Environmental, Health and Safety Report 2013

SARAS


SARAS

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Foreword

Welcome to the Saras Group Environmental, Health and Safety Report 2013.

In 2013, the Group implemented a significant corporate reorganisation, transferring all refining assets held by Saras SpA to subsidiary Sarlux Srl

This transfer enabled all industrial operations to be concentrated in a single company, thereby increasing operational and management efficiency.

As part of the measures launched in 2010 with the "**Safety is our energy**" project, which was designed to make the "culture of safety" more widespread and to promote safe behaviour at work and elsewhere in all of our lives, as expressed in our vision: "*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*", during the year, *the* "**Safety Champions**" project was launched.

The aim of this initiative is to promote employee involvement in strengthening the **proactive culture of safety**. All employees can play a leading role within the company, through their behaviour and attitudes, and actively contribute to achieving the company's objective of zero accidents or mishaps at work.

On the environmental front, in the fifth year in which integrated environmental authorisation (AIA) applied, the Group confirmed improvements in the figures for air quality outside the site, the primary objective in sustainable development.

Specifically, there was a significant improvement in production efficiency, with the reduction of the plant's "energy" requirement, which is an essential part of environmental protection.

In 2013, the ongoing initiatives launched to improve "energy efficiency", aimed at ensuring Saras' competitiveness and future sustainability, enabled the energy requirement to be reduced by 7% compared with the average of the last three years.

Lastly, new educational initiatives were launched in 2013 in partnership with schools and universities, particularly on the subjects of safety and environmental protection.

Ignazio Piras
Group HSE quality and policies manager


Milan
ARCOLA
Arcola
SARAS
Madrid
Rome
SARDEOLICA
Ulassai
Macchiareddu
Cartagena
Sarroch
saras
SARAS
SARAS
SARLUX
Refining & Power
SARTEC

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 national and international markets, both directly and through its subsidiaries Saras Energia SA in Spain and Arcola Petrolifera Srl in Italy
- the production of oil products through associate Sarlux Srl
- the generation and sale of electricity through Sarlux Srl and Parchi Eolici Ulassai Srl
- industrial engineering services and supplies, and research, consultancy and technological development for the oil, petrochemical, energy and environmental sectors through Sartec

Saras SpA - Parent Company established in 1962 to carry out refining activities. It has shareholdings in a number of subsidiaries in Italy and abroad, which are briefly described below.

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

Deposito di Arcola Srl - provides receipt, storage and land or sea redelivery services for oil products.

Sarlux Srl - a wholly-owned Saras subsidiary, which owns the refining plants of the Sarroch site (following the transfer of refining operations from Saras SpA to Sarlux Srl from 1 July 2013) and the IGCC plant, and which fully manages the site's operational activities and the commercial aspects relating to the sale of energy to the IGCC.

Saras Energia SA - distributes oil products in the Spanish retail and wholesale market, and manages a biodiesel production plant and a hydrocarbon storage facility in Murcia.

Sardeolica owns the wind farm, with installed capacity of 96 MW, built in the municipality of Ulassai (OG).

Sartec (Saras Ricerche e Tecnologie SpA) develops and supplies, both nationally and internationally, advanced solutions in the fields of environmental protection, industrial efficiency and energy savings, industrial engineering services, analysis of oil and environmental analyses.

SARAS

Saras has **240 employees**. Its registered office is in Sarroch, its administrative office in Milan and it has a sales office in Rome.

Strategy and investment

According to forecasts from various leading industry institutions, the environment for the European refining sector is set to remain challenging in 2014, although should improve on 2013, thanks to the gradual economic recovery. In addition, certain specific geopolitical factors of importance to the Saras Group are expected to be resolved. Specifically, production and exports of Libyan crude oil are likely to recover gradually, and the necessary conditions may arise for an easing of sanctions against Iran.

Against this backdrop, the Saras Group's industrial strategy in the refining and electricity generation sectors, will remain prudent and geared towards improving industrial efficiency, lowering operating costs and preserving financial solidity. The main strategic directions will be as follows:

- full exploitation of the refinery's conversion capacity, in line with expectations of a gradual improvement in margins and the renewed availability of paraffin crude oil
- continuation of the improvement programmes, aimed at boosting operational performance, energy efficiency and cost cuts, which are part of the "Focus Project" that has been ongoing since 2011
- limited investments concentrated on "HSE" activities, as well as those dedicated to maintaining units' full capacity and operational efficiency
- careful management of working capital and oil inventories, to enable the debt position to be carefully monitored

In relation to the proposed establishment of a commercial joint venture between Saras and Rosneft, Rosneft's recent announcement of its plans to buy Morgan Stanley's oil trading business further strengthens commercial activity development programmes, and offers new opportunities. The companies therefore plan to confirm their commitment to developing joint commercial operations, in line with Rosneft's acquisition of Morgan Stanley's business.

Lastly, as regards other segments, the Group's strategy will be focused on the consolidation of its positions and the possible rationalisation of certain non-strategic activities.

Investment by business segment

In 2013, the Saras Group invested a total of EUR 109.6 million, approximately EUR 10 million less than in the previous year. The breakdown by business segment is shown in the table below. Over the year, the Group again confirmed its traditional proactive approach, with targeted investments in full compliance with all HSE provisions, and others dedicated to maintaining complete plant operational efficiency. It also made some important investments targeting growth. Overall, investment decisions were always prudent, in order to maintain the Group's financial solidity, in light of the difficult economic environment.

EUR million	2013	2012
REFINING	87.1	97.0
ELECTRICITY GENERATION	16.9	8,7
MARKETING	3.7	8.2
WIND POWER	0.2	3.8
OTHER ACTIVITIES	1.7	1.6
Total	**109.6**	**119.3**

In 2013, even more so than in previous years, investments were almost fully channelled into the refining and electricity generation segments. Specifically, as regards investments targeting growth in the refining segment, the Group concluded the revamping project for the MildHydroCracking-2 (MHC2) plant at the end of the second/beginning of the third quarter. Once fully operational, this investment will generate annual 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/year.

Also as regards investments targeting growth and technological improvements at the Sarroch site, in the electricity generation sector, the Group upgraded three turbines of the IGCC plant, in order to increase operational efficiency and the power generated.

Lastly, HSE investments in 2013 mainly concerned the protection of land through the installation and restoration of double bottoms in some hydrocarbon tanks, and work to pave some basins of tanks and pipework.

Group companies

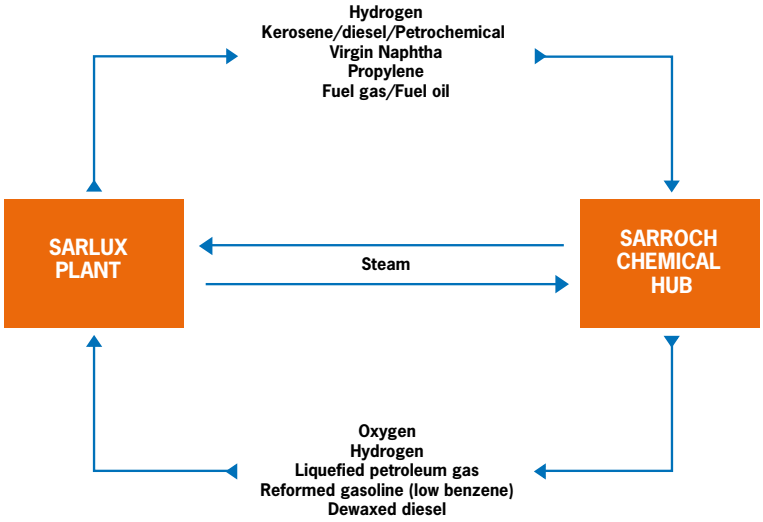
The Sarlux site: refining and electricity generation

Sarlux Srl carries out 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 fully 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)

2010	2011	2012	2013
14,340	14,006	13,309	12,980

Figure 1 – Synergies between the Sarlux 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 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 Sarlux, Versalis, Sasol Italy, Air Liquide and Liquigas. These companies build and maintain the plants of the larger firms, and therefore represent a significant satellite industry. Sarlux 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. 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 Sarlux 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 Sarlux (mainly diesel and kerosene).
Air Liquide produces liquid oxygen, which is used in the Sarlux plants (IGCC plant). Lastly, the Liquigas site stores and sells the LPG from Sarlux.

The development of the Sarroch site

The history of the Sarroch refinery dates back to 1962, when Angelo Moratti identified this site as a strategic location for oil refining operations. Construction of the refinery facilities began in 1963, and refining activity in 1965. Until the end of the 1980s, the plant mainly provided refining services for third parties (i.e. it refined crude oil owned by other oil companies, which 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 to gasify heavy distillates from the refining process and 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 led to the progressive reduction of the quantity of sulphur present in the oil products and the improvement in the quality of medium distillates and gasolines; from 1 July 2013, all operating activities were transferred to Sarlux Srl

Site layout

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

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

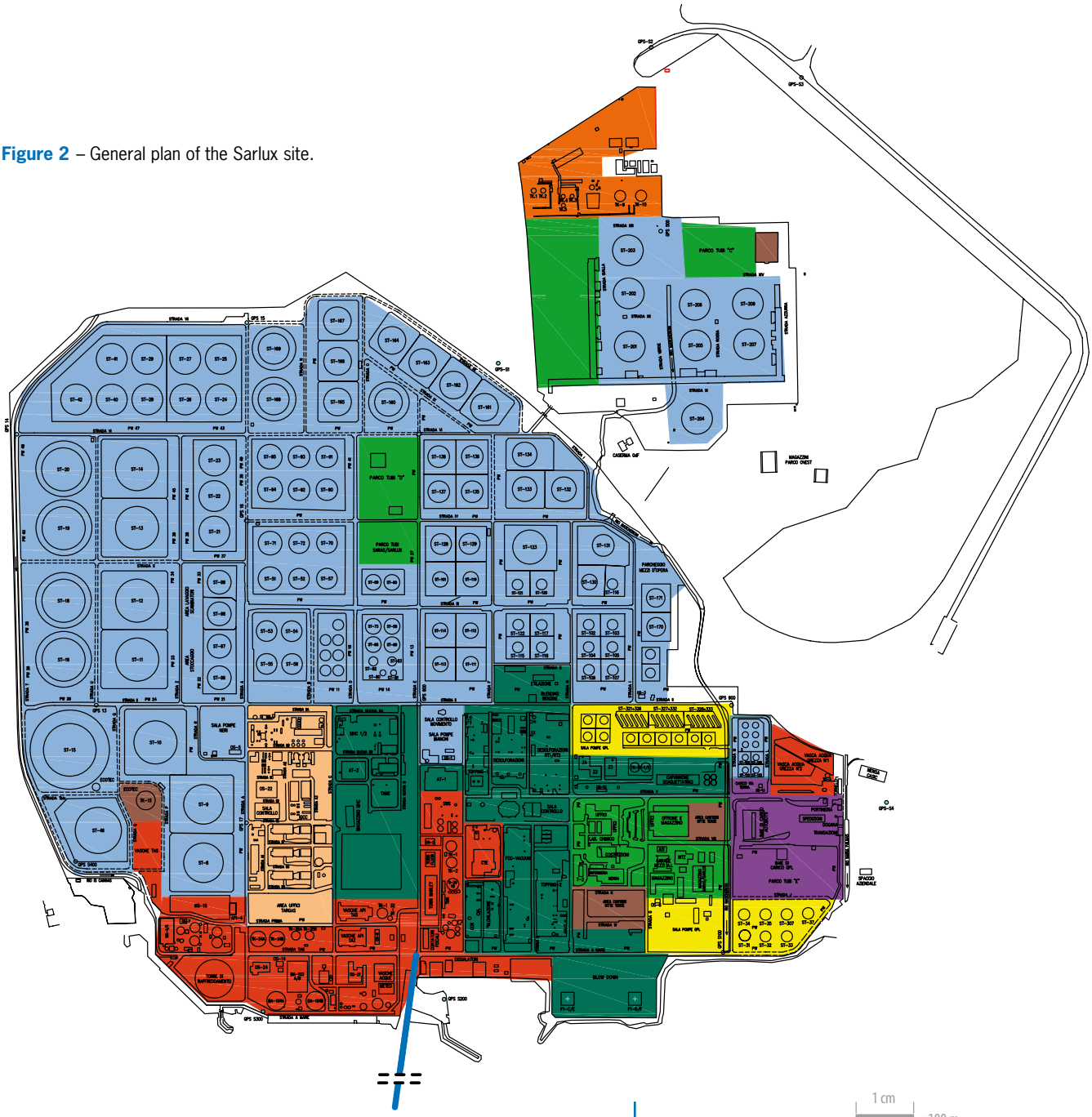
Figure 2 on page 15 shows the areas used for the different types of activity performed within the facility, summarised below.

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

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

All raw materials are delivered here, and the bulk of the oil products are shipped from here. In 2013, approximately 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

Figure 2 – General plan of the Sarlux site.



up to 300,000 tons. Advanced monitoring systems ensure that all receipt and shipping operations take place under conditions of the utmost safety: the phases relating to the docking and mooring of ships and the connection between the ship and the loading arms transferring raw materials to the shore and finished products to the ship are carried out under continuous surveillance. In order to be admitted to the Sarlux 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 Sarlux. A dedicated control room, which has been completely renovated and updated 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 solid and liquid forms 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 SO_2 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 Sarlux plant: oil production and electricity generation

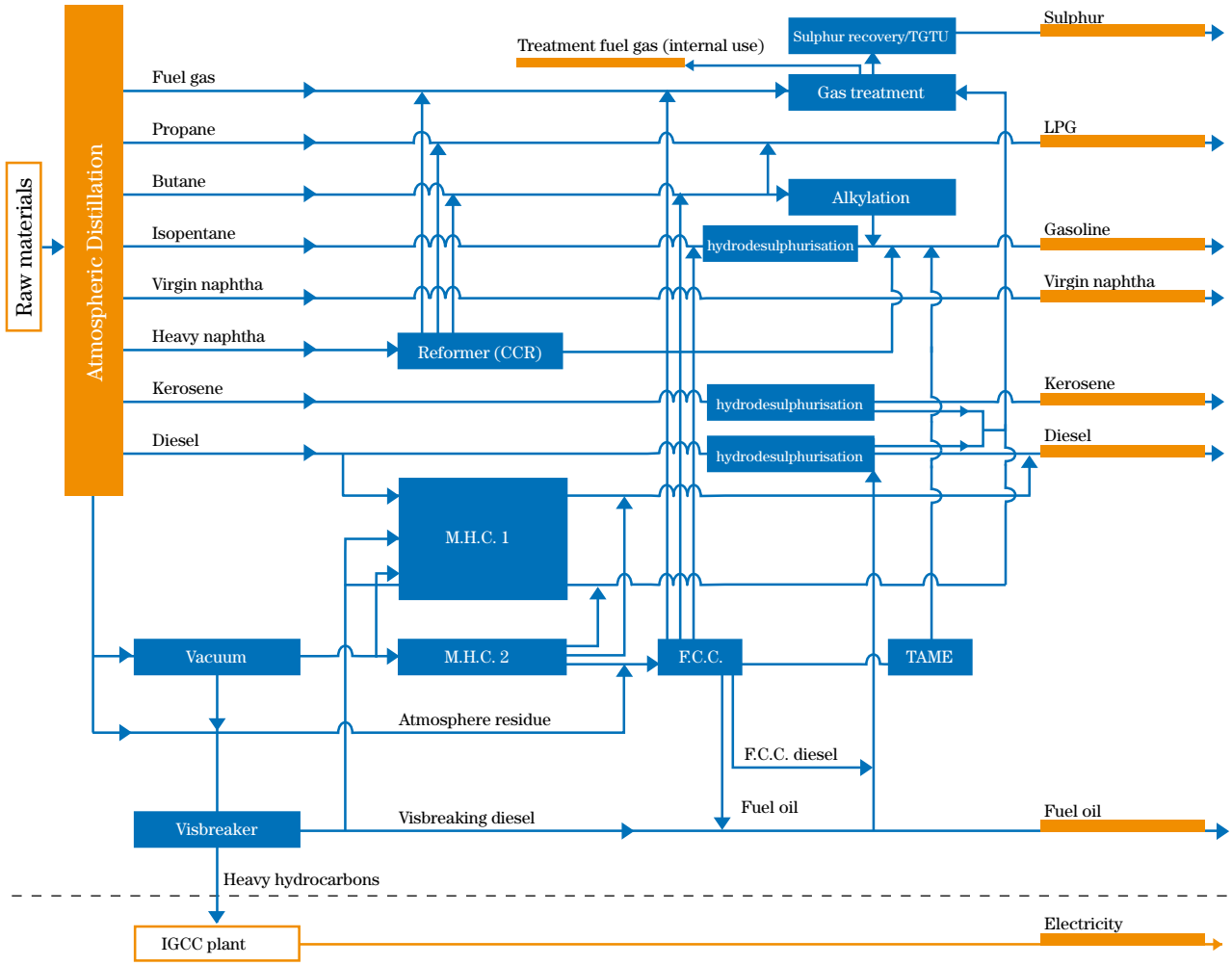


Chart 1 – Refinery products and consumption

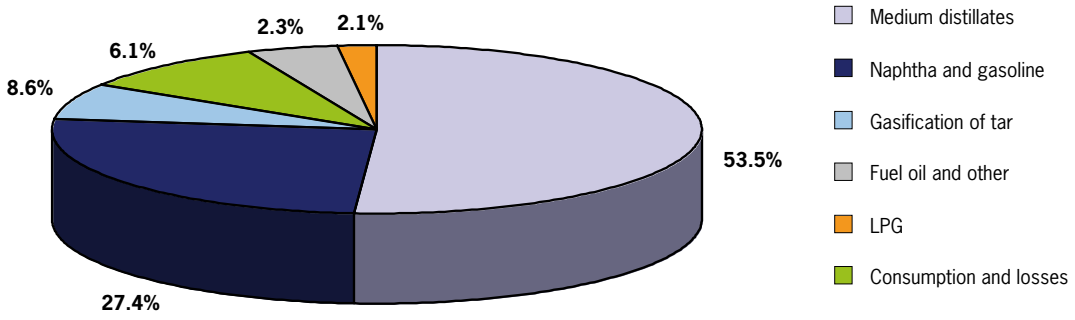


Table 2 – Oil products (tons/year)

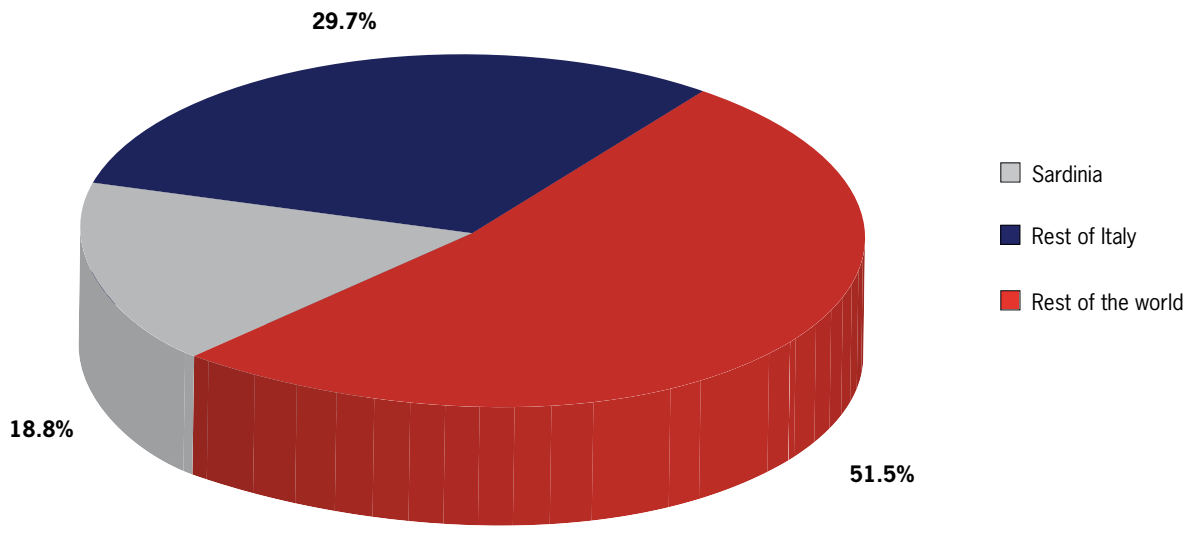
	2010	2011	2012	2013
LPG	323,000	238,000	205,000	267,000
Gasoline and virgin naphtha	4,024,000	3,824,000	4,002,000	3,558,000
Middle distillates (gasoil, kerosene)	7,517,000	7,415,000	6,891,000	6,959,000
Fuel oil and other	463,000	623,000	272,000	304,000
Sulphur*	130,000	113,000	122,000	117,000
TAR	1,166,000	1,075,000	1,146,000	1,123,000

* Includes sulphur recovered both from refining and the IGCC

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

	2010	2011	2012	2013
Africa: Nord West	38	15 16	35	27.8
Middle East	7	20	18	5.6
Russia and Caspian Sea	30	42	39	53.8
North Sea	11	3	2	2.7
Miscellaneous	14	4	6	10.1
Total	100	100	100	100

Chart 2 – Total shipping 2013



The Sarroch plant has a high output of medium oil products (diesel) and light oil products (LPG, naphtha and gasoline), which in 2013 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 2010–2013.

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 2013, approximately 19% 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. Taken as a whole, it is recognised as one of the best techniques available for the refining sector.

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

- gasification
- combined cycle

In the gasification section, oxygen supplied by the Air Liquide plant is used to convert heavy hydrocarbons from the visbreaking plant into a synthesis gas (shortened to "syngas"), which, once purified of the sulphur and metals it contains, is burned in the combined cycle section. 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 refining plants for use in refining processes, along with the hydrogen produced by the gasification section. As with the sulphur recovered from the refining cycle, the sulphur recovered through the removal of hydrogen

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Sarlux, owner of the plants, has 1,019 employees. Its registered office is in Sarroch.

Figure 4 – Flow chart of the IGCC plant

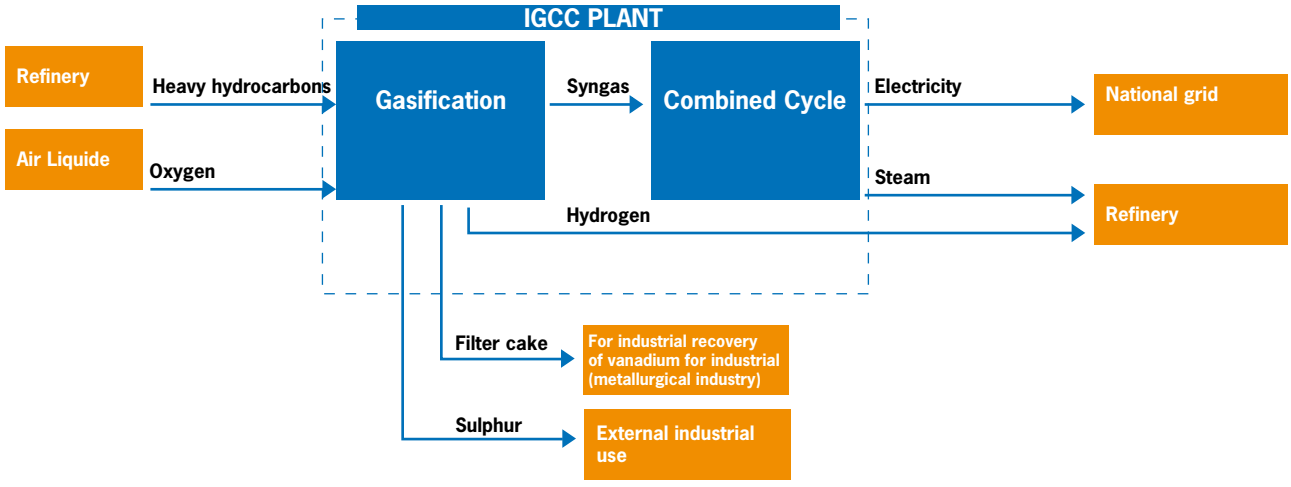


Table 4 – IGCC Products

	2010	2011	2012	2013
"Gross" electricity (MWh)	4,339,335	4,034,163	4,211,290	4,242,729
Low-pressure steam (tons/year)	586,626	555,647	582,843	659,696
Medium-pressure steam (tons/year)	737,033	699,486	743,660	859,248
Hydrogen (t/year)	39,731	35,809	36,214	32,109
Sulphur (tons/year)	52,666	37,872	43,196	38,932
Vanadium concentrate (tons/year)	1,122*	1,494**	1,142	1,279

* 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

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", which is sent to external plants to recover the metals. The IGCC plant therefore enables the production site to maximise the conversion of raw materials into value-added products. The three-line configuration of the IGCC plant ensures continuity in electricity generation and the production of hydrogen and steam for internal use on the site. The figures recorded to date confirm the effectiveness of the plant processes and technology. The plant is extremely reliable (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 site as a whole (refinery + IGCC) was achieved following the start-up of operations at the gasification plant.

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

Table 5 – Comparison of power plant efficiency

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

The Filter Cake

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

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 are divided into the following areas:

- 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 (48 tanks), or earthworks (113 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. Moreover, 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, 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 Sarlux 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 some 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 (wastewater treatment 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 carried out 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 standards 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.

Saras and corporate social responsibility

Ongoing dialogue with the local community, continuous improvement in environmental services, and support for initiatives aimed at social, economic and cultural development in the community. These policy guidelines again formed the basis of the Saras Group's social responsibility initiatives in 2013. The Group's commitment to keeping a channel of communication open with institutions, residents and stakeholders is aimed specifically at the community around the Sarroch production site and Cagliaritano. But Saras also promotes the development of the whole island.

Environment: dialogue with the community

Against a backdrop of increasing environmental awareness, EMAS (Eco Management Audit Scheme) certification, which was awarded in 2008, is based on the perfect combination of respect for the local community and the sharing of results with residents. Saras presented its performance figures at a meeting of the Sarroch Environmental Committee. The figures were a tribute to its huge efforts in this area, illustrating how the company had reduced emissions in 2013 to 45% of what they were in 2008. Other results are reported in the “Environmental Declaration” and the “Environmental, Health and Safety Report”.

Education: safety and new training projects

A specific page of Saras' history is reserved for its relationship with schools and universities, which has always involved a host of educational initiatives and training programmes. The Group aims to disseminate a culture of safety, starting with the very youngest, through its support of "Safe Schools", a project devised by the National Fire Service in Cagliari and organised by the Sarroch elementary/middle school, in association with the Municipalities of Sarroch and Villa San Pietro. Under the initiative, lessons on safety are given to children in language that is easy to understand to make them aware of the risks around them.

In addition to the regular visits to the site as part of the "work-related learning" programme, new forms of partnership with high schools were launched in 2013. The aim of this ministerial programme, which recognises the value of company internships, is to introduce young people to the difficult world of work. For this reason, over the course of four days, students attended lessons run by Saras employees on safety, environmental protection rules, ICT and company organisation in the Company's multi-purpose room at the Sarroch site. They also visited the marine terminal, which is the refinery's door to the sea. Lastly, the Group has a solid link with Cagliari University through apprenticeships and scholarships for doctorate students. The relationship is about to be strengthened with the renewal of the memorandum of understanding that has provided the framework for this partnership since 1999.

Social commitment: participation in important events for the island

There were two major events in Sardinia in 2013: Cyclone Cleopatra (19 November), which left 19 people dead and devastated over half the island, and the visit of Pope Francis to Cagliari on 22 September. Saras employees, together with their colleagues in the Sarroch industrial area, rallied alongside the people affected to help them with the reconstruction work. In this way, they were able to get involved personally, as well as participate in the company-organised monetary collection. During the Holy Father's visit, the Group supported the organising committee, providing 20,000 bottles of water for pilgrims. In summary, the Group continues its unwavering support of charities and other voluntary organisations on the island.

The culture of sport

In 2013, the Group continued to sponsor the world of sport through its support of local sports clubs, such as the Sarroch Polisportiva Volley, a team that competes in Serie B2 of the National Volleyball League, and Sarroch Football Club. The Group is one of the sponsors of the Dinamo-Sassari basketball team, a nationally successful Sardinian team that has won the Italian Cup.

Sartec: environmental research and innovation

Sartec is the Saras Group's environmental and industrial engineering and technological development company. Its environmental consultancy and monitoring, design, creation and supply of systems, and production-process and industrial-automation optimisation services are aimed at supporting innovation, efficiency and sustainable industrial development. These services, which are delivered through the technical expertise of its specialists, are strengthened by a special focus on Sartec's key values, which translates into added 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, it also draws on the results of studies from the world of research or conducted at its own behest.

Sartec offers the following services:

- Environmental protection services: systems for monitoring air, water and emissions quality; environmental consultancy and engineering; and water, air and emissions analysis through its state-of-the-art laboratory.
- Specifically, in relation to environmental monitoring, Sartec is able to offer both individual analysis tools and integrated substations as well as entire turn-key measurement networks, managing the whole process from design, construction and supply to after-sales technical assistance and maintenance; in consultancy services, the company provides studies and analytical services and modelling for contaminated site characterisation, specific site risk analysis, the planning of measures for the safety and reclamation of contaminated sites, and the monitoring of fugitive emissions and odours, as well as 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: this type of service includes engineering services (feasibility studies and cost/benefits analysis, process basics), FEEDs, and detailed engineering services (piping and layout, civil, mechanical, electrical and instrumentation and automation engineering). The Group's significant engineering expertise enables it to design and build package plants for industry (including blowdown gas recovery systems, filtration systems and chemical additivation systems), automation engineering and the development of advanced process controls, together with process analysis systems (design, build, supply and maintenance) and projects for alarm rationalisation and the development of training systems for operators of the OTS (Operator Training Simulator). In addition, Sartec offers consultancy services in the oil refining sector, with studies relating to the characterisation of crude oils and semi-finished goods and products, and studies of hydrotreating catalytic systems on pilot plants and the modelling of refining processes. Lastly, as an ESCo (energy service company), Sartec develops energy efficiency projects for industry and the public administration. Services include the identification of areas

SARTEC
SARAS RICERCHE E TECNOLOGIE

With **132 employees**, Sartec has two locations in Italy: Cagliari, in the industrial zone of Macchiareddu (registered office, facilities and laboratories) and Milan (sales office).

of improvement in energy efficiency, the design and execution of the work, the recognition by the GSE of energy efficiency credits (TEE), and the measurement and calculation of TEEs. Specifically, Sartec has developed energy efficiency solutions with the award of TEEs for numerous optimisation procedures as part of refining processes (totalling 270,000 certificates to date), together with projects relating to the management of steam networks, insulation systems, advanced process control and LED lighting systems.

Sartec applies innovation as its guiding principle in every project, enabling it to develop original solutions that have effectively resolved customers' problems. The company carries out 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. In connection with innovation, Sartec also helps incubate new start-ups within its premises, for projects of common interest in its areas of business.

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. Since 2012, Sardeolica's integrated safety, environment and quality management system has been certified under the OHSAS 18001:2007, ISO 14001:2004 and ISO 9001:2008 international standards. 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 will receive green certificates for 15 years after its initial start-up.

The Ulassai wind farm is situated 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 2013, it generated around 197 GWh.

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 meticulous 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 have been adopted, such as the burying of electric cables, in order to minimise the visual impact and prevent electromagnetic interference with telecommunications.

SARDEOLICA

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

Arcola Petrolifera, Deposito di Arcola and Saras Energia (Spain)

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, Arcola transported approximately 2,342,000 tons of products for the retail and wholesale market in 2013. Arcola has 13 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 from Arcola Petrolifera Srl was completed in September 2011. Owing to the above-mentioned spin-off, effective from 1 October 2011, Deposito di Arcola Srl took over the ownership of the industrial assets, previously held by Arcola Petrolifera, relating to Arcola's fuel storage facility and the related logistics equipment.

Deposito di Arcola

Deposito di Arcola Srl provides leading operators with receipt, 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 200,000 m3, which the company uses to store more than 500,000 m3 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.

Saras Energia

The company operates across Spain through its own sales structure endowed with a high degree of expertise, professionalism and market knowledge. Products are distributed nationwide using a logistics network comprising the terminal owned by Cartagena, supplemented by the CLH system and independent storage facilities.

Network

Saras Energia's network currently consists of 108 service stations, including 68 directly managed COCO (Company Owned Company Operated) stations, 8 CODO (Company Owned Dealer Operated) stations and 32 DODO (Dealer Owned Dealer Operated) stations.

In 2013, Saras Energia automated eight stations, in order to maintain and improve the net margin of each business unit, operating in a market environment that shed 5% in volume terms overall, and with a constant increase in the number of sales outlets (a total of 11,000 stations in 2013, compared with 9,000 in 2009), which tends to reduce the average volume provided per service station.

Figure 5 – Storage facilities - loading bases

Own storage facilities: Arcola and Cagliari

ARCOLA

Arcola has **13 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 **22 employees**, Deposito di Arcola has its registered and operational office in Arcola; it provides receipt, storage and land or sea redelivery services for oil products.

Logistics and plants

In 2009, Saras Energia also strengthened its logistics 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 2013, it produced 144,196 tons of biodiesel for the Spanish and Italian markets, to satisfy the mixing requirements pursuant to European legislation regarding the release of biofuels for sale to consumers.

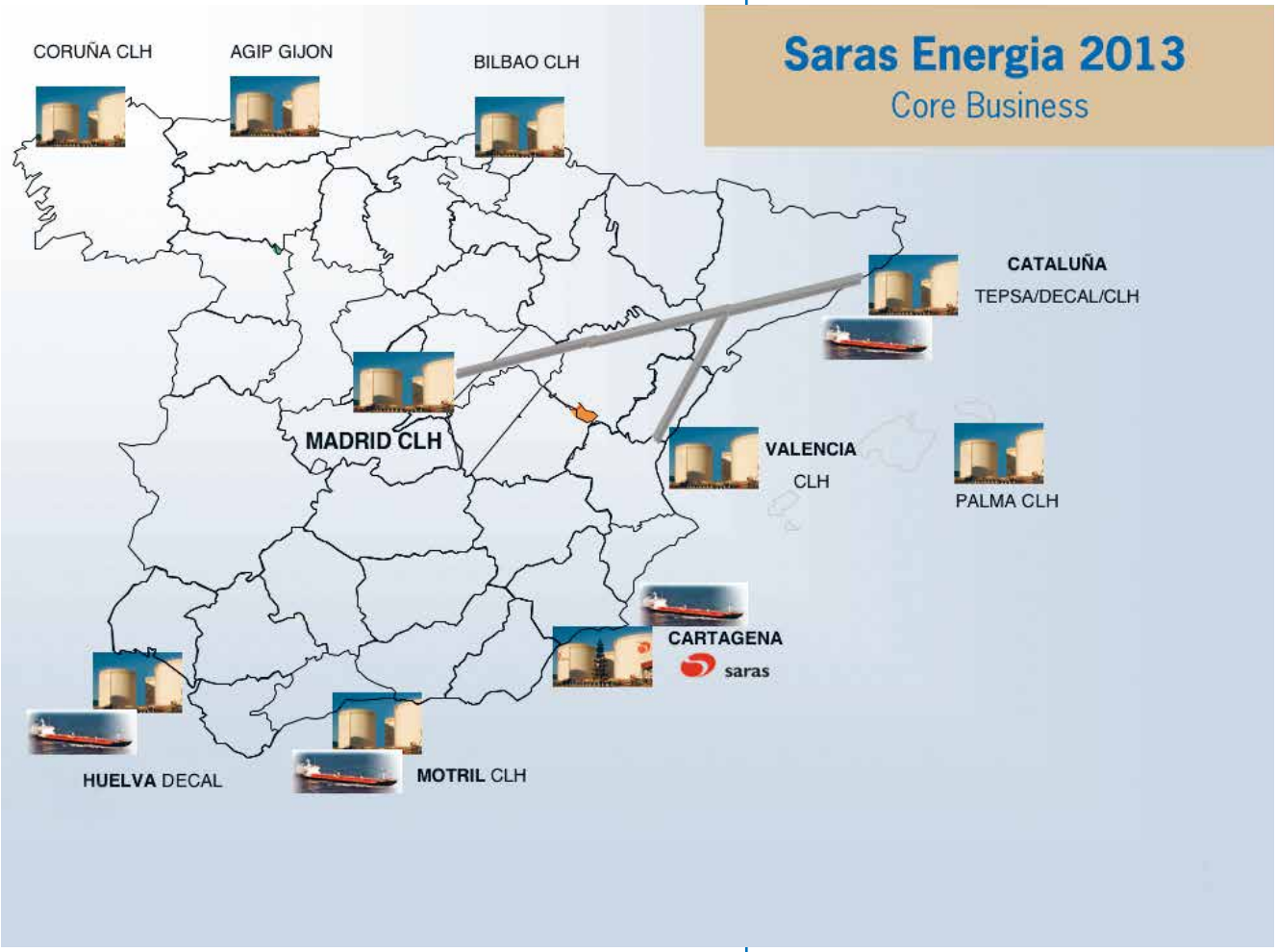
Wholesale

Saras Energia consolidated its position as fifth largest operator on the Spanish market (CORES data). On the back of the performance of Spain's refining sector, which achieved the objective of overturning the import-export ratio, the company undertook a strategic review of its sales channels, favouring those with higher margins over those generating higher volumes, which were significantly reduced.

At the end of 2013, Saras Energia completed the major project of implementing its SAP platform, which began in April 2012.

With **361 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 relating to the sale of oil and oil products that have an impact on the environment.

Group companies

Sarlux

The plant has always paid attention to the various aspects of its activities that have an impact on the environment, and in 2001, as part of its long-held commitment to environmental protection, measures were implemented 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 the Group had had in place for a number of years:

- in May 2002, the company's Environmental Policy, containing the 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 company employees
- objectives for improvement have been set and approved by the Management Committee; these are checked and updated annually
- internal audit activities have been put in place to periodically check that the EMS is being applied correctly
- in June 2004, the company gained EMS certification pursuant to ISO 14001:1996, and in May 2006, this was updated to ISO 14001:2004 certification (Figure 6)
- in June 2007, the first three-year EMS audit was conducted for the renewal of the environmental certification, followed by the second three-year audit in June 2010
- 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 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 the site's activities, the direct and indirect environmental aspects associated with these activities and the environmental improvement targets that the company has set itself.


LRQA
Business Assurance

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Gestione Ambientale di:

Sarlux Srl
sede amministrativa:
Galleria de Cristoforis, 1 – 20122 Milano – Italia
Sede operativa e legale:
S.S. Sulcitana n.195 – Km 19 - 09018 Sarroch (Cagliari) - Italia

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

ISO 14001:2004

Il Sistema di Gestione Ambientale si applica a:

Raffinazione, ricezione, stoccaggio, preparazione
e spedizione di prodotti petroliferi.
Produzione e vendita di energia elettrica.

Certificato di Approvazione
N.: LRC 4180526/EMS/Ulf

Approvazione Originaria: 1 Giugno 2004
Certificato Attuale: 1 Giugno 2013
Scadenza Certificato: 31 Maggio 2016

Emesso da: Lloyd's Register Quality Assurance Italy Srl
per conto di Lloyd's Register Quality Assurance Ltd


Certificato di Registrazione
Registration Certificate

EMAS

SARAS SpA
Stabilimento di Sarroch
s.s. Sulcitana, 195 - km.19
09018 Sarroch (CA)

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

PRODUZIONE DI ENERGIA ELETTRICA
PRODUCTION OF ELECTRICITY
NACE: 35.11

FABBRICAZIONE DI PRODOTTI DERIVANTI DALLA RAFFINAZIONE DEL PETROLIO
MANUFACTURE OF REFINED PETROLEUM PRODUCTS
NACE: 19.20

Roma, 13 settembre 2012
Certificato valido fino al: 07 luglio 2014

Comitato Ecolabel - Ecoaudit
Sezione EMAS Italia
Il presidente
Pietro Campa

- 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, the plant 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 1211/2009, was validated, again by LRQA, and published, while EMAS registration was confirmed at the same time.
- LRQA continued its half-yearly inspections of the Environmental Management System during 2011, with positive results. In July 2011, the certifying body also conducted its three-year audit of the EMAS registration, validating the 2011 Environmental Declaration and recommending to the ECOLABEL Control Body that the Group's three-year registration be renewed.
- in 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.
- in May 2013, the plant obtained the third renewal of its EMS certification, pursuant to ISO 14001:2004, from certifying body LRQA Italy. Still in connection with environmental certification, in July 2013, following the transfer of refining operations from Saras SpA to Sarlux Srl, LRQA changed the certificate registration from Saras to Sarlux.

Sardeolica

Sardeolica generates electricity from wind power at its production unit in the municipality of Ulassai (OG). Although this type of energy generation is in itself already an activity with a low environmental impact, Sardeolica believes it is important to adopt an Environmental Management System in order to ensure continuous improvement in various environmental aspects: consumption of energy, water and auxiliary materials, production of waste and the prevention and reduction of all forms of pollution. Since 2006, Sardeolica has achieved ISO 14001:2004 environmental certification for its Environmental Management System (EMS). The EMS was then integrated in 2012 with the Occupational Health and Safety Management System and the Quality Management System. In June 2012, the company's Safety, Environment and Quality policy, containing Sardeolica's guiding principles and commitments, was unveiled to the workforce. The policy also sets out the actions and conduct required of all the company's staff in the form of procedures for implementing the Integrated Management System.


CERTIFICATE

TÜV AUSTRIA

Management system as per
EN ISO 9001:2008, EN ISO 14001:2004, OHSAS 18001:2007

Sardeolica S.r.l.
Seata Strada Ovest - Zona Industriale Macchiareddu
IT-09010 Uta (CA)
SP 13, km 11+500
IT-08040 Ulassai (OG)

Operation and maintenance of wind farms.

Sartec

In order to prevent pollution and implement every reasonable solution to reduce the significant environmental impacts of its activities, promote the rational use of natural resources, energy and materials, where possible reducing consumption thereof, providing for sufficient maintenance of its plant, machinery and equipment and for any measures deemed necessary to ensure its workers' health and safety, improved energy efficiency and environmental protection, maintain the offer of its products and services relating to environmental protection, industrial efficiency and energy saving, identifying its customers' requirements and proposing comprehensive solutions, in April 2011 Sartec adopted an environmental management system, certified in accordance with EN ISO 14001:2004, supplemented with Safety and Quality management systems. Senior management issued a new integrated company policy, containing the company's guiding principles and commitments on environmental protection, worker health and safety, and product and service quality when performing its activities.


CERTIFICATO

TÜV AUSTRIA

per il sistema di gestione secondo
EN ISO 14001:2004, OHSAS 18001:2007

Saras Ricerche e Tecnologie SpA
Sede legale e operativa:
Traversa 2° Strada Est Z. I. Macchiareddu
IT-09032 Assemini (CA)

Servizi di Ingegneria nel campo industriale e ambientale.
Progettazione, montaggi, commissioning e manutenzione
di impianti package in campo industriale e ambientale.
Commercializzazione e assistenza di strumentazione analitica.

Health and 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.

The subsidiaries and the Occupational Health and Safety Management System

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

Sarlux

On the basis of increasingly stringent legislative guidelines for safety management in industrial activities and for the protection of workers and the local area, the plant 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, the company implemented the "Safety" project in support of safety management, designed in co-operation with Du Pont - a global leader in issues relating to safety at work.

The company sees the protection of health and the prevention of any kind


CERTIFICATO

TÜV AUSTRIA

per il sistema di gestione secondo
OHSAS 18001:2007

Sarlux Srl

Sede Direzionale:
Galleria De Cristoforis 1, IT-20122 Milano
Sede Legale e Operativa:
Strada Statale 195 Sulcitana km 19,000, IT-09018 Sarroch (CA)

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

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, as is confirmed not least by the new policy document on the environment, workers' health and safety, and the prevention of accidents, approved and published on 30 May 2012. Since 1 July 2013, following the transfer of refinery operations from Saras to Sarlux, these principles have been fully incorporated into the new integrated Environment and Safety Policy document approved by the new Chief Executive Officer of Sarlux.

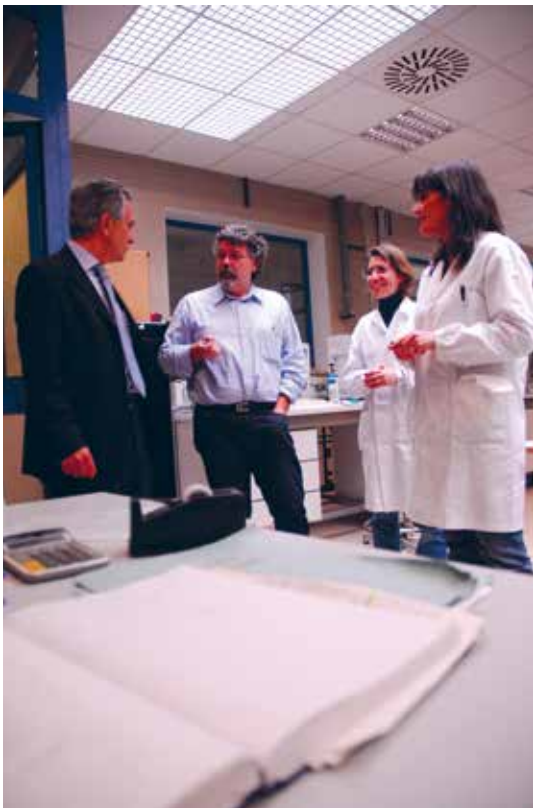
The Safety Management System

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 the site obtained OHSAS 18001:2007 certification for its Occupational Health and Safety Management System from Lloyd's Register Quality Assurance Italy. In 2011, the plant's OHSMS was subject to another audit, through an intense 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. Since July 2013, following the transfer of the refining business from Saras to Sarlux, the OHSMS certification has been registered by TÜV Austria in the name of Sarlux Srl, and its adequacy was confirmed during the last inspection conducted in January 2014. The main objectives of Sarlux's commitment to safety management have always been accident prevention and the identification of the most effective methods of reducing the likelihood of accidents. This approach is the same as that which underlies Legislative Decree 334/99 (Seveso II), which stipulated the adoption of a Safety Management System for the Prevention of Major Accidents (SMS), also covering electricity generation at the IGCC plant. To make synergic use of the common parts of the management systems, Sarlux's SMS, integrated with the Management System for the Prevention of Major Accidents, pursuant to the requirements of the Ministerial Decree of 9 August 2000, was integrated with the Environmental Management System; since 1 July 2013, Sarlux Srl has not held Quality Management System certification, which remains the responsibility of parent company Saras.

The manual for the Sarlux integrated environmental and safety management system is currently being approved.

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 its tools to prevent injury, accidents and occupational illness. In this regard, the company's Safety, Environment and Quality policy, containing Sardeolica's guiding principles and commitments, was unveiled to the workforce in June 2012. The policy also sets out the actions and conduct required of all the company's staff in the form of procedures for implementing the Integrated Management System.



Data: 08 Aprile 2011

SARTEC

POLITICA PER LA SALUTE, SICUREZZA, AMBIENTE E QUALITÀ

La Saras Ricerche e Tecnologie SpA (Sartec) è nata nel 1998 ed appartiene ad un grande gruppo che opera nel settore del petrolio e dell'energia.

Sartec fornisce supporto per il miglioramento e l'innovazione dei processi industriali e si presenta sul mercato con un ampia offerta di prodotti e soluzioni nei settori della salvaguardia ambientale, efficienza e risparmio energetico, sicurezza e affidabilità industriale.

Il principale Cliente e la Raffineria del Gruppo Saras che ha rappresentato, e tuttora rappresenta, una continua opportunità di crescita.

Sartec intende rafforzare la propria identità in termini di capacità di generare, tramite la ricerca, l'innovazione dei processi industriali a supporto del miglioramento continuo.
Nei confronti del Gruppo questo significa elevare la qualità delle proprie prestazioni verso livelli di eccellenza; nei confronti del mercato esterno significa esportare le esperienze maturate nel Gruppo proponendo soluzioni ad alto valore aggiunto che le garantiscano una prospettiva di crescita e stabilità economica.

L'Azienda considera la Salute e Sicurezza sul Lavoro, l'Ambiente e la Qualità come valori primari e ne assicura la salvaguardia nello svolgimento della propria attività produttiva. Oltre al rispetto degli obblighi di legge, si pone come obiettivo il miglioramento continuo e per questo si impegna ad adottare principi, standard e soluzioni che costituiscono le "best practices" del settore in cui opera.

Adotta la massima trasparenza e collaborazione con la collettività, con le autorità e tutte le parti interessate ed assicura il coinvolgimento, la formazione e la responsabilizzazione del proprio personale.

Il miglioramento continuo delle prestazioni della Società è perseguito stabilendo annualmente, in accordo al piano industriale, gli obiettivi, gli indicatori ed i progetti di miglioramento.

Gli impegni della Direzione sono rivolti pertanto a:

- salvaguardare la salute e la sicurezza dei lavoratori e delle persone terze che accedono ai siti della Società, attivando tutti gli strumenti del Servizio Prevenzione e Protezione per prevenire incidenti, infortuni e malattie professionali;
- assicurare la conformità ai requisiti cogenti;
- perseguire la prevenzione dell'inquinamento e l'attuazione di ogni ragionevole soluzione per ridurre gli impatti ambientali significativi delle proprie attività;
- promuovere l'uso razionale di risorse naturali, di energia e di materiali riducendo, ove possibile, i relativi consumi;
- provvedere una adeguata manutenzione degli impianti, delle macchine e delle attrezzature e gli eventuali interventi utili a garantire la salute e la sicurezza dei lavoratori, il miglioramento della efficienza energetica e la protezione dell'ambiente;
- mantenere l'offerta dei propri prodotti e servizi relativi alla salvaguardia ambientale, l'efficienza industriale ed il risparmio energetico, individuando le esigenze dei Clienti e proponendo soluzioni integrate;
- promuovere l'innovazione attraverso investimenti e partnership;
- puntare alla crescita ed al consolidamento nel mercato di riferimento attraverso il "miglioramento continuo" delle competenze e delle prestazioni delle proprie risorse garantendo l'informazione e la formazione sui rischi specifici della posizione ricoperta e l'aggiornamento in occasione di cambio di posizione;
- favorire la gestione di lavori trasversali all'Azienda tramite l'integrazione, la semplificazione e la standardizzazione delle modalità di lavoro, l'accorpamento di funzioni sotto una unica linea ed il supporto dei principi e metodi del Sistema di Gestione.

Il Sistema di Gestione Integrato Salute, Sicurezza, Ambiente e Qualità adottato, rappresenta il mezzo per soddisfare i requisiti e raggiungere gli obiettivi aziendali ed in questa ottica la Direzione si impegna a sostenerlo, mettendo in pratica ed a mantenerlo continuamente aggiornato, efficace ed efficiente.
La Direzione della Sartec assicura che la presente Politica sia comunicata a tutte le persone che lavorano per la Società, per conto di essa, ed eventuali Terzi e la rende disponibile al pubblico, garantisce inoltre che essa sia attuata e mantenuta attiva assicurando le risorse necessarie.
L'attuazione dei suddetti principi ed il comportamento ad essi conforme è obiettivo e responsabilità degli organi direttivi e di tutti i dipendenti dell'organizzazione, ciascuno secondo il proprio ruolo e le proprie responsabilità.

IL PRESIDENTE
ING. FRANCESCO MARINI

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 and 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 on the basis of the company's 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


CERTIFICATO

TÜV AUSTRIA

per il sistema di gestione secondo
OHSAS 18001:2007

Saras Ricerche e Tecnologie SpA

Sede legale e operativa:
Traversa 2° Strada Est Z. I. Macchiareddu
IT-09032 Assemini (CA)

Sede operativa:
5° Strada Ovest Traversa C Z.I. Macchiareddu
IT-09032 Assemini (CA)

Servizi di ingegneria nel campo industriale e ambientale. Progettazione, montaggi, commissioning e manutenzione di impianti package in campo industriale e ambientale. Servizi di campionamento e chimica analitica in ambito merceologico ed ambientale. Commercializzazione e assistenza di strumentazione analitica.

Deposito di Arcola srl

The drafting and dissemination at all levels of the Occupational Health and Safety Policy, containing the guiding principles and Arcola's commitments, and the revision of the Risk Assessment Document to bring it into line with the criteria set out in Legislative Decree 106/2009, supplement the statutory obligations regarding the risk of major accidents and are codified in the Health and Safety Management System (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 revising and updating of the Safety Management System Manual, represent the cornerstones on which the concept of "continuous improvement" is based. In order to make the training and communication process more effective and efficient, in March 2009 Arcola Petrolifera / Deposito di Arcola Srl obtained a multimedia e-learning platform to support operator training and communication activities; the first sessions planned and organised were naturally dedicated to specific issues relating to major accident prevention


ICIC

Certificato n. 1175/ESCO/01

Si certifica che l'Organizzazione

SARAS Ricerche e Tecnologie S.p.A.

Loc. Grogastu 2ª trav. strada est, 09032, Assemini (CA)

è conforme alla norma CEI UNI 11352:2010

nelle seguenti sedi operative:

Loc. Grogastu 2ª trav. strada est, 09032, Assemini (CA)

per i seguenti tipi di processi-servizi:

Progettazione e Realizzazione di interventi, studi e consulenze di servizi energetici per i settori industriali e Pubbliche Amministrazioni.

DATA DI 1ª CERTIFICAZIONE: 20/12/2013
DATA DI EMISSIONE: 20/12/2013
DATA DI SCADENZA: 19/12/2016

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 dangerous 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 offences being committed, part of which is very important in relation to occupational health and safety". Over 2012, the map was completed with 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 offences being committed". This activity is one of those covered by the "Organisation, Management and Control Model" document pursuant to Legislative Decree 231/01, adopted by the company, which describes the basic elements and management procedures that Arcola has implemented for the current internal control system, lists the actions carried out to date in relation to organisational and procedural compliance, and indicates the general measures put in place to prevent potential offences from being committed. The analysis and training activities referred to have been extended to include Società Arcola Petrolifera Srl personnel working permanently at Deposito di Arcola. In 2013, training courses were conducted for managers on health and safety in the workplace, pursuant to article 37 of Legislative Decree 81/08 and the State and Regions Agreement of 22 November 2011.

Specialist courses were provided to technical staff (expert, instructed and qualified persons) for live-line working (courses 1A+2A) pursuant to GEI EN 50110- 1-GEI 11-27 III Ed.

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 to activities at the various facilities. Amongst other things, the programme provided training in specific safety procedures for unloading fuel, road safety and anti-theft and robbery measures. 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 site specifically to address these questions. To adequately develop the idea 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 necessary changes made and action taken to make the improvements indicated by the audit process. For the biodiesel plant, the company also launched a review of the emergency plan 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.

saras

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

Trabajar de forma segura y respetuosa con el medio ambiente no es un coste añadido, es el camino a tomar para la búsqueda de soluciones eficaces y eficientes.

Es política de SARAS ENERGIA, S.A., ser conscientes de la importancia que tiene desarrollar nuestras actividades promoviendo la Salud, el bienestar y la Seguridad de nuestro personal, contratistas, clientes y comunidades, así como el respeto y cuidado del Medio Ambiente.

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

1. Cumplir la legislación vigente en materia de Seguridad, Salud y Medio Ambiente.
2. Buscar la mejora continua en nuestra actuación y resultados, mediante la evaluación y revisión sistemática de nuestro sistema de gestión de la Seguridad, la Salud y el Medio Ambiente, valorando su eficacia y eficiencia. Atendiendo a esta revisión se establecerán objetivos específicos en materia de H.S.E., proporcionando los recursos necesarios para alcanzarlos y evaluando continuamente su fiel cumplimiento.
   De manera adicional a todos los integrantes de cada centro de trabajo, cada uno dentro de su ámbito de competencias y atribuciones, para la consecución de los mismos y para el correcto desarrollo del Sistema de Gestión de la Seguridad, la Salud y el Medio Ambiente.
3. Adoptar las recomendaciones de Organismos Oficiales y otras organizaciones de reconocido prestigio, relacionadas con nuestra actividad.
4. Identificar mediante la aplicación de metodologías específicas de análisis de riesgos, los posibles accidentes graves y de carácter laboral que puedan producirse en nuestros centros de trabajo, evaluando sus posibles efectos y adoptando las medidas preventivas y correctivas más adecuadas, tanto en condiciones operativas normales, como en casos de emergencia, con el fin de evitar los intereses y en caso de materializarse, limitar los daños personales, sobre el Medio Ambiente y sobre los bienes.
5. Investigar todos los accidentes o casi accidentes ocurridos en nuestras instalaciones mediante una gestión transparente, que parte de la declaración del personal involucrado ya sea personal propio o personal de empresas contratistas, que asegure la participación de estos en el proceso de investigación y análisis, la adopción de medidas correctivas y la comprobación de la eficacia de estas, con el fin de evitar la repetición de los mismos.
6. Asegurar el control de cualquier eventual emergencia, mediante Planes de Emergencia Interior adecuados y en estrecha coordinación con las Autoridades y Organismos Públicos competentes, asegurando la formación del personal en estos, mediante la realización de ejercicios y simulacros de emergencia.
7. Evaluar los requisitos de formación de cada puesto de trabajo, para dar cumplimiento a las normativas y a las mejores prácticas del sector en la materia, impartiendo los correspondientes cursos y comprobando su adecuado aprendizaje.
8. Garantizar el cumplimiento de los procedimientos internos en materia de seguridad, estableciendo medidas adecuadas que garanticen su verificación periódica y actualización constante.
9. Difundir y asegurar el cumplimiento de la presente Política entre los proveedores, contratistas y demás personas relacionadas con Saras Energía, mediante compromisos contractuales.

Giampiero Spanedda
Consejero Delegado

Agosto 2011

Quality certification

Saras

The company has adopted a Quality Management System (QMS) according to the ISO 9001:2008 quality standard; the certified company processes are:
Supply and Trading, the drafting of contracts for the supply of raw materials (through both purchasing and processing contracts) and the sale of products
purchasing and tenders, the issuing and scheduling of orders for materials and tenders, and the selection and evaluation of suppliers
human resources and organisation, ensuring that employees meet company requirements, through careful staff selection and training aimed at acquiring, developing and transferring professional expertise
ICT management, management of a range of interconnected software applications, in order to gather, process and distribute information to support the company's decision-making, management and business control activities.


Lloyd's Register LRQA

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Gestione per la Qualità di:

SARAS S.p.A.
Sede operativa: Galleria de Cristoforis, 8 - 20122 Milano – Italia
Sede legale e ammistrativa: S.S. Sulcitana km. 19.5
09018 Sarroch (Cagliari) – Italia

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

ISO 9001:2008

Il Sistema di Gestione per la Qualità si applica a:

Acquisto e commercializzazione di prodotti e semilavorati petroliferi.

Certificato di Approvazione N.: LRC 0180526VQMS/it/it
Approvazione Originaria: 8 Luglio 1999
Certificato Attuale: 30 Gennaio 2014
Scadenza Certificato: 29 Gennaio 2017

Emesso da Lloyd's Register Quality Assurance Italy Srl per conto di Lloyd's Register Quality Assurance Ltd

Sustainability

European Directive 2009/28/EC laid down rules and criteria for sustainability and imposed a requirement that it be certified; on 31 August 2012, Saras, as the business operator, obtained from certifying body Bureau Veritas a certificate of compliance in accordance with the Italian national system for the certification of the sustainability of biofuels and bioliquids. This means that Saras SpA 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, configuration, 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
- energy efficiency services
- 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


BUREAU VERITAS Certification

Certificato numero: IT245288 - Valido fino al 30/08/2017
Certificate number - Valid until

Bureau Veritas Italia S.p.A. certifica che l'operatore economico:

Saras S.p.A.
S.S. Sulcitana, 195 km19 - 09018 Sarroch (CA)

per le seguenti attività:
Commercializzazione di biocarburanti e miscelazione di biocarburanti per conto terzi
Production and trading of biofuels and blending of biofuels for third parties

per i seguenti prodotti: Biocarburanti
Biofuels

per tutti i siti riportati in allegato

L'azienda è stata valutata e giudicata conforme a:

Data dell'ultimo giorno della verifica: 16-08-2012

Data di emissione/emission date: 31-08-2012

ACCREDIA

Responsabile firma certificato

- 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.


CERTIFICATO

TÜV AUSTRIA

per il sistema di gestione secondo
EN ISO 9001:2008

Saras Ricerche e Tecnologie SpA
IT-09032 Assemini (CA), Traversa 2°Strada Est Z.I. Macchiareddu
IT-09032 Assemini (CA), 5°Strada Ovest Traversa C Z.I. Macchiareddu

Servizi di ingegneria nel campo industriale e ambientale. Progettazione, montaggi, commissioning e manutenzione di impianti package in campo industriale e ambientale. Servizi di campionamento e chimica analitica in ambito merceologico ed ambientale. Commercializzazione e assistenza di strumentazione analitica.

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 SA plant at Cartagena obtained from the certifying body SGS Germany GmbH a certificate of the company's compliance in accordance with the voluntary ISCC/EU (International Sustainability and Carbon Certification) scheme, which is internationally recognised and is the most widespread of the voluntary certification systems, recognised by the EU and valid in all 27 of its member states. This means that SARAS ENERGIA SA can buy and sell biofuels that meet the required sustainability criteria.


12
10

Production

Production

Group companies

Sarlux's Sarroch refinery

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 thermo-electric 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 2013, the Sarroch site recorded an energy requirement of 911,573 TOE.

Figure 7 – Sarlux's Sarroch site: flow diagram

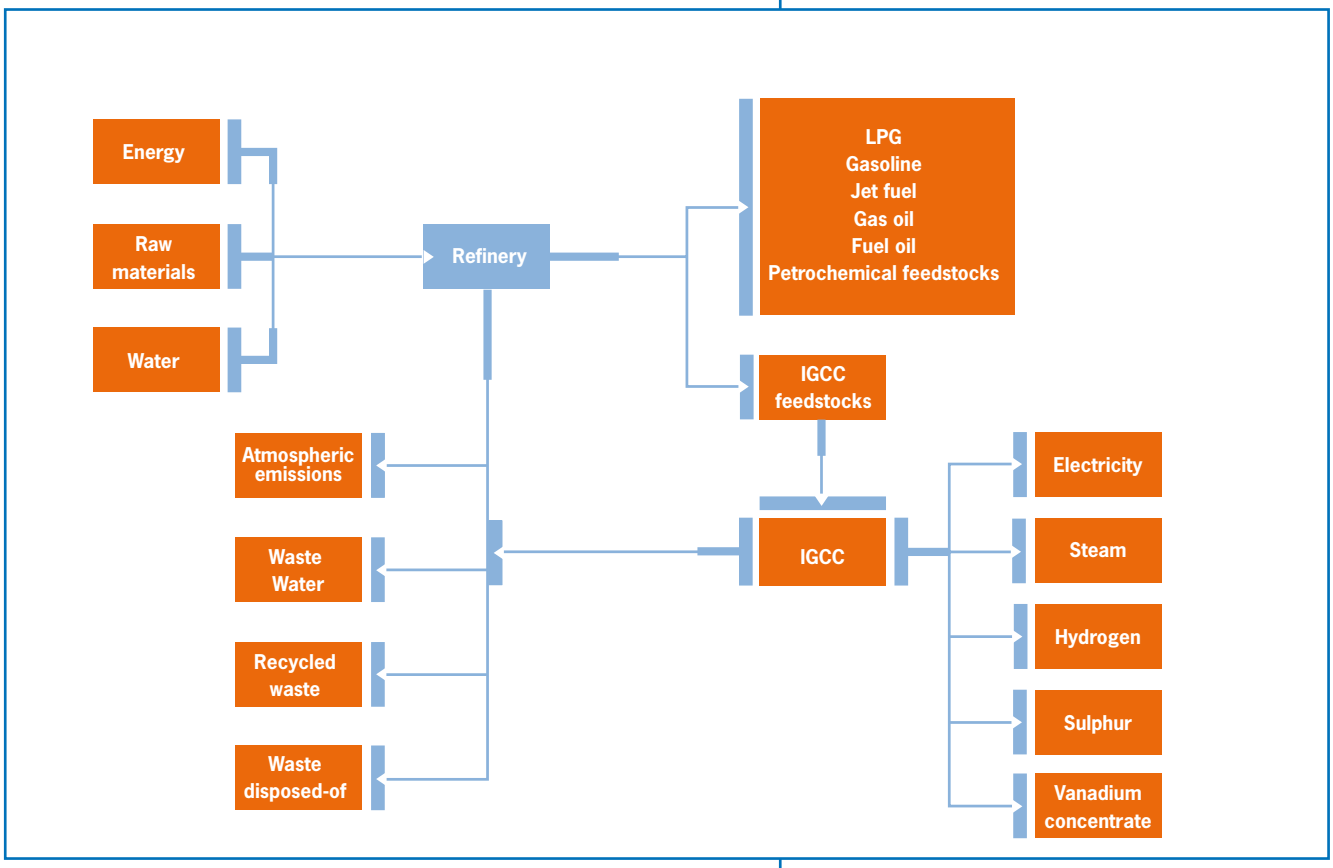


Table 6 – Energy in (TOE)

	2013
Crude and fuel oil	12,980,000
Power from external sources*	252,788
Total	**13,232,788**

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

Table 7 – Energy out (TOE)

	2013
Finished products	11,088,000
Electricity fed into the grid	779,389
Fuel gas	40,982
Total	11,908,371

Refining

In 2013, the Sarroch refinery processed approximately 12.98 million tons (Mton) of raw materials (crude oil and fuel oils), which is an average figure for recent years. Between 2010 and 2013, a total of 54.72 Mton of raw materials were processed, with an average of 13.68 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)

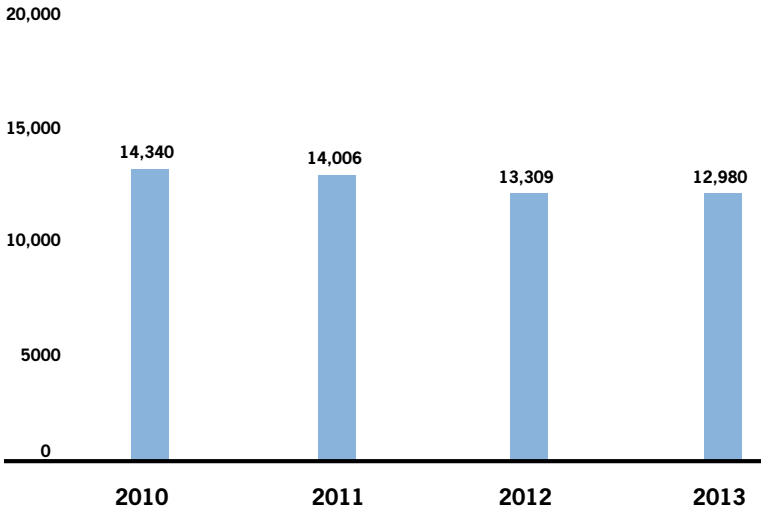


Table 8 – Products of the Saras plants (tons/year)

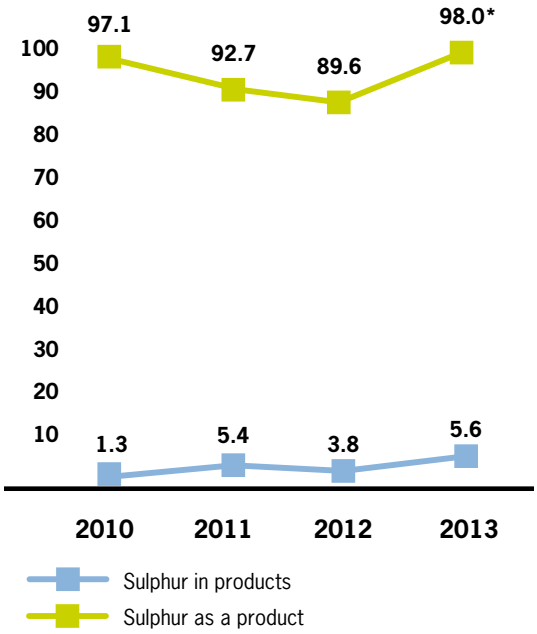
	2010	2011	2012	2013
LPG	323,000	238,000	205,000	267,000
Gasoline and virgin naphtha	4,024,000	3,824,000	4,002,000	3,558,000
Middle distillates (gasoil, kerosene)	7,517,000	7,415,000	6,891,000	6,959,000
Fuel oil and other	463,000	623,000	272,000	304,000
Vanadium concentrate	1,122*	1,494**	1,142	1,279
Electricity (TOE)	797,136	759,386	782,972	789,003
Sulphur	130,000	113,000	122,000	117,000
Heavy hydrocarbons to IGCC	1,166,000	1,121,000	1,146,000	1,123,000

* 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 2013 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



* Including a portion of sulphur from storage

Figure 8 – Sulphur balance of plants - 2013

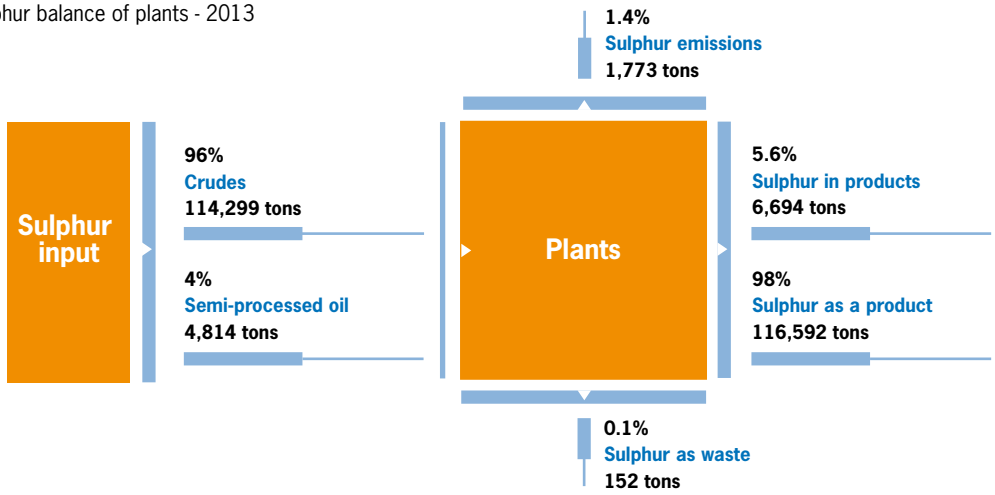


Table 9 – Sulphur balance of plants

	2010		2011		2012*		2013**	
	tons	% of total	tons	% of total	tons	% of total	tons	% of total
Sulphur input								
Raw materials	133,634	100	121,686	100	136,628	100	119,113	100
Sulphur output								
Atmospheric emissions	2,086	1.55	1,990	1.64	1,896	1.4	1,773	1.4
In products	1,767	1.3	6,554	5.39	5,245	3.8	6,694	5.6
As pure sulphur	129,718	97.1	112,773	92.68	122,367	89.6	116,592	98
As waste	63	0.05	369	0.3	194	0.1	152	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
** The total does not add up to 100% due to differences in internal stocks of -6,098 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 2013 and comparison with the previous three years.

Table 10 – IGCC consumption (tons/year)

	2010	2011	2012	2013
Heavy hydrocarbons for gasification	1,222,328	1,121,249	1,191,011	1,172,486
Syngas (obtained from gasification)	4,021,014	3,676,704	3,877,697	3,887,443
Diesel	3,440	13,994	2,614	3,570
Electricity from external sources (MWh)	379,495	349,658	369,202	361,849

Table 11 – IGCC products

	2010	2011	2012	2013
Electricity to external grid (MWh)	4,336,730	4,012,325	4,194,000	4,217,000
Medium-pressure steam (tons/year)	741,905	699,486	743,660	859,248
Low-pressure steam (tons/year)	613,911	555,647	582,843	659,696
Hydrogen (t/year)	39,731	35,809	36,214	32,109
Sulphur (tons/year)	52,666	37,872	43,196	38,932
Vanadium concentrate (tons/year)	1,122*	1,494**	1,142	1,279

* 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

Companies of the Sardeolica Group

Sardeolica

The net electricity produced in the Ulassai wind farm and fed into the national grid (GSE) is shown in Table 12. The same table indicates avoided emissions of CO_2, SO_2 e NO_x. The avoided emissions figure is particularly significant, because it highlights tons of pollutants not released due to the fact that the electricity was generated using wind rather than conventional fuels.

Similarly, the corresponding quantity of oil saved is estimated.

Table 12 – Electricity generated at the Ulassai wind farm

	2010	2011	2012	2013
Production (GWh)				
Net electricity	176	141	171	197
Indicators				
CO_2 emissions avoided (1)	145,674	116,697	141,697	163,211
SO_2 emissions avoided (2)	669	536	650	749
NO_x emissions avoided (3)	334	268	325	374,5
TOE saved(4)	15,037	12,046	14,626	15,887
Barrels of oil saved	109,771	87,936	106,774	115,962

(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 gNOx/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) 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 an IR 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 contamination sources and their possible evolution over time, based on a forensic chemical approach using a very 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 provision and management of air quality measurement systems has also continued, notably the management of monitoring networks in Valle d'Aosta and the provision of a wide range of goods and services for monitoring networks for third-party industrial sites. Specifically, a DOAS system was provided for the perimeter monitoring of the ILVA plant's emissions in Taranto, and the revamping of the entire air quality monitoring station network has begun at ARPA Campania. In addition, the provision of emission and wastewater emission monitoring systems is continuing at the Sarlux plant.

In the field of energy efficiency, Sartec designs and builds energy-saving systems and renewable energy plants for special applications. In this regard, since 20 December 2013 Sartec has been CEI UNI 11352:2010 certified for processes and services entailing the "Design and creation of systems, studies and energy advisory services for industrial sectors and public administrations".

In the field of energy efficiency, Sartec designs and builds energy-saving systems and renewable energy plants for special applications. 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). As a result of Sartec's advisory services, from 2010 to date about 270,000 TEEs have been accrued for the Sarlux Refinery at an average value of EUR 100.00/each. In addition, at Sarlux and the IPLOM refinery Sartec has also launched a project to manage steam traps in steam networks geared towards improving energy efficiency by using TEEs to cover investment costs. 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. On behalf of Hitachi, Sartec was involved in the development of package utility automation and control room design at the new Jazan refinery in Saudi Arabia, and in addition to designing automation systems for Sarlux and Tamoil, on behalf of Sarlux it created a large new development project for advanced multi-variable process control systems. The company also continues to offer and build process analysis systems in the refining and industrial sector. In addition to process engineering and the development of feasibility, basic, FEED and detailed engineering projects, on behalf of Sarlux, Sartec has continued to provide process sampling services for the refining sector with particular benefits in terms of operator safety and the reduction of fugitive emissions together with the supply of tank head and floor drainage valves. Finally, integrated work is continuing on the development and management of Sarlux's online gasoline blending system, from the maintenance of chemiometrics models and the FTIR analyser to the administration of control management applications and the creation of tests for MHC catalytic systems at a pilot plant.

Saras Energía

The service station network belonging to Saras Energia ended 2013 with total turnover of more than 177 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	2013
Fuel sold (litres/year)	233,326,098	222,663,614	175,745,249	177,548,000

Similarly, incoming and outgoing traffic at the fuel storage facility was more than 466,000 tons. Table 14 shows changes in storage facility traffic in the three-year period 2010-2013.

Table 14 – Movement of products at the Cartagena storage facility

Incoming + outgoing (metric tons)

	2010	2011	2012	2013
DIESEL	958,402	534,725	352,000	381,500
GASOLINE	99,334	96,212	77,000	48,500
BIOFUEL	27,398	25,410	10,000	9,400
METHANE	21,018	15,923	15,000	27,000
Total	1,106,147	672,270	454,000	466,400

The environment

The environment

Group companies

Sarlux's Sarroch refinery

Commitment to continuous improvement

For many years, we have prepared an Environment and Safety Report that provides detailed and up-to-date data on all aspects that directly or indirectly affect the Sarroch plant's internal and external environments.
Some of these, such as atmospheric emissions or wastewater, are more immediately obvious because they relate to the environment in which people live and work every day; others, such as energy and water consumption and carbon dioxide (CO_2) emissions, relate to problems of more general concern, and have a more global impact without significant direct effects on the local environment. The trend in emissions over a four-year period shows a picture of general improvement, with the exception of some small fluctuations that may occur from year to year relating to plant changes and extraordinary maintenance. The improvement in environmental data is due to a series of technical, 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, sulphur dioxide (SO_2) emissions, which are of notable interest to the local community, have decreased sharply compared with previous levels, dropping substantially in the past three years due to the start-up of the tail gas treatment unit at the sulphur recovery plant. Compared with the average figure for previous periods, SO_2 emissions have fallen by about 50% in the past three years.

EMAS registration

Starting 1 July 2013, Sarlux Srl completed the Environmental Declaration as a result of the move of refining operations through the transfer of the corresponding division from Saras SpA to Sarlux Srl, which was approved by the Saras SpA Board of Directors on 24 June 2013. In July the certifying agency, LRQA, validated the Sarlux 2013 Environmental Declaration prepared in accordance with EC Regulation 1221/2009, and recommended annual renewal of registration to the EC Control Body, ECOLABEL; at the same time, the company submitted a request to transfer the certificate to Sarlux. The 2013 Environmental Declaration, which targets the company's internal and external community, and is intended to establish a transparent relationship with the local population, local authorities and employees, and to illustrate Sarlux's activities, the associated direct and indirect environmental impacts and the environmental improvement targets that the company has set itself, was then published and disseminated.

AIA permit

The AIA permit has been in effect at the refinery for about four years. In fact, the permit was issued for the refinery complex and IGCC on 24 Mary 2009. On 1 July 2013, the permit was transferred from Saras to Sarlux.
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. IPPC (Integrated Pol-

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.
In 2013 operational resources were concentrated on instruction during three phases of company training:

1. a special two-hour module on the Environmental Management System was also provided as part of general orientation training;
2. ongoing training dedicated as usual to issues of environmental conservation and protection with a special emphasis in 2013 on procedures with a high environmental impact;
3. training for new recruits and technical training for specialists.

A total of 4,500 hours of environmental training were provided.

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 lastly in 2009 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 Environmental 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 related implementation legislation. Measures relating to the control of major accident hazards involving dangerous substances are governed by specific legislation (Seveso).

lution Prevention and Control) is a new strategy in place throughout the European Union, aimed at enhancing the "environmental performance" of industrial complexes requiring authorisation. 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. In 2013 the following activities were begun:

- installation of the system that measures dust in CO boilers
- installation of the system to measure H_2S and VOCs at points where emissions produced from the combustion of fuel oil are ducted.

These activities will be completed in 2014.

The prototype used to measure flare temperature was installed and placed in operation. In 2014 engineering measures will be carried out to make the prototype a "true" tool.

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. In this context, in 2009 major heat conservation measures were carried out, which, together with operating activities identified as a part of the FOCUS project (including the reduction of over-consumption in kilns and maximisation of thermal integration among plants), made it possible to reduce annual consumption in 2013 by about 60,000 TOE. For these significant investments, applications were filed with the AEEG for 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 downward trend in energy consumption, especially in 2013.

In particular, Table 16 on the following 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)

	2010	2011	2012	2013
Electricity	168,159	167,918	178,710	177,071
Fuel oil	183,450	174,786	152,009	132,241
Fuel gas	446,345	459,213	450,739	423,035
Flue gas	183,564	187,298	177,992	179,226
Total	**981,518**	**989,215**	**959,450**	**911,573**

Chart 5 – Total energy consumption (refinery + IGCC)

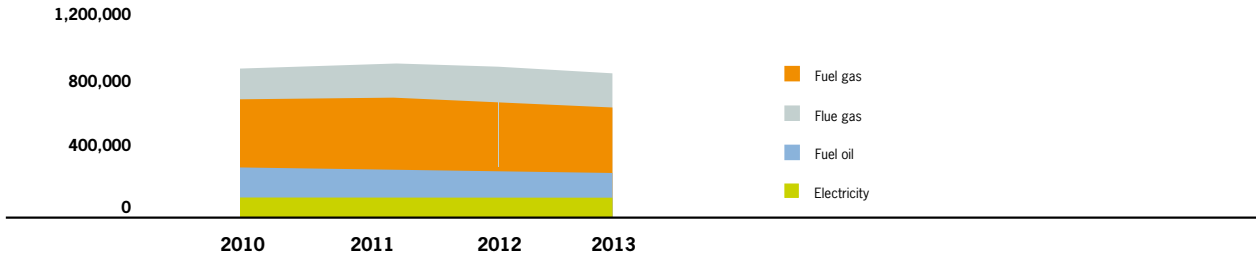
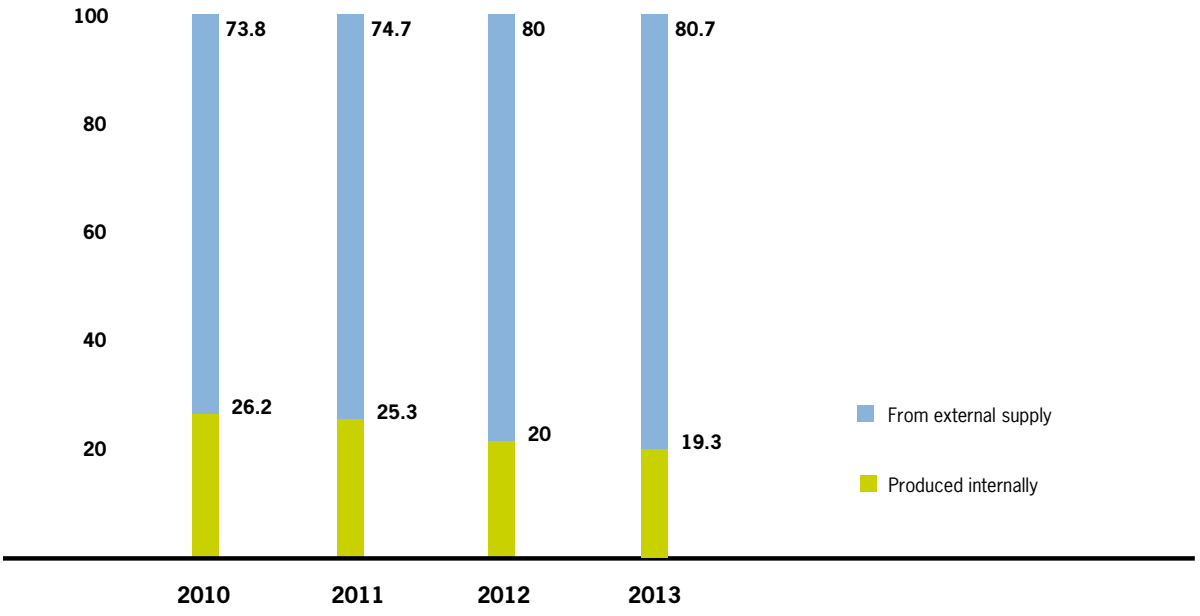


Table 16 – Electricity requirement and supply (refinery + IGCC; MWh)

	2010	2011	2012	2013
Total demand	1,218,295	1,202,358	1,194,495	1,173,744
- from internal production*	319,049	304,402	238,829	226,842
- external	899,246	897,956	955,666	946,902

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

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



Water consumption

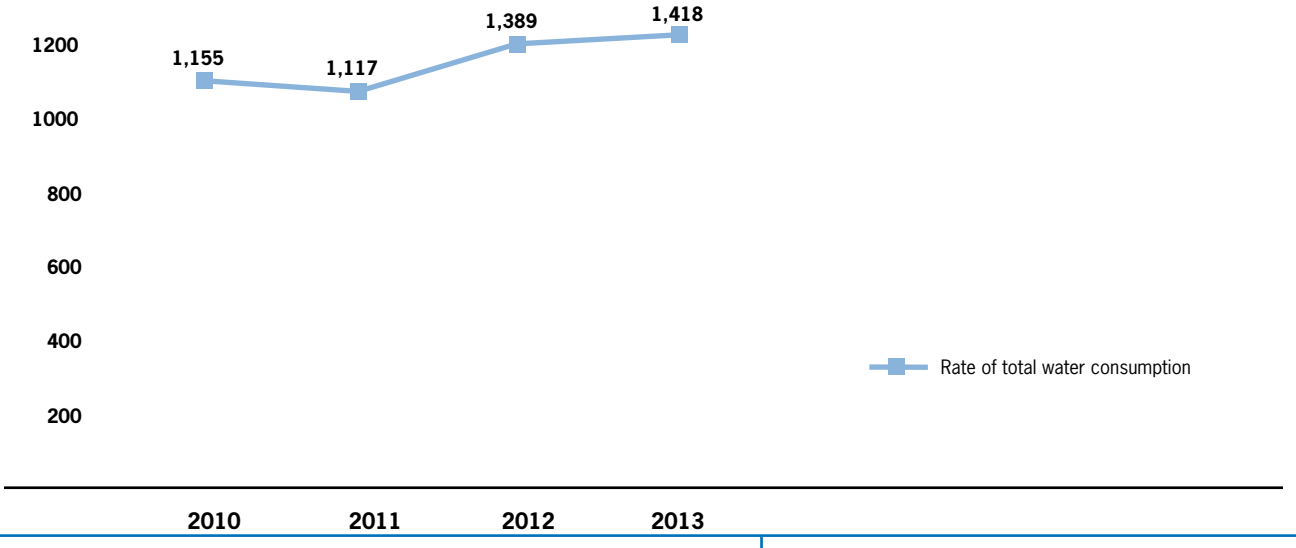
Water is a precious resource for the Sarroch facility, and its use is constantly monitored to optimise consumption and to promote recovery and desalination, instead of using fresh water supplied by CASIP (Cagliari Industrial Development Area Consortium), which manages the water supply to the Sarroch industrial district. Water used 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 replenish cooling cycle leaks 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 is largely unchanged. Supply sources in 2013 continued the trend seen in previous years, with stabilisation in the internally recovered portion (purified water from the biological plant that is no longer discharged into the sea) to offset desalinated seawater, as shown in Table 17 and Chart 7.

In the period under review, internal recovery met approximately 27% of the total annual requirement, and desalination was also a source of supply, accounting for about 21% of the total. Taken together, desalination and recovered water met approximately 48% of the requirement in 2013. 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

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

	2010	2011	2012	2013
Desalination	540	464	381	394
CASIC	905	885	927	955
Internal recovery	446	438	541	491
Total	**1,891**	**1,787**	**1,849**	**1,840**

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



as the BE-5, with a capacity of 230 m3/h of demineralised water) was introduced 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

Sarlux has pursued its commitment to reducing atmospheric emissions by implementing a series of measures designed, over time, to improve its facilities and put in place procedures and management systems that can ensure its activities are environmentally compatible, as demonstrated by a reduction in pollutant emissions. As part of these activities, the gasification plant has made a substantial contribution to reducing atmospheric emissions, as described on page 17. 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 processes tail gases, thereby increasing the plant's sulphur recovery and reducing SO_2 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 SO_2 emissions. Initiatives to improve furnace combustion and to reduce diffuse emissions (by installing double seals on gasoline pumps) have also been implemented. In terms of legislation, meanwhile, the AIA permit came into force on 9 April 2009, imposing new, stricter limits in the area of atmospheric emissions. These have been fully respected, as shown in the following charts.

Greenhouse gas emissions

Through Sarlux, the Saras Group is subject to the application of the European Emission Trading Directive based on the two activities performed at the Sarroch site: oil product refining and power production (IGCC plant). 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

Water conservation

Aware of the problem of scarce water resources, Sarlux has adopted specific measures to reduce the use of primary water sources supplied by 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/hr;
- implementing measures to maximise the recycling of purified water from the refining process, following improvements to the treatment process and increased filtering capacity.

The desalination plant made it possible not to increase the use of fresh water from the CASIC water system (Cagliari Province Industrial Consortium, responsible for managing the water system in the Sarroch industrial area) without disrupting the marine ecosystem by the refinery. In terms of water treatment systems, the refinery is equipped with a wastewater treatment plant and a ballast water treatment (BWT) plant for oil tankers transporting crude oil and products to and from the refinery.
They were both built with the best technology available, and 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 wastewater treatment plant (approximately 490 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)

	2010		2011		2012		2013	
	Refinery	IGCC	Refinery	IGCC	Refinery	IGCC	Refinery	IGCC
SO_2	3.71	0.46	3.57	0.39	3.35	0.44	3.32	0.22
NO_x	2.85	0.60	2.13	0.56	1.91	0.52	1.76	0.67
DUST	0.35	0.03	0.32	0.03	0.33	0.03	0.21	0.01
CO	0.36	0.16	0.26	0.17	0.25	0.20	0.23	0.16
CO_2*	2,369	3,783	2,354	3,519	2,239	3,690	2,191	3,699

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

Sulphur dioxide (SO_2)

In 2013 the site recorded total SO2 emissions in line with previous years, 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 2013 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 (thousand tons/year)

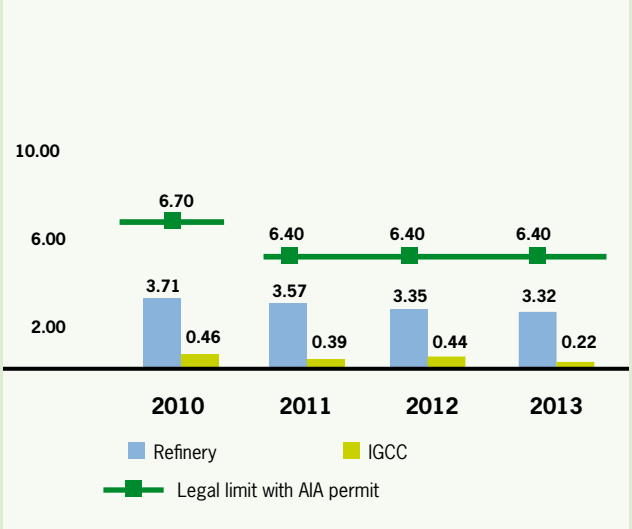


Chart 9 – Sulphur content (% in weight)

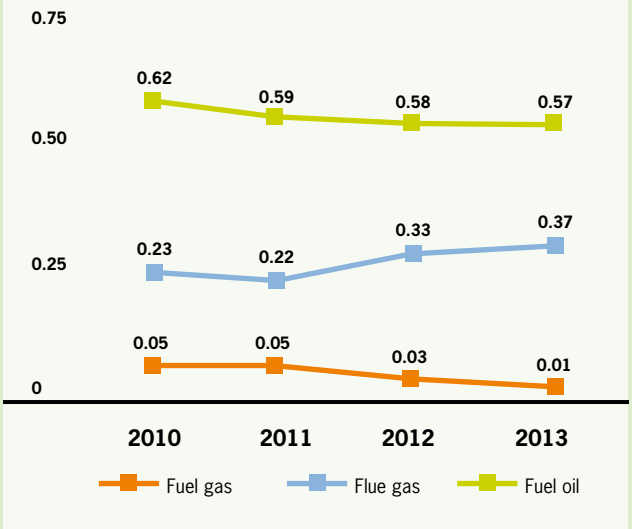


Chart 10 – Rate of SO_2 emissions (tons of SO_2 / thousands of tons processed)

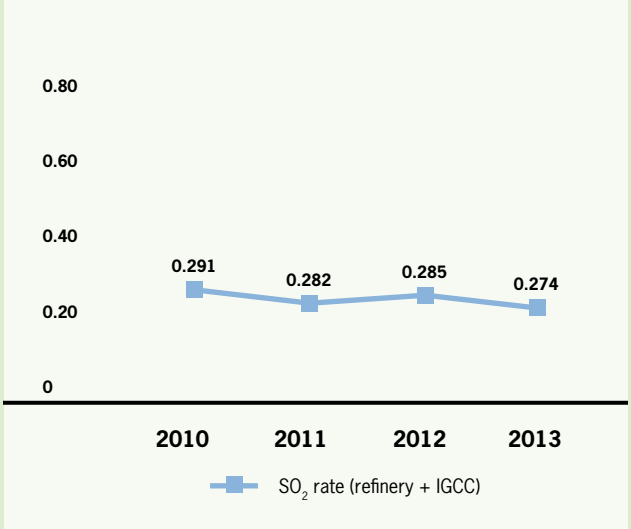


Chart 11 – SO_2 concentrations in refinery smokestacks (mg/Nm^3)

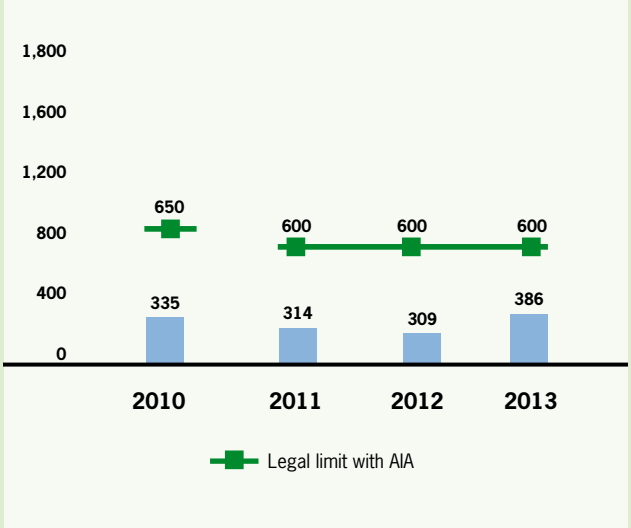
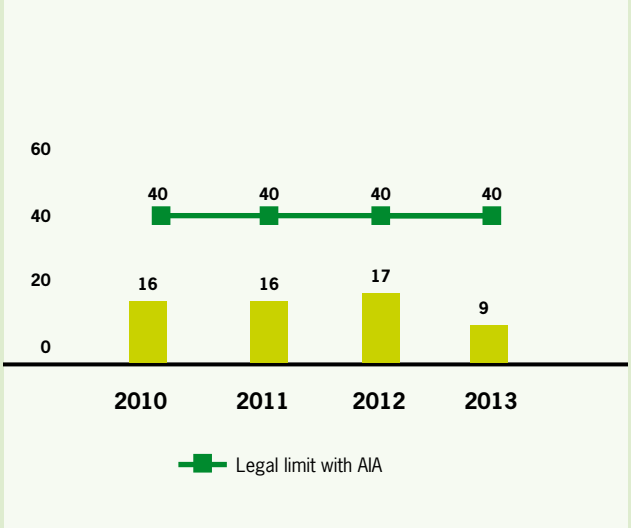


Chart 12 – SO_2 concentrations in IGCC smokestacks (mg/Nm^3)



Nitrogen oxide (NO_x)

Overall, the Sarlux 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 2013 NOx emissions recorded the best ever performance in terms of refinery smokestacks (Chart 13). The emissions rate is also in line with previous years (Chart 14). The trend in emissions concentrations in 2013 confirmed that of previous years.
A comparison of concentrations with the regulatory limits confirms that the results are positive and under the limit (Charts 15 and 16).

Chart 13 – NO_x emissions (thousand tons/year)

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

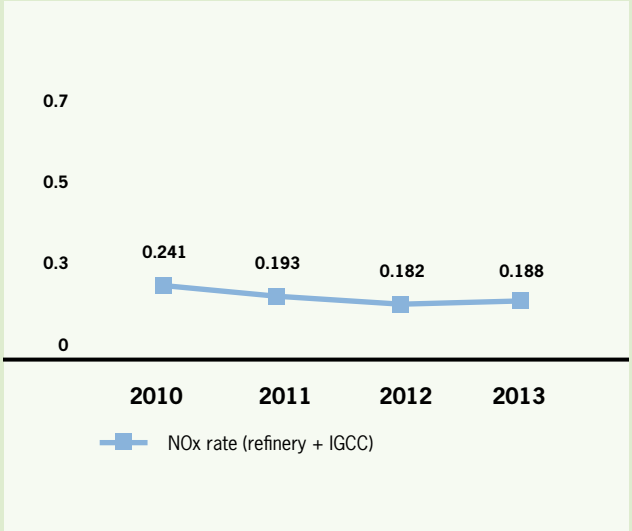


Chart 15 – NO_x concentrations in refinery smokestacks (mg/Nm^3)

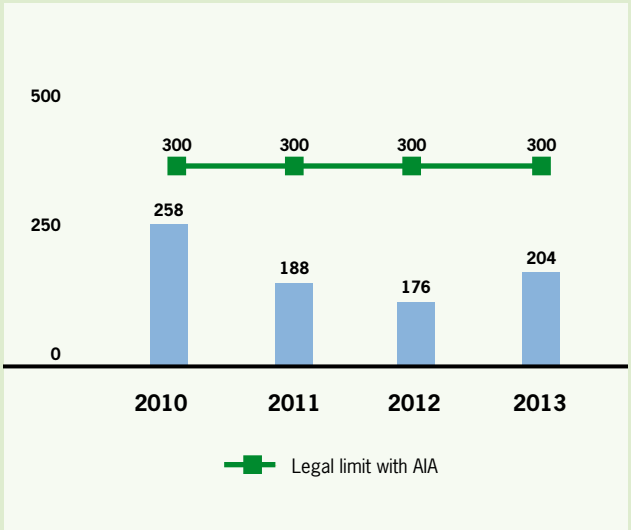


Chart 16 – NO_x concentrations in IGCC smokestack (mg/Nm^3)

Dust

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

The trend can also be seen in the positive performance of the IGCC plant, which has negligible dust emissions, as seen in Chart 17 showing total emissions. In 2013 there was a further decrease in dust emissions, which was also confirmed by the overall trend in the site's index (Chart 18) and was also due to measurement system optimisation.

Chart 17 – Dust emissions (thousand tons/year)

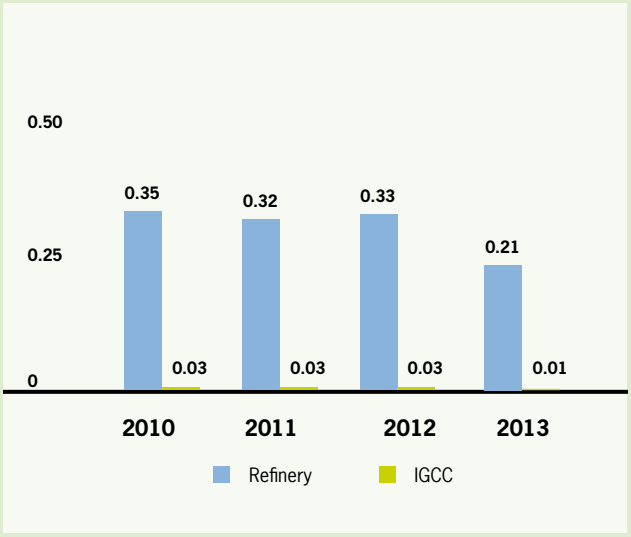


Chart 18 – Rate of dust emissions (tons of dust/thousand tons processed)

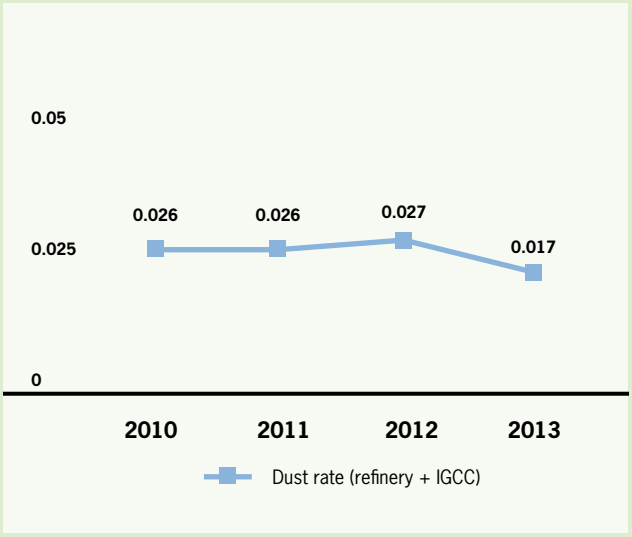


Chart 19 – Dust concentrations in refinery smokestacks (mg/Nm^3)

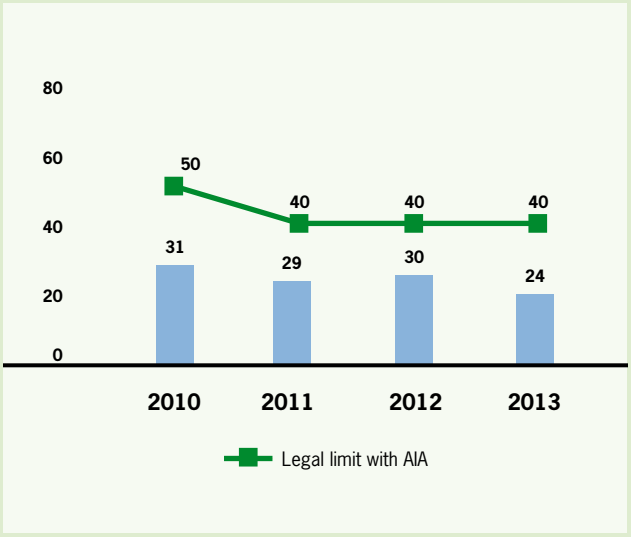
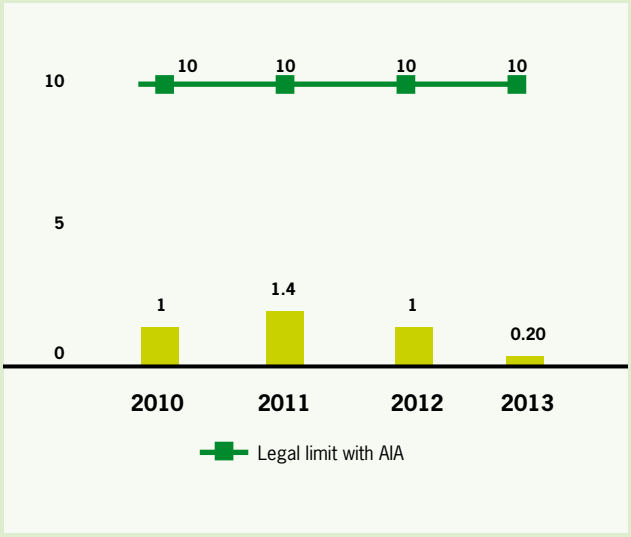


Chart 20 – Dust concentrations in IGCC smokestacks (mg/Nm^3)



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 improved steadily since 2009.

Chart 21 – PM10 emissions (thousand tons/year)

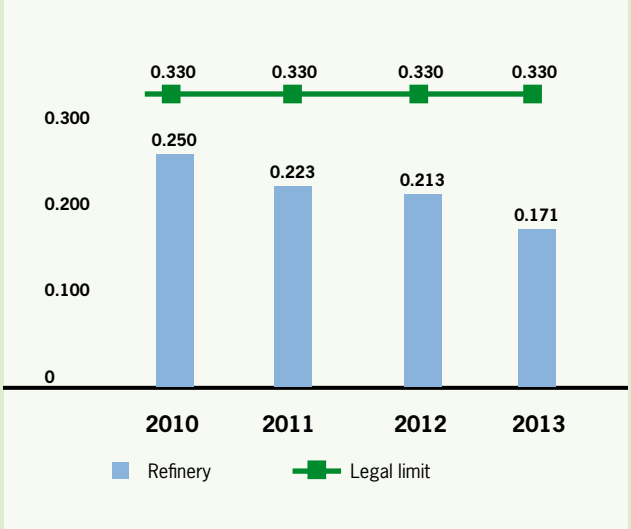


Chart 22 – Rate of PM10 emissions (tons of PM10/thousand tons processed)

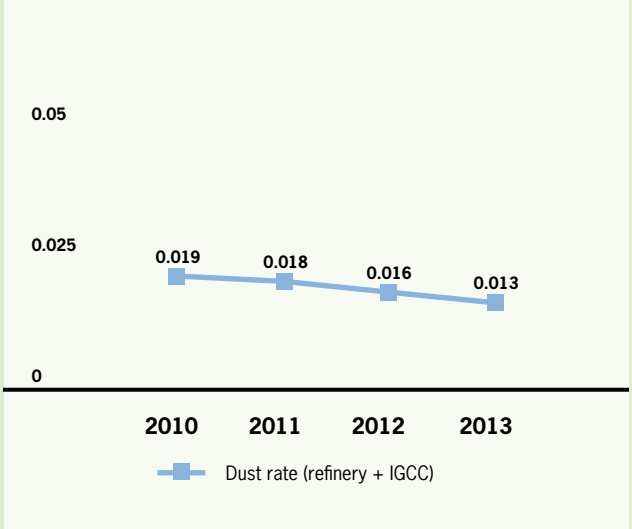
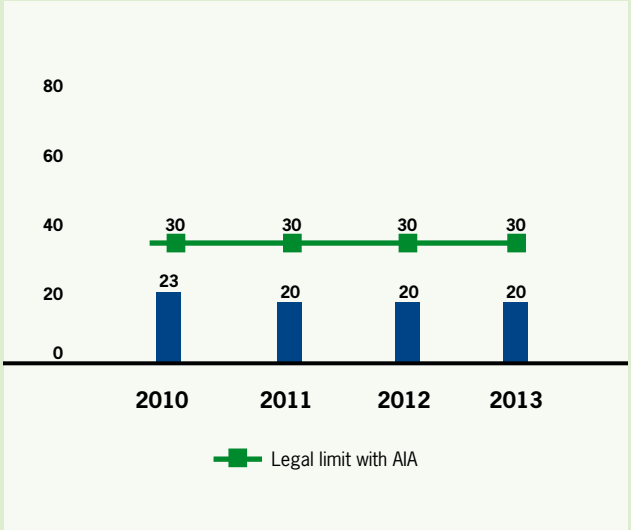


Chart 23 – PM10 concentrations in refinery smokestacks (mg/Nm^3)



Carbon monoxide (CO)

An ongoing positive trend can also be seen in carbon monoxide emissions: The IGCC figure has been broadly in line with the trend, while the figure for the refining plants has been stable due to combustion process optimisation in 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 2013 in line with recent years.
All the values recorded are also well below legal limits.

Chart 24 – CO emissions (thousand tons/year)

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

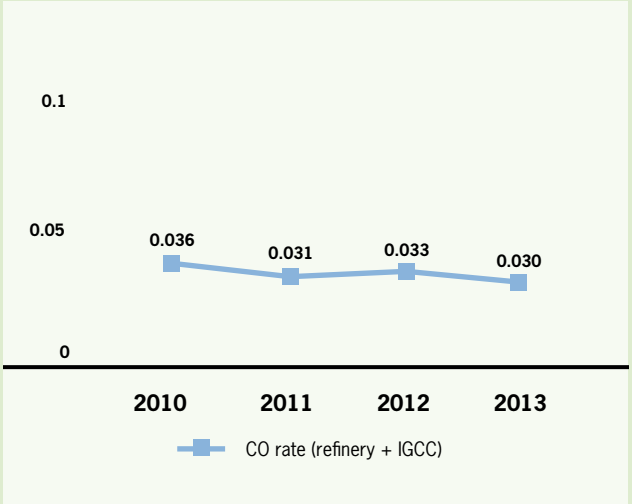


Chart 26 – CO concentrations in refinery smokestacks (mg/Nm^3)

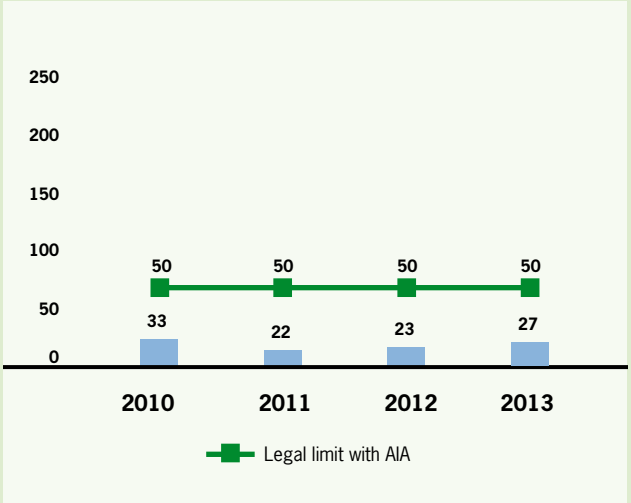
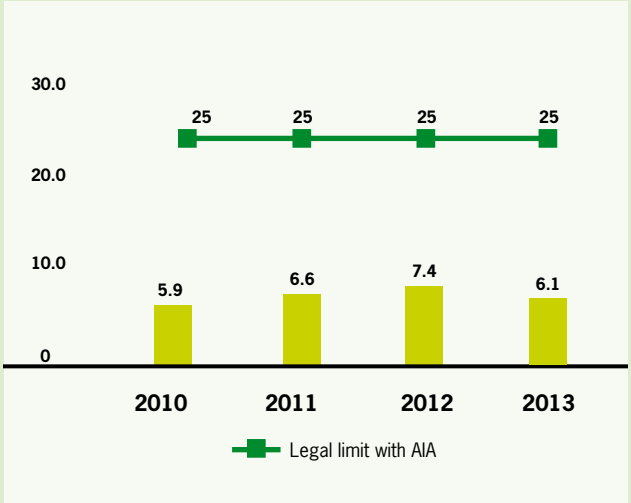


Chart 27 – CO concentrations in IGCC smokestack (mg/Nm^3)



traded and/or stockpiled, and any deficit must be covered by purchasing emissions allowances on the market. In 2013 the directive's third period of application began and will last until 2020. Previous assignment rules were changed: Directive 2009/29/EC, which amends Directive 2003/87/EC on the basis of harmonised EU regulations, assigned free allowances of CO_2 for those sectors with a high risk of carbon emission relocalisation. For the Sarroch site, Sarlux received free allocations (for 2013) totalling 2,601,956 tons as determined by Resolution 29/2013 of the national committee for the management of Directive 2003/87/EC. Emissions by the IGCC in 2013 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, a reduction that is due to investments in energy saving. The figures for 2013 also demonstrate that the route taken by Saras, involving rational energy use and the adoption of efficient production systems, is the key mechanism for controlling and reducing CO_2 emissions.

Air quality monitoring

Constant monitoring and ongoing control of air quality are the key elements in a strong environmental protection policy. Over the years, the site has therefore acquired the tools and adopted the management procedures to do so. 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 criteria for interpreting the categories of air quality and atmospheric purity, with reference to the Index of Atmospheric Purity (I.A.P.)1. The categories that include the indicator values measured in the stations being monitored are also highlighted in Table 20.

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:

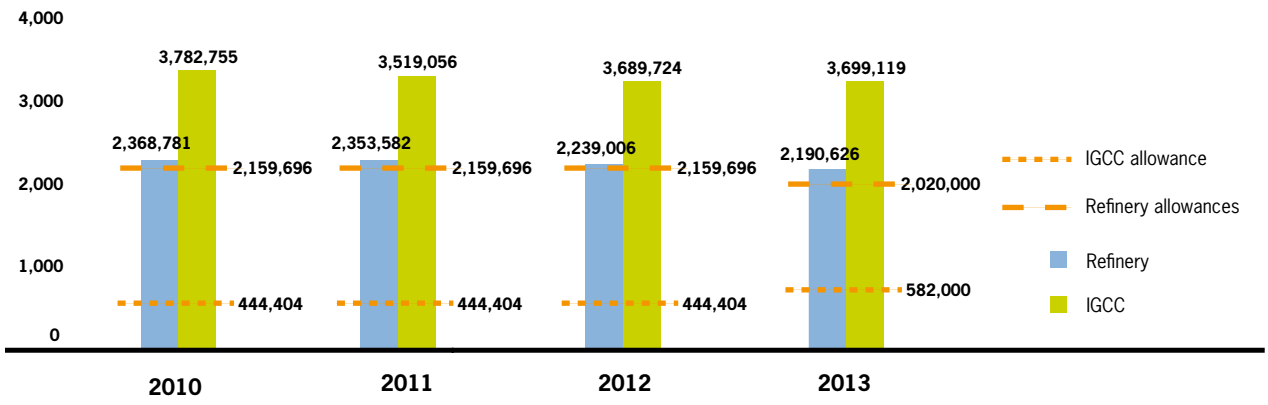
- as of 1 January 2005, no plant within the scope of the directive may emit CO_2 (i.e. continue to operate) without appropriate authorisation;
- each year the operators of these plants must surrender CO_2 allowances equal to the CO_2 released into the atmosphere to the competent national authority;
- maximum CO2 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)

	2010	2011	2012	2013
Refinery	2,368,781	2,353,582	2,239,006	2,190,626
IGCC	3,782,755	3,519,056	3,689,724	3,699,119
Total	6,151,536	5,872,638	5,928,730	**5,889,745**
Total allowance (refinery + IGCC)	**2,604,100***	**2,604,100***	**2,604,100***	**2,601,956****

* Separate allowances: Refinery (2,159,696 tons) IGCC (444,404 tons)
** Total site allowances

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



In 2013, air quality in the area studied again fell into category IAP3, with an assessment of "average" for air quality and atmospheric purity in seven out of the 10 monitoring stations, while two units fell into category IAP4 with an assessment of "mediocre" for air quality, "low" for atmospheric purity and "low" for pollution. The unit closest to the industrial area again fell into a low IAP category.

- **Monitoring networks**

  Air quality outside the Sarroch refinery (emissions) is checked by three monitoring networks. Sarlux manages its own air quality measurement sensors (four), while Versalis 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 Sarlux network – managed with 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 laid down by the laws in force, and that immediate steps can be taken when necessary.

Each of the four Sarlux control units (Villa d'Orri, Sarroch, Porto Foxi and the national storage facility) is equipped with analysers that continuously gauge levels of the following pollutants in the air: SO_2, NO_2, CO, H_2S, PM10, ozone and hydrocarbons (PM10 in 2013 was only available for the Porto Foxi station, due to an update in the management software); however at the national storage facility stations and Sarroch it was possible to monitor the parameter using on-site data).

The station located in the area of the national storage facility is also supplemented by a weather station. In the second half of 2010, two stations (Sarroch and the national storage facility) were also fitted with PM 2.5 continual analysers, and in 2013 a PM 2.5 continual analyser was also installed at the Porto Foxi station.

The ARPAS network records average hourly concentrations of the following pollutants: SO_2, NO_2, dust, H_2S and PM10 at all stations; ozone and benzene

Figure 9 - Location of air quality biomonitoring units.

at two stations; and CO at two stations. A dedicated monitoring system constantly checks emissions from the IGCC plant for SO_2, NO_X, PTS, CO and flue gas flow rate, guaranteeing a high degree of reliability, as shown by the data availability index (the ratio between the device's operating hours and normal plant operating hours), which in 2013 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

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

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

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 Sarlux 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 SO2, a trend that was confirmed in 2013.

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

Wastewater

A new plant using reverse osmosis technology was launched in 2012 and became fully operational in the third quarter of 2012. Using purified wastewater, it produces pure, demineralised water to feed the refinery's boilers. All demineralised water produced using reverse osmosis is removed from purified waste discharged into the sea (Charts 29 e 30). In 2013 average production of demineralised water was stabilised at about 170 mc/h. However, the overall wastewater was in line with the trend of past years, and thus greater than 2012 since more water was input into the treatment plant due to significant plant maintenance work. 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 Sarlux 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. In any case, work is currently under way to restore/improve the efficiency of the purification system in order to optimise its performance. In 2013 the COD emission rate was in keeping with previous years and compared to 2012, was affected by the larger quantity of water and lower quantity of crude oil processed.

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 Legislative Decree 155 of 13 August 2010 (µg/m^3)

SO_2	Number of times that limits have been exceeded									
	in excess of hourly limit[1]			in excess of 24-hour limit2[2]			in excess of limit for ecosystems[3]			
	2011	2012	2013	2011	2012	2013	Limit	2011*	2012*	2013*
Villa d'Orri	0	0	0	0	0	0	**20**	4	4	3
Porto Foxi	0	0	0	0	0	0	**20**	7	8	6
Sarroch	0	0	0	0	0	0	**20**	3	5	5
Facility	0	0	0	0	0	0	**20**	1	3	3

1 - Hourly limit must not be exceeded more than 24 times per calendar year (350 µg/m3 since 2005)
2 - 24-hour limit must not be exceeded more than three times per calendar year (125 µg/m3)
3 - Limit for the protection of ecosystems (20 µg/m3)
*- Value recorded (annual average on an hourly basis)

NO_2	Number of times the hourly limit was exceeded1[1]			2011		2012		2013	
	2011	2012	2013	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]
Villa d'Orri	0	0	0	4	**40**	3	**40**	1	**40**
Porto Foxi	0	0	0	3	**40**	6	**40**	5	**40**
Sarroch	0	0	0	5	**40**	4	**40**	7	**40**
Facility	0	0	0	5	**40**	5	**40**	4	**40**

1 - Hourly limit must not be exceeded more than 18 times per calendar year (200 µg/m^3 since 2010)
2 - Annual limit
3 - Annual average on an hourly basis

PM10	Number of times the daily limit was exceeded[1]			2011		2012		2013	
	2011	2012	2013	Value recorded[2]	Limit	Value recorded[2]	Limit	Value recorded[2]	Limit
Villa d'Orri	-	N.A.	N.A.	-	**40**	N.A.	**40**	N.A.	**40**
Porto Foxi	4	0	1	19	**40**	16	**40**	16	**40**
Sarroch	N.A.	N.A.	4*	N.A.	**40**	N.A.	**40**	25*	**40**
Facility	-	N.A.	4*	-	**40**	N.A.	**40**	19*	**40**

1 - 24-hour limit must not be exceeded more than 35 times per calendar year (50 µg/m3 since 2005)
2 – Arithmetic mean of average daily concentrations in a one-year period
* Figure available only in on-site stations
N.A.: figure not available

CO	Number of times average daily peak exceeded[1]		
	2011	2012	2013
Villa d'Orri	0	0	0
Porto Foxi	0	0	0
Sarroch	0	0	0
Facility	0	0	0

1 - Average daily peak in 8 hours (10 µg/m3 since 2005)

Chart 29 – Total wastewater (m^3/h)

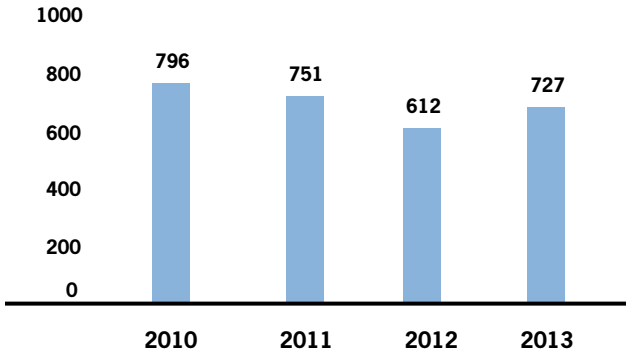


Chart 30 – Total wastewater rate (m^3/thousand tons processed)

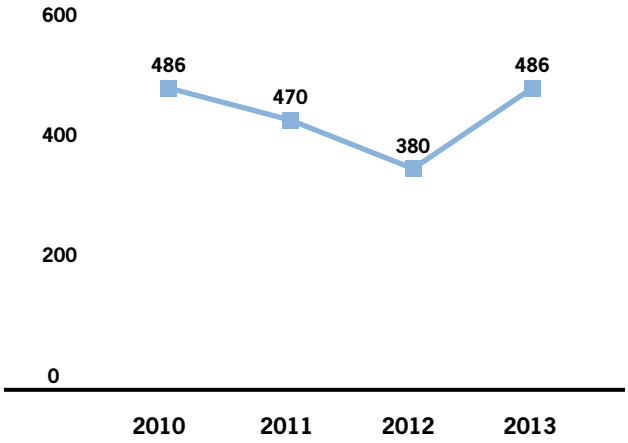


Table 22 – Main substances detected (tons/year)

	2010	2011	2012	2013
COD	673	571	363	573
MINERALS OIL	13.8	14.6	13.5	17.8

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 (tons/year)

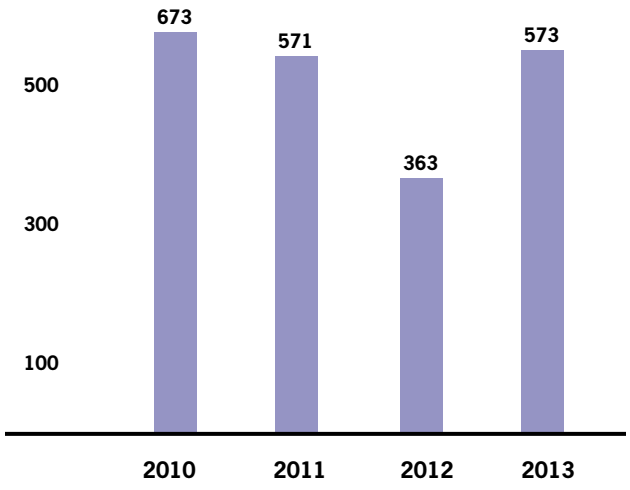


Chart 32 – Mineral oil emissions (tons/year)

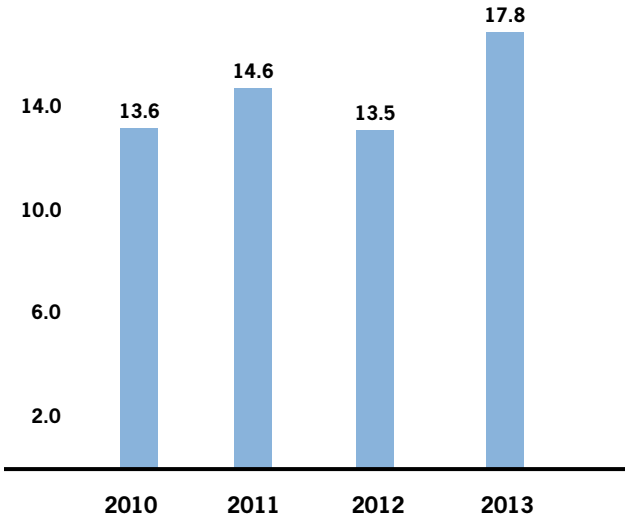


Chart 33 – Rate of COD emissions (tons/million tons processed)

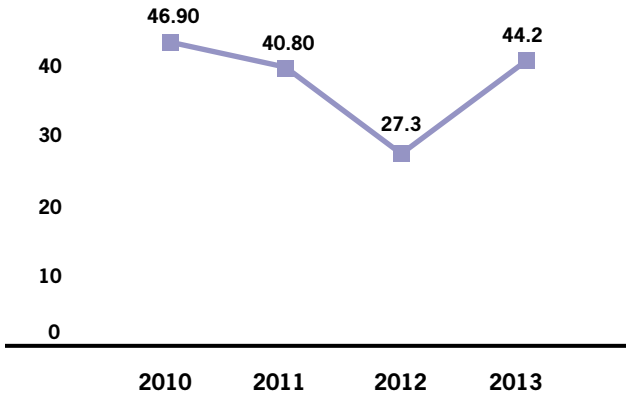


Chart 34 – Rate of mineral oil emissions (tons/million tons processed)

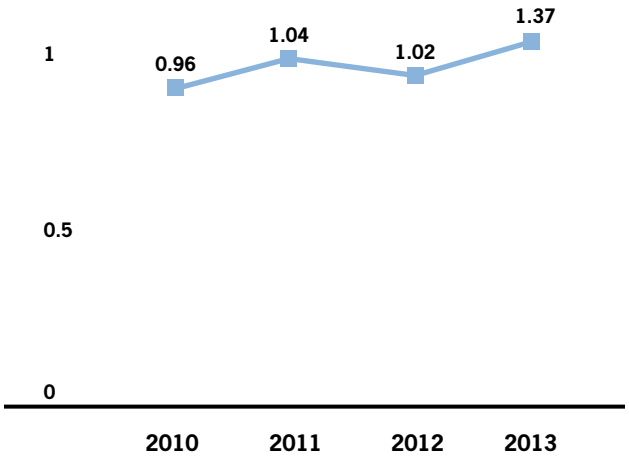


Chart 35 – COD concentration (mg/l)

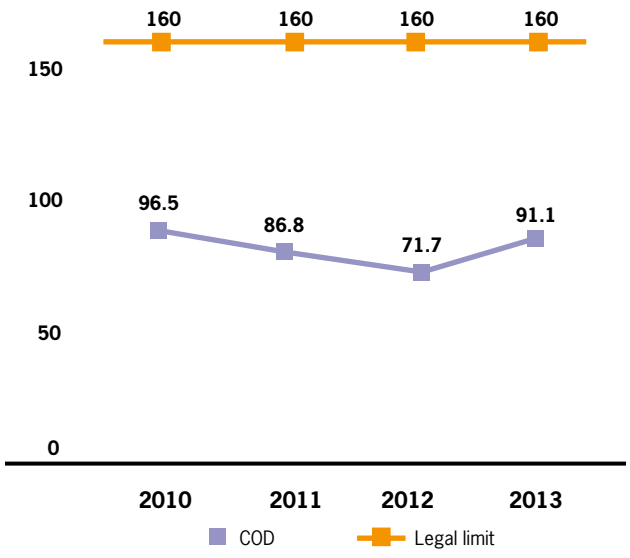
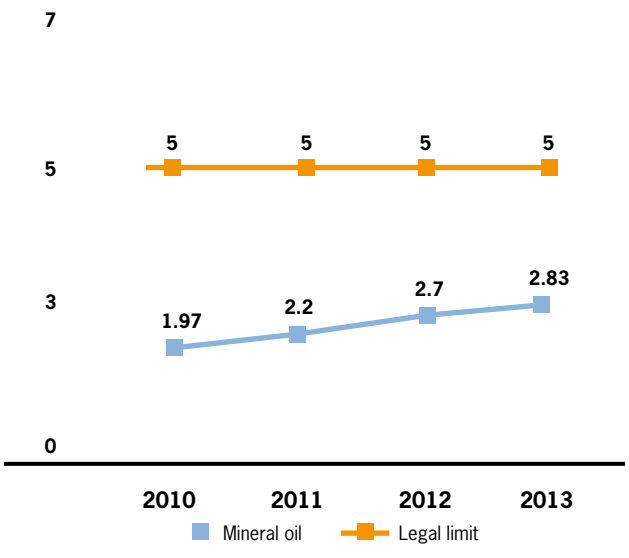


Chart 36 – Mineral oil concentration (mg/l)

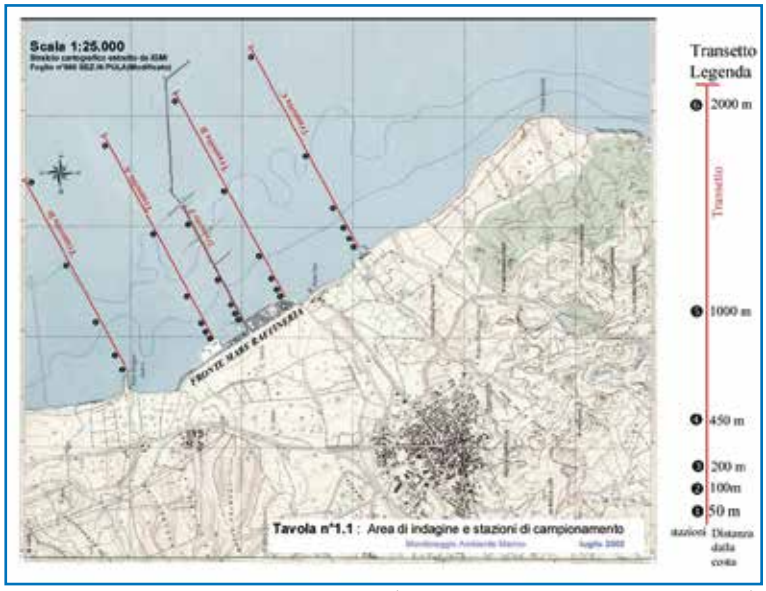


Monitoring the marine environment

For Sarlux, 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)

Figure 11 - Seawater quality survey area



- monitoring of sediment particles (deposited during the study period) and surface sediment
- monitoring of heavy metals in the above sediment

Table 23 - Trophic index (TRIX): seawater quality categories and results (2010-2013 survey)

	Surface water	Bottom water
January 2010	good	good
July 2010	good	high
January 2011	high	high
July 2011	high	high
January 2012	**high**	**high**
July 2012	**high**	**high**
January 2013	**high**	**high**
July 2013	**high**	**high**

Table 23 on page 73 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.
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 entire survey area. The sole exception was 2009 when the quality of seawater was poor due to a particularly rainy period that started in the last quarter of 2008, causing a number of water courses to overflow into the Gulf of Cagliari with the resulting 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 2013, the parameter showed a continuation of the trend seen in previous years.

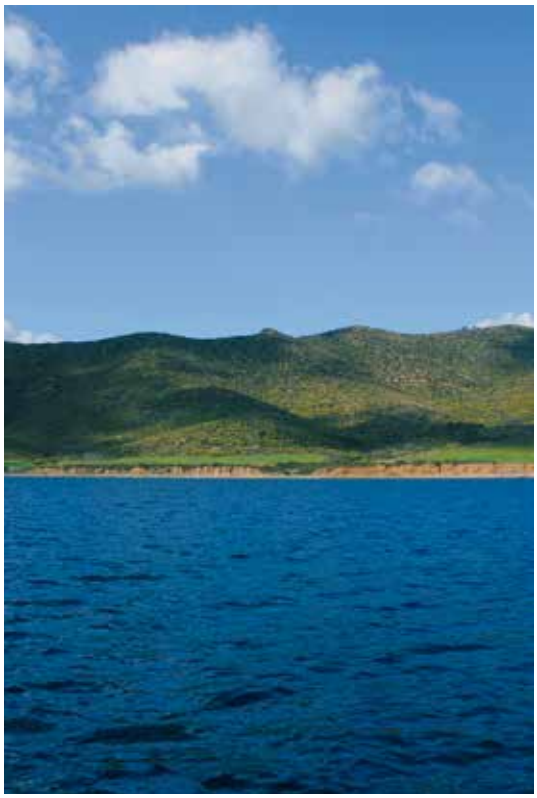
Table 24 - Trophic state of seawater (2010-2013 survey) CAM Index (specific to the seas surrounding Sardinia)

	Surface water	Bottom water
January 2010	average	average
July 2010	low	low
January 2011	average	average
July 2011	high	high
January 2012	**average**	**average**
July 2012	**average**	**average**
January 2013	**average**	**average**
July 2013	**average**	**average**

Measures to protect the sea and coastline

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

- adoption of "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 Sarlux marine terminal
- the implementation of the Safety Service, which involves the presence of qualified personnel on board ships at all times during operations,



to verify technical and operational compliance in terms of safety and environmental protection. This measure is intended to mitigate and minimise the greater risk to the marine 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) control system, to prevent the spilling of products by automatically stopping the loading pumps and closing the interception valves for oil products in the event of a pressure surge
- a ban on the discharge of segregated ballast (seawater that does not come into contact with oil products) into the sea at night applied to ships carrying particularly pollutant products
- an agreement with a specialist company for the constant attendance of anti-pollution staff and equipment

In the event of a spill, vehicles and equipment are available to deal quickly with all types of incidents, according to procedures laid down in the Internal Emergency Plan, which includes the Marine Pollution Prevention Plan (page 74).

For several years, Sarlux 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 will definitively replace paper-based documents (registers, forms and MUDs [unified environmental declarations]) in January 2015.

In accordance with current legislation, Sarlux introduced the use of SISTRI alongside paper-based documentation starting 1 October 2013, as a company disposing hazardous waste, and starting 3 March 2014 as a producer of hazardous waste. The site's waste management is aimed at op-

Refinery equipment for the protection of the sea and coastline

The Sarroch refinery has four vessels that operate 24 hours a day:

- the Neptune, an anti-pollution motorboat equipped with systems to recover and store heavy hydrocarbons
- the pilot boat Pegasus, used to transport people and equipment and assist in the positioning of floating booms
- the working boat Proteo, used for rapid identification, positioning of floating booms and operations in shallow water;
- the motorboat Tripesce, used to position floating booms and carry out operations in shallow water

A wide range of equipment guarantees that the site is able to respond immediately and fully to contain and remove any product spills:

- skimmers to collect spillage floating on the surface of the water with a recovery capacity of up to 27 m^3/hour
- floating tanks, each with a 5 m^3 capacity, to collect any product recovered from the sea
- motor pumps to recover products, with a capacity of up to 48 m^3/hour
- 1,950 m of floating booms to contain floating product, equipped with inflation systems (three compressors and two blowers)
- radio buoys connected to the GPS system
- absorption systems

Table 25 – Commitments and results relating to the protection of the marine environment from shipping traffic - 2013

	Commitment for 2013	Result for 2013	Commitment for 2014
Double hull for light crude oil	100%	100%	100%
Gasoline/kerosene/diesel	100%	100%	100%

Chart 37 - Types of vessel (%)

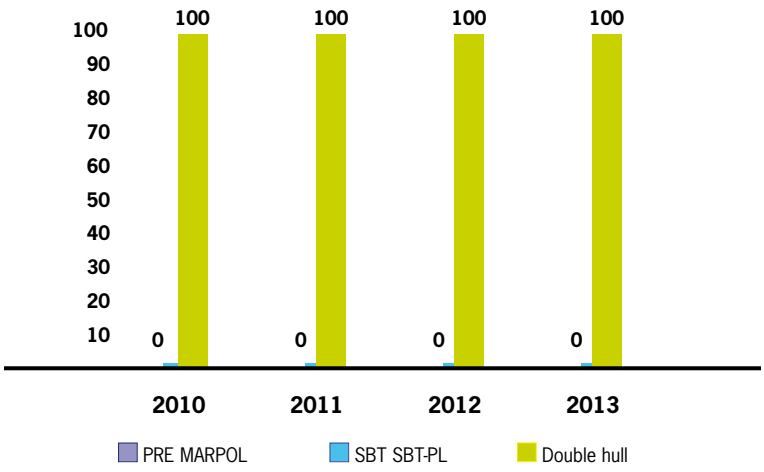
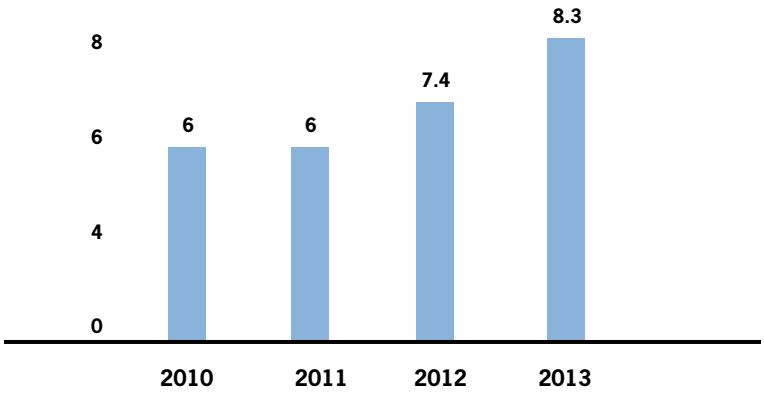


Chart 38 - Average age of tankers (years)



timising the quantity of waste recovered. In 2013 there was an increase in total production of refining-related waste as compared to recent years due to an increase in the production of sludge at the PWP. Around 105,830 tons of waste were recovered or recycled in 2013, in line 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 Sarlux's 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 used by Sarlux. Treated

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 in 2010.

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

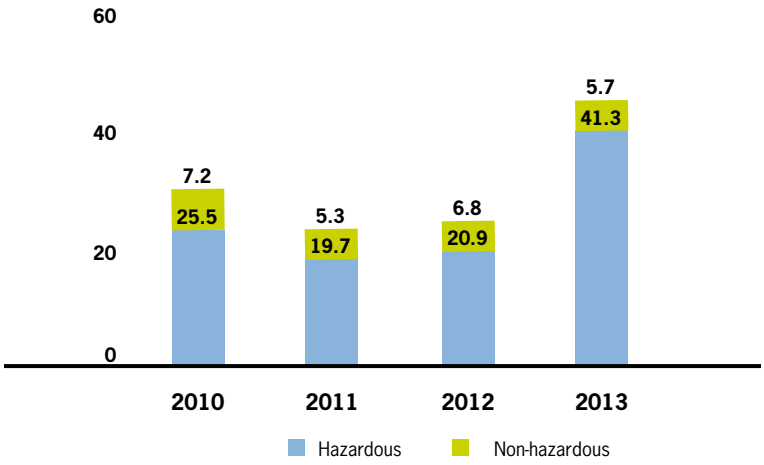
- **Category 1**: the **"pre-MARPOL"** single-hulled tanker, which does not have segregated ballast tanks in protective locations (**SBT/PL**). These are the oldest and most vulnerable tankers, mostly built before 1982.
- **Category 2**: the **"MARPOL"** single-hulled tanker, which is the same size as 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. Sarlux 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)

	2010	2011	2012	2013
Hazardous waste	25.5	19.7	20.9	41.3
Non-hazardous waste	7.2	5.3	6.8	5.7
Total	**32.7**	**25.0**	**27.7**	**47.0**

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



waste is transformed into non-hazardous waste that can then be sent to landfill (Table 29).

In 2013 the internal inertisation plant sent about 16,526 tons of waste rendered inert to controlled landfills on behalf of Sarlux. This amount was greater than in previous years due to the larger quantity of sludge produced at the PWP. Separated waste from offices and the canteen continued to be collected in 2013 by agreement with the Municipality of Sarroch. The quantity of material sent for recovery is indicated in Table 30. There has been a gradual improvement in

Table 27 - Remediation activity (thousand tons/year)

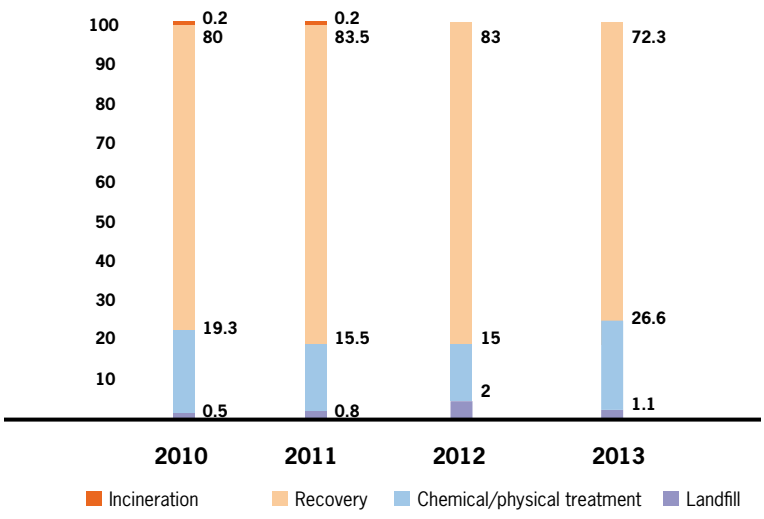
	2010	2011	2012	2013
WATER	105	103	103	99
EARTH	2.8	0	0	0

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

	2010	2011	2012	2013
Landfill	0.75	1.0	2.57	1.62
Recovery	112.35	106.53	108.28	105.83
Incineration	0.37	0.31	0.01	0.00
Internal chemical/physical treatment External chemical/physical treatment	27.09	19.79	19.55	38.88
Total	**140.56**	**127.63**	**130.42**	**146.33**

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

Chart 40 – Final destination of waste (%)



separated waste in recent years nearly reaching levels achieved in the previous year in 2013. An analysis aimed at optimising results was carried out to enhance the process, which still shows room for improvement.

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

	2010	2011	2012	2013
Chemical/physical treatment, of which:	27.09	19.79	19.55	38.88
Rendered inert and sent to landfill	13.1	9.3	11.29	16.53
Internal recycling	13.9	10.49	8.26	22.35

Table 30 - Separated waste sent for recycling (tons)

	2010	2011	2012	2013
Paper	81.7	82.4	111.5	101.9
Plastic	20.8	17.5	21.8	18.8
Glass and aluminium	14.4	12.1	14.6	14.0
Wet waste (since 2008)	12.6	22	22.2	22.0
RSU	373	307.1	332.9	358.8

Soil, subsoil and underground water

In accordance with the provisions of Ministerial Decree 471 of 25 October 1999, as subsequently amended (regulations containing criteria, procedures and methods for the safety, remediation and environmental restoration of polluted sites), the site, pursuant to Article 9 of the Decree, presented the competent authorities with its Site Characterisation Plan on the condition of the terrain and the layers of water beneath the refinery. Subsequently, in 2004, in conjunction with the Italian Ministry for the Environment, the Region of Sardinia, the Province of Cagliari, Local Health Authority no. 8 and the Municipality of Sarroch, the company defined the procedures for implementing the Site Characterisation Plan, which set out a series of surveys to be carried out and proposed possible 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 verify 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 forwarded to control bodies in December 2012. Based on the final 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. All 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 physical barrier planned 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 entire project, subdivided 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 washing for removal of hydrocarbons and the subsequent restoration of washed soil

to the original site has been ongoing at the West Tank Farm area, while contaminated soil in the former ST1 area has been removed and delivered to the 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 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 required. In 2013 a draft procedural change was presented to the Ministry for the Environment and competent authorities with a request to expand the extraction and replenishment system rather than building a physical barrier. The draft is currently being reviewed by the ministries and authorities in charge. The site risk analysis was also forwarded in 2013.

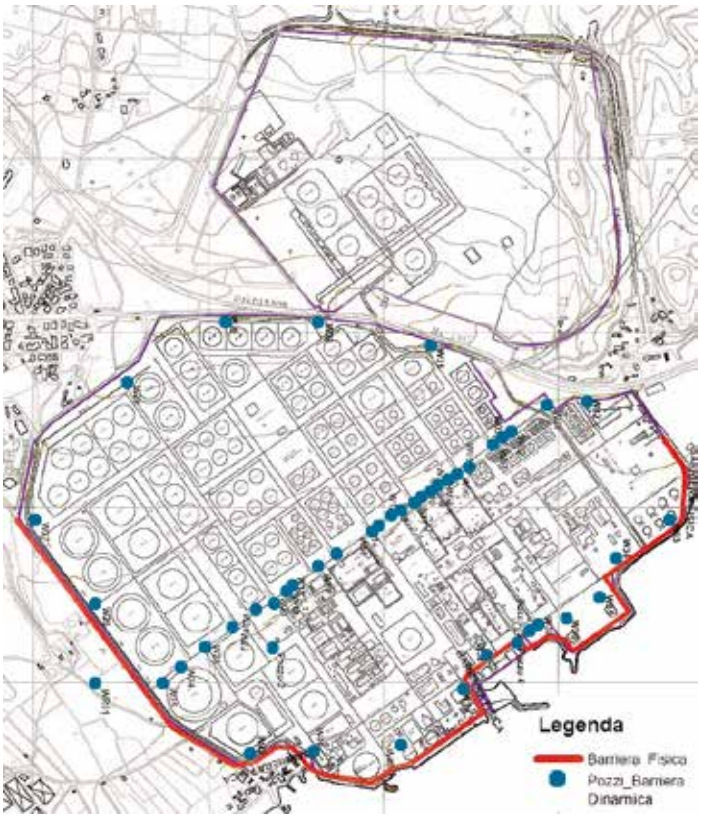


Figure 12 – Location of the wells comprising the dynamic barrier, and planned location of the physical barrier

Measurement of electromagnetic pollution

In 2001, in order to determine the possible existence of risk situations, Sarlux launched a study to analyse and assess this phenomenon within 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.
In 2013, in order to check results obtained in past years, the monitoring of the electromagnetic impact outside the site was repeated. This study also confirmed what was determined in the past: the magnetic fields generated within the site are well below the legal limits set to protect the population. Thus, it can be concluded that there is no risk of electromagnetic pollution outside the site.

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.

In 2013 the sampling programme was revised to monitor a greater area of the city centre of Sarroch by adding stations that do monitoring at night in place of stations that do daytime monitoring irregularly in order to enhance Sarlux's ability to understand the true impact in the city centre. For the reasons indicated, there were no daytime measurements in 2013.

The location of the measurement points is shown on the map at Figure 13, which is based on the Municipal Acoustical Classification Plan.

The phonometric testing showed that the refinery emits steady and continuous noise.

In the city centre, the noise level fluctuates more markedly, as it is affected by noise from vehicle traffic and other noises unrelated to the refinery. The L90 noise level attributable to the refinery (which allows traffic noise to be excluded), measured at night, is considerably lower in the recordings taken in Sarroch city centre. The latest measurements taken in 2013 confirm this trend as seen in Chart 41, page 81.

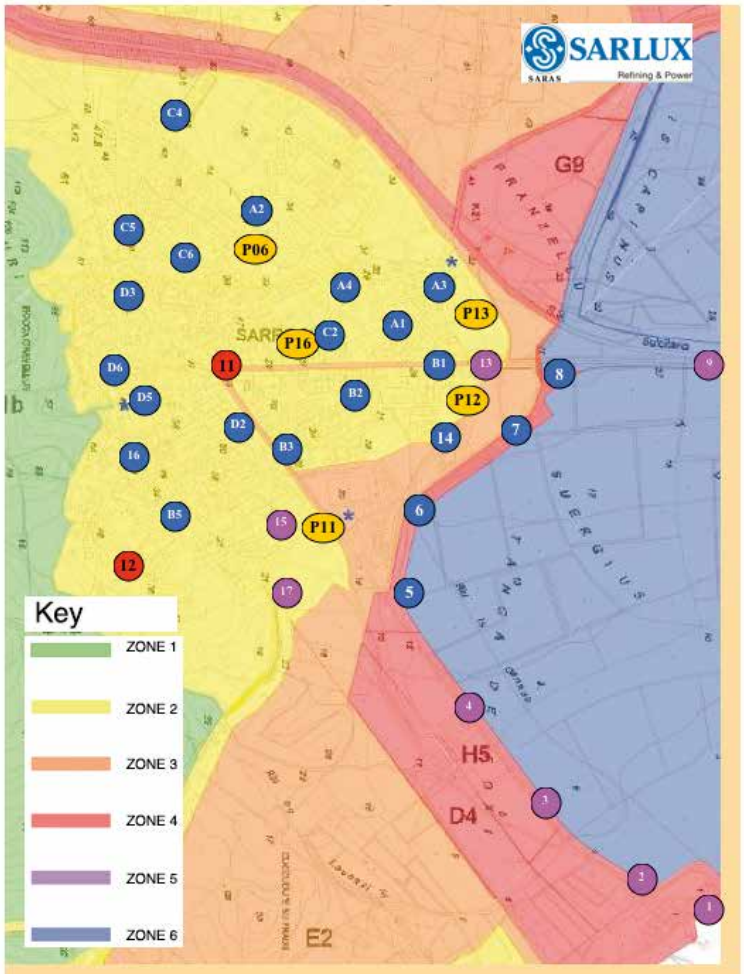
Parameters	Period	Stat. 11 (H8)	Stat. 12 (H8)	Stat. P13 (H8)	Stat. 14 (SPOT)	Stat. D2 (SPOT)	Stat. 16 (SPOT)	Stat. B5 (SPOT)
	L90	44.0	45.9	49.1	47.6	43.3	42.6	44.6

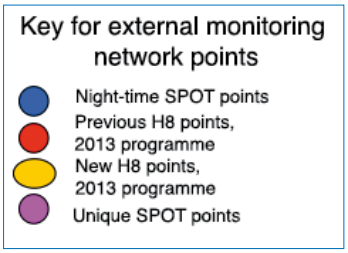
Notes:
Position 13 was replaced by P13 and measurement H8.
Position 15 was replaced by D2 and a SPOT measurement.
Position 17 was replaced by B5 and a SPOT measurement.

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 aim, the internal area was renovated through improvements to spaces and structures, painting, upgrading of green areas, graphics to raise awareness about environmental protection and safety, and new signs. Several sculptures, created following suggestions from employees and external companies and made of scrap metal and other materials used in plant operations, have also been installed. Structures and spaces in direct contact with the outside were also improved, with green areas established to provide continuity between the site and its surroundings. In particular, the junction on the S.S.195 was rebuilt and the green spaces in the car park were improved. Work 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 plumes of smoke, and also enabled heat to be recovered for use in activities related to the process.

Figure 13 – Location of noise monitoring units in 2013





Municipal acoustical classification
Circled numbers are for measurement stations
(Source: Sarroch municipal website, regional planning area)

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

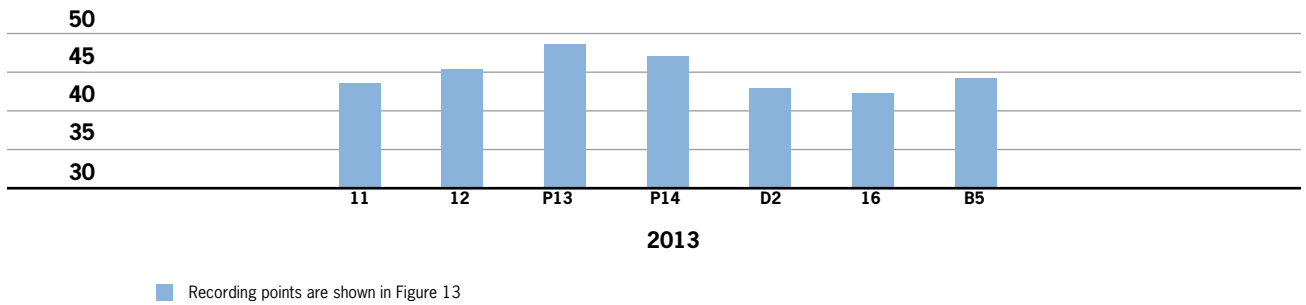
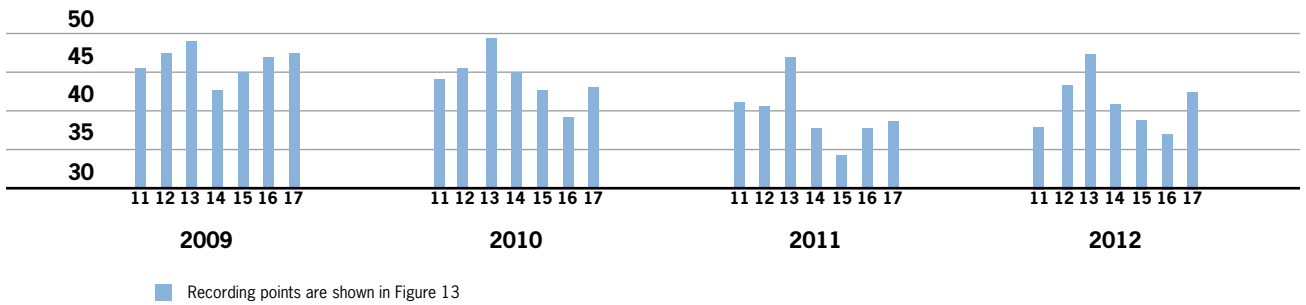


Chart 42 - External environmental immissions (dBA) - L90 levels - Night time (Sarroch city centre) - Historical data



Investment in the environment

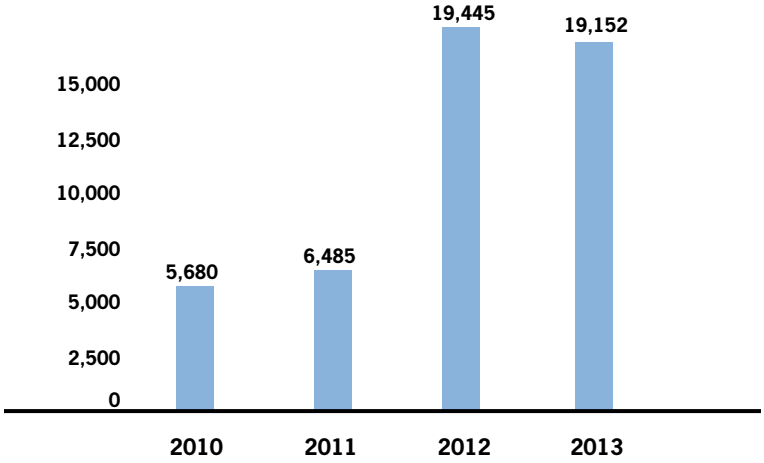
Sarlux's commitment to continually improving environmental performance can also be measured and evaluated in terms of the financial investment devoted to this purpose. The data in Table 31 show the company's strong commitment on this front, with total investment of more than EUR 50 million in the past four years. In 2013, the main investments were as follows:

- Study to reduce dust from the CO-Boiler
- Study and preparations to recover energy efficiency in various site systems
- Ongoing tank and pipeway paving
- Ongoing installation of double bottoms in tanks
- Creation of emission monitoring systems

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

	2010	2011	2012	2013
Investiments	5,680	6,485	19,445	19,152

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



Sardeolica

Environmental 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.

Arcola storage facility

The project to reclaim subsoil at the Arcola storage facility, currently at an advanced stage of implementation, completes a process that began in 2002 with the approval of the preliminary project and later of the operational plan drawn up by Arcola Petrolifera, in preparation for the programme of remediation and safety improvements at the Arcola storage facility. The project was designed to identify the best subsoil decontamination techniques to use at the Arcola site, taking into account the fact that the groundwater is used to obtain potable water. The test phase then began, aimed at planning and drawing up a remediation project using the best available technologies appropriate for the site. The test project was developed with the assistance and scientific advice of the University of Cagliari. A variety of biodegradation techniques were selected and tested in areas that were specifically identified and set up on the basis of the preliminary project and the subsequent operational plan. A hydraulic barrier was kept in operation throughout the test phase, in order to protect the site. This comprised five extraction wells distributed at various points within the facility that were constantly monitored to check that they were working properly using groundwater quality checks. The test phase involved a substantial amount of work to identify and define optimum operational parameters based on the site's specific features and vulnerabilities. Many series of tests were carried out, incorporating coherent 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 evolutionary process. Among other things, the research identified a particular biosurfactant micro-organism (already known in scientific literature as the Gordonia bacterium), which specialises in biodegrading hydrocarbons, demonstrating that the indigenous microbiological communities are selectively evolving in favour of micro-organisms specific to the type of organic substratum that can be found at the site. On completion of this full raft of tests, field monitoring and laboratory research, the base technology – bioslurping – was developed further and refined to maximise its effectiveness in light of the specific features and vulnerabilities of the site. The testing of remediation technology was completed in December 2004. The definitive reclamation plan was the result of nearly three years' work, during which it was possible to perfect the most suitable techniques, ensuring that the required result

could be achieved while taking into account all the environmental factors, particularly potable water resources.
The definitive remediation project provides for the simultaneous and synergistic application of bioventing and skimming techniques (which were optimised during testing) in 60 newly equipped and installed piezometers. Arcola Petrolifera drew up and presented the definitive remediation project to the Services Conference, organised by the Municipality of Arcola, in 2005. The Conference approved the project at the end of the same year. In 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 periodically 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 have enabled a sizeable part of the unsaturated area of the area for remediation to be decontaminated. As expected, the focus is still on the capillary fringe, which remains a contaminated layer due to groundwater dynamics. In 2009, a new phase of testing was launched, 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 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 information obtained was 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 lev-

Figure 14 – Remediation project of Arcola site

el 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 water boundaries of the site. The first version of the model was submitted at the end of July and was discussed at the meeting of the supervisory committee 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 then, at the appropriate Technical Committee meeting at the end of March, the supervisory committee resolved as follows:

1. "to approve the site-specific health and environmental risk analysis since the levels in the CSR [chemical security report] were deemed appropriate (page 33) with the requirement to submit a monitoring programme pursuant to paragraph 5, Article 242 of Legislative Decree 152/2006 as amended"
2. "to request the submission of a project to permanently make the site safe according to the guidelines indicated by the technical committee that met on 5 February 2013 as indicated in the minutes forwarded in memo number 4294 of 28 February 2013..."

Based on the requirements indicated in item 2, a preliminary version of the project to permanently render the Arcola storage facility safe was drafted. Among other things, the document includes measures to streamline the existing equipment to ensure the operational safety of the site (hydraulic barrier) and the work necessary to create a partial physical barrier to permanently ensure the site's safety. At the end of 2Q2013 the paper was sent to the Municipality of Arcola and the authorities comprising the supervisory committee. In Q3, after a special meeting of the technical committee was called, the municipal administration received and forwarded the list of supplemental documents requested by individual authorities. In 4Q2013 the supplemental documentation was drafted and sent to the authorities. We are currently waiting for the municipal administration to set the date to call a supervisory council meeting to discuss the project, which we expect will be called in early 2014.

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 verification 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 2013. 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

Training

In 2012 Saras Energia developed the 2012-2013 training plan dedicated to the network. The purpose was to ensure that all resellers and managers had basic training on work-related risks at their stations including procedures for combating thefts and robberies. After analysing reported claims, the Company also decided to develop a road safety training campaign given the high incidence of driving accidents experienced by employees in all company areas. To accomplish this, the training programme was developed using three different methods: online training for the Madrid office staff, classroom training for network staff and personnel at the biodiesel production facility and hydrocarbon terminal, and on-the-job training for all employees who regularly drive vehicles to do their work (commercial work, sales development and network staff). The latter was carried out over an entire day at the safe driving facilities of the Royal Automobile Club of Spain, at which employees learned to drive, first-hand, in hazardous situations: water, snow, emergency stopping, obstacle avoidance, etc. In 2013 several courses were developed for safety and environmental risks tailored for the biodiesel production facility and hydrocarbon terminal: explosive environments, prevention of hydrocarbon pollution in the sea and port areas, courses for dock operators for hazardous merchandise and the transport of hazardous merchandise by road.

Table 32 – Control parameters

	2010		2011		2012		2013	
Parameter	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]	Value recorded[3]	Limit[2]
CO (ppm)	49.1	500	17.7	500	32	500	9.84	500
NOx (ppm)	71.3	300	97	300	140	300	84.08	300
COV´s (mg/Nm^3)	<0.05	–*	<0.05	–*	<0.05	–*	<0.05	no limite
HCL (mg/Nm^3)	<0.5	–*	11.76	–*	1.12	–*	1.43	460
Noise dB(A)	60.1	65.0	-	65.0	-	65.0	64	65

*No legal limits have been established.

statement on the soil situation to the Directorate-General of Environmental Planning, Assessment and Control. On the basis of the planned and completed analyses, 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 2013, 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 the land around SARTEC's operational headquarters
- wastewater
- waste
- energy and resources consumption
- water consumption
- soil/subsoil contamination
- atmospheric emissions

Health and safety

Health and safety

Group companies

The Sarlux site in Sarroch

One of the company's key priorities is to constantly foster a culture of safety, by creating working conditions appropriate to the needs of employees, in order 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 2013 report using precise and detailed figures. The decisions made by the company in terms of safety cannot be properly evaluated except by detailed analysis of the figures as compared against suitable indicators. The indicators considered 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 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 developing a 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 disseminate 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 according 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 maintaining co-ordination with PPD. One important step was the appointment in each produc-

Safety training

To obtain reliable conduct, the people putting it into practice must be adequately prepared and motivated through an effective safety culture based on concepts of legal awareness, technical awareness and the principles of safe conduct.

The training efforts by the Saras/Sarlux workforce again led to mastery of all three of these areas in 2013. Volumes of training seen in previous years continued in 2013, with more than 23,700 hours delivered on topics directly relating to health and safety.

Special emphasis was placed on the use of in-house trainers. These trainers, who underwent a qualification process, helped to increase the credibility of the message and overall effectiveness of the training measures in cases where a change in behaviour was required.

Furthermore, as mastery of technical matters is fundamental to assessing and managing situations involving exposure to risk, another 6,000 hours were delivered to develop and maintain the technical/specialist skills required to achieve operational excellence, which enhance the reliability of the system as a whole.

tion area of a new HSEQ (Health, Safety, Environment and Quality) specialist with the specific task of helping to promote safe conduct, identifying anomalies and monitoring corrective action.

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), which 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 purposes and aims of the inspection, with a focus on subcontractors

One real innovation, however, is the concept of 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. Managing external firms

Major innovations have also been introduced in the way subcontractors are managed. Joint working by 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 check 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
- Implementation of weekly checks of compliance with HSE standards

REACH and CLP

Implementation of the REACH regulation

The main aim of the "REACH Regulation" 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 within the scope of REACH, which requires 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 chemical affinity in refining processes, and 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, by 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 of the substance (2010, 2013 or 2018). These substances are subject to the “transitional regime”
- facilitate 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 eco-toxicological), their uses and hazards to human health
- a chemical safety 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 the exposure to and characteristics of risks

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

REACH and CLP

REACH Regulation

EC Regulation 1907/2006 of the European Parliament and the Council came into force on 1 June 2007 to rationalise and improve 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:

1. it is listed in EINECS, (European Inventory of Existing Commercial Chemical Substances)
2. it was 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
3. they were placed on the EU market before REACH came into force by the manufacturer or importer, and were regarded as having been notified in accordance with Directive 67/548/EEC, but do not meet the definition of polymers ("no-longer polymer", or NLP) 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”.

these checks. As of 1 July 2013, ECHA registration ownership was transferred from Saras to Sarlux. Registration related to 41 oil-based substances, 30 of which were to be sold. The Safety Data Sheets, already amended pursuant to the REACH and CLP regulations, were also reissued in Sarlux's name.
During 2013, as in 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.

Occupational health monitoring

A number of monitoring campaigns have taken place at the refinery over the years, in both open and closed working environments, to check for the presence of physical, chemical or microclimate hazards. The monitoring programme is implemented periodically and meets the requirements for safeguarding the health and safety of workers. Examples of monitoring include: hazardous and carcinogenic substances, electromagnetic fields, biological agents, etc. The following table summarises occupational health monitoring in the period 2007-2015.

Table 33 – Monitoring programme

Hazards	2007	2008	2009	2010	2011	2012	2013	2014	2015
Noise - personal dosimeters	■				■				■
Microclimate			■			■			■
Carcinogenic and mutagenic substances		■			■			■	
Class 1 hazardous substances			■			■			■
Class 2 hazardous substances		■			■			■	
Asbestos	■			■			■		
Biological agents			■		■			■	
Electromagnetic fields		■				■			
Lighting	■					■			
Artificial optical radiation					■	■			■
Monitoring in non-routine conditions			■		■				■

The following is a brief summary of occupational health monitoring in recent years:

LIGHTING (2007)

Workplace lighting (internal and external) was monitored during the period February - May 2007 as part of the analysis and assessment of risks to the health and safety of workers. Pursuant to the regulations in force, the lighting levels required for control activities in open-air plant areas fall within the 20 lux - 50 lux range. 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. A new monitoring campaign began in October 2013 and is still in progress. Hazardous, carcinogenic and mutagenic substances.

General considerations

Hazardous substances and carcinogenic substances

The aim of the surveys is to ascertain the level of risk to personnel operating inside the site after exposure to organic and non-organic compounds selected according to the raw materials used, the site's production cycles and, of course, their intrinsic hazardousness. Monitoring involves both night-shift and day-shift staff in production areas and staff who can be regarded as potentially exposed to risk, based on their working activities. The following specific targets have been set:

- assessment of the exposure of operators using personal dosimeters, during the normal working hours of the three shifts, in order to measure risk over eight hours and over 24 hours, and by comparison with the TLV-TWA thresholds
- assessment of the exposure of operators during the execution of specific tasks (sampling), and by comparison with the TLV STEL thresholds
- measuring the exposure of each person with access to a given area, by monitoring transit routes (fixed points), in the course of the eight-hour working day

To enable the results to be statistically analysed, the concentration values recorded were divided into the following categories:

CLASS 1 - values under 10% of the Threshold Limit Value (TLV-TWA)

CLASS 2 - values between 10% and 50% of the Threshold Limit Value (TLV-TWA)

CLASS 3 - values between 50% and 100% of the Threshold Limit Value (TLV-TWA)

CLASS 4 - values over the Threshold Limit Value (TLV-TWA).

For benzene monitoring alone, CLASS 1 is further subdivided into:

CLASS 0 - values under 5% of the Threshold Limit Value (TLV-TWA)

CLASS 1 - values between 5% and 10% of the Threshold Limit Value (TLV-TWA)

AIDII (the Italian Occupational Hygiene Association) sets out three Threshold Limit Value (TLV) categories (AIDII, 1997; ACGIH, 2002), shown in the table below.

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 – Threshold Limit Values

TLV-TWA Threshold Limit Value Time-Weighted Average	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: 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.
Threshold Limit Value (Ceiling)	The concentration that must never be exceeded during working activity, even for a very brief period.

CLASS 1 HAZARDOUS SUBSTANCES (2012)

During 2012, we conducted surveys to assess the exposure of workers to Class 1 hazardous substances, as described in notes 1 and 2.

Specifically, 261 surveys were carried out using personal dosimeters, as well as 43 environmental surveys using fixed points and 42 surveys using personal dosimeters during the performance of "specific tasks" (sampling). The data analysis showed that most of the results came in under the measurable threshold. Of the values that were analytically measurable:

- 12% related to the measurement of hydrogen sulphide
- 7% related to measurements of respirable dust
- four samples of carbon monoxide.

The majority of these data were under 10% of the Threshold Limit Value and therefore "acceptable" (according to the guidelines used for risk assessment). However, some results fell within the range of 10-25% of the TLV and were therefore classified as “insignificant/acceptable with caution” (see table 4.0).

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 the TLW-STEL limit), relating to the performance of a specific operation. Analysis of the results for carbon monoxide show that all personal dosimeters were Class 1 (lower than 10%), while only four fixed-point records showed Class 2 values, and these were just over the Class 1 limit value. Analysis of the results for respirable dust and carbon monoxide show that personal dosimeters were in Class 1 (lower than 10%) in 93% of cases while 7% showed Class 2 values but all were lower than the TLV-TWA limit of 25% and therefore "acceptable", as they were between 10% and 25% of the limit value and thus corresponded to a class of risk described as "insignificant/acceptable with caution".

CLASS 2 HAZARDOUS SUBSTANCES (2012)

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. Initial results show 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 pentoxide 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 tasks 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).

CARCINOGENIC AND MUTAGENIC SUBSTANCES (2011)

During 2011, surveys were performed to establish workers' exposure to carcinogenic and mutagenic substances. These substances were selected according to the raw materials used, the site's production cycles and, of course, their intrinsic hazardousness. The survey involved 333 plant operators, 39 fixed points and 29 workers involved in "specific tasks" (sampling). The results of the monitoring showed no particular problems in most cases, except for the duties of the Merox FCC operator and the national storage facility operator, where technical measures and PPMs are also planned/used during certain specific activities.

The survey confirmed that the existing environmental and biological monitoring programmes for all personnel regarded as exposed to risks, and included in the register of "personnel exposed to carcinogenic/mutagenic substances", are still in place.

HAZARDOUS/CARCINOGENIC SUBSTANCES IN NON-ROUTINE CONDITIONS (2013)

In the period 22-27 October 2013, when the Z4 plant was closed for scheduled maintenance, workers' exposure to hazardous/carcinogenic substances during the remediation phases (including equipment start-up) was monitored.

The following chemical agents were monitored:

hydrogen sulphide, ammonia, sulphur dioxide, sulphur in the respirable fraction, dust in the removable fraction, total hydrocarbons. Monitoring was carried out via personal dosimeters and fixed points and involved the Z2-Z4 operator, the HDS1 foreman and the TGTU-Z3 operator and the senior and junior maintenance assistants involved in the shutdown activity. Pursuant to the regulations, the surveys lasted for a minimum of six hours for each shift and continued for three consecutive days.

The results of the sampling analyses show that all the chemical agents monitored are lower than the threshold limit values. With regard to the respirable fraction of dust recorded by the fixed points, there were various cases of instances of values higher than both 10% and 25% of the TLV-TWA values (3 mg/m3).
Although these values are well below the threshold limit values, they validate the use of ABEK filter masks during the remediation phases by exposed personnel, as reported under the job-related risks of plant operators.

ASBESTOS (2013)

In October/November 2014, pursuant to the occupational health programme, an environmental survey was carried out relating to airborne asbestos fibres. Monitoring was carried out using fixed-point level gauges and involved 111 points in total, broken down as follows:

- 75 points in production areas
- 31 in transit routes
- 5 in the transformer rooms

The results obtained showed that concentrations of airborne asbestos fibres were well below the threshold limit value (100 ff/L[1]); the risk workers at the Sarlux site will be exposed to asbestos can therefore be regarded as insignificant.

NOISE (2011)

Workers' exposure to the risk of noise was measured using personal dosimeters in 2011.
The measuring processed involved 94 operational jobs (carried out by 69 shift operators and 25 daily operators) at the various production units.
The results of the analysis showed that workers could be divided into four categories of acoustic risk:

0 workers performing activities involving a personal daily exposure value of no higher than 80 dB(A) and peak levels (ppeak) no higher than 135 dB(C);

I workers performing activities involving a personal daily exposure value of between 80 and 85 dB(A) and peak levels (ppeak) no higher than 137 dB(C);

II workers performing activities involving a personal daily exposure value of between 85 and 87 dB(A) and peak levels (ppeak) no higher than 140 dB(C);

III workers performing activities involving a personal daily exposure value higher than 87 dB(A) and/or non-weighted instantaneous acoustic pressure values higher than 140 dB(C).

This classification was made according to the limits set by Article 189 of Legislative Decree 81/2008, which are summarised in the following table.

1 - The limit for asbestos exposure is defined by article 254 of Legislative Decree 81/08, as amended and supplemented

Table 35 - Noise exposure limits (article 189 of Legislative Decree 81/08)

Lower exposure action values		Upper exposure action values		Exposure limits	
LEX,8h 80 dB(A)	ppeak 135 dB(C)	LEX,8h 85 dB(A)	ppeak 137 dB(C)	LEX,8h 87 dB(A)	ppeak 140 dB(C)

The table below shows the correlation between risk class and exposure level:

Table 36 - Exposure classes and acoustic risk category

ACOUSTIC RISK CATEGORY	PERSONAL EXPOSURE LEVEL	RISK
0	LEX,8h < 80 dB(A)	NEGLIGIBLE
I	80 dB(A) < LEX,8h < 85 dB(A)	LOW
II	85 dB(A) < LEX,8h < 87 dB(A)	AVERAGE
III	LEX,8h > 87 dB(A)	HIGH

Based on the surveys performed and the analysis of individual tasks, the exposure to noise of the operational staff at the site is as follows:

- weekly personal exposure levels were higher than 80, 85 and 87 dB(A), which represent the entry thresholds for the various acoustic risk categories set out in Legislative Decree 81/2008
- some operational tasks were classed as risk category I, some as category II and some as category III
- no instantaneous acoustic pressure levels higher than 140 dB(C) were detected
- some areas[2] of the plant's operations are subject to variable environmental sound levels and produce daily/weekly exposure to risk, sometimes for periods of just a few minutes
- sound is produced by a wide range of sources near the plants (furnaces, pumps, compressors, etc.), which are unevenly distributed in the area of the plant. The sound levels reached near these sources are high, but the exposure times of operators to these levels are limited to short periods, or only to transit periods near the sources. The noise risk, determined by sound levels in relation to exposure times, therefore appears to be fragmented and uneven, in terms of both the noise density of the sources and the exposure times of the operator, which vary in different areas
- The auditory PPMs currently used ensure compliance with the exposure limits and determine the appropriate protection for workers (in terms of the signal to noise ratio, or SNR)

The table below shows the percentage exposure by category of acoustic risk.

2 - The number and location of these zones is not quantifiable, since the aim of the monitoring was purely to ascertain workers' exposure to noise risk rather than to determine environmental noise levels.

Table 37 - Percentage exposure by category

CATEGORY OF ACOUSTIC RISK	PERSONAL EXPOSURE LEVEL	RISK	%
0	LEX,8h < 80 dB(A) e/o ppeak < 135 dB(C)	NEGLIGIBLE	27
I	80 dB(A) < LEX,8h < 85 dB(A) e/o ppeak < 135 dB(C)	LOW	35
II	85 dB(A) < LEX,8h < 87 dB(A) e/o ppeak < 137 dB(C)	AVERAGE	16
III	LEX,8h > 87 dB(A) e/o ppeak > 137 dB(C)	HIGH	22

ELECTROMAGNETIC FIELDS (2013)

Workers' exposure to electromagnetic fields was measured in May-June 2013. Specific monitoring was therefore carried out to quantify levels of electrical and magnetic fields generated by electrical equipment (electrical switchboards, lighting systems, electricity lines) and electronic equipment used within the site. These values were then compared with the exposure limits set by Legislative Decree 81/2008, Title VIII, Chapter IV (protection from the risk of exposure to electromagnetic fields).

The assessment was made by directly measuring the electrical and magnetic field in the relevant frequency range; specifically, the following were surveyed:

The survey frequency range of 0-3 GHz

0-100 kHz range, separate acquisition of electric and magnetic field strength (in terms of magnetic induction)

100 kHz-3 GHz range, acquisition of electric field only

Individual measurements have an acquisition time of 360 seconds for each frequency range

Measurements are taken at 326 sampling points, including all the transformer rooms at the refinery, the ENEL substation and the topping charge pumps, as reported below

Table 38 – Electromagnetic field monitoring stations

Refinery area	Number of measurement points planned	TARGAS area	Number of measurement points planned
OS1/ T1	11	OS21	11
OS2	11	OS22	23
OS3	4	OS24	23
OS4	3	OS25	4
OS5	8	AT3/BL2	7
OS6	4	BL1	18
OS7	3	I701/702/703	18
OS8	7	SCT	2
OS9	5	SUBSTATION 380 KV	4
OS11	1	TOPPING CHARGE PUMP ROOM	1
OS12	15	PPD	1
OS13	3	ITC	1
OS14	4	MANNED ENTRANCE	1
T2	11		
D1	3		
D2	12		
Thermoelectric plant	39		
Refinery control room	2		
AT1/MT	26		
AT2	32		
MIXER1/2/3/4/5	10		
CAM 10/11	4		
SUBSTATION 150 KV	4		
NATIONAL STORAGE FACILITY	1		
ENEL ROOM	1		

At each point, pursuant to the relevant regulations in force, three measurements are taken of six minutes each, totalling 978 measurements and approx. 98 hours of measuring time.
Based on the measurements and analysis carried out, the surveys showed that the values indicating the strength of the electric field and magnetic induction did not at any time exceed the action levels set out in Legislative Decree 81/2008, Title VIII, Chapter IV.
In conclusion, therefore, there is no risk of exposure to electromagnetic fields by workers at the Sarlux Srl site.

IONISING RADIATION (2013)

In accordance with the requirements of Legislative Decree 230 of 17/03/1995 and Legislative Decree 81/08, Saras has appointed a qualified expert to carry out periodic checks for potential staff exposure to ionising radiation and to produce the relevant accompanying documentation. There are some instruments at the refinery that 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 prefecture.
No controlled or supervised areas were identified based on the characteristics of the equipment, measurements taken, operational conditions and dose assessment; all areas external to the equipment with radioactive sources must therefore be described as "UNCLASSIFIED". In view of the low irradiation levels in question, there is no possibility of operators or visitors to the area absorbing doses that are much different from those in natural environments, and must therefore be considered as belonging to the population as a whole, with a legal dose limit of 1,000 µSv a year.

BIOLOGICAL AGENTS (2011)

Microbiological monitoring campaigns aim to monitor the biological sources identified and check seasonal trends in concentrations.
An objective comparison of results achieved 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 article 268, section X – Exposure to biological agents) and EC Directive 2000/54.
Some of the working 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 therefore measured:

- Total bacterial count
- Total coliforms
- Escherichia coli
- Salmonella spp and legionella pneumophila in the aerosol
- Escherichia coli and salmonella spp in wastewater

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

- preventing and minimising injury to people 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 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-accidents

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 in the possession of key personnel) are widely available throughout the refinery, so that personnel and equipment can be mobilised immediately. Following a list of priorities, the refinery's Emergency Co-ordination Centre (Figure 15, page 89) distributes information and provides updates on the management of accidents to the relevant organisations, depending on the type of incident involved, namely:

- the fire service
- the prefecture
- neighbouring 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.

The results of the monitoring showed that the objectively estimated level of risk at the WATER TREATMENT PLANT is low, as the species identified are associated 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 monitoring, show overall risk values of average-low.
Levels of exposure are moderate and manly 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 correct behaviour by operators).
Only three of the points identified recorded average risk values.
An analysis of the results, including those from the previous monitoring campaign (2009) confirms the risk classification of average-low levels of exposure. Although the individual species identified belong to level 2-3 classes of pathogens (moulds), they were in concentrations that are considerably lower than the limits.

MICROCLIMATE (2012)

The main objective of the monitoring was to check the wellbeing indicators in moderate environments, and calorie stress indicators in hot environments within the site. It is legislative convention to break down thermal environments into moderate, hot and cold environments.
Given the climatic and environmental conditions, only moderate and hot environments were taken into account in the site surveys. Owing to the site's longitudinal position, no environments are classified as cold.
Moderate environments: the results of assessing the microclimate in moderate environments are expressed in percentages of people satisfied and dissatisfied due to the heat or the cold. Note, however, that these indicators cannot be considered absolute values as there is a considerable variation between individual responses to the different climate conditions. Furthermore, the Predicted Percentage Dissatisfied (PPD) index is calculated using statistically based formulae and is not therefore based on any actual discomfort expressed by staff.
Analysis of environments in refinery areas defined as “moderate environments” (72 in total) shows that percentage dissatisfied levels of less than 10% (the target of the UNI EN ISO 7730 standard) 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 percentage dissatisfied for the remaining 27 environments (37.5% of all those assessed) was 10%-30%, due in all cases to heat.
Hot environments: an exploratory survey was conducted of hot environments using the WBGT1 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 value (26°C) was achieved and exceeded for all the points analysed, multi-environment analysis was performed using the PHS [4] model. This model 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 (D50L 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 staff exposed to such temperatures to adopt all necessary standards of behaviour for working safely (reducing exposure times, positioning in refrigerated areas, taking in 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 positioned for almost 7 hours at the analysed point, whereas the Job Safety Analysis showed that this is not practicable.

ARTIFICIAL OPTICAL RADIATION (2012)

The purpose of monitoring was to assess exposure to artificial optical radiation (AOR) of workers (furnace operators, foremen, etc.) who could be regarded as being exposed to this risk while performing their tasks.
Measurements were taken of the following AOR sources: processing furnaces and boilers.
The survey was performed through fixed-point measurement and took account of both the "direct exposure" and "indirect exposure" of workers.
In the first case, the source (e.g. furnace) is observed directly (through an open hatch); in the second case, the source is observed using equipment (e.g. goggles with integrated protective shield) that enables the source to be checked indirectly.
While observing the source, assessments were also made of the length of time operators were exposed to it. Each monitoring operation (observation of an individual station) lasts a stated time of no longer than 10 seconds, which is generally the right amount of time to ensure that the exposure limit is not exceeded. However, each monitoring operation can be repeated several times depending on the type of activity and source. Taken individually, these do not exceed the calculated Exposure Time Limit but could do so if the whole working day is taken into consideration.

3 - WBGT (Wet Bulb Globe Temperature): is the method used for the exploratory assessment. It is based on the calculation of an empirical index that measures heat stress.

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

The table below summarises the risk classes used.

Table 39 - Remediation activity (thousand tons/year)

RISK CLASS	CONDITION
I (Acceptable)	T_exp lower than 80% 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

The results of the monitoring identified that T2F1 and T2F101 sources would be a class II risk and sources CCR F3 and F5 a class III risk, which can be reduced to an acceptable level of risk (class 1) via the requirement to use specific PPMs.
Furthermore, as a precaution, since it is currently not technically possible to reduce the source of risk, the decision was taken to make it mandatory for all workers exposed to the risk to use specific PPMs.
During 2013, we carried out some unscheduled monitoring of occupational health in order to assess workers' exposure to:

- Dust in the Refinery's new control room
- Hazardous/carcinogenic substances in the Water Purification Plant station
- The studies were carried out by the PPD following reports by Saras employee representatives, and did not show any problems worthy of mention

HEALTH MONITORING (2013)

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 every six months for the tests set out in the plan. 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 20013 , the site has created a specific protocol for testing for, and monitoring, psychotropic substances as part of general drugs testing.

The site Safety Report

For the purposes of drafting the Safety Report for the site, every five years, the company carries out, for all its plants, an accurate and in-depth analysis of its activities and the risks associated with them arising from the refining process, the materials used and all the procedures involved in running a complex operation such as an oil refinery. The company's existing plant and management system are therefore examined, assuming certain risk scenarios and potential incidents, and hence the consequences that these could have for workers, 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, and for identifying and adopting the technological solutions, equipment and safety systems that will enable any incident to be correctly dealt with, minimising the consequences.

The refinery prepared its first Safety Report in 1989, and since then the document has been constantly updated to reflect all changes made to the plant over the years, after checking their interaction with the existing system.

Currently, an analysis of potential incidents has ruled out any significant consequences outside the plant; if an incident did occur, it would be in the direction of the S.S. 195 road, 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 in the same month. In July 2007, the Sardinian Regional Technical Committee for Fire Prevention completed its examination of the 2006 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 involved in 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 industrial area, which takes account of updates to the Safety Reports of the various sites at risk of a major incident in the industrial hub. The plan is available in the Civil Protection - Provincial Civil Protection Plans section of the prefecture's website (www.prefettura.it/cagliari). With 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 relevant bodies in November 2011, had to be updated. The update also included a revised classification of crude oil in the 11/10 CONCAWE Report. 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, was to ascertain progress in implementing a security

The External Emergency Plan (EEP)

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

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

In addition, the safety reports for the various production facilities and analysis of hypothetical incidents (study of the local area, especially populated districts and infrastructure) are used to plan the best way of managing incidents 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 incidents at the site, control in the surrounding area, dissemination 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 authority). will be involved in various ways to ensure that incidents 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 organisations responsible.

Figure 15 – Location of the refinery's Emergency Coordination Centre

management system. The inspection was carried out by a committee appointed for the purpose by the ministry. It concluded the following: "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." Following the disposal by Saras SpA of its refining activity, since 1 July 2013 all activities relating to compliance with Legislative Decree 334/99 are the responsibility of Sarlux Srl

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 site.
All the storage tanks are protected by cooling systems; the most important of these are activated automatically if a tank overheats. Similar systems are installed on all the pressure tanks, LPG storage and loading equipment and any other piece of equipment for which a rise in temperature could compromise safety. The refinery also has eight fast and easily manoeuvrable fire trucks carrying powder and foam extinguishers, which can be operated quickly in emergencies and act as a back-up to the installed systems. Safety equipment and systems are regularly checked, and carefully and routinely maintained.

Figures

Accidents

Production site personnel (Sarlux/Saras). As reported in the introduction, on 1 July 2013 Saras SpA transferred all its production units to Sarlux Srl To compare the figures with previous years in a standardised way, the indices in tables 40 and 41 were calculated including the figures for Saras personnel with those relating to Sarlux. As of 1 January 2014, all the figures for Saras SpA will be incorporated into the table relating to external companies, and therefore only the figures for Sarlux employees will appear in table 40.

Table 40 – Sarlux employees – Accident indices

	2010	2011	2012	2013
Total frequency index	10.7	6.8	2.5	2.6
Accident frequency index *	7.5	3.7	1.8	1.9
Severity index	0.434	0.155	0.07	0.093
Average duration	58	41.8	38	48.0
Near accidents notified	82	129	176	268

* 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 – Sarlux employees – Total frequency index

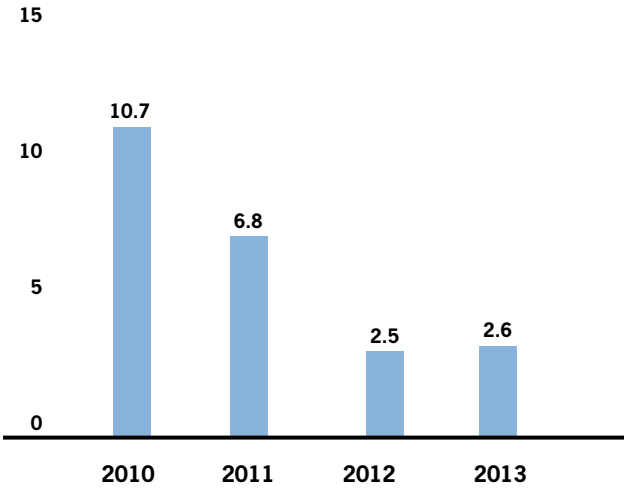


Chart 45 – Sarlux employees – Accident frequency index

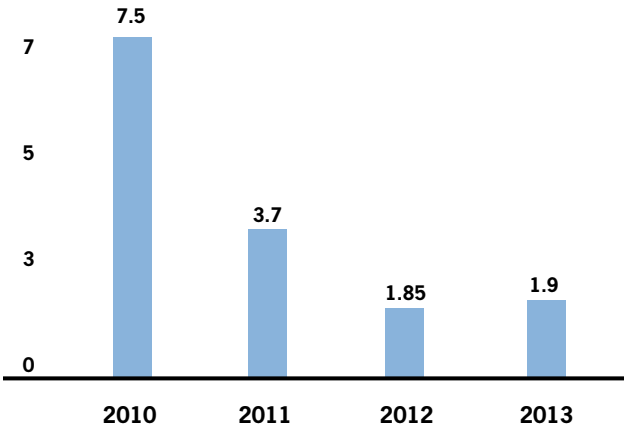


Chart 46 – Sarlux employees – Accident severity index

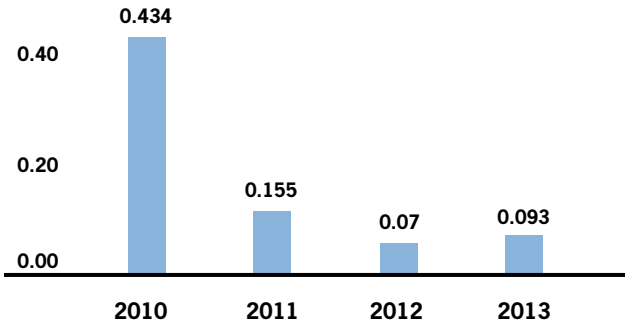
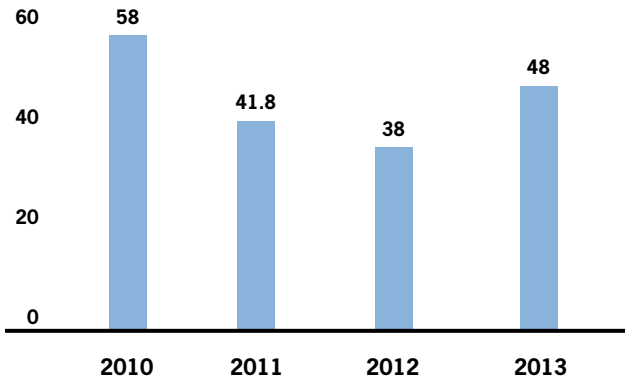


Chart 47 – Sarlux employees – Average accident duration (days)



Subcontractors

Sarlux also records and analyses data on accidents at work that take place on site involving staff employed by subcontractors. The INAIL total frequency and accident frequency indices recorded in 2012 show significant improvement: the 2013 result confirmed the excellent result achieved in 2012. In 2013, Sarlux again focused on subcontractors oper-

ating within the site, stepping up checks on the ground and classroom training activities by Sarlux staff. These initiatives have had a positive effect on accident rates, which improved markedly on previous years.

Table 41 – External staff – Accident indices

	2010	2011	2012	2013
Total frequency index	5.97	6.18	1.0	1.2
Accident frequency index ***	3.5	3.27	1.0	0.6
Severity index	0.203	2.752	0.042	0.070
Average duration	58.8**	10*	44	113
Near accidents notified	153	60	44	36

* This figure does not include the fatal accident
** 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 – External staff – Total frequency index

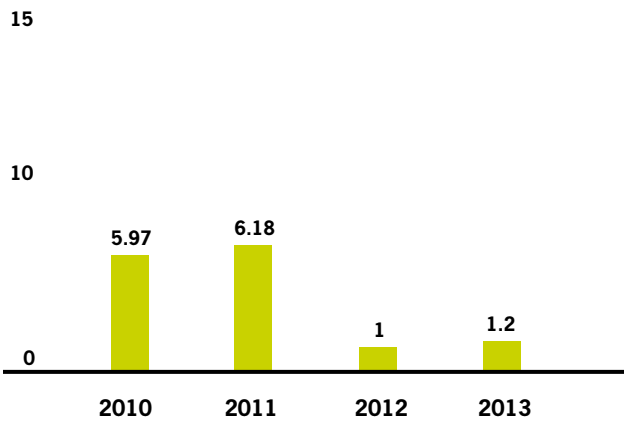


Chart 49 – External staff – Total accident frequency index

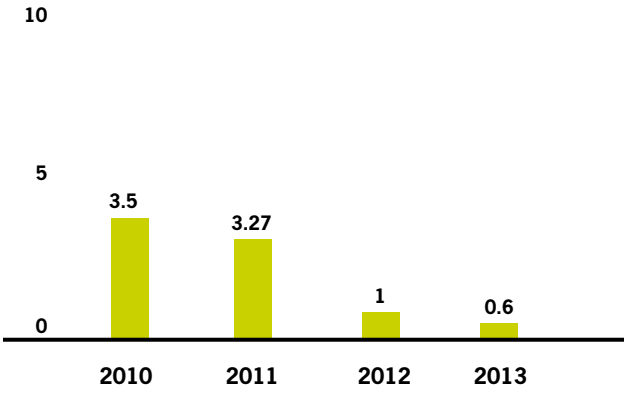


Chart 50 – External staff – Accident severity index

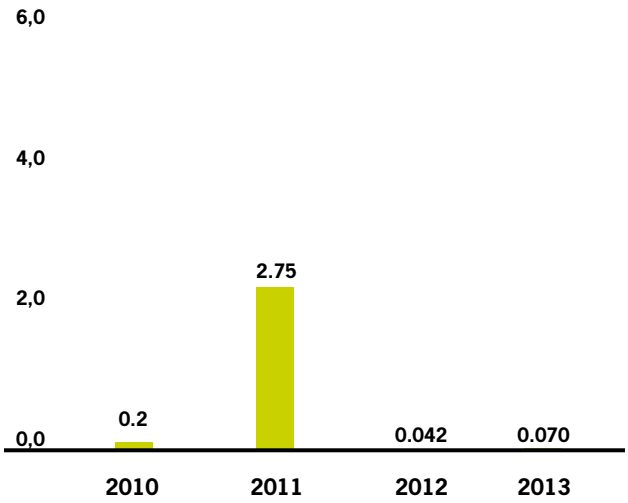
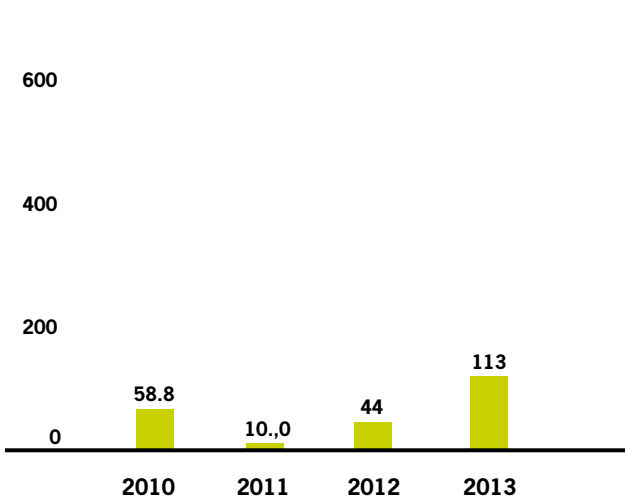


Chart 51 – External staff – Average accident duration



Emergencies

In 2013, two general emergencies and four localised emergencies were recorded. No emergencies occurred that caused people harm or resulted in plant closure. (Tables 42 and 43).

Reports of near-accidents (Chart 51) decreased in 2013 compared with the figure in 2012. 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 42 – Emergencies – Number of events

	2010	2011	2012	2013
Localised emergencies	15	4	3	4
General emergencies	5	1	2	2
Near accidents	4	17	10	4

Chart 52 – Localised emergencies

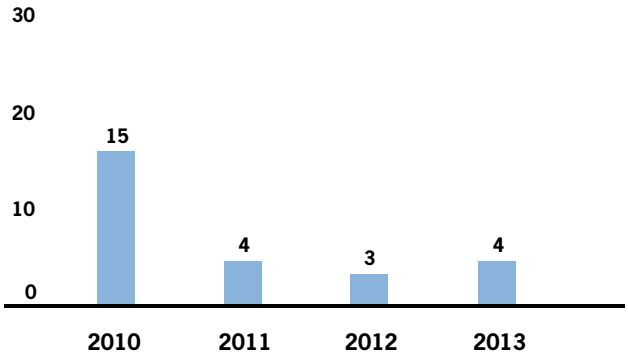


Chart 53 – General emergencies

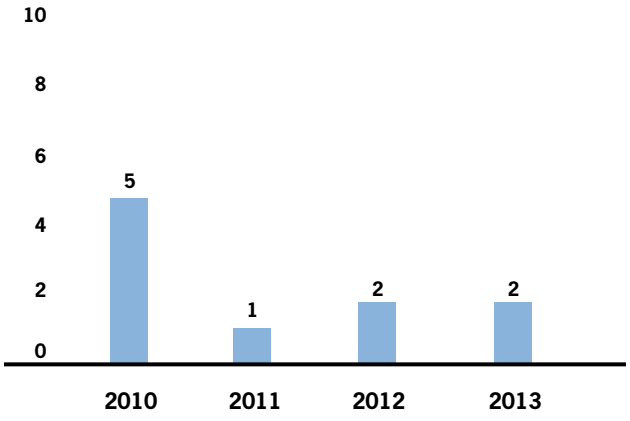


Chart 54 – Near accidents

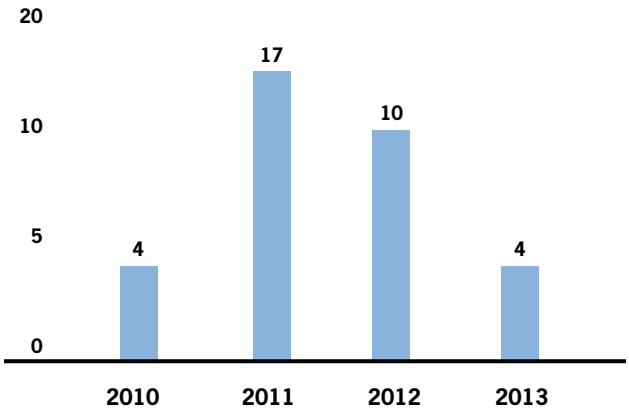


Table 43 – Shutdowns following an emergency

	2010	2011	2012	2013
Number of shutdowns	4	0	1	0
Number of days of shutdown	11	0	5	0

Chart 55 – Shutdowns

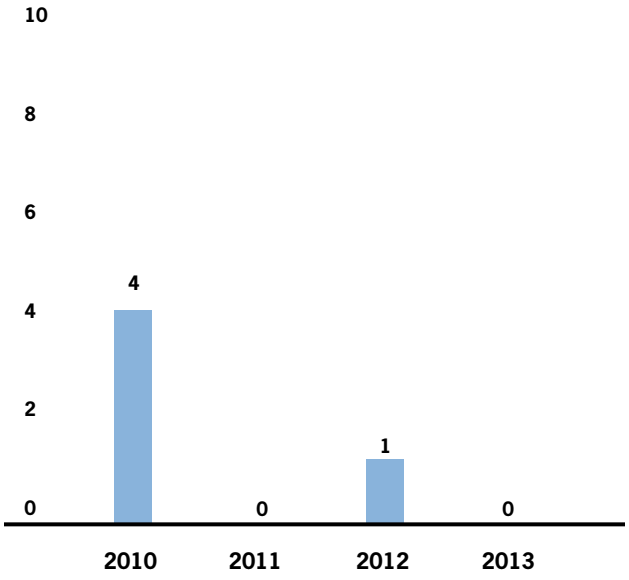
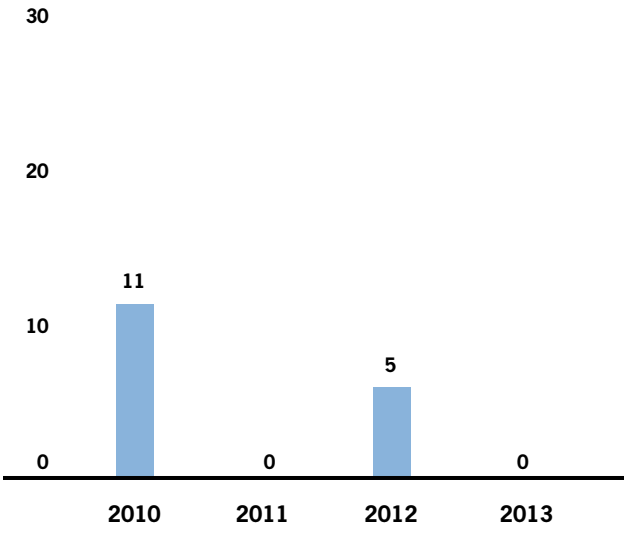


Chart 56 – Shutdown days



Investment in safety

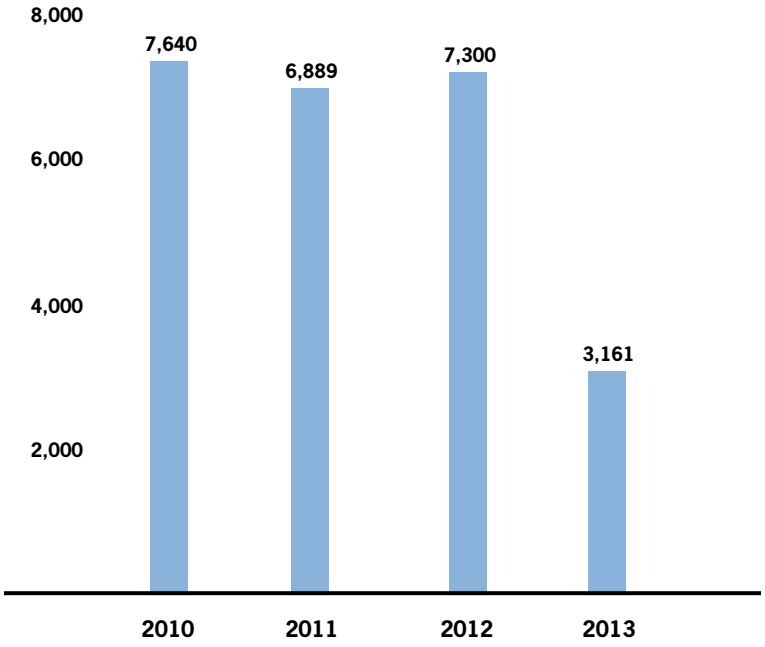
Between 2010 and 2013 Saras invested approximately EUR 25 million in projects and policies to continually improve safety levels at its site, spending on average around EUR 6.27 million a year. The main measures funded in 2013 involved both the improvement of existing safety equipment and modifications to plant and product handling systems, as follows:

- fitting of further product volume interception valves to the FCC plant
- the continued upgrading of the fire prevention system and new equipment
- continued upgrading of the fire and hydrocarbon detection systems
- the completion of the upgrade of the fire prevention systems at the facilities
- safety improvements within the tank containment basins

Table 44 – Investment in safety (EUR thousands/year)

	2010	2011	2012	2013
Investiments	7,640	6,889	7,300	3,161

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



Comparison of the Group's accident figures

The charts opposite show the results of the main accident indices for Group companies. Figures for the Sarlux site have already been provided.
None of the employees of Saras, Deposito di Arcola, Sardeolica or Sartec have reported any accidents entailing a loss of working days, either in the case of direct employees or the staff of external companies.
In 2010, the figures for Saras Energia, which operates in the Spanish oil products distribution market, were included. 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 2013 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 all accidents to both direct and indirect employees compared with the sum of hours worked by those employees. Staff at the Sarroch site and the staff of Saras Energia have a large effect on the Group figure, since the hours worked by direct staff account for 53% and 27% of the total respectively, while for the staff of subcontractors, the Sarroch site has the biggest effect on the data, with a percentage of 95.8%.

Sartec

Occupational health monitoring

Last year, monitoring and/or measurements taken to check employees' levels of exposure to the following risks to health and safety 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 results of the surveys all gave encouraging results; the monitoring showed that no threshold limits set by legislation or technical regulations were exceeded.

Health monitoring - Excerpt from 2013 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:

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

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 133 employees in 2013. 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 - 2013 Health Report

The health monitoring plan, drawn up by the competent doctor, provides for the following clinical and instrumental tests for all areas at the site, in relation to the risk assessment:

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

Chart 58 – Total frequency index

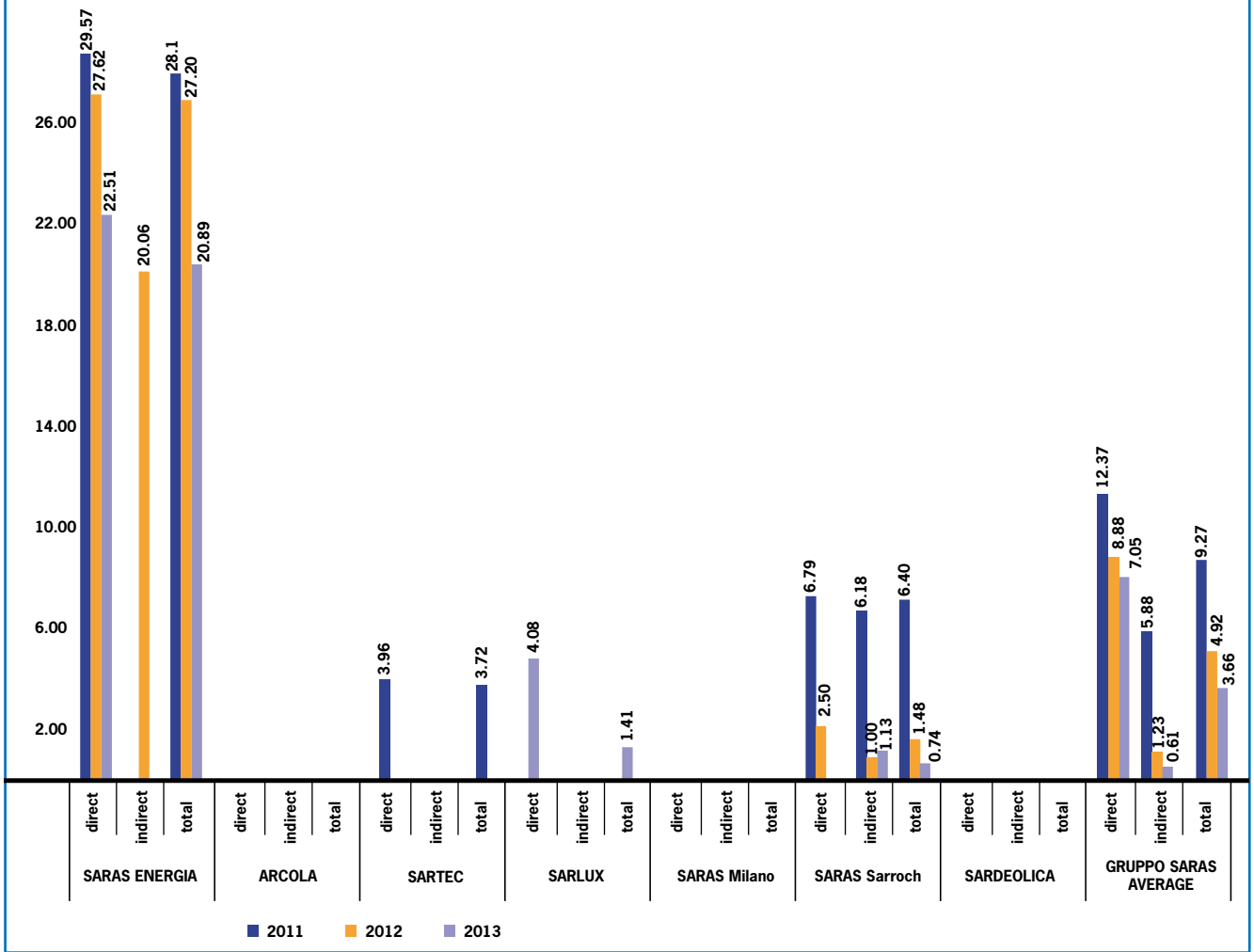


Chart 59 – Total accident frequency index

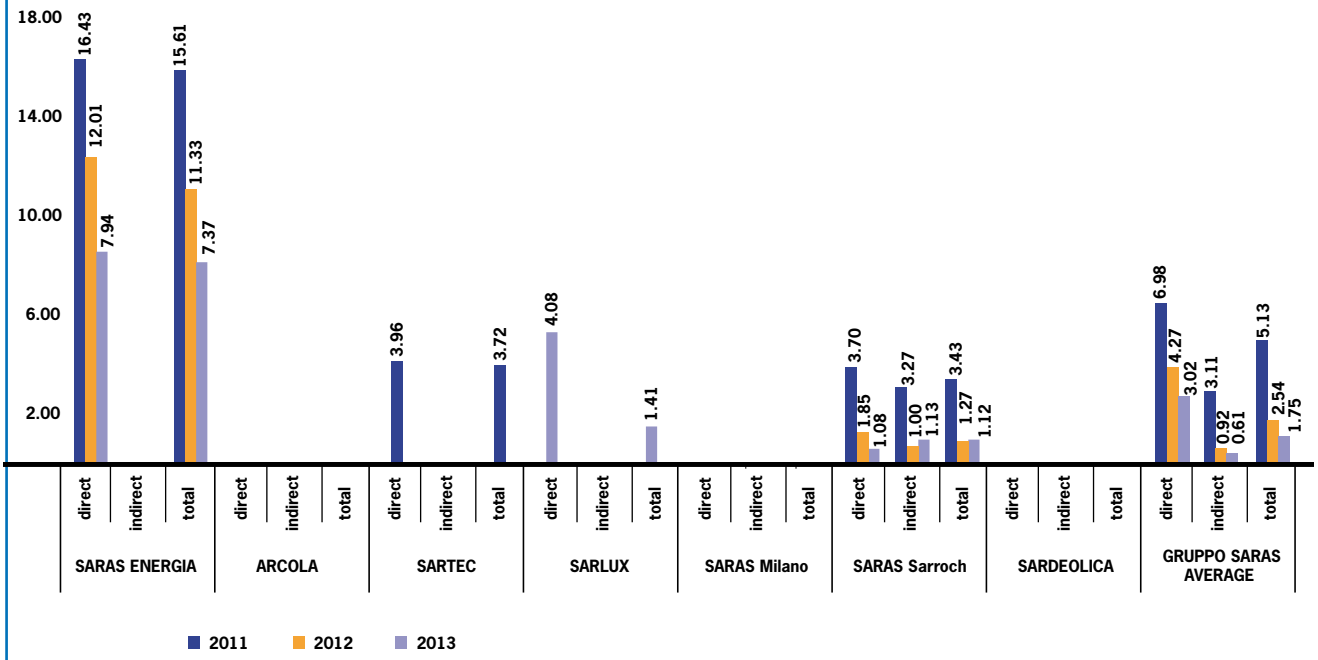
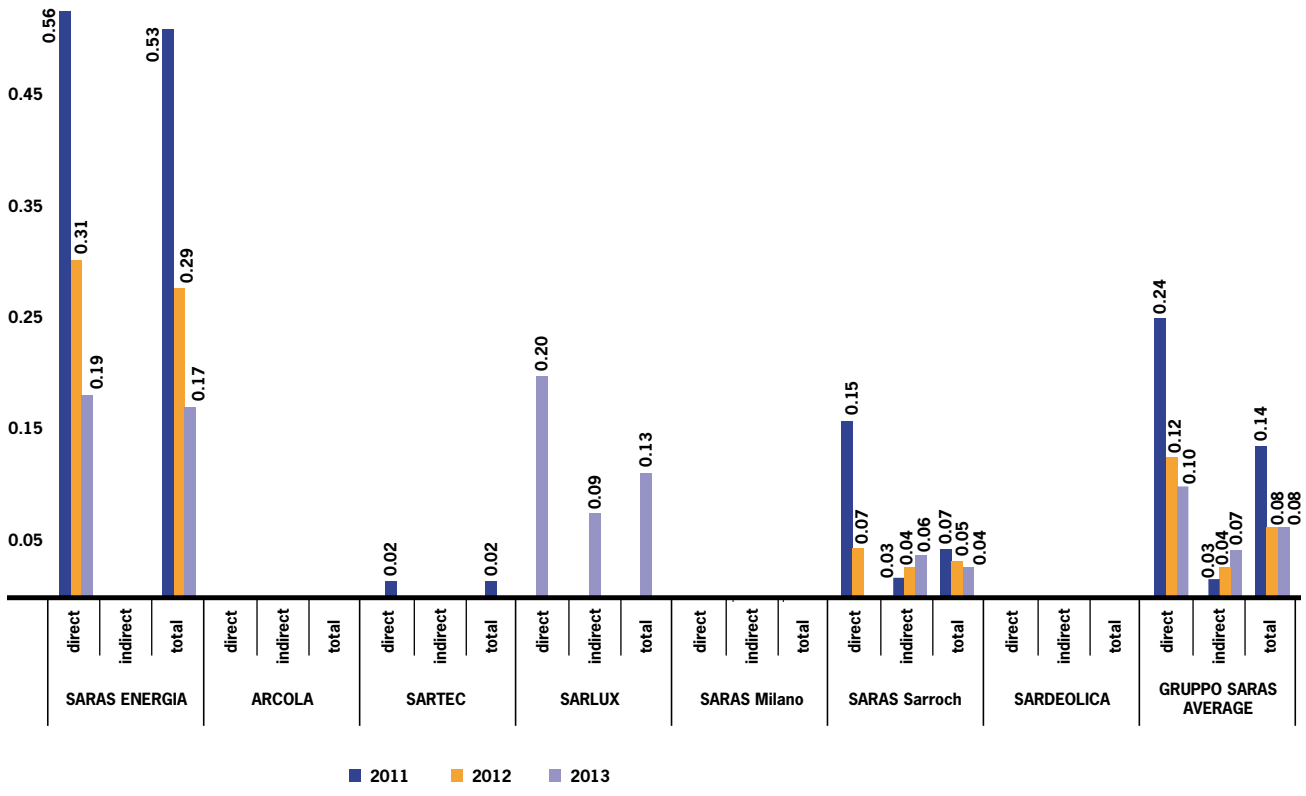


Chart 60 – Accident severity index



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

Chart 61 – Hours worked by direct employees

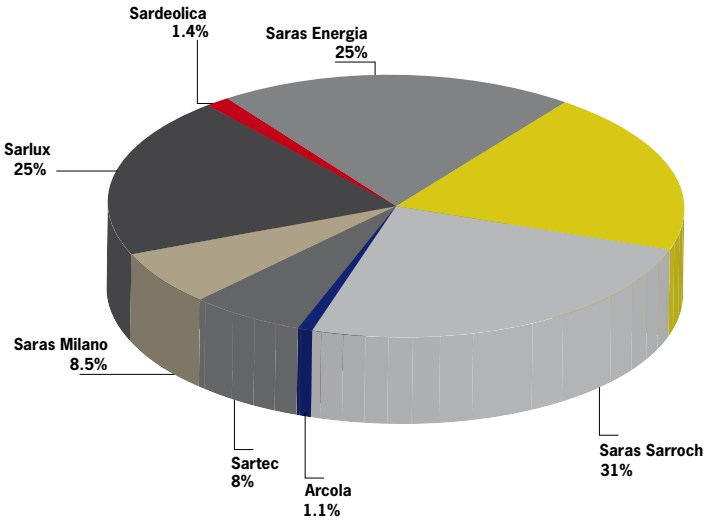


Chart 62 – Hours worked by contractors

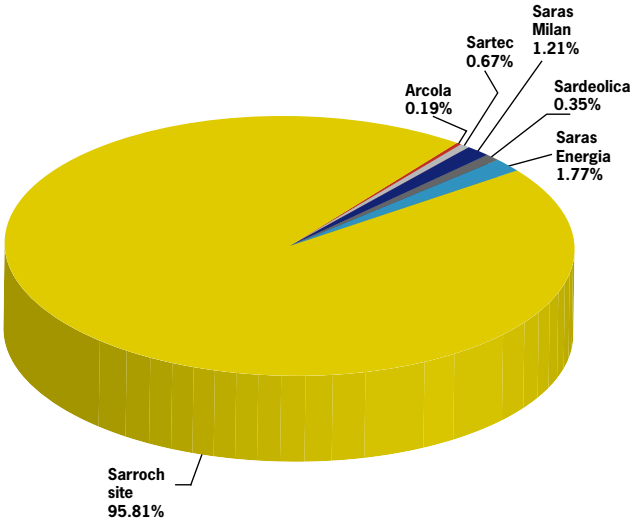
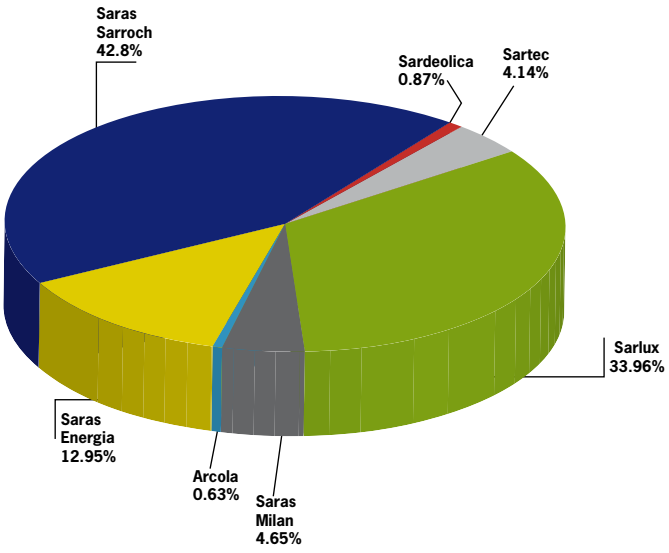


Chart 63 – Total hours worked



Glossary

Glossary

BALLAST WATER

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

RELIABILITY

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

AIA (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.

ARPAS (REGIONAL ENVIRONMENTAL PROTECTION AGENCIES)

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

AUDIT

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

GASOLINE

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

REMEDIATION

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

CO (CARBON MONOXIDE)

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

CO2 (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.

COD (Chemical Oxygen Demand)

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

COGENERATION

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

DESULPHURISATION

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

DISTILLATION

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

GREENHOUSE EFFECT

A gradual increase in average atmospheric temperature due to the increased concentration of gases in the atmosphere. Substances that contribute significantly to the greenhouse effect (greenhouse gases) include chlorofluorocarbons (CFCs), carbon dioxide (CO2), methane (CH4), nitrogen oxides (NO6) and sulphur hexafluoride (SF6).

EMAS (EcoManagement 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 (previously APAT).

EMISSION TRADING

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

EMISSION

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

EPER (European Pollutant Emission Register)

The European Pollutant Emission Register was set up by the European Commission with its decision of 17 July 2000 (2000/479/EC) in accordance with Article 15 of European Council Directive 96/61/EC on integrated pollution prevention and control (IPPC). 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 liability. The financial savings obtained are shared between the ESCO and the end-customer through various types of commercial agreement.

WHOLESALE

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

FILTER CAKE

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

DIESEL

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

IGCC (Integrated Gassification Combinated 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 from which it was emitted.

ENVIRONMENTAL IMPACT

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

CAM INDEX (CLASSIFICATION OF SEAWATER)

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

INAIL FREQUENCY INDEX

Calculated using the number of accidents reported by the company to the work accident compensation authority (INAIL) and the number of hours worked (calculated using the formula: number of accidents reported to INAIL x 106/hours worked).

TOTAL FREQUENCY INDEX

Calculated using the total number of events (accidents reported to INAIL and cases of medical treatment) and the number of hours worked (calculated using the formula: number of events x 10^{6}/ hours worked).

SEVERITY INDEX

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

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

The national 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 Environment Ministry for forwarding to the European Commission and inclusion in the EPER register.
È l'organizzazione internazionale non governativa, con sede a Ginevra, cui aderiscono gli organi normatori di circa 140 paesi e che ha il compito di studiare, redigere e divulgare

nella comunità internazionale il complesso delle norme riguardante essenzialmente la Gestione Ambientale (ISO 14000) e il Sistema Qualità (ISO 9000) relativi alle aziende di ogni settore.

IPPC (Integrated Pollution Prevention and Control)

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

ISO (International Organization for Standardization)

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

ISPRA (INSTITUTE FOR ENVIRONMENTAL PROTECTION AND RESEARCH)

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

KWH (KILOWATT-HOUR)

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

MW (Megawatt)

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

MWH (MEGAWATT-HOUR)

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

UNI CEI 11352:2010 REGULATION

The UNI CEI 11352 standard ("Energy management - Energy service companies (ESCos) - General requirements and checklist for verifying requirements" is the Italian standard that sets minimum requirements for companies wishing to perform the role of Energy Service Companies (ESCos). The standard outlines the minimum requirements for energy performance services and the capacity (organisational, diagnostic, planning, managerial, economic and financial) that the ESCo must possess to be able to offer these activities to its customers: is also provides a checklist for verifying ESCos' capacity.

NOX (NITROGEN OXIDES)

Gaseous compounds consisting of nitrogen and oxygen (NO, NO2, etc.), normally released during the combustion of fossil fuels when free nitrogen (N2) is oxidised. They are the main agents in the atmosphere responsible for photochemical smog and, after SO^2, the biggest cause of acid rain.

OHSAS (Occupational Health and Safety Assessment Series)

FUEL OIL

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 heavy fraction obtained in oil refining and used as a fuel, increasingly in a form with low sulphur content, in order to limit negative effects on the environment in terms of atmospheric emissions (chiefly SO^2 and particulates).

PM10

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

PPM (PARTS PER MILLION)

Particulates with a diameter of less than 10µm (1 µm = 1 millionth of a metre) can pass through the airways and penetrate the lungs, becoming a potential health hazard depending on the substances involved.

KYOTO PROTOCOL

Unit of measurement of the concentration of a substance present in small quantities in a liquid or gas, corresponding to parts per million.

An agreement approved by the Conference of Parties in Kyoto (1-10 December 1997), containing the initial decisions on the implementation of some of the 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.

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.

REFINING

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

YIELD

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

REVAMPING

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

MAJOR ACCIDENT HAZARD

MANAGEMENT SYSTEM

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

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

SO_2 (SULPHUR DIOXIDE)

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

TEE (TITOLI DI EFFICIENZA ENERGETICA, ENERGY EFFICIENCY CREDITS)

Energy efficiency credits (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, came into force in January 2005. They consist of credits that can be obtained and subsequently resold. Their value was originally fixed at 100 €/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.

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.

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