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 check for the presence of hydrocarbon gas in the soil interstices
- **top soil surveys**, for which samples of the first 10-15 cm of soil were taken from 10% of the survey points to determine their asbestos, PCB and dioxin content

The site investigation plan was completed in June 2009, with 739 surveys, 140 piezometric tests, 89 top soil surveys and 542 gas surveys carried out.
In October 2010, sampling and analysis of groundwater was carried out jointly with ARPAS to verify the results of the analysis: a total of 130 piezometric readings were taken, including 15 in partnership with ARPAS technicians.
All the soil and water samples taken were analysed in early 2011. Analysis of the surveys provided the following information:

- the soil analyses showed only restricted areas in which hydrocarbon concentration limits were exceeded. Other parameters also marginally exceeded the limits (Cd, Co, Cr, Cu, Ni, Pb, V, Zn and IPA) in limited and non-adjoining areas, confirming that they were isolated cases rather than a widespread problem.
- analysis of the groundwater indicated the presence of hydrocarbons above the concentration limit in some cases. Hydrocarbons were also detected in the light non-aqueous (supernatant) phase liquid (LNAPL); and certain other parameters (Cd, Ni, Pb, IPA, BTEX, MTBE, sulphates) marginally breached the limits.
- No abnormal readings were found in the gas surveys of topsoil.
- No abnormal readings were found in the top soil surveys.

Preparation of the final documentation for the Site Characterisation Plan began in 2011. The document was officially submitted to the supervisory bodies in December 2012.
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 phase involving construction of a hydraulic barrier with supernatant recovery systems has already been completed. The 46 wells required have been created: 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 extraction wells are hydrogeologically upstream, controlling groundwater level, and were activated in early 2011. In September 2011, replenishment tests were carried out on the 13 wells on the sea side; these will be completed by spring 2012. It is aimed to activate the entire replenishment side after that. The planned physical barrier will extend over 3,050m and will be constructed using jet grouting and waterproofing injections. Field tests were carried out in 2009 to test operating and construction conditions in preparation for the implementation project.
Preliminary surveys were carried out in 2010 to assess the best techniques for installing barriers on the southern side of the refinery. The tender specifications for the whole project, divided into operational lots, were defined in 2011. During 2008, Saras drew up the projects for the 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 wash-

ing 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 disused ST1 area has been removed and delivered to authorised landfill. Both projects are nearing completion. In 2010, sampling and analysis was carried out jointly with ARPAS to approve the replacement of washed soil and uncontaminated soil in the West Tank Farm area. All contaminated soil from the former disused ST1 area has been sent to landfill, and in December 2011 the plan to make the site permanently safe was presented. After the plan has been implemented, restitution of the site will be requested.

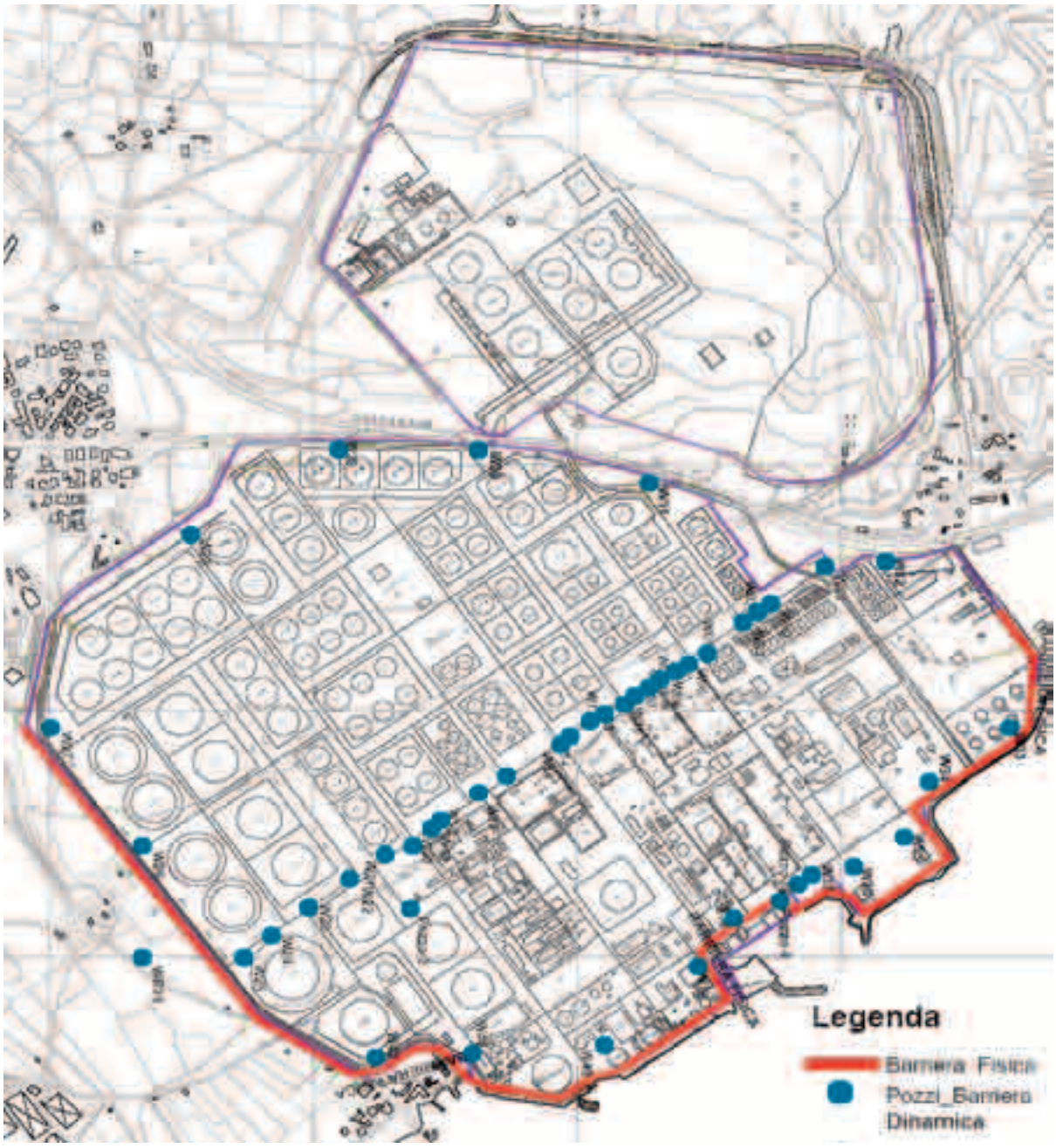


Figure 12 – Location of the wells comprising the dynamic barrier, and planned location of the physical barrier

Noise monitoring

Since 1999, Saras has planned and implemented regular checks of noise levels in the local area, using 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 boundary, on roads leading to the Sarroch city centre and in the city centre itself. These can be seen in Figure 13 (Map and key to urban areas). 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 measuring campaign relating to 2012 confirmed the above trend, as shown in Charts 41 and 42 on 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 2010, the MHC1, MHC2, TAME and U800 plant areas were mapped, while the TMK plants (incoming water treatment) and SWS (sour water stripper) were mapped in 2011.
The aims of this mapping activity are:

- to accurately 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 plant 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 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, due 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.

Parameters	Period	Stat. 11 (H24)	Stat. 12 (H24)	Stat. 13 (SPOT)	Stat. 14 (SPOT)	Stat. 15 (SPOT)	Stat. 16 (SPOT)	Stat. 17 (SPOT)
L90	Day time Chart 41	43.3	38.0	44.9	39.0	39.1	40.8	43.3
	Night time Chart 42	38.3	43.8	48.0	41.3	39.2	37.4	42.9

Figure 13 – Location of noise monitoring units

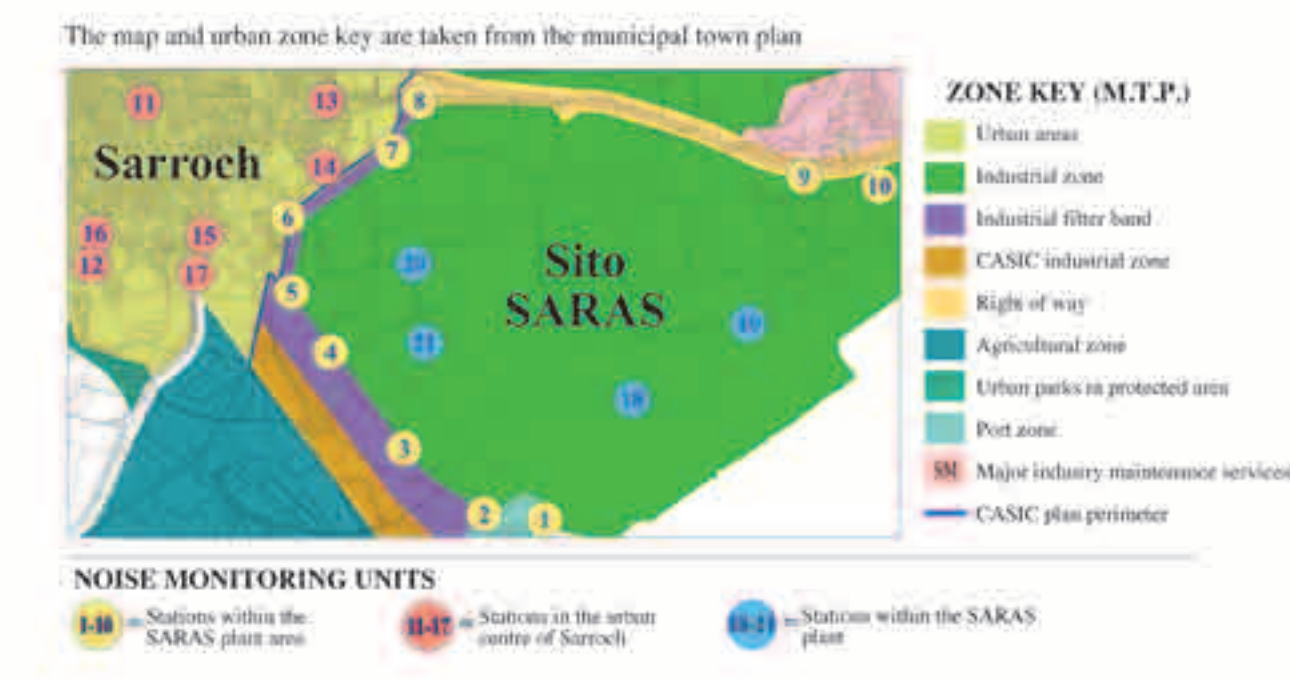


Chart 41 - External environmental immissions db(A) – L90 levels – Day time (Sarroch city centre)

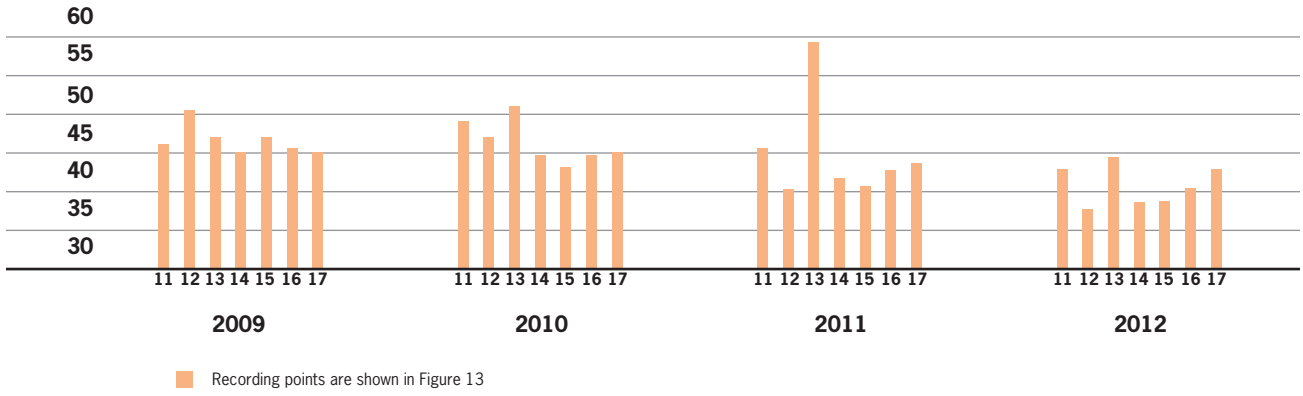
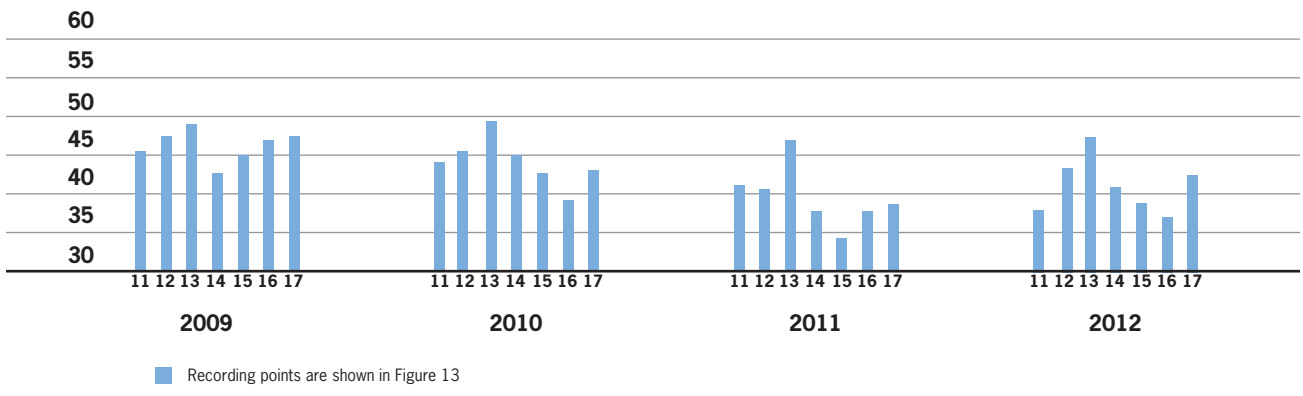


Chart 42 - External environmental immissions db(A) – L90 levels – Night time (Sarroch city centre)



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 external environment 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 has been completed in recent years 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

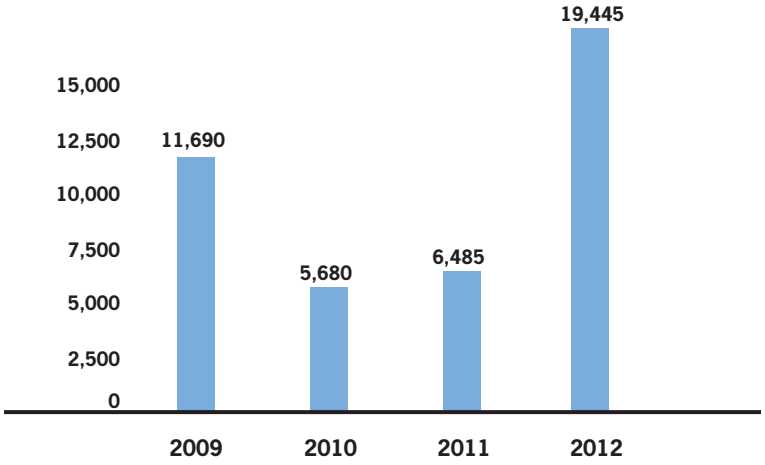
Saras' commitment to continually improving environmental performance can also be measured and evaluated in terms of the financial investment devoted to this purpose. The data in Table 31 show the company's strong commitment on this front, with total investment of more than EUR 43 million in the past four years. In 2012, the main investments were as follows:

- start of work on the development of a plant to recover water from the sour water stripper unit
- ongoing installation of double seals on gasoline pumps
- ongoing tank and pipeway paving
- ongoing installation of double bottoms in tanks
- start of work on the development of a unit to filter slurry, in the FCC plant.

Table 31 – Investment in the environment (EUR thousands/year)

	2009	2010	2011	2012
Investiments	11,690	5,680	6,485	19,445

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



Group companies

Sardeolica

Environmental and occupational health & safety monitoring

When the wind farm was built, Sardeolica set up an environmental monitoring system to quantify the possible environmental impact of the site. The monitoring of:

- flora
- fauna (and birds in particular)
- noise
- electromagnetic fields

showed not only that the wind farm is compatible with the local environment, but that it is fully integrated with the traditional activities carried out in the area and with the pre-existing natural habitats.

Table 32 below shows production data for the photovoltaic plant (power: 18.9 kW) installed on the roof of the Ulassai Multifunctional Building.

Table 32

	2009	2010	2011	2012	TOTAL
Power [kW]	18.9	18.9	18.9	18.9	18.9
Production [MWh]	21,186.4	21,137.3	26,884.0	27,847.0	103,054.7
Months in financial year	8	12	12	12	44
Equivalent households	7.062	9.046	8.961	9.282	34.351

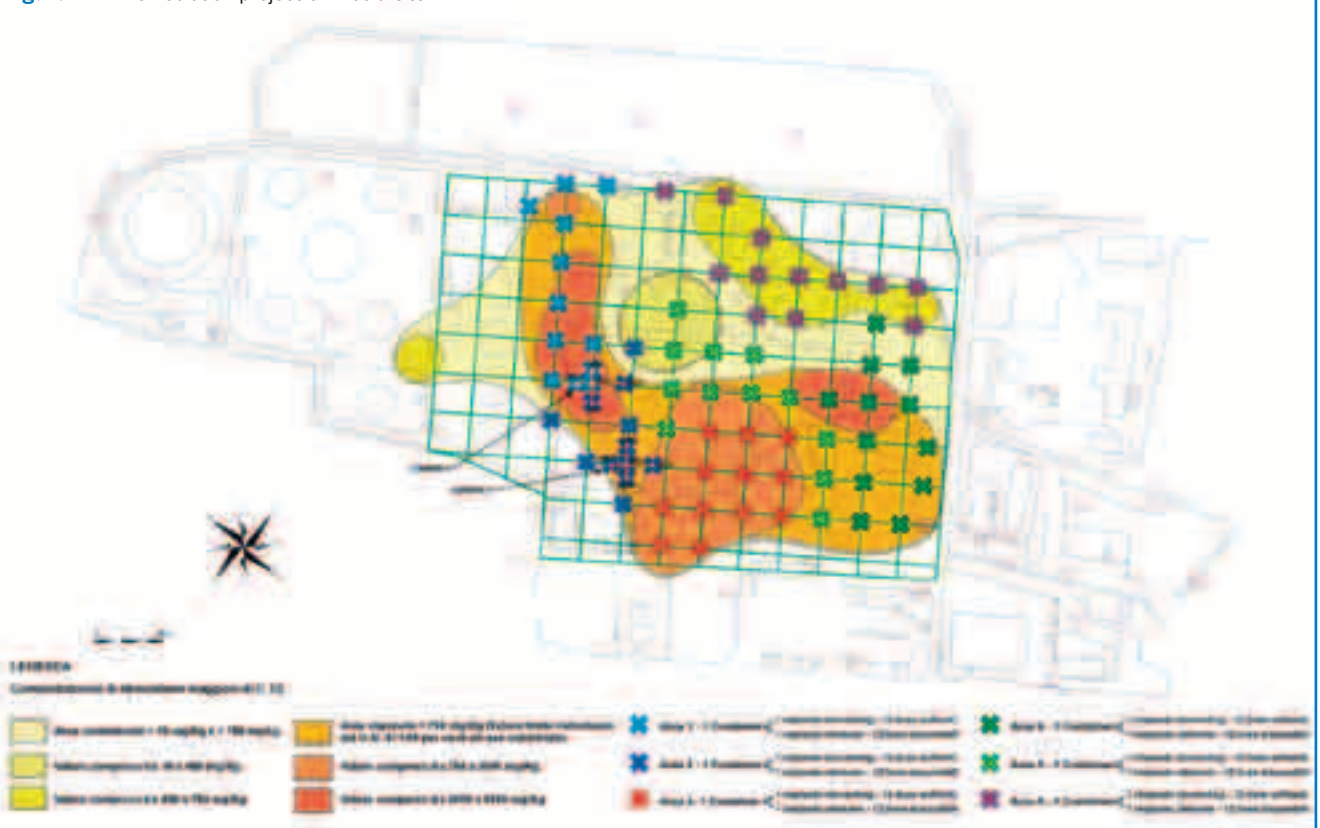
Deposito di Arcola

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 groundwa-

ter is used to obtain drinking 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 study 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 site's specific features and vulnerabilities. Many series of tests were carried out, incorporating consistent and co-ordinated 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 developmental process. The research identified, inter alia, a specific 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 testing of remediation technology was completed in December 2004. The definitive reclamation plan was the result of nearly three years' work, during which the most suitable techniques were perfected, ensuring that the required result could be achieved while taking into account all the environmental factors, particularly drinking 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 early 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 periodic 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 prepared 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

Figure 14 – Remediation project of Arcola site



have enabled a sizeable part of the unsaturated part of the area for remediation to be decontaminated. As expected, the focus remains on the capillary fringe, where there is still a contaminated layer due to the groundwater dynamics. In 2009, a new phase of testing was launched, using additional techniques designed to maximise the degradative capacity of the capillary fringe by adding oxygenated water. In 2010, air sparging was added to the bioventing and skimming techniques. Air sparging involves directing large quantities of air below groundwater level (4 metres) to eliminate volatile fractions (VOC) through stripping and to increase oxygen levels in the saturated layer. Construction of a large-diameter open well was also planned to test techniques for reclaiming and collecting residual product in the free phase. Samples of contaminated subsoil were also taken to carry out further laboratory tests. The process of building and launching the plants continued until spring 2011, with a three-month break due to the particularly adverse weather conditions. This process was completed in March, when a system was installed to reclaim and recover residual contaminants in the large-diameter well. During the year, a number of tests were conducted to assess the degradability of the remaining contaminants in the capillary fringe; chemical oxidation tests were performed for this purpose using the most effective oxidising resources. Aerobic and anaerobic oxidation tests were also carried out in the laboratory and in the field (on a reduced scale). All the data obtained were collected and commented on in a specially prepared technical paper sent to the Environmental Office of the Municipality of Arcola. It was then discussed at a Services Conference and used to establish the action still required to complete the remediation work. During 2012, at the request of the supervisory committee, a study was designed to update the modelling of the patterns of the groundwater table below the deposit to reflect the considerable seasonal variations caused

by the water regime of the Magra River that flows near the facility. To this end, a survey was carried out in June 2012 to measure the level of the groundwater table across a considerable number of piezometric readings and wells positioned both inside and outside the site; this work enabled the "scope" of the model to be extended to an area beyond the boundaries of the site and as far as the two areas for the extraction of drinking water at the southern and south-western boundaries of the site. The first version of the model was presented at the end of July and was discussed during the CdS held in November. In December, a second survey was carried out in order to refine the model, using readings taken when groundwater levels are higher, typically during the very rainy seasons when the River Magra is at its height. At the same time, the document "Risk analysis pursuant to Legislative Decree 152/06 as amended" was drafted.
The updated, refined diffusional model and the site-specific risk analysis report were submitted to the supervisory bodies and will be examined and discussed at the appropriate Technical Committee preparatory to a subsequent meeting of the supervisory committee to be held by the end of the first quarter of 2013.

Saras Energia

Biodiesel production plant

On 5 June 2008, Saras Energia obtained an AIA permit from the Directorate-General of Environmental Planning, Assessment and Control for the biodiesel production plant in Cartagena, complying with all integrated contamination prevention and control requirements set out in Law 16/2002 of 1 July, which transposed Directive 91/61/EEC into Spanish law. In order to maintain this authorisation, the company has developed an environmental monitoring programme implementing timely and systematic checking of environmental effects arising from activity at the site and defining necessary control measures to ensure adequate environmental protection. The environmental monitoring programme was successfully completed in 2012. The Directorate-General of Environmental Planning, Assessment and Control verified the adoption and proper implementation of the programme by means of inspections by a partner organisation, which confirmed this positive result and certified that the site meets all the environmental requirements set out in the legislation in force.
Pursuant to Royal Decree 9/2005 of 14 January, which defines the reporting of potential soil-contaminating activities and criteria and standards for the declaration of soil contamination, in 2011 the site drafted and submitted a preliminary disclosure statement on the soil situation to the Directorate-General of Environmental Planning, Assessment and Control. On the basis of the planned

Training

During 2010, specific courses on safety and respect for the environment were held at service stations in the Saras Energia network, in line with the Training Plan (DERES Project).
An initial, three-day course on safety during unloading was held for staff responsible for sales development and managers at the stations.
The course included: a brief discussion of the products and their chemical and physical properties, protective measures and safety procedures for unloading trucks.
Technical training days were also run by experts in maintenance and environmental issues, which explored the topics mentioned in detail.
Operational exercises were also held at selected service stations. The exercises involved the service station staff, the head office transport co-ordinator and the network sales managers in their various roles. The teaching was co-ordinated by the head of HSE with the support of safety advisers from the transport companies and RED.
In the 2011 Annual Plan, safety and a focus on the environment continue to feature prominently in relation to the Saras Energia service stations.

Table 33 – Control parameters

Parameter	2009		2010		2011		2012	
	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]
CO (ppm)	54.6	500	49.1	500	17.7	500	32	500
NOx (ppm)	69.9	300	71.3	300	97	300	140	300
COV´s (mg/Nm^3)	<0.05	–*	<0.05	–*	<0.05	–*	<0.05	–*
HCL (mg/Nm^3)	<0.5	–*	<0.5	–*	11.76	–*	1.12	–*
Noise dB(A)	64.0	65.0	60.1	65.0	-	65.0	-	65.0

*No legal limits have been established.

and completed analysis, the statement declared that no initial contamination had been detected and that there was no evidence of soil contamination. In 2013, the Presidential Environmental Committee issued a resolution authorising the biodiesel production plant to emit greenhouse gas for the period 2013-2020; reports are prepared based on the provisions of this resolution.

Fuel storage facility

The fuel storage facility was built by Saras Energia in Cartagena in accordance with the provisions of Royal Decree 833/1988 of 20 July, which approved the implementation regulation for Law 20/1986 of 14 May governing toxic and hazardous waste. The storage facility is registered with the Spanish Ministry of the Environment as a facility producing hazardous waste; it therefore has to submit an Annual Environmental Declaration, an Annual Declaration as a Producer of Hazardous Waste and an Annual Declaration as a Producer of Contaminated Packaging. In 2011, the above declarations were duly drawn up and submitted within the relevant deadlines, with no observations from the public administration. The storage facility is authorised to discharge industrial wastewater into the El Fangal water course by the Confederación Hidrográfica, the Spanish body that regulates industrial discharges into publicly owned water. The legislation in force requires the company to submit an annual record of discharges made over the course of the year. This record was drawn up and submitted within the relevant deadlines with no observations from the competent authority. Pursuant to Royal Decree 9/2005 of 14 January regarding potentially contaminating activities, which sets out rules for the identification and declaration of contaminated soil, a report on the state of the soil below the facility was sent to the Spanish Ministry of the Environment. The report shows that the current level of soil contamination is exactly the same as it was before Saras Energia began its activities.

SARTEC

In accordance with the Integrated Management System, Sartec keeps all of its significant environmental aspects under constant control, including through specific monitoring with instruments. Specifically, the following aspects are kept under control:

- noise pollution in respect of the foundations and the sites overlooking Sartec's operational headquarters
- Wastewater
- Waste
- Energy and resources consumption
- Water consumption
- Soil/subsoil contamination
- Atmospheric emissions

Health and safety

Health and 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 2012 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 through ongoing improvements to employee safety, there is still room for further improvement, which the company sees as reasonable and achievable.

The Saras Safety Project

Saras implemented the "Safety is our Energy" programme in March 2009, as part of its efforts to achieve continuous improvement. The three-year project focuses on spreading the culture of safety and on the safe conduct of everyone working on site. The programme is based on the seven modules described below.

1. Project vision and strategic management

- The starting point for the project was the definition of a vision for safety that expresses our company's values and aspirations in terms of safety.
- This vision for safety was approved on 7 April 2009 by the steering committee, which also ensured its maximum dissemination and visibility.

2. Standards and procedures

As part of the "Safety is our Energy" project, new tools to spread and implement the principles of safe conduct were developed, including:

- Basic Safety Measures leaflets explaining the fundamentals of safe conduct
- Safety Tours consisting of field inspections to a specific yearly schedule, to ensure constant monitoring and oversight of safety in all areas of the plant, checking conditions and conduct, and highlighting both positive and negative points

3. Communication

To support all the programme's initiatives, internal communication activities were also developed, aimed at both Saras staff and the employees of subcontractors.

4. Managerial/HSE structure

Major organisational changes were made to decentralise management responsibility for safety from the Prevention and Protection department (PPD) to the production areas/staff services, while leaving co-ordination with the PPD. One important step was the appointment in each production area, and in other company processes, of a new HSEQ (Health, Safety, the Environment and Quality) specialist tasked with helping to promote safe conduct, identifying anomalies and overseeing corrective action.

Safety training

A highly reliable system can ensure safety only if the people who apply it have the training and skills to act in their various capacities. All staff must be trained to the highest possible level, in terms of both technical skill and responsible conduct.

During 2012, in accordance with standards and procedures, the training plan for health and safety, environmental protection and certified processes was approved.

During the year, we analysed the training undertaken by all staff in the five-year period from 2008 to 2011 to check compliance with standards and the State and Regions Agreement nº. 221 of December 2011. This assessment confirmed that Saras continues to foster the health and safety and environmental protection of its employees, including through its training initiatives, in advance of regulations.

The results of the analysis, which covered part of the first half year, confirmed that, when the abovementioned agreement became effective, almost all employees had already undergone training in compliance with the legal provisions and the guidance given in the national collective labour agreement on the length, contents and arrangements for taking the courses.

An analysis of past activities enabled us to optimise our training obligation and align it with the regulations, free up resources to deal with other training requirements and generally enhance expertise. In total, some 33,500 training hours were delivered, including around 21,500 hours of safety training.

Many of the training initiatives had a direct impact on the acquisition of expertise and technology, some of which became necessary after tools and processes were updated. About 7,400 hours were spent on this training.

5. Accident management

In this area improvements have been made to the tools (revision of procedure) and methods for assessing accidents (first- and second-level analysis) that have greatly enhanced the company's capability and speed when conducting analysis, preparing corrective measures and monitoring implementation of these measures.

6. Auditing and safety dialogues

Important changes have also been made to the audit system in the field, with a major overhaul of the field inspection tool:

- reducing the number of inspectors involved (to make inspections “leaner”)
- more targeted selection of inspectors (choosing from individuals with extensive plant experience)
- changes to the subjects and aims of inspections, with a focus on subcontractors

One true innovation is the Safety Dialogues. A Safety Dialogue is a meeting between an operator and two suitably trained "dialoguers", with the aim of:

- disseminating the culture of safety through the adoption of safe conduct and the identification and assessment of risks
- identifying and collecting ideas for improvements to safety at work;
- involving and motivating staff.

7. Management of external firms

Major innovations have also been introduced in the management of subcontractors. Synergic work between the Prevention and Protection and the Purchasing and Tenders departments led to the following changes:

- Creation of a minimum HSE (Health, Safety and the Environment) standard for subcontractors
- Implementation of formalised auditing through checklists for the various aspects (including HSE aspects).
- Creation of an additional HSE standard to verify compliance with legal obligations.
- Certification of external companies in relation to the HSE standards as a pre-requisite for inclusion in the vendor list (authorised subcontractors).
- Updating of the audit system for HSE-certified external companies.
- Determination of weekly checks of compliance with HSE standards.

REACH and CLP

Implementation of the REACH regulation

The main aim of REACH is to improve the protection of human health and the environment through better and earlier identification of the intrinsic properties of chemical substances. It also aims to enhance the competitiveness of the European chemicals industry. Unless they are registered, substances cannot be produced or released on the European market, according to the "no data no market" principle. The substances produced by the refinery fall with the scope of REACH, which enforces the registration of chemical

substances via transmission of a file to a central, shared database for member states, which is managed by ECHA, the European Chemicals Agency. With regard to the oil sector, the substances concerned (about 660) have been grouped into 20 categories by CONCAWE, the European Oil Company Association, based on affinity between refining processes as well as similarities in chemical and physical properties and end use.

The substances produced by the Saras refinery fall into the following categories: gases, low boiling point naphthas/gasolines, kerosenes, straight run gas oils, vacuum gas oils, hydrocracked gas oils and distillate fuels, cracked gas oils, heavy fuel oils and sulphur.

Registration of substances takes place in two phases:

- pre-registration
- final registration

In line with the regulation, Saras pre-registered 43 phase-in substances by 1 December 2008, submitting summary information on the substances to ECHA.

Pre-registration allows producers and/or importers to:

- continue manufacturing and releasing the substances onto the market after 1 December 2008
- benefit from staggered registration according to the hazards and tonnage band of the substance (2010, 2013 or 2018). These substances are subject to the "transitional regime"
- access facilities for data sharing between registrants (the Substance Information Exchange Fora).

Registration was completed pursuant to the regulation by 30 November 2010 and required the preparation and delivery to ECHA of a file comprising:

- a technical dossier containing information on the intrinsic properties of the substances (chemical, physical, toxicological and ecotoxicological), their uses and hazards to human health;
- a chemical security report for quantities exceeding 10 tons a year, identifying chemical and physical hazards to health and the environment and PBT and vPvB substances, and providing, if necessary, an assessment of risk characterisation and exposure.

The regulation stipulates that there should be a lead registrant for each substance, mandated by the other registrants to submit the registration file to ECHA, to which each registrant then refers. Saras was lead registrant for seven of the 43 substances registered.

Each file submitted to ECHA was checked for compliance and completeness. A registration number is assigned only after the files have passed these checks. During 2011 and 2012, work was undertaken to maintain the registration, focusing particularly on documentary checks of the substances coming into or leaving the Sarroch site. Saras registered 41 oil-based substances, of which 30 were to be sold and hence required a safety data sheet to be issued in accordance with the new standards.

REACH and CLP

REACH Regulation

Regulation 1907/2006/EC of the European Parliament and the Council entered into force on 1 June 2007 with the object of rationalising and improving the previous legislative framework for chemical substances in the European Union (EU).

The REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) Regulation aims to provide greater protection for human and environmental health and to improve the competitiveness and capacity for innovation of the European chemicals industry, via an integrated system of registration, evaluation, authorisation and restriction of chemical substances.

"Phase-in" substances

These are substances subject to the transitional regime, fulfilling at least one of the following conditions:

- they are listed in EINECS, (European Inventory of Existing Commercial Chemical Substances)
- they have been manufactured in the EU, but not placed on the market by the manufacturer or importer, at least once in the 15 years prior to the entry into force of the current regulation, provided that there is documentary evidence of this
- they were placed on the EU market before the entry into force of REACH by the manufacturer or importer, and were considered as having been notified in accordance with Directive 67/548/EEC, but do not meet the definition of polymers as set out by REACH, provided that there is documentary evidence of this.

SIEF

A SIEF (Substances Information Exchange Forum) is a forum for businesses that have pre-registered substances with the same CAS/EINECS number, which enables them to share and send data, share registration costs and avoid the duplication of tests, particularly tests on vertebrates.

Lead Registrant

The Lead Registrant is the registrant within a SIEF that acts on behalf of other registrants of the same substance (member registrants) and presents the "joint submission dossier".

Occupational health monitoring

A number of monitoring campaigns have taken place at the refinery over the years, both in open and closed working environments, to check for the presence of physical, chemical or microclimate hazards. The regular monitoring programme includes VDUs, hazardous substances, biological agents, electromagnetic fields, etc. For ease of reference, please see the table relating to the occupational health monitoring carried out between 2006 and 2012. This takes place every three years, but the frequency may vary according to requirements that arise within the site or in a single area.

General considerations

Hazardous substances and carcinogenic substances

Monitoring of hazardous substances is based on the raw materials used, the production cycles involved and, naturally, the intrinsic harmfulness of the substances (e.g. hydrocarbons, sulphur dioxide, hydrogen sulphide and hydrofluoric acid).

The sampling parameters for the hazard classes are as follows:

- Group 1 hazardous substances (all hydrocarbons, n-hexane, benzene, toluene, xylene, ethyl benzene, tetrachloroethylene, butadiene, methane, TAME (ether) and metal oxides
- Group 2 hazardous substances (respirable dusts, thiols, phenol, lead, hydrochloric acid, hydrofluoric acid, hydrogen sulphide, carbon monoxide and ammonia)

Under the Health and Safety Protocol adopted by Saras, shift workers carrying out normal production activities, technical service staff and staff responsible for inspection and control are involved in the assessment process. This essentially means all those who, based on the Risk Assessment Document, are potentially exposed to the above-mentioned substances.

The aims of the assessments are as follows:

- to measure the exposure of operators using personal dosimeters
- during operational activities in the normal three shifts of eight hours each, for all jobs at the plant
- during daily activities in the course of eight hours over three consecutive days, for all technical/inspection and control staff; the results are compared with the weighted-average concentration thresholds (TLV-TWA) prescribed by national or international standards

GHS-CLP

The UN has developed a global system to define harmonised criteria for the classification and labelling of chemical products (GHS – Globally Harmonised System on the Classification and Labelling of Chemicals), which provides a high-level international standard to safeguard the health of anyone using chemical substances (professionally or otherwise) and to protect the environment.

Regulation 1272/2008, also known as the CLP Regulation, which came into force in 2010, led to the application of new classification, labelling and packaging criteria (including for the purposes of REACH). Application was due to become mandatory from 1 December 2010 for substances and from 1 June 2015 for mixtures.

The aim of the regulation, which applies international criteria taken from the Globally Harmonised System in the EU, is to harmonise classification criteria and standards on the labelling and packaging of substances and hazardous mixtures to ensure their free circulation, while at the same time guaranteeing a high level of protection for human health and the environment.

The CLP Regulation introduces changes for the industry relating to the classification of substances and mixtures and the reformulation of the Safety Data Sheets and hazard labelling, with changes being made to the current hazard symbols and the risk (R) and safety (S) phrases.

Saras is part of a national working group involved in the creation of new Safety Data Sheets on oil products, co-ordinated by Unione Petrolifera, an association of the main companies operating in oil processing and oil product distribution in Italy.

The Safety Data Sheets represent the most important technical documents for information on chemical substances and mixtures, since they contain the information on the physical, chemical and toxicological properties of the substances and their environmental hazards necessary for the proper and safe handling of the substances and mixtures.

The SDSs allow:

employers to determine whether hazardous chemical substances are being handled in the workplace and to assess any risk to the health and safety of workers resulting from their use

users to adopt the necessary measures to safeguard health and the environment and promote safety in the workplace. These documents are published on a dedicated page of the company website and are available to all staff at the site. They are also sent to all our customers, before or at the time of the first product delivery.

Table 34 – Monitoring programme

Pericoli	2005	2006	2007	2008	2009	2010	2011	2012
Lighting			■					■
Group 1 hazardous substances	■			■			■	
Group 2 hazardous substances		■			■			■
Noise			■				■	
Electromagnetic fields			■					
Microclimate		■		■	■			■
Biological agents		■			■	■		
Asbestos			■			■		

Table 35 – Threshold Limit Values

TLV-TWA Time-weighted average threshold limit value	Time-weighted average concentration over one typical eight-hour working day and over a 40-hour working week, to which nearly all employees may be repeatedly exposed on a daily basis without any negative effects.
TLV-STEL Threshold Limit Value Short Term Exposure Limit	Concentration to which workers may be exposed continually for short periods, as long as the daily TLV-TWA is not exceeded, without any of the following effects arising:: 1) irritation; 2) chronic or irreversible damage to tissue; and 3) a reduction in vigilance sufficient to increase the likelihood of accidents or influence a person's ability to reach safety or materially reduce working efficiency (always provided that the TLV-TWA is not exceeded).. The TLV-STEL does not constitute an independent, separate exposure threshold, but rather supplements the TLV-TWA of a substance, whose toxic action is mainly chronic, when recognised acute effects exist. STELs are recommended when human or animal exposure to a high concentration for a short period has identified toxic effects. A STEL is defined as the average weighted exposure for a period of 15 minutes, which must never be exceeded during the working day, even if the weighted average over eight hours is less than the relevant TLV. STEL exposure must never exceed 15 minutes and must not be repeated more than four times a day. There must be at least 60 minutes between successive STEL exposures.. A different averaging period may be advisable if this is justified by the observed biological effects.
TLV-C Threshold Limit Value (Ceiling)	The concentration that must never be exceeded during working activity, even for a very brief period.

- to measure the exposure of operators while performing particular tasks; the results are compared with the short-term exposure limits (TLV-STEL), where available, applied over limited periods (at specific, fixed points)
- to measure the exposure of every person with access to a given area, by monitoring transit routes (fixed points), in the course of the eight-hour working day

For a statistical analysis of the results, the concentration values measured are divided into four classes within the maximum concentration:

CLASS 1 Safe zone – values up to 10% of the maximum tolerable concentration.

CLASS 2 First zone of caution – values in the range of 10% to 50% of the maximum tolerable concentration.

CLASS 3 Second zone of caution – values in the range of 50% to 100% of the maximum tolerable concentration – need for further checks and possible technical improvements.

CLASS 4 Risk zone – values higher than the maximum tolerable concentration.

CLASS 0 In the case of benzene, Class 1 was divided into two and a Class 0 was created, to distinguish between TLV-TWA concentrations of up to 5% and those within the range of 5% to 10%.

Summary of the last three years

Monitoring in 2009/2010

In late 2009 and the early months of 2010, monitoring of hazardous substances was carried out to measure the level of exposure of staff operating within the refinery to certain organic compounds and non-organic substances.

All the substances monitored fell within Class 1, including thiols, phenol, hydrofluoric acid, hydrochloric acid, ammonia and carbon monoxide.

In the case of hydrogen sulphide, thiol and phenol, no significant concentrations were detected at any time, i.e. the levels were too low to be detected by the instruments. The respirable dust results were in line with previous data.

To conclude, we can state that the substances monitored did not exceed threshold levels at any time during any activity or at any of the points monitored.

Monitoring hazardous substances in the first group in 2011

In the monitoring campaign, which covered all the shift and daily working activities considered to expose workers to this risk, the study was carried out using both personal dosimeters and fixed monitoring points located in the most representative positions on the site.

Around 300 samples were taken for each substance monitored except for nickel and methanol (139 and 116 samples respectively) in the specific areas where the substances are present. The first results showed that no significant quantities (only amounts of under 1 mg/m3) of substances such as n-hexane, toluene, ethyl benzene, xylene, tetrachloroethylene, methanol, molybdenum, aluminium and diphosphorus pentaoxide were detected. The only significant value of toluene (approx. 1 mg/m3) recorded was in the CCR-ALKY plant, but even this value is well below the TLV-TWA limit (192 mg/m3). The results show that all concentrations measured are below 10% of the TLV-TWA and TLV-STEL limits, which means that all personal dosimeters, fixed locations and specific operations fall within Class 1. However, as regards the substances 1.3-butadiene, benzene, total hydrocarbons and nickel (insoluble inorganic compounds), the results are in line with the previous surveys; for benzene in particular, 98% of the values are in Class 0 (5% of TLV-TWA limit).

Monitoring of hazardous substances in the first group in 2012

During 2012, we conducted surveys to assess the exposure of workers to Class 2 hazardous substances, as described in the general section. Covering 261 plant operators, 43 fixed points and 42 operators involved in “special tasks” (extraction of sample), these showed that the majority of results are below detectable levels.

Of the values which were analytically measurable:

- 12% related to measurements of hydrogen sulphide,
- 7% related to measurements of respirable dust
- and there were four samples of carbon monoxide.

The majority of these data were less than 10% of the benchmark and therefore "acceptable", (according to the guidelines in appendix 2.1). However, some results fell in the range of 10-25% of the benchmark and were therefore classified as "“insignificant/acceptable with caution” (see table 4.0). An analysis of the hydrogen sulphide results showed that all personal dosimeters were in Class 1 (lower than 10%). Only one value was recorded in Class 2 (higher than 25% and lower than 50% of TLW-STEL limit), relating to the performance of a specific operation. An analysis of the carbon monoxide results showed that all personal dosimeters were in Class 1 (lower than 10%). Only four fixed points were recorded in Class 2, and these were only slightly higher than the threshold for Class 1. An analysis of the respirable dusts results showed that the personal dosimeters were within Class 1 (lower than 10%) in 93% of cases. In the remaining 7% of cases, the values were in Class 2, but all were below 25% of the TLV-TWA limit and therefore “acceptable”, as they fell in the 10-25% range of the benchmark. Their risk class was therefore "insignificant/acceptable with caution".

Monitoring in 2011 during plant remediation and maintenance

In 2011, monitoring of hazardous and potentially carcinogenic substances was also carried out when the IGCC plant was closed for maintenance during remediation operations and equipment start-up. Measurements were taken in more onerous conditions (plant dismantling and remediation); it should be noted, however, that all the employees involved in the remediation wore masks fitted with ABEK filters specifically designed for organic compounds during the time they were working and therefore exposed, eliminating any risk associated with exposure.

The aim of the survey was to obtain the information needed to assess the risk of exposure to the substances mentioned below during periods when the plant was being prepared for maintenance compared with periods of normal operation. This covered eight shift operators involved in the remediation and during the equipment start-up, with eight fixed points in operation at the same time. The personal dosimeter results showed concentrations of benzene and toluene in class 2 for only one operator, while the results for all others fell in class 1. Of total hydrocarbons, all samples for the benzene TLV-TWA limit were in class 1. However, with respect to the much more restrictive TLV-TWA for diesel, there were concentrations in class 2 and one in class 3. For fixed positions, all results for toluene, etilbenzene, xileni and n-hexane were in class 1, whereas one of the 18 benzene samples was in class 1 and one in class 2. Of total hydrocarbons, all samples for benzene TLV were in class 1 and three samples for diesel TLV were in class 2. An analysis of the data revealed no particular problems during the activities monitored; which means that the limits were not breached for any operator or fixed position. The few positive results, which related to one single operator, were, however, well below the threshold for caution. The values recording during monitoring of respirable dusts were well below the threshold. Four of the measurements were in class 1, 12 in class 2 and 2 in class 3.

Asbestos

Historically, glass wool and rock wool were used as insulation materials at the refinery. In some facilities and for small-diameter tubing, asbestos cord was occasionally used. Eternit panels were also used in coverings at the refinery and asbestos fibre edging was used on flanged couplings. There are no longer any asbestos-containing materials at the refinery. Asbestos-containing materials were banned in 1990, and progressive elimination measures began, particularly during plant maintenance operations. In 1995, two processing furnaces were demolished. A work plan for the removal and dismantling of small quantities of asbestos cord was submitted to, and approved by, the competent health authority. In 1996, further dismantling of tubing was carried out, again involving the removal of asbestos cord and again following approval of a work plan submitted to the competent health authority. An environmental survey was performed in 1998, to check for the presence of asbestos in the working environment. The results of the survey showed a very low risk of staff exposure. Another environmental survey was performed in 2002, and this also showed a very low risk of staff exposure.

Various plans were subsequently drawn up for the removal of the Eternit panels, in order to progressively eliminate this material. The plans were submitted on each occasion to the competent health authority and were all approved, sometimes subject to the fulfilment of further requirements. All Eternit materials were completely removed under these plans.

In September and October 2004 the periodic environmental survey was carried out, and was repeated at the same points in April 2007, pursuant to amendments set out by Legislative Decree 257/2006 and subsequently included in Section IX, Chapter III of Legislative Decree 81/08. The results of these surveys indicated the presence of fibrous airborne particles, irrespective of their mineralogical nature, at levels close to zero. The exposure limit for asbestos set out in Article 254 of Legislative Decree 81/08, is 100 ff/L. Since 98% of the samples taken (100 out of total of 102) recorded a level of 0 ff/L, and the remaining samples recorded levels of less than 1 ff/L, we can conclude that the survey indicates a very low level of exposure to asbestos fibre at the site. The survey in 2010 produced similar results.

Noise

A phonometric survey of noise exposure was carried out between July and September 2007, to update previous surveys and in implementation of Legislative Decree 195/2006, which amended previous noise legislation. The measuring process involved all employees in the various production divisions, including in the planning, operational, presentation and results verification stages.

Article 189 of Legislative Decree 81/08 sets out the following exposure limits and levels requiring action for daily noise exposure and peak acoustic pressure:

- Exposure limit (EL) LEX, 8H=87 dB(A) and Ppeak=140 dB(C)
- Upper action level (UAL) LEX, 8H=85 dB(A) and Ppeak=137 dB(C)
- Lower action level (LAL) LEX, 8H=80 dB(A) and Ppeak=135 dB(C)

As the regulations stipulate, the assessment will be updated every four years.

The most recent monitoring of worker noise exposure, completed in 2011, identified employees' current exposure levels in relation to the regulations on controlling exposure to noise in the workplace. The exposure to noise of operational staff at the site was therefore assessed by means of analysis and estimates based on phonometric data taken from personal dosimeters. To date, a range of specific environmental improvements measures have been implemented and soundproofing systems for machines and plants have been installed as the result of targeted workplace health and safety initiatives, and we continue to develop and seek certification for workplace prevention activities.

As previous testing and noise measuring campaigns have shown, some operational jobs fall into the acoustic risk category.

Based on personal phonometric readings, the noise exposure situation for operational staff is as follows:

ACOUSTIC RISK CATEGORY	LEVEL OF PERSONAL EXPOSURE	EXPOSURE TO NOISE BY OPERATIONAL STAFF %
0	LEX,8h < 80 dB(A)	27
I	80 dB(A) < LEX,8h < 85 dB(A)	35
II	85 dB(A) < LEX,8h < 87 dB(A)	16
III	LEX,8h > 87 dB(A)	22

However, it should be noted that:

- no instantaneous sound pressure levels higher than 140 dB(C) were detected
- the auditory Personal Protection Measures (PPMs) currently used are sufficient to ensure compliance with exposure limits, and provide suitable protection for employees (in terms of noise mitigation)

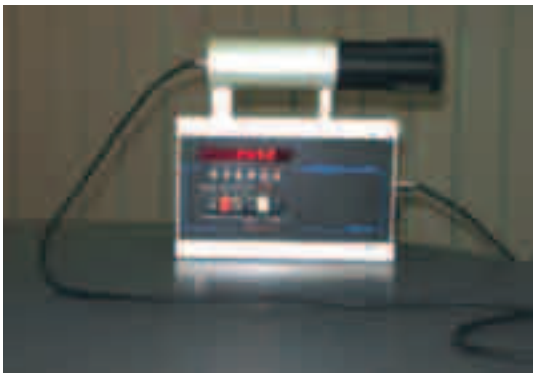
Table 36 - Acoustic risk category (D.Lgs. 81/2008, art.189)

ACOUSTIC RISK CATEGORY	LEVEL OF PERSONAL EXPOSURE		RISK
0	LEX,8h < 80 dB(A)	p_{peak} < 135 db (C)	Absent
I	80 dB(A) < LEX,8h < 85 dB(A)	135db (C) <p_{peak} < 137 db (C)	Low
II	85 dB(A) < LEX,8h < 87 dB(A)	135db (C) <p_{peak} < 140 db (C)	Average
III	LEX,8h > 87 dB(A)	p_{peak} < 140 db (C)	High

- acoustic mapping is also taking place at plants within the "refinery + IGCC" complex; one of the main goals of the mapping is to characterise noise frequency, so that the octave band method can be applied and suitable PPMs identified for each individual plant

This type of monitoring – both subjective mapping using personal dosimeters and objective mapping (acoustic mapping of plants) – is carried out by the Prevention and Protection department.

To date, acoustic mapping has been completed for the following plants: T1, T2/V2, CTE, Alkalisation, CCR, FCC, API/PWP/BWT, Targas Chemical Laboratory and Unit 800 TAME MHC1/2. In 2011, mapping was carried out for the SWS and TMK plants and will also follow for all the other plants.



Electromagnetic fields

In 2008, a new study was carried out as an update to previous studies, pursuant to Section VIII, Chapter IV of Legislative Decree 81/08.

Measurement of workers' exposure to electromagnetic fields to improve knowledge about these exposure levels was carried out through monitoring of working activity (monitoring of the three shifts using personal dosimeters) and certain work points (about 42 fixed points with low and high frequency readings), selected to give a comprehensive picture of the site. The jobs monitored were selected according to the greatest likelihood of exposure, but staff working in the offices were also monitored.

Analysis of the magnetic induction readings from personal dosimeters at industrial frequency (about 50 Hz) showed that the maximum legal limit of 500 µT was not reached at any time for any of the jobs in question. The average exposure level during the work shift was 1.23 µT, i.e. well below legal limits. The study did not detect any maximum exposure levels exceeding the threshold limits; generally, average exposure levels for the 22 jobs monitored were measured in terms of microteslas, which is extremely low. Analysis of the high-frequency electromagnetic field readings also showed compliance with threshold limits. Electric field readings also came in at zero for all the points monitored. The electric field readings took place under normal working conditions.

Ionising radiation

In accordance with the requirements of Legislative Decree 230 of 17 March 1995 and Legislative Decree 81/08, Saras has appointed a qualified expert to carry out periodic checks for possible staff exposure to ionising radiation and to produce the relative accompanying documentation. Some instruments at the refinery use X-ray sources (analysers in the Chemical Laboratory) and radioactive isotope sources (level measuring instruments at the CCR plant and FFC Stage IV). Use of these instruments has been duly authorised by the Cagliari prefectural authorities. No controlled or supervised zones have been identified based on the equipment characteristics, the measurements carried out, operational conditions and dose assessment, and therefore all areas surrounding the equipment using radioactive sources are categorised as “unclassified”. In view of the low irradiation levels in question, there is no possibility of operators or visitors to the area absorbing doses differing significantly from those absorbed in natural environments, and they are therefore included in the general population, with a legal dose limit of 1,000 µSv a year.

Biological agents

2011 Monitoring

Microbiological monitoring campaigns aim to monitor the biological sources identified and check seasonal trends in concentrations.

An objective comparison of results recorded in different operational conditions (summer and autumn) not only enables a thorough risk classification but, most importantly, provides an assessment of the effectiveness of the preventative systems identified and adopted for airborne biological pollutants (bioaerosols), especially of the air and wastewater near the refinery's purification unit at the WASTEWATER TREATMENT FACILITY.

The study was carried out pursuant to Legislative Decree 81 of 9 April 2008 (implementing art.268, Section X – Exposure to biological agents) and of EC Directive 2000/54.
Some of the work activities envisaged by the law-makers that could involve potential exposure to micro-organisms include those carried out at urban and industrial wastewater purification units, where advanced technology is used to support the natural, aerobic and anaerobic process of bacterial degradation.
The following parameters were monitored:

- total bacterial count,
- total coliforms,
- escherichia coli,
- salmonella spp and legionella pneumophila in the aerosol,
- escherichia coli and salmonella spp in wastewater.

The method used to assess biological risk at the wastewater treatment plant complies with operating protocols stipulated by existing legislation and is carried out in a sequence of phases:

PHASE 1 - DATA COLLECTION: STRUCTURE

- Site assessment with map and designation of use of the working area
- Assessment of the potential pollution sources (activity, machinery, microclimate)
- Assessment of management protocols (maintenance procedures)

PHASE 2 - AUDIT

- Inspection of the environments and assessment of plant, equipment and production layouts
- Definition of parameters (bacterial classification) to be researched based on the activities carried out.
- Definition of the most representative sampling points for each operational area
- Definition of a timetable of action (4 samples in different environmental and operational conditions)

PHASE 3 - MONITORING

- Survey using an impactor air-sampling device (Surface Air System).
- Surveys of the internal and external microclimate (temperature, relative humidity and air direction)
- Definition of risk category

The survey may be considered complete if the results of the checks of the first three phases are negative or acceptable. The protocol states that the survey should only continue to phases 4 and 5 if the results are abnormal (high-risk category). The monitoring showed that the objectively estimated level of risk at the WATER TREATMENT PLANT is low, as the species identified are correlated with the nature and type of the matrices (waste), treatment methods and environmental conditions.

Workers' levels of exposure to biological agents, estimated by area of the PWP-BWT cooling plant and examined during the course of the monitoring, show overall risk values of average-low (risk = 2 ÷4).
Levels of exposure are moderate (2nd-4th degree) and mainly limited to one concentration of Total Bacterial Count and moulds. The isolated pathogenic species recorded a low concentration, and consequently, have a limited impact thanks to suitable prevention systems (the use of Personal Protection Measures (PPMs) and the correct behaviour by operators).
Only three of the points identified recorded average risk values.
An analysis of the results between September 2009 and the second half of 2011 confirm the risk classification at average-low levels of exposure. Although the individual species identified belong to level 2-3 classes of pathogens (moulds), the concentrations recorded are considerably lower than the limits.

Lighting

Lighting at the refinery has changed radically in recent years, and adequately meets the requirements for working and moving around within the site. However, a specific series of lighting checks was performed in 2007 by a specialist company, which carried out a systematic study of the lighting situation in both the plant areas and the offices. The study indicated areas of the site where improvements could be made.
After the study was completed, the site drew up a multi-year plan to improve lighting at the various plants.

Microclimate

This type of monitoring is performed according to a three-year programme, and is carried out at representative points, i.e. at the centre of the environment in the case of a homogenous area, and at specific points if there are particular locations requiring assessment.
The previous surveys carried out were in 2006 and 2008/2009.
The main objective of monitoring was to check the wellbeing indicators in moderate environments, and caloric stress indicators in hot environments within the facility. It is legislative convention to break down thermal environments into moderate, hot and cold environments.
Moderate environments are characterised by:

- fairly homogenous environmental conditions with limited temporal variations
- no localised heat exchange between the person and the environment that significantly affects the overall thermal balance;
- moderate physical activity and substantially similar for the various people involved
- the clothing worn by the various operators is substantially the same

Hot environments are characterised by:

- high temperature values relating to the features of the activity carried out and the clothing worn by the operators; there may also be high levels of humidity in the air that require significant intervention of the heat exchange mechanism, via perspiration, in order to maintain a constant body temperature

- thermo-hygrometric conditions that vary from job to job and possibly within a job
- large variation in conditions over time
- imbalance between the level of physical effort required and the clothing worn by operators

Cold environments are characterised by:

- low operating temperatures (indicatively between 0 and 10 °C for moderately cold environments and lower than 0 °C for extremely cold environments)
- limited spatial and temporal variation in conditions
- physical activity and type of clothing work is fairly standard.

Given the climatic and environmental conditions, the survey conducted within the facility only looked at moderate and hot environments

Moderate environments: The results of microclimate assessment in moderate environments are expressed in percentages of satisfaction or dissatisfaction due to heat or cold. Note, however, that these indicators cannot be considered absolute values as there is a considerable variation between the individual responses given to the various climatic conditions. Furthermore, the expected percentage of dissatisfaction is a parameter calculated using statistically based formulas and is not therefore based on the actual discomfort expressed by staff. Analysis of environments in refinery areas defined as "moderate environments" (72 environments in total) shows that dissatisfaction levels of less than 10% (the UNI EN ISO 7730 standard target) were recorded for 45 points, representing 62.5% of the points assessed. Of these, 17.8% were due to cold and 82.2% due to heat.

The dissatisfaction level for the remaining 27 environments (37.5% of all those assessed) was 10-30%, in all cases due to the cold. Hot environments: an exploratory survey was conducted of hot environments using the WBGT[1] index as the benchmark, as specified by prevailing legislation.

Given that operators are not posted permanently in one specific place in the plant, the Job Safety Analyses were used to obtain an indicative assessment of the times of exposure to the (external) measurement points.

As the WBGT benchmark values (26 °C) were achieved and exceeded for all the points analysed, it was necessary to perform multi-environment analyses using the PHS[2] model. This method produced the following limits (expressed in minutes):

D50 = maximum loss of water in 50% of the population (D50L with free access to water);

D95 = maximum loss of water in 95% of the population (D95L with free access to water);

Tre = maximum rectal temperature.

These parameters provide information on the time required for the threshold values to be reached. They enable the exposed staff to adopt all necessary standards of behaviour for working safely (reduction of exposure times, posting in refrigerated areas, intake of liquids/supplements, etc).

The PHS model showed that the threshold values for white operators (D95L=401 min, TRE=416 min) and black operators (D95L=416 min, TRE=415 min) had been reached. However, the risk class is considered "acceptable" in that the above-mentioned limits would only be reached if

the operator were continuously posted for almost 7 hours at the analysed point, whereas the Job Safety Analysis showed that this is not practicable.

Artificial optical radiation (in 2012)

The purpose of monitoring was to assess exposure to artificial optical radiation (AOR) of workers (furnace operators, foremen, etc.) who could be considered to be exposed to this risk while performing their tasks. Monitoring covered:

- identification of risk sources;
- assessment of exposure procedures;
- instrumental measurements;
- comparison with exposure limits (stipulated in Appendix XXXVII of Legislative Decree 81/2008).

Measurements were taken of the AOR sources: processing furnaces and boilers.

Note that workers can interact with the source with either "direct vision" or "indirect vision". In the first case, the source (e.g. furnace) is observed with direct vision (door open); in the second case, the source is observed via equipment (e.g. goggles with integrated screen protection) that enables indirect control of the source.

The results show that direct vision subjects the operator to greater exposure to AOR than indirect vision, in particular radiation in the 780 to 3000 nm frequency spectrum (with respect to the limits “m” and “n” stipulated in Appendix XXXVII of Legislative Decree 81/08) and to a high flow of heat which hits the operator when opening the door. In parallel, the length of time operators were exposed to the source was also assessed. The stipulated time for each control task (observation of individual station) is no more than 10 seconds, which is generally not enough time to exceed the exposure limit. However, each control task can be repeated various times depending on the type of activity and source. Considered individually, these do not exceed the calculated Exposure Time Limit but could do so if the whole working day is taken into consideration.

To summarize the exposure assessments:

- Class I, acceptable risk (GREEN): the Exposure Time does not exceed the Exposure Limit. The source may be observed without using specific Personal Protection Measures (PPM).This class is for situations in which Exposure Time (T_exp) is lower than 80% of the calculated Time Limit (T_lim)
- Class II, risk requiring caution (YELLOW): the Exposure Limit is not exceeded if the Calculated Time Limit (lower than the Exposure Time stipulated by legislation) in the absence of PPMs is complied with. Personal Protection Measures must be provided for exposures higher than or equal to the Calculated Time Limit. However, use of PPMs is highly recommended, even for exposure times lower than the Calculated Time Limit. This class is for situations in which Exposure Time (T_exp) is between 80% and 90% of the Calculated Time Limit (T_lim)
- Class III, priority risk (RED): the stipulated Exposure Time when specific PPMs are not used for observation tasks exceeds the Exposure Limit. Personal Protection Measures must be always provided for use.

1 - WBGT (Wet Bulb Globe Temperature): is the method used for the explorative assessment. It is based on an empirical thermal stress indicator.

2 - PHS (Predicted Heat Strain Model): is a method for performing an analytical assessment based on the principle of thermal balance.

This class is also for situations in which the observation time does not exceed the Time Limit but it is very close to the Calculated Time Limit. This class is for situations in which Exposure Time (T_exp) is higher than 90% of the Calculated Time Limit (T_lim) The following table summarizes the criterion for allocating risk classes.

Table 27 - Remediation activity (Thousand tons/yr)

RISK CLASS	CONDITION
I (Acceptable)	T_exp lower than 80% of T_lim
II (Caution)	T_exp between 90% T_lim and 80% T_lim
III (Priority)	T_exp equal to or higher than 90% T_lim

Monitoring identified class II risk before any mitigating action for T2F1 and T2F101 sources and class III risk before any mitigating action for CCR F3 and F5 sources, which, via the requirement for specific PPMs, can be reduced to an acceptable risk class (class I).
Furthermore, as a precaution since it is currently not technically possible to reduce the source of risk, it has been decided to make it mandatory for all workers exposed to the risk to wear specific PPMs.

Health monitoring - 2012 Health Report

The health monitoring plan, drawn up by the competent doctor, provides for the following clinical and instrumental tests for all employees at the site:

- preventative medical consultations
- spirometry
- audiometry
- biohumoral tests
- urinary metabolites (hippuric acid, methylhippuric acid, total phenols, trans-muconic acid)
- eye tests
- drug tests

Pursuant to legislation in force, employees subject to health monitoring are invited to undergo the tests set out by the plan every six months. At the first check, all the instrumental tests are carried out as well as the biohumoral and urinary metabolite tests. The second check involves biological exposure monitoring tests (complete blood count and urinary metabolites). Drug tests are carried out at a later stage for emergency response teams and drivers.
Testing for psychotropic substances In accordance with the provisions set out by the conference of the state and regions on 30 October 2007, pursuant to Article 8, paragraph 6 of Law 131 of 5 June 2003, the site has created a specific protocol for testing for, and monitoring, psychotropic substances as part of general drugs testing.

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

The site's Safety Report

For the purposes of drawing up the Safety Report for the site, every five years the company carries out, for all its plants, a precise and in-depth analysis of its activities and the risks associated with them in relation to the manufacturing process, the materials used and all the procedures involved in running a complex operation such as a manufacturing refinery. As part of this, the company's existing plant and management system are examined, and risk scenarios and hypothetical accidents are reviewed, together with the possible consequences for staff working in the plant and the surrounding area. The Safety Report is therefore an invaluable tool for preventing risk situations from arising, through the examination of all possible prevention measures; it is also used for identifying and adopting the technological solutions, equipment and safety systems that will enable any accident to be correctly dealt with and the consequences minimised. The Saras refinery prepared 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 that have 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. The Safety Report was last revised in October 2010 (the previous revision was carried out in 2006, which in turn was a revision of the 2005 report in accordance with the provisions of Legislative Decree 238/2005), and was sent to the competent authorities the same month. 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. Ahead of the assessment for the 2010 Safety Report, Saras is currently implementing the requirements of the Regional Technical Committee following the review of the 2006 Safety Report.

In June 2011, the Cagliari prefecture approved the 2011 External Emergency Plan for the Sarroch urban area, which takes account of updates to the Safety Reports of the various sites at risk of a major accident hazard in Sarroch's industrial areas.

The plan is available in the Civil Protection - Provincial Civil Protection Plans section of the prefecture's website (www.prefettura.it/cagliari).

Following the entry into force of EC Regulation 1272/2008, better known as the CLP Regulation, fuel oil has been reclassified and, therefore, pursuant to article 6 of Legislative Decree 334/99, the 2010 Safety Report sent to the competent authorities in November 2011 needed to be updated. The update also included the revised classification of crude oil contained in the CONCAWE Report 11/10.

In 2011, an inspection visit, arranged by the Environment Ministry, was carried out at the site, pursuant to Ministerial Decree of 5 November 1997. The purpose of the inspection, which took place over eight and a half days,

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 while minimising the impact via co-ordinated intervention. The objective of the IEP is to ensure the company responds 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:

- localised emergency
- general emergency
- near-accident

A localised 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 held by 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 (see Figure 15 on page 89) distributes information and updates on the management of accidents to the relevant external organisations, as appropriate to the nature of the incident:

- 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.

was to ascertain progress in implementing a security management system. The inspection was carried out by a committee appointed for the purpose by the ministry.
It concluded as follows: "The safety management system, as currently in existence, is largely adequate, and its essential elements comply, in terms of both structure and content, with the provisions of legislation and the Policy Document."

Safety systems at the refinery

The Sarroch site has a complex safety system designed to detect potentially dangerous situations immediately. The fire prevention 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 where a rise in temperature could compromise safety. The refinery also has eight 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.

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. The “Safety is our Energy” programme, launched in 2009, was completed in 2011. Significant efforts were spent on activities aimed at influencing - through training and information programmes - conduct, the main cause of accidents at work.
The total frequency and accident frequency indices recorded in 2012 show significant improvement: the 2012 result was the best result ever. In 2012, there was a further increase (36%) in the number of near accidents reported. These were analysed and corrective action taken to prevent such accidents.

The External Emergency Plan (EEP)

The External Emergency Plan (EEP) is closely related to the Internal Emergency Plan. The EEP was 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 covers the Sarroch industrial complex as a whole, and considers hypothetical accidents affecting sites belonging to the various companies located there (Saras, Polimeri Europa, Sasol Italy, ENI, Liquigas 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 carrying out particular actions 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 37 – Saras employees – Accident indices

	2009	2010	2011	2012
Total frequency index	13.2	10.7	6.8	2.5
Accident frequency index *	7.5	7.5	3.7	1.8
Severity index	0.376	0.434	0.155	0.07
Average duration	49.9	58	41.8	38
Near accidents notified	60	82	129	176

* The calculation of this index includes all accidents that involved absence from work of at least one day (excluding the day on which the accident occurred)

Chart 44 – Saras employees – Total frequency index

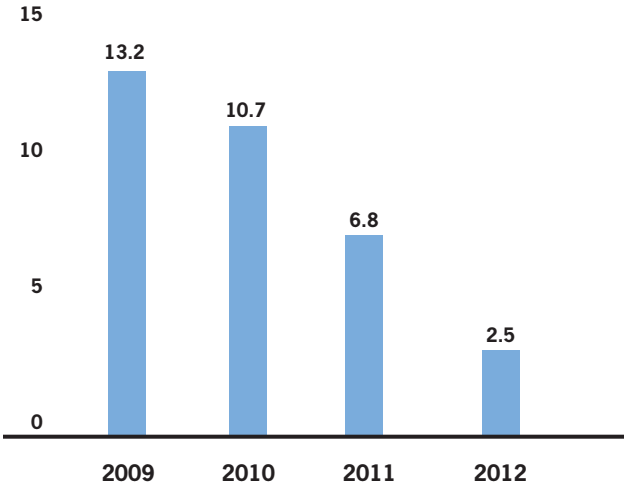


Chart 45 – Saras employees – Total accident frequency index

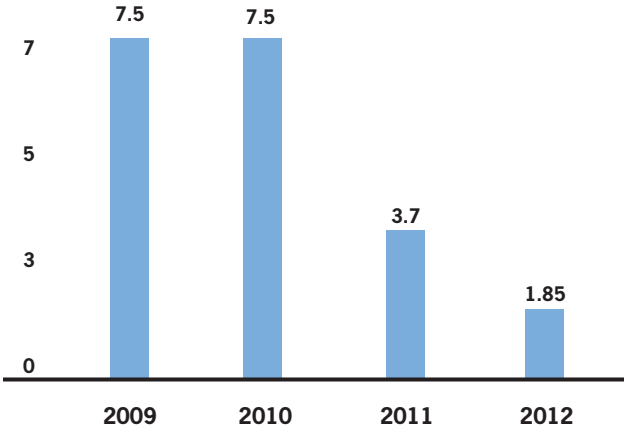


Chart 46 – Saras employees – Accident severity index

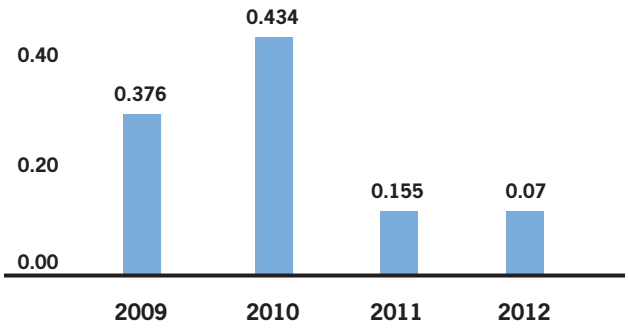
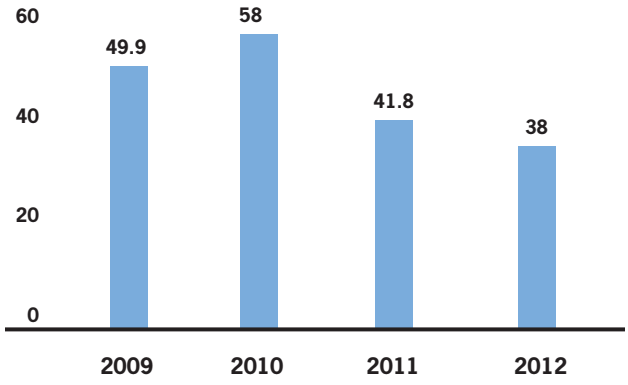


Chart 47 – Saras employees – Average accident duration (days)



Subcontractors

Saras also records and analyses data on work accidents at the site involving staff employed by subcontractors. The total frequency and accident frequency indices recorded in 2012 show significant improvement: the 2012 result was the best result ever. In 2012, Saras again increased its focus on subcontractors operating within the site, stepping up checks on the ground and classroom information activities led by Saras staff. These initiatives have had a positive effect on accident rates, which improved markedly on previous years.

Table 38 – External staff – Accident indices

	2009	2010	2011	2012
Total frequency index	8.50	5.97	6.18	1.0
Accident frequency index ***	4.90	3.5	3.27	1.0
Severity index	4.939	0.203	2.752	0.042
Average duration	30.5*	58.8**	10*	44
Near accidents notified	127	153	60	44

* This figure does not include fatal accidents
** The figure is affected by two accidents that occurred in 2009, which extended into 2010. Stripping out these two accidents. the figure would be 31.6
* The calculation of this index includes all accidents that involved absence from work of at least one day (excluding the day on which the accident occurred)

Chart 48 – Saras employees – Total frequency index

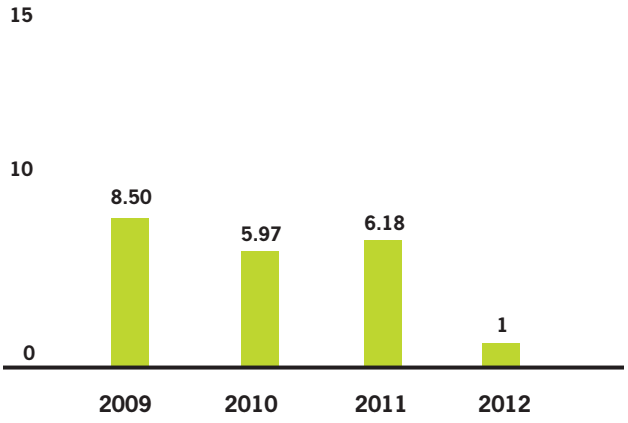


Chart 49 – External staff – Total frequency index

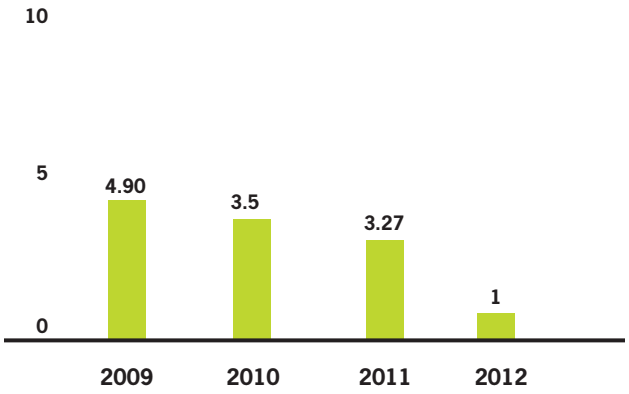


Chart 50 – External staff – Accident severity index

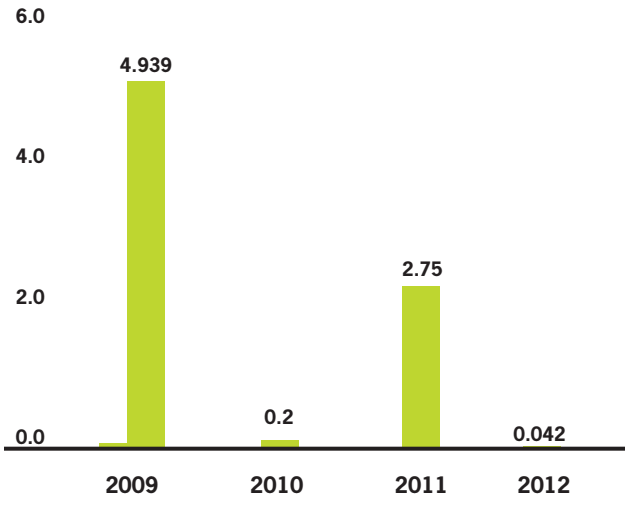
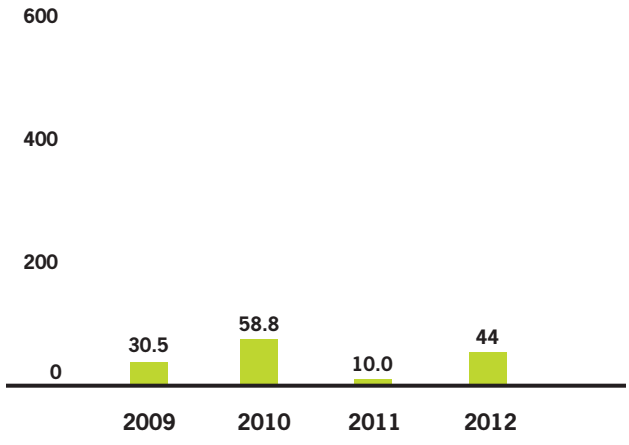


Chart 51 – External staff - Average accident duration



Emergencies

In 2012, two general emergencies and three localised emergencies were recorded. None of these emergencies caused any physical injury, while one of the general emergencies caused a shutdown of the Topping 1 plant (Tables 39 and 40). Reports of near-accidents (see Chart 51) decreased in 2012 compared with the figure in 2011. On the opposite page, Charts 55 and 56 also show the number of plant shutdowns following an emergency and the related number of shutdown days.

Table 39 – Emergencies - number of events

	2009	2010	2011	2012
Localised emergencies	32	15	4	3
General emergencies	3	5	1	2
Near accidents	20	4	17	10

Chart 52 – Localised emergencies

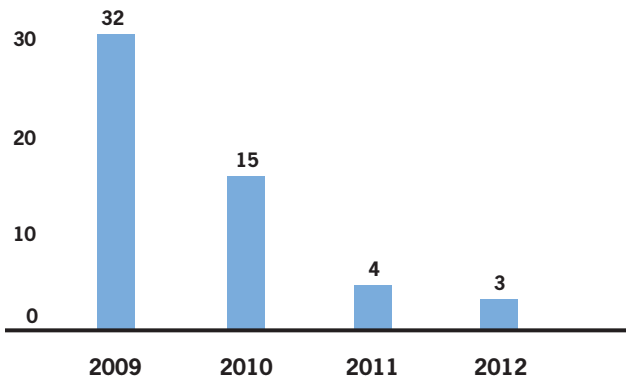


Chart 53 – General emergencies

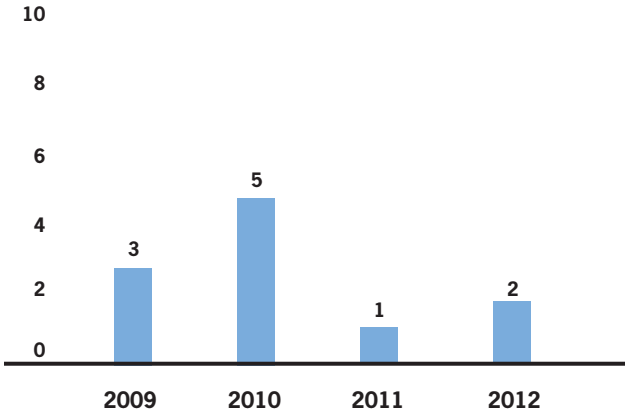


Chart 54 – Near-accidents

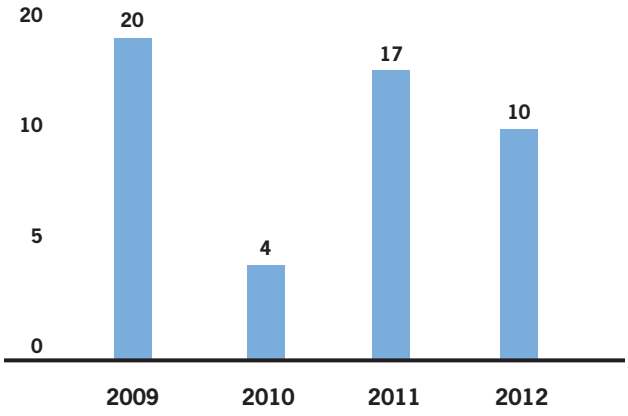


Table 40 – Shutdowns following an emergency

	2009	2010	2011	2012
Number of shutdowns	3	4	0	1
Number of shutdown days	7	11	0	5

Chart 55 – Shutdowns

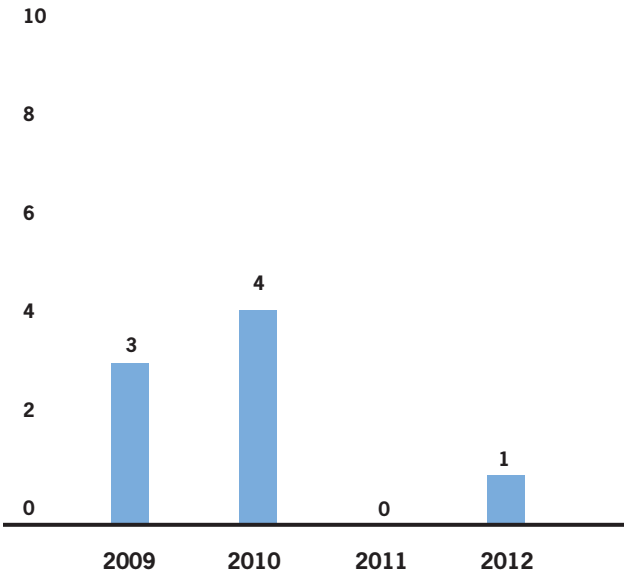
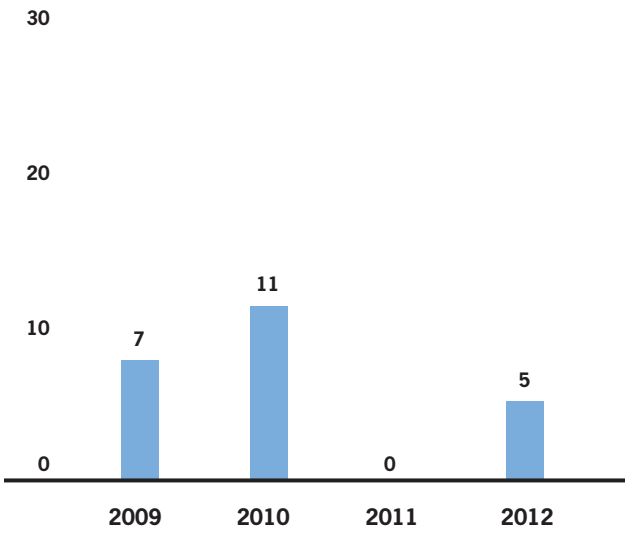


Chart 56 – Shutdown days



Investment in safety

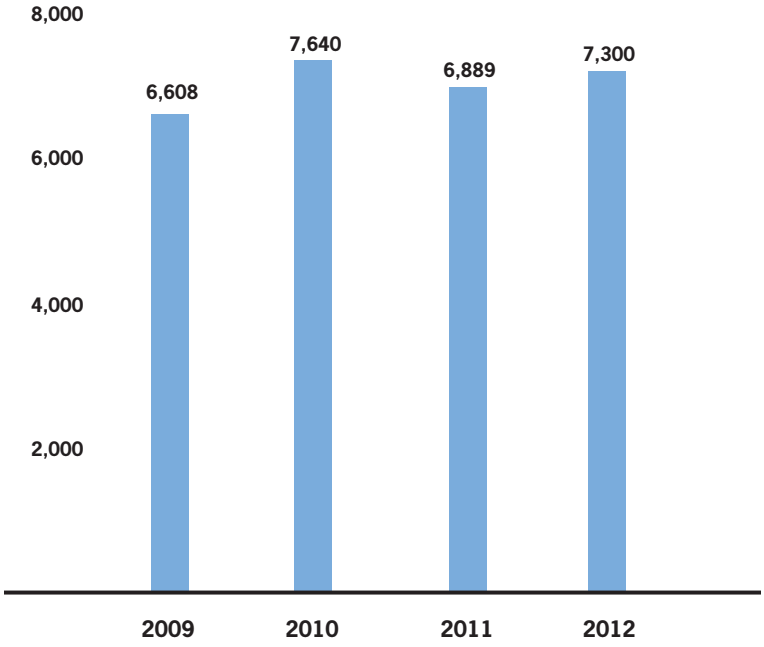
Between 2009 and 2012, Saras invested over EUR 28 million in projects and policies to continually upgrade safety levels at its site, spending on average around EUR 7.1 million a year. The key measures funded in 2012 involved both the improvement of existing safety equipment and modifications to plant and product movement systems, as follows:

- fitting of further product volume interception valves to the plant
- the replacement of glass "klingers" with magnetic ones at the processing plant (Topping 1, Vacuum 2 and MHC2 plants)
- the continued upgrading of the fire prevention system and new equipment
- the continued upgrading of the fire and hydrocarbon detection systems (alkalisation plant)
- the completion of the upgrade to the structural fire prevention systems
- safety improvements within the tank containment basins

Table 41 – Investment in safety (EUR thousands/year)

	2009	2010	2011	2012
Investimenti	6,608	7,640	6,889	7,300

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



Group companies

Data

The following charts 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 Deposito di Arcola, Sarlux, Sardeolica or Sardec have reported any accidents entailing a loss of working days, either in the case of their employees or the staff of external companies.
In 2010, data for Saras Energia, which operates in the Spanish oil products distribution market, was included. Its total accident frequency, INAIL and severity rates were calculated according to the aggregate methods used for the other Group companies, all operating in Italy. The rates recorded by Saras Energia in 2012 were also, on average, higher than the Group average, corresponding to the results recorded by the service stations, where most accidents were concentrated. 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. At the Sarroch site and Saras Energia, direct employees have a particular influence on the Group figure since their hours worked account for 53% and 27% of the total respectively, while at the Sarroch site, the staff of subcontractors have the biggest influence on the data, with a percentage of 95.8%.

Occupational health monitoring

Sartec

Last year, monitoring and/or measurements taken to check employees' levels of exposure to the following health and safety risks were carried out as shown below.

- Noise
- Vibrations
- Hazardous substances - relating to the exposure of operating staff in the chemical-oil laboratory
- Microclimate
- Ionising radiation

The surveys all produced encouraging results; the monitoring showed that no threshold limits set by legislation or technical regulations were exceeded.

Health monitoring - Excerpt from 2012 Health Report

In accordance with the guidelines set out by the Health Monitoring Plan created by the MC in accordance with the interdepartmental decree and the provisions of Legislative Decree 81/2008, the programme of controls based on the Risk Assessment was completed in 2012.
The health monitoring plan provides for the following clinical and instrumental tests for all employees at the site:

- Preventative medical consultations
- Spirometry
- Audiometry;
- Eye tests;
- Biohumoral tests;
- Urinary metabolites.

Chart 58 – Total frequency index

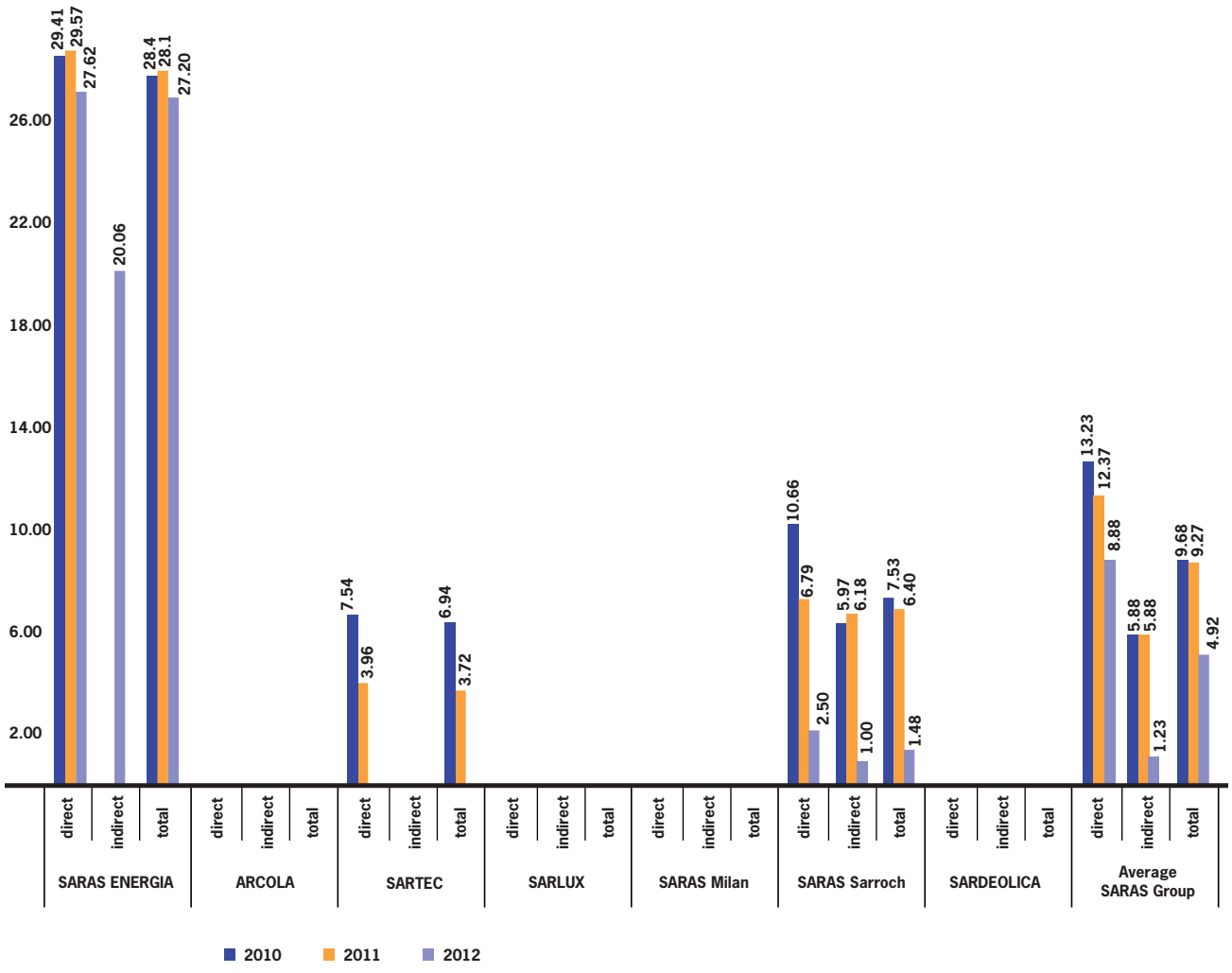


Chart 59 –Total accident frequency index

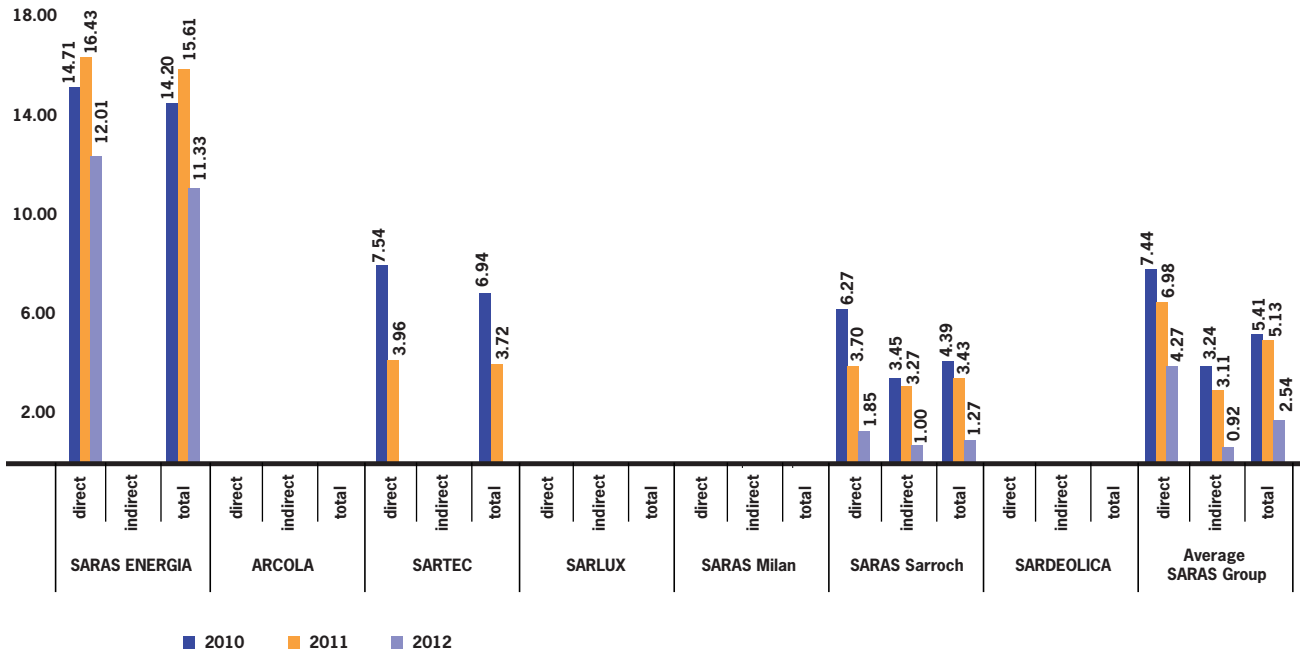
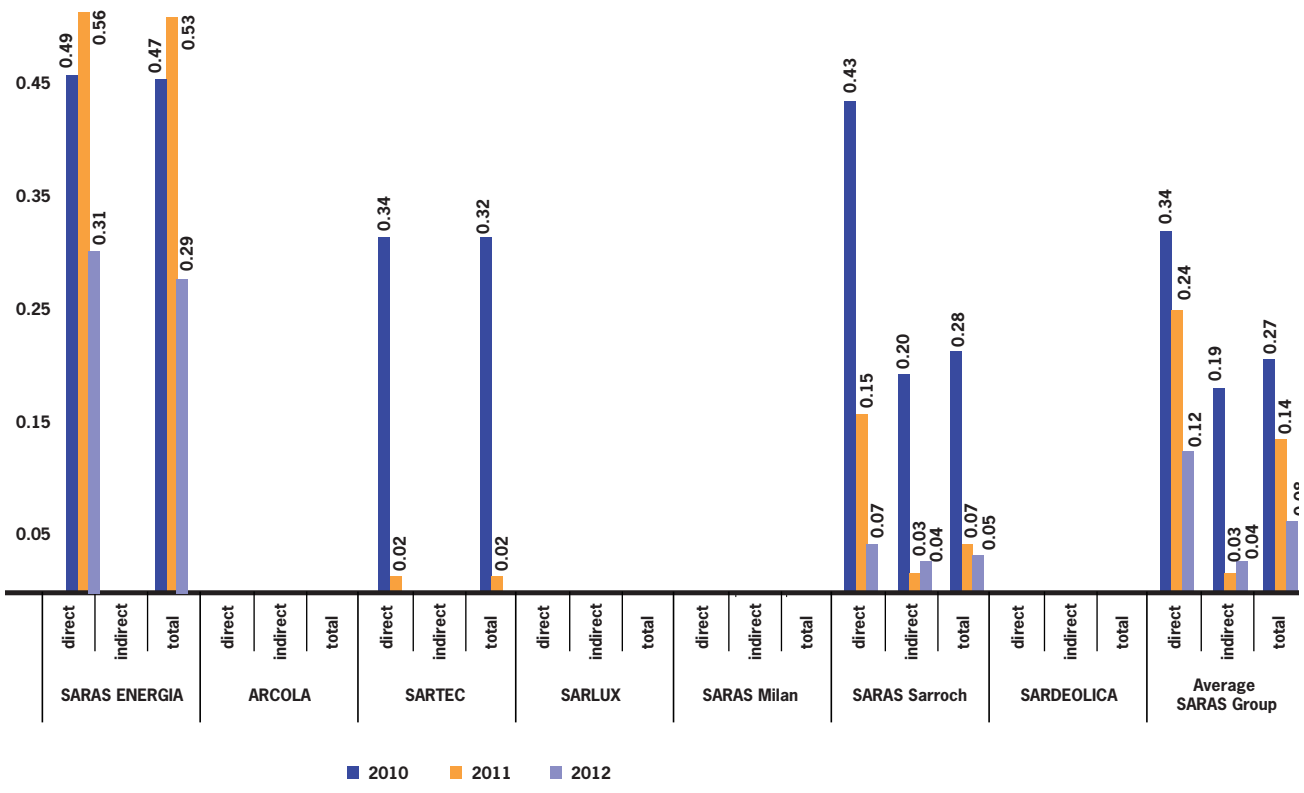


Chart 60 – Accident severity index



* The fatal accident (SARAS Sarroch indirect) is excluded from the severity index

In accordance with existing legislation, the individuals covered by health monitoring were invited to undergo the tests included in the monitoring plan on a regular basis commensurate with the type of activity carried out. The company's annual average headcount was 139.34 employees in 2012. Analysis of the clinical and instrumental test results paints an encouraging picture with regard to the absence of occupational illness and the general state of employees' health.

Sardeolica

The results of the health report confirm that there are no occupational risks to staff.

Deposito di Arcola srl

Health monitoring - 2012 Health Report

The health monitoring plan, drawn up by the competent doctor, provides for the following clinical and instrumental tests for all employees at the site, for the purposes of risk assessment:

- preventative medical consultations
- spirometry
- audiometry
- bihumoral tests
- urinary metabolites

Chart 61 – Hours worked by direct employees

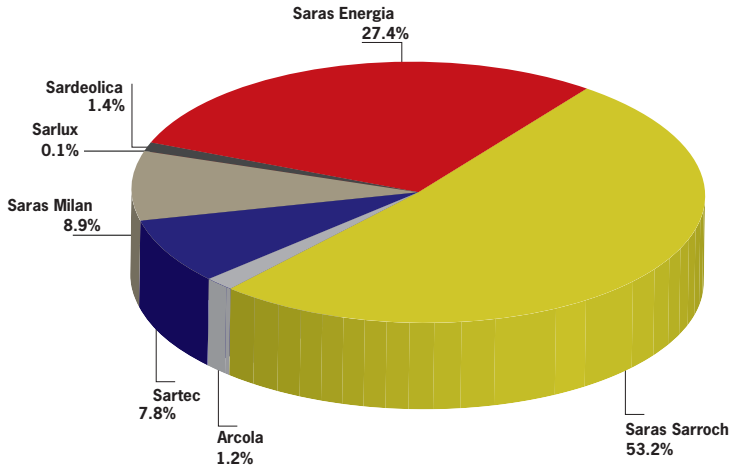


Chart 62 – Hours worked by contractors

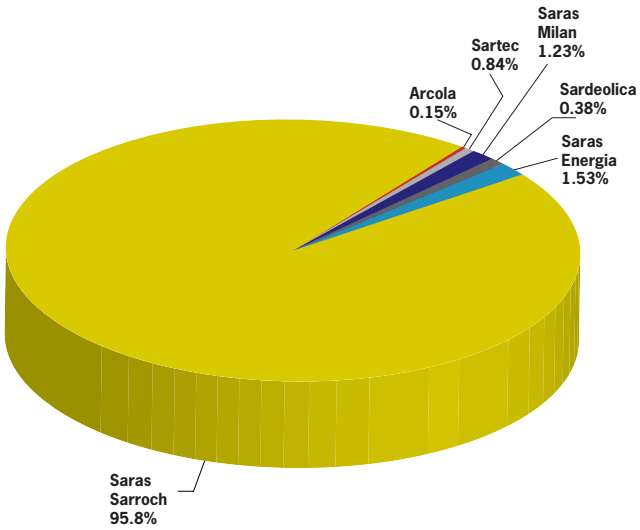
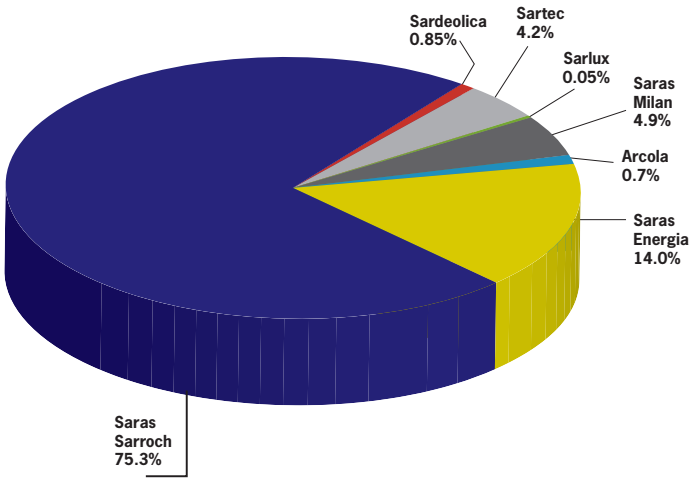


Chart 63 – Total hours worked



Glossary

Glossary

AIA (Integrated Environmental Authorisation 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.

ARPA (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 (ARPA) was created under Regional Law 6 of 18 May 2006.

AUDIT

Term used in various contexts to mean verification by inspection or assessment. It indicates a systematic, independent and documented process to obtain evidence (recordings, 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.

BALLAST WATER

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

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 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.

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.

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.

CO_2 (carbon dioxide)

An odourless, colourless, flavourless gas produced from 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.

DESULPHURISATION

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

DIESEL

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

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.

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.

EMISSION

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

EMISSIONS 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.

ENVIRONMENTAL IMPACT

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

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.

ESCO (ENERGY SERVICE COMPANY)

Companies that implement measures aimed at improving energy efficiency. The companies assume the risk relating to the initiative and release the end customer from any organisational or investment liability. The financial savings obtained are shared between the ESCO and the end customer through various types of commercial agreement.

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.

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 impact on the environment in terms of atmospheric emissions (chiefly SO_2 and particles).

GASOLINE

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

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 (CH4), nitrogen oxides (NOX) and sulphur hexafluoride (SF6).

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.

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 106/hours worked).

INES (Inventario Nazionale delle Emissioni e loro Sorgenti - 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 Organisation for Standardisation)

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

ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale - 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.

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 that 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 sanctions if they fail to meet the targets set. The rules for developing countries are more flexible.

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.

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.

NOX (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.

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

REFINING

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

RELIABILITY

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

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.

REVAMPING

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

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.

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).

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.

TEE (TITOLI DI EFFICIENZA ENERGETICA, ENERGY EFFICIENCY CREDITS)

Energy efficiency credits (which are also known as white certificates) serve as an incentive and certify that energy savings have been achieved through the implementation of specific measures. White certificates, which were created in Italy with the electricity and gas ministerial decrees of 20 July 2004 and came into force in January 2005, are credits that can be obtained and subsequently resold. Their value was originally fixed at 100 Euro/TOE. The energy value of one TOE is comparable to an average family's annual consumption of electricity.

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.

TOTAL FREQUENCY INDEX Calculated using the total number of verified events (accidents reported to INAIL and cases of medical treatment) and the number of hours worked (calculated using the formula: number of events x 106/hours worked).

TSPS (TOTAL SUSPENDED PARTICULATES) These are tiny solid particulates suspended in the air. They mostly comprise uncombusted carbonaceous material able to absorb various types of compound onto its surface.

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

YIELD The yield of a machine is defined as the ratio between the power distributed (or energy generated) and the power absorbed (or energy consumed) at a given time. The greater the yield, the more efficient the machine; the lower the yield, the more energy wasted.

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