

Saras S.p.A.
Abstract of the Environmental Declaration
2008



This document, validated on 10 October 2008, is an Abstract of the 2008 Environmental Declaration by Saras SpA.

Validation

The 2008 Environmental Declaration and this Abstract were validated by:
Lloyd's Register Quality Assurance Italy Srl
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The complete version of the 2008 Environmental Declaration is available on the company website: www.saras.it

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Saras S.p.A.

Head office and production site: located at km 19 of National Route SS 195 "Sulcitana", Sarroch (CA), Sardinia, Italy

General management and administrative office: Galleria De Cristoforis, 8, Milano, Italy

NACE activity codes: 19.20 (Refinery) and 35.11 (IGCC)

IPPC activity codes: 1.2 (Refinery) and 1.1 (IGCC)

Presentation

Environment and production, two areas that were once incompatible, are now two sides of the same coin—inseparable values that are the hallmark of a quality company, and values which Saras has always accorded the same importance.

Caring for the environment and developing people add up to greater production efficiency, and therefore more value created.

The major investments we have made in innovating our systems—the results of expertise, technological assets and human resources matured over forty years of working in our sector—have always been made in full observance of these values.

In the early 1990s we were one of the first to carry out an environmental impact assessment, for a gasification plant for heavy hydrocarbons.

Over the following years this monitoring has been transformed into a systematic plan of dedicated activities.

Our deep commitment resulted in our obtaining ISO 14001 Environmental Certification in 2004.

For many years, and well before legislation on maritime traffic (which will come into effect only in 2010), Saras has favoured the use of double-hull vessels. Today over 95% of all ships that operate at the site are double-hulled vessels.

In early 2007 Saras submitted its application for integrated environmental authorisation, which addresses the base concepts of the Environmental Code in which all elements—air, water, soil, and visual impact—are considered together.

In the coming months, two new units will be coming on line: one of these will permit major reductions in SO₂ emissions, and the other will allow full production of petrol in observance of the latest European environmental legislation, which came into force on 1 January 2009.

To this program, which is aimed at reconciling economic results, industrial development and environmental sustainability, is now added the objective of obtaining EMAS Registration, which requires the direct involvement of the community and which Saras is certain will represent a further stimulus to achieve levels of excellence.

The Environmental Declaration is the tangible demonstration of Saras's willingness to pursue transparent relations with the community, local authorities, suppliers, customers and, especially, with the workers at the site. It is a tool that collects information and data to give a complete and detailed picture of our company, allowing us to continuously improve the internal and external sharing of our development objectives.

Sarroch, 27 June 2008

General Management
Dario Scaffardi

1. The Company

Saras Group

Saras Group operates in the energy sector and is one of the principal independent European oil refining companies. At the end of 2007, the Group had around 1,900 employees, of which 1,250 in the parent company Saras S.p.A., which is the subject of EMAS Registration. With its head office and production site in Sarroch (where 1,050 are employed) and its administrative and financial office in Milan (200 employees), Saras is the most important employer in Sardinia with over 7,000 jobs being supported by its economic impact.

The Sarroch site

Saras's Sarroch site, located to the southwest of Sardinia's capital, Cagliari, around 20 km from the city, hosts one of the biggest refineries in the Mediterranean in terms of production capacity.

[refining]

With a refining capacity of 15 million tonnes a year, the Saras refinery covers 15% of the total distillation capacity in Italy. The refining cycle is integrated with the IGCC (Integrated Gasification Combined Cycle) plant, used to generate electricity.

[production of electricity]

The Saras site is located in the industrial estate developed in the Sarroch area (Figure 1) in the 1960s. Around the big industrial names in this estate – like Saras, Polimeri Europa, Sasol Italy, Air Liquide, and Liquigas – over the years many small and medium enterprises in related industries have grown up. Saras maintains industrial exchange relationships with all of these factories.



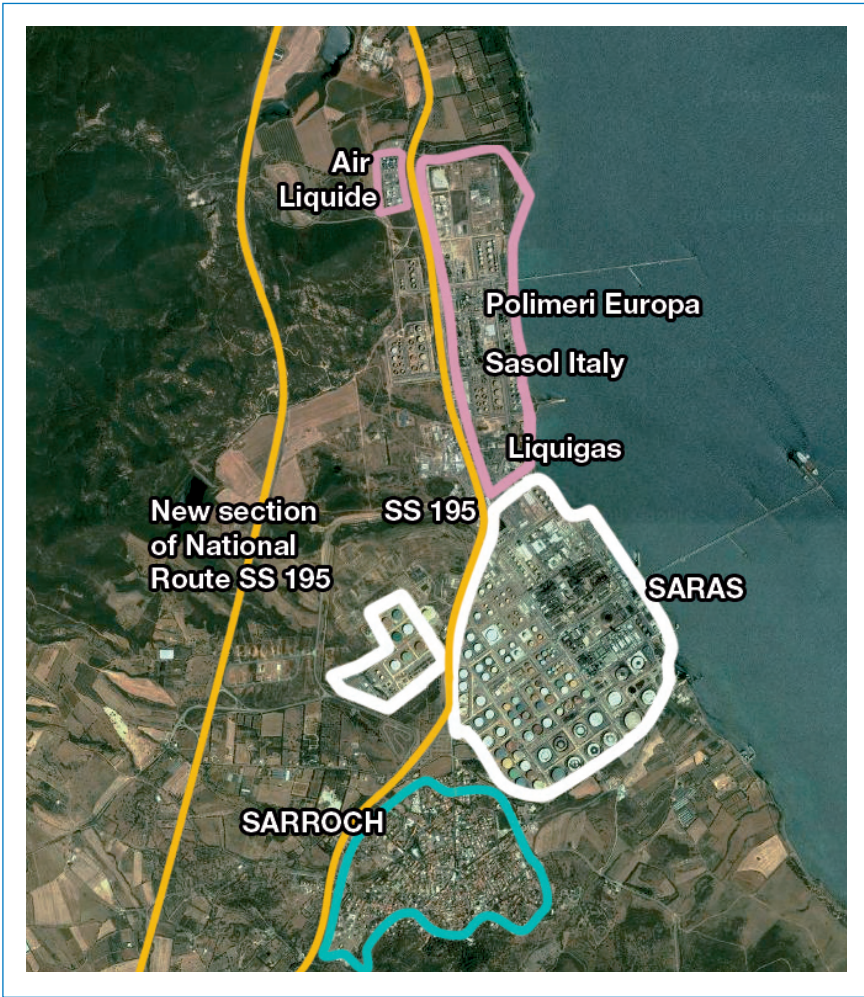


FIGURE 1. The Saras production site and the surrounding region



2. Commitment to the environment and regional communication

The Environmental Policy

The drawing up and public distribution of the Environmental Declaration is part of the process of continually improving our environmental management, which was begun by Saras many years ago.

In June 2004 Saras obtained certification of its Environmental Management System to the ISO 14001:1996 standard, and later, in May 2006, to the reference ISO 14001:2004 standard. In May 2008 the reviewed Environmental Policy was issued (Figure 2), and distributed to all direct employees and contracting firms working at the site.

Investments to protect the environment

Saras has made and is planning to make major investments in projects to improve environmental performance.

As can be seen in the following table, environmental investments almost quadrupled from 2004 to 2007.

TABLE 1 Investments in improving environmental protection

Parameter	2004	2005	2006	2007
thousands of €/year	2,840	8,682	12,250	11,320

The various types of interventions planned for the 2008-2012 period are described in Chapter 5 on page 26.

Communication with the general public

The general public and local communities, authorities, schools, universities, customers and suppliers: for each of these stakeholders, Saras has for some time conducted a series of activities aimed at reinforcing information about the actions taken in line with its environmental commitment.

For the past ten years, the Saras School Project – aimed at children in their final year of primary school in Sarroch and in other nearby municipalities – has been an opportunity to both to work with and get feedback from local educational institutions. It is also an opportunity for dialogue with the children and their families, to give information of interest and to offer the students further opportunities to discuss and find out about energy, the environment, and industrial and professional life at the Saras site. Other important opportunities include site visits by secondary schools, where students can meet and talk to Saras technicians directly, making these visits reciprocal opportunities for discovery and awareness.

In October 2007 the “Open Refinery” event represented an important step in Saras's programme of meeting and dialogue with the local community. For the first time ever, the company opened its doors to the public. Over two days, around 4,000 people took

Saras S.p.A.



SARAS'S ENVIRONMENTAL POLICY

Saras considers respect for and protection of the environment to be of primary importance in achieving its development objectives and for an appropriate integration of its activities in the area where it operates.

The criteria underlying the management of Saras's activities include the preventive assessment of the possible environmental consequences of new activities and products, the adoption of the reference principles, standards and solutions indicated in the "BREF for refining" (Best Available Techniques Reference documents, a document drawn up to apply the 61/96/EC IPPC Directive: Integrated Pollution Prevention and Control), the utmost transparency and cooperation with the general public and with the authorities, and the involvement and accountability of its personnel and of all those who access the site on the subject of environmental protection.

Through the introduction and maintenance of the Environmental Management System applied to the refining and electricity production activities at the Sarroch Refinery, SARAS aims to guarantee the efficient and proper management of the systems and activities conducted on site and to achieve, over and above the due observance of current legislation and the other regulations subscribed to by the company, the twin objectives of continuously improving environmental performance and preventing pollution.

Specifically, Saras commits to:

- Pursue the reduction of atmospheric emissions, to ensure minimum impact on air quality
- Pursue the prevention of sea pollution, by acting on seagoing transport vessels and on the waste water treatment system
- Minimise the use of fresh water from external sources
- Improve the waste management cycle, by favouring recovery
- Develop its own monitoring system for emissions and for environmental quality
- Improve accessibility and usability of the data found and of the studies conducted
- Mitigate the impacts deriving from company activities that can be perceived by the surrounding community.

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

Every person in Saras is directly responsible for putting the environmental policy into practice when carrying out their activities, and conduct consistent with these issues is one of the objectives at both an individual and group level.

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

Saras is committed to promoting its environmental policy and to requiring its application by contracting firms, suppliers and any other person who works on behalf of the organisation, and to this end the company provides training and information. The responsibility, conduct and attitudes to environmental aspects of the abovementioned parties are significant elements in judging the quality of performance, and the parties must also set up adequate training and information on these issues.

Saras undertakes to ensure provision of the human and technical resources necessary to achieve and maintain the environmental policy at the Sarroch site.

Sarroch, 23 May 2008

Saras S.p.A.
The General Manager

FIGURE 2. Saras Environmental Policy

guided tours of the plant and systems. Members of the public could avail of specially created areas to find out more about what goes on at the site, with separate programmes designed for adults and children. Saras personnel were on hand to answer visitors' questions and explain what the Group does.

Of the recent initiatives for communication in the region, the following are of note:

- Participation in meetings with the general public and with local associations, organised by the Municipality of Sarroch (started July 2008)
- Publication in local newspapers of information about the environmental improvement programmes in progress and planned (July 2008)
- Organisation of the second "Open Refinery" event for the general public (24 – 26 October 2008).

Communication and cooperation with public institutions

To share information with and get feedback from communities in the area, meetings are held with the municipal administrations, with environmental associations and with other institutions and associations interested in what Saras is doing in terms of the environment. Specific meetings are planned for associations in the Municipalities of Sarroch, Villa San Pietro, Pula, and Capoterra and for schools.

There is constant, frequent exchange of information and communications between Saras and the Municipality of Sarroch, and some of this is through periodic meetings on topics of mutual interest: protection of the environment, safety, and regional development. There is also frequent contact with other institutions (the Province of Cagliari and the Region of Sardinia).

Initiatives regarding the recent epidemiological study

In 2006 the Municipality of Sarroch carried out an epidemiological study of the state of health of the resident population in the municipality, and concentrating specifically on the child population aged under 14.

The results of the study were released at the meeting titled "Sarroch Environment and Health: the Results", held by the Municipality of Sarroch on 9 May 2008. At the same time as the study results were published, the Municipal Administration drew up a number of guidelines for sustainable development, aimed at the industrial companies in its jurisdiction.

The proposal of the Municipality, shared with the Regional and Provincial authorities and by the Sardinia ARPA, can be summed up in the following principal lines:

- Take actions to ensure lower environmental emissions
- Put in place better controls of levels of environmental pollution

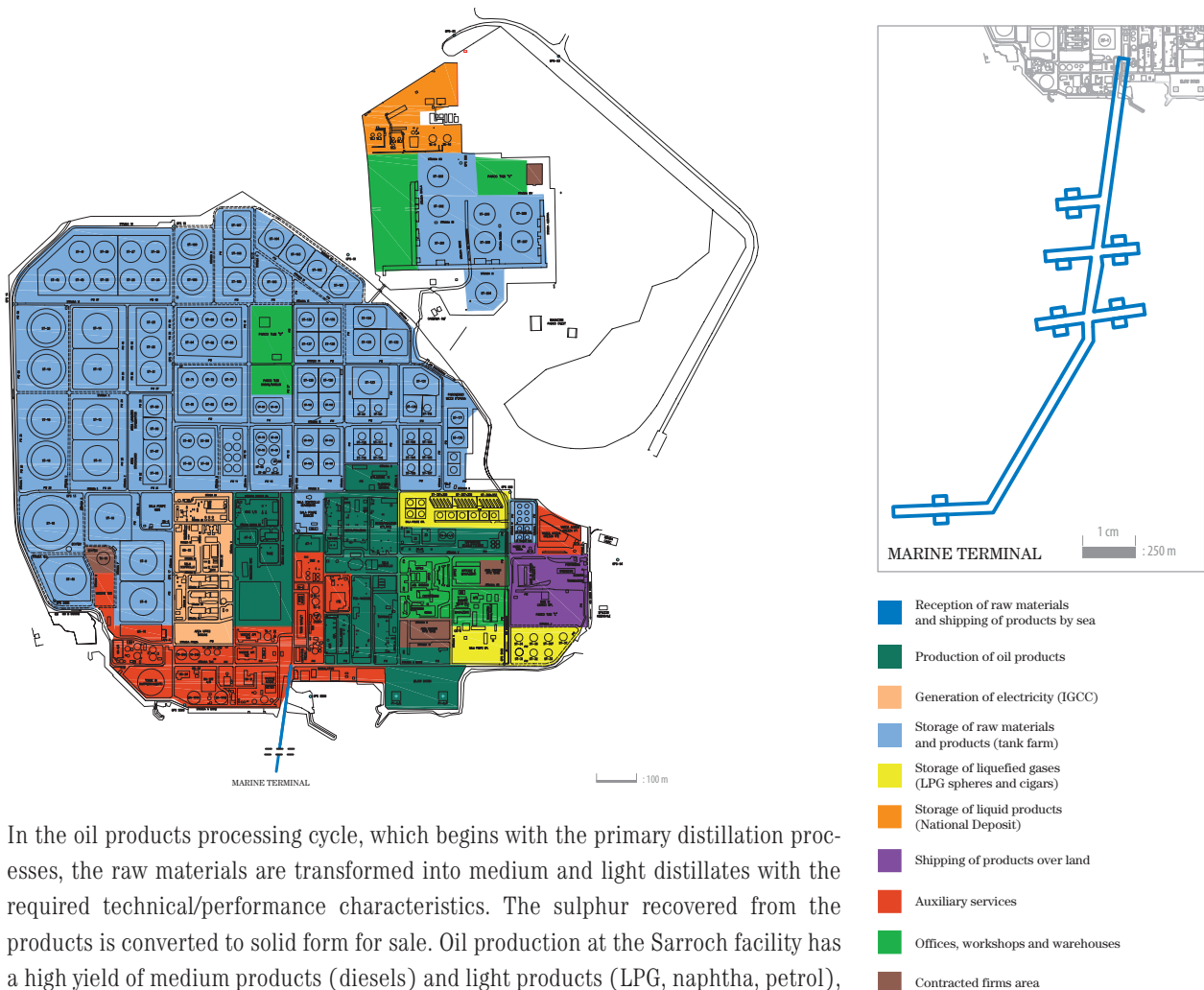
Returning to the epidemiological study, Saras followed the development of activities from the beginning of the project and participated proactively in the called by the Authorities. In particular, in the period April – June 2008, many initiatives were conducted: meetings with representatives of the Municipality of Sarroch, the neighbouring Municipalities, the Province and the Region, and with technicians from the control bodies and with the general public. At these meetings Saras presented its plans for environmental improvement, which are targeted at reducing emissions into the atmosphere, improving the monitoring systems, and preventing episodes where air quality alarm thresholds are exceeded (these can be detected by the sensors in the public monitoring network). For more information see the first seven planned interventions of those listed in Chapter 5 on page 26.

3.

Saras's production activities in Sarroch

With reference to figure 3, the activities conducted by Saras at the Sarroch site can be functionally divided as follows:

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



In the oil products processing cycle, which begins with the primary distillation processes, the raw materials are transformed into medium and light distillates with the required technical/performance characteristics. The sulphur recovered from the products is converted to solid form for sale. Oil production at the Sarroch facility has a high yield of medium products (diesels) and light products (LPG, naphtha, petrol),

which in 2007 represented overall around 80% of total production, as shown in table 2 which gives the production figures for the four-year period, 2004 – 2007.

TABLE 2 Oil products (t/year)

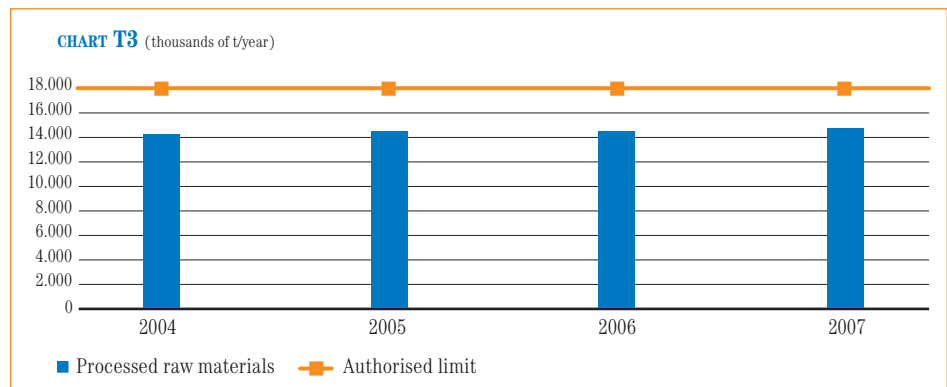
	2004	2005	2006	2007
LPG	360,000	363,000	341,000	323,000
Petrol	2,890,000	3,036,000	2,945,000	3,110,000
Virgin Naphtha	789,000	873,000	936,000	916,000
Kerosene	290,000	449,000	388,000	467,000
Diesel	6,174,000	6,423,000	6,713,000	6,813,000
Fuel oil	1,567,000	1,149,000	1,033,000	788,000
Sulphu*	114,000	106,000	111,000	112,000
Heavy hydrocarbons in IGCC	1,250,769	1,172,874	1,217,391	1,190,195

* Includes recovered sulphur, both from refining and from the IGCC.

Chart T3 shows the trend in annual production compared with the maximum authorised quantity (18 million tonnes/year) specified by the Concession to Process Mineral Oils for the refinery (Decree of Italian Ministry for Productive Activities no. 17086 of 7/07/2003).

TABLE 3 Processed raw materials (thousands of t/year)

	2004	2005	2006	2007
	14.113	14.423	14.515	14.593



The IGCC (Integrated Gasification Combined Cycle) plant produces electricity, hydrogen, steam and sulphur from the heavy hydrocarbons deriving from the refining process.

The IGCC production data are given in the following table:

TABLE 4 IGCC Products

	2004	2005	2006	2007
Electricity (kWh)	4,372,651,530	4,363,035,390	4,473,702,675	4,432,135,634
Low-pressure steam (t/year)	586,864	590,262	608,042	556,828
Medium-pressure steam (t/year)	623,804	702,237	677,703	568,650
Hydrogen (kNm ³)	300,596	285,652	360,220	307,083
Sulphur* (t/year)	46,892	53,821	48,184	42,589

* The quantity shown is included in the amount given in Table 2 above, "Oil products"

The electricity produced by the IGCC is sold, and the steam and hydrogen are used in the refining cycle.

4. The most significant environmental aspects

Atmospheric emissions

DATA ON THE EMISSIONS

The area of the Saras site where the atmospheric emissions-producing smoke stacks are located is shown in figure 4.

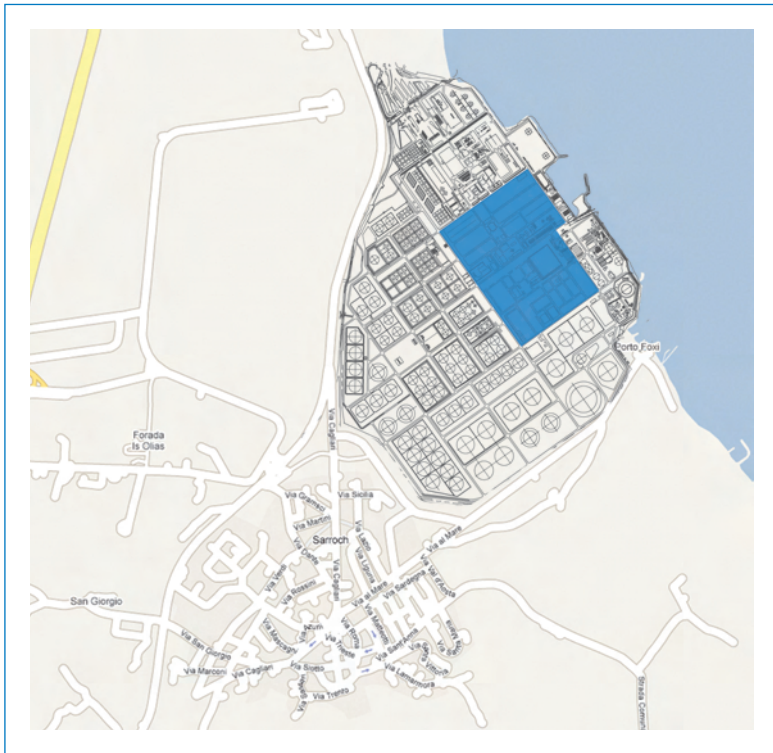


FIGURE 4. The Saras production site and the area where the smoke stacks are located

The main pollutants present in the atmospheric emissions from the site which can have effects on the air quality in the surrounding area are the following:

- Sulphur dioxide (SO₂)
- Dusts
- Nitrogen oxides (NO_x)
- Carbon monoxide (CO).

Below is the data for emissions of the pollutants listed above, in the period 2004 – 2007, compared with the authorised limits.

The trend of reduction in SO₂ is confirmed. This has been apparent for several years, and the best result recorded was in 2007. This result is all the more significant because

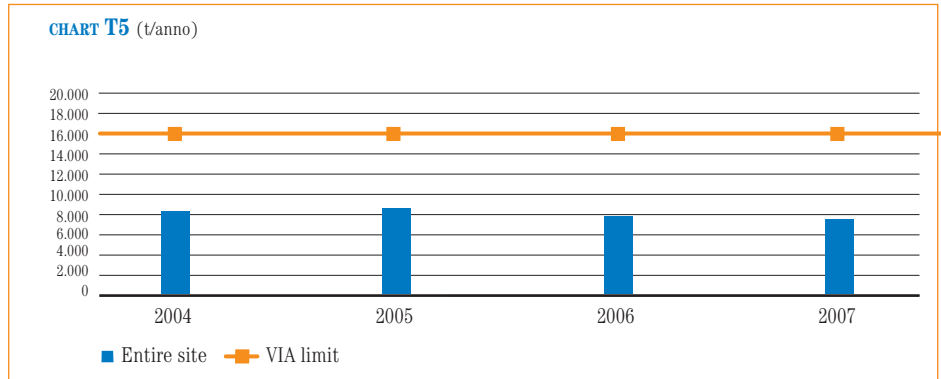
[Sulphur dioxide, SO₂]

it was obtained despite an increase in the refinery's annual production, as can be seen from the data shown in table 3 on page 8.

TABLE 5 SO₂ emissions from the site*

Parameter	2004	2005	2006	2007
t/year	8,182	8,497	7,794	7,393

* Compared to the limit of 16,000 t/year, established by DEC/VIA/2025 of 28/12/94 following the environmental impact assessment of the planned construction of the IGCC.



A further reduction (of around 30%) in SO₂ emissions from the site is expected with the commissioning of the new treatment unit for gases coming from the refinery's sulphur recovery plant, known as "tail gases" (intervention no. 1 on the list in Chapter 5 on page 26).

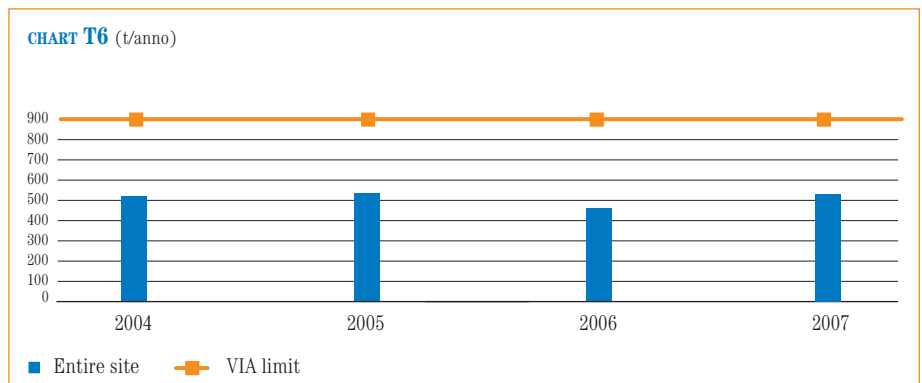
[Dusts]

The amount of dust contained in the emissions from the smoke stacks (see table and chart 6) has always been much lower than the authorised limit value. The increase in 2007 over 2006 values was due to the adoption of a different method of determining dust emissions: because the dust analysis system installed on the refinery's central smoke stack was out of service, the 2007 emissions were determined mainly through calculation, and conservative criteria were adopted.

TABLE 6 Dust emissions from the site*

Parameter	2004	2005	2006	2007
t/year	517	533	456	529

*Compared to the limit of 900 t/year, established by DEC/VIA/2025 of 28/12/94 following the environmental impact assessment of the planned construction of the IGCC.



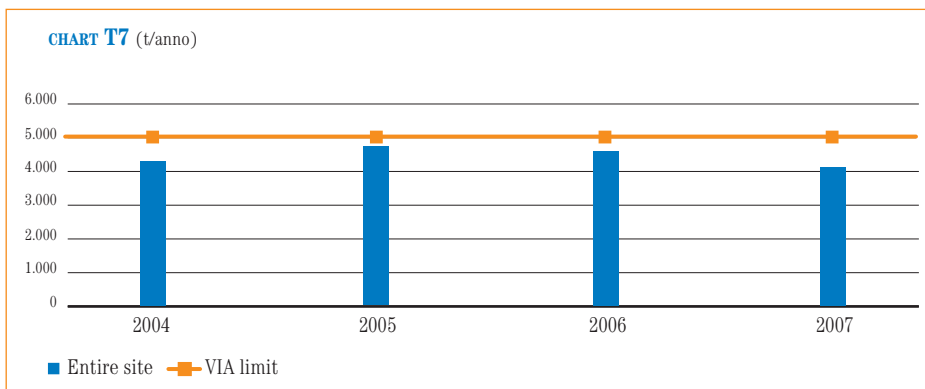
In 2007 nitrogen oxides, as can be seen from the following table, showed a level of emissions lower than those in previous years. The improvement is due to the installation of low-NO_x-producing burners in the furnaces of the Topping RT2 and Visbreaking plants.

[Nitrogen oxides, NO_x]

TABLE 7 Nitrogen oxides emissions from the site*

	2004	2005	2006	2007
t/year	4,430	4,899	4,781	4,164

*Limit value of 5,000 t/year, established by DEC/VIA/2025 of 28/12/94 following the environmental impact assessment of the planned construction of the IGCC.



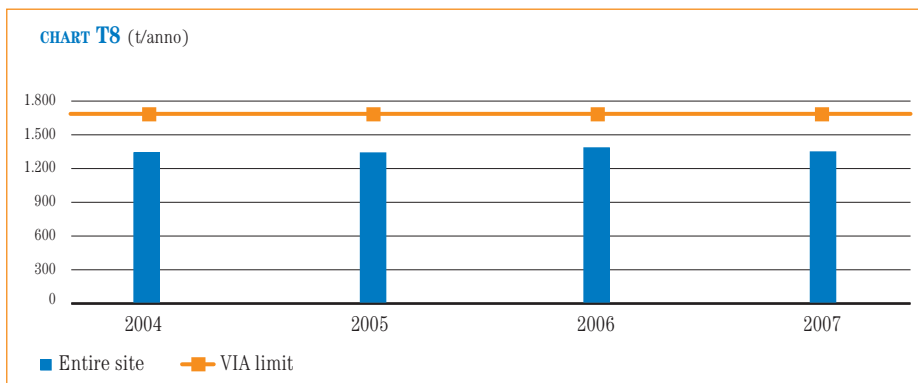
Carbon monoxide, as can be seen from the data given in the following table, show emission values that have remained substantially stable over time.

[Carbon monoxide, CO]

TABLE 8 Carbon monoxide emissions from the site*

	2004	2005	2006	2007
t/year	1,325	1,324	1,369	1,333

*Limit value of 1,700 t/year, established by DEC/VIA/2025 of 28/12/94 following the environmental impact assessment of the planned construction of the IGCC.



[non-ducted emissions]

The data for emissions that cannot be ducted to the smoke stacks for technical reasons, and which mainly derive from the storage of raw materials and products, the treatment of waste water, and small-scale physiological emissions from sealing components i.e. valves and flanges, are contained in table 9.

TABLE 9 Non-ducted emissions of Volatile Organic Compounds from the site*

Parameter	2004	2005	2006	2007
t/year	1,895	1,960	1,910	1,908

*Light hydrocarbons which can evaporate in the environmental and process conditions present.

Although the amount of raw materials processed has increased, non-ducted emissions have been contained and this is due to lower emissions from storage and lower quantities of waste water sent to the wastewater treatment plant.

Data on air quality in the Sarroch area

The sensors of the public network are located in the positions shown in figure 5.

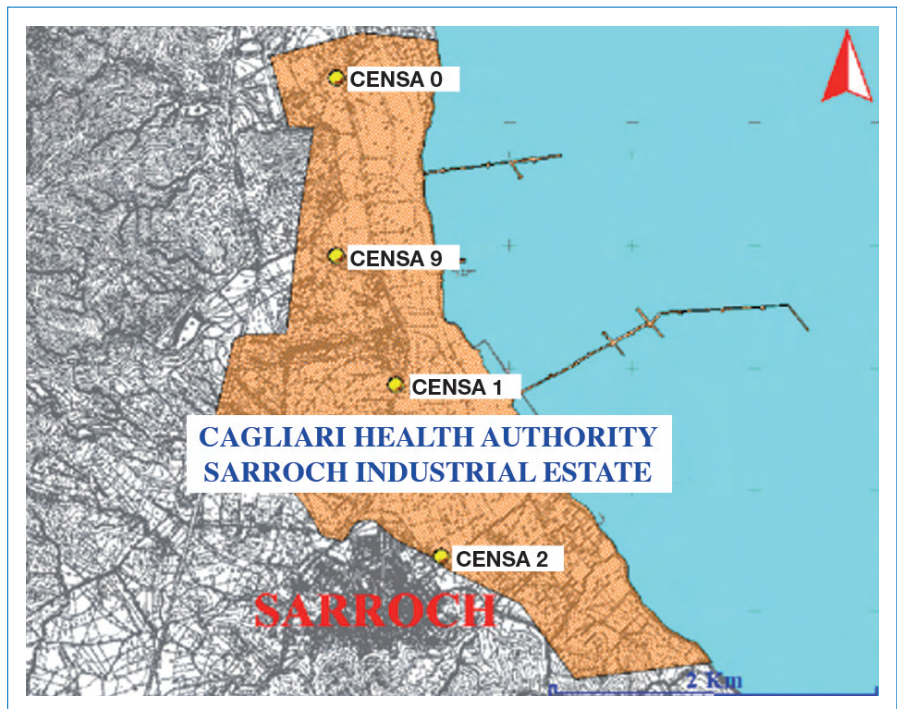


FIGURE 5 Map of the locations of the air quality monitoring sensors of the public network.

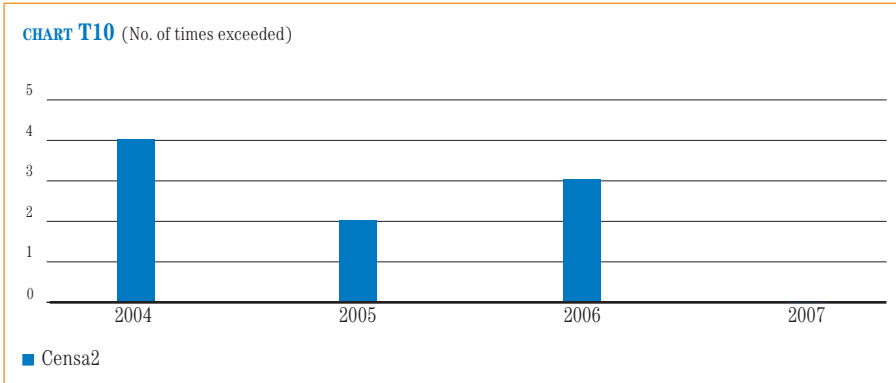
[SO₂]

Turning to the levels of SO₂, the report issued by the Province of Cagliari shows an improved trend in 2007 compared to those of previous years, as can be seen from the tables and charts given below. In 2007 the situation measured by CENSA2 conformed to legal requirements, did not exceed the alarm thresholds, and the numbers of times the hourly and daily limits for protecting human health were exceeded were lower than those permitted by law.

TABLE 10 SO₂: measurements of the provincial network – no. of days the alarm threshold was exceeded

Sensor	2004	2005	2006	2007
CENSA0	0	0	0	0
CENSA1	0	0	2	0
CENSA2	4	2	3	0
CENSA9	0	0	0	0
Limit value*	500 µg/m ³ not to be exceeded for 3 consecutive hours			

*Limit value specified by Italian Ministerial Decree no. 60/2002

**TABLE 11** SO₂: measurements of the provincial network - no. of times hourly limit for protecting human health was exceeded

Sensor	2004	2005	2006	2007
CENSA0	0	1	1	6
CENSA1	4	2	17	0
CENSA2	133	126	55	21
CENSA9	0	1	0	0
Limit value *	350 µg/m ³ not to be exceeded more than 24 times in a calendar year			

* Limit value specified by Italian Ministerial Decree no. 60/2002 from 2005 onwards. In 2004 the threshold not to be exceeded was 380 µg/m³

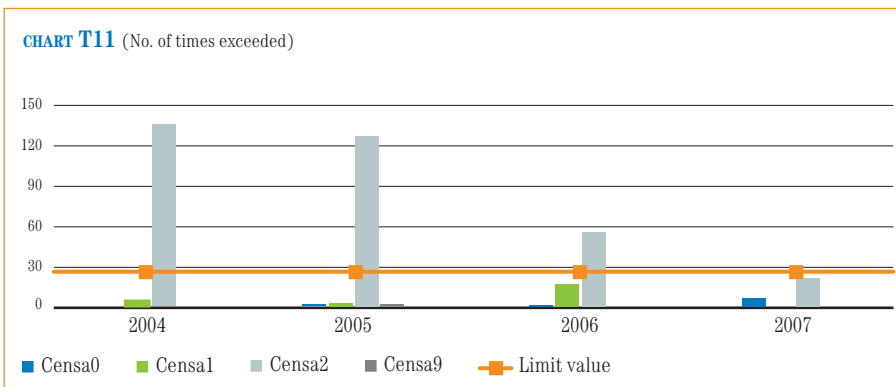


TABLE 12 SO₂: Concentration values measured by the provincial network
no. of times daily limit for protecting human health was exceeded

Sensor	2004	2005	2006	2007
CENSA0	0	0	0	1
CENSA1	0	0	2	0
CENSA2	9	11	7	2
CENSA9	0	0	0	0
Limit value*	125 µg/m ³ not to be exceeded more than 3 times in a calendar year			

*Limit value specified by Italian Ministerial Decree no. 60/2002

CHART T12 (No. of times exceeded)

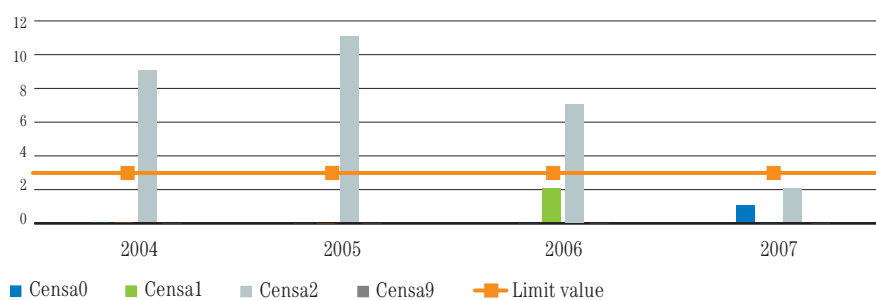
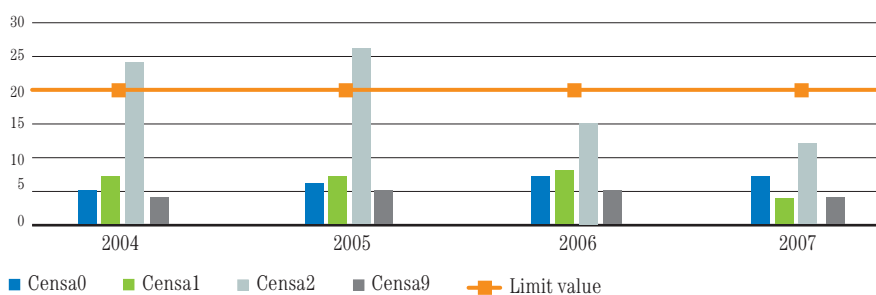


TABLE 13 SO₂: Concentration values measured by the provincial network – Average annual concentration

Sensor	2004	2005	2006	2007
CENSA0 (µg/m ³)	5	6	7	7
CENSA1 (µg/m ³)	7	7	8	4
CENSA2 (µg/m ³)	24	26	15	12
CENSA9 (µg/m ³)	4	5	5	4
Limit value*	20 µg/m ³ limit for protection of ecosystems			

*Limit value specified by Italian Ministerial Decree no. 60/2002

CHART T13 (µg/m³)



For PM10 (small dust particles, of diameter less than 10 micrometres), no violation of the legal limits was found in the 2006 – 2007 period. The number of times the hourly limit value for protecting human health was exceeded and the annual average concentration values of PM10 are given in tables 14 and 15.

[PM10]

TABLE 14 PM10: Concentration values measured by the provincial network (no. of times hourly limit value for protecting human health was exceeded)

Sensor	2004	2005	2006	2007
CENSA0	---	4	4	12
CENSA1	---	5	10	8
CENSA2	30	15	20	21
CENSA9	---	55	---	0
Limit value*	50 µg/m ³ not to be exceeded more than 35 times in a calendar year			

*Limit value specified by Italian Ministerial Decree no. 60/2002; --- : data not available

CHART T14 (No. of times exceeded)

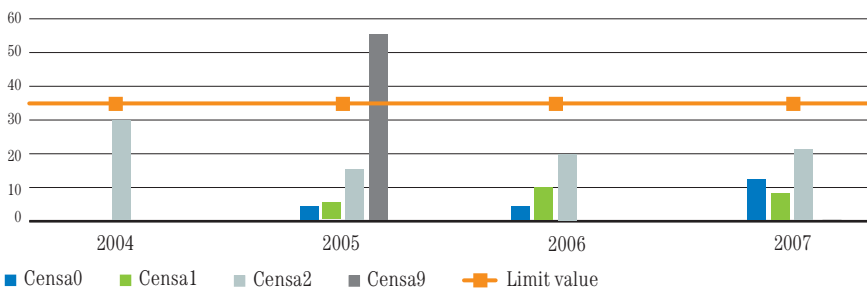
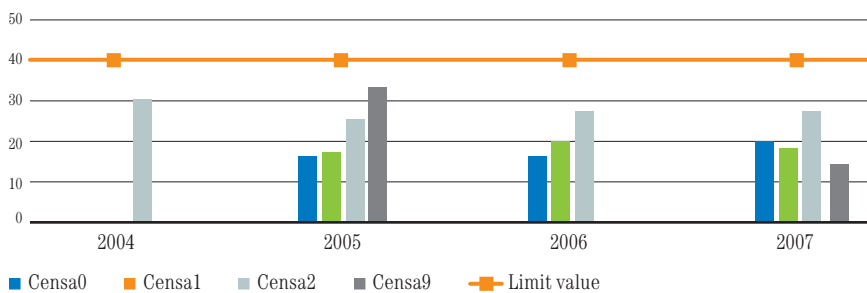


TABLE 15 PM10: Concentration values measured by the provincial network Average annual concentration

Sensor	2004	2005	2006	2007
CENSA0 (µg/m ³)	---	16	16	20
CENSA1 (µg/m ³)	---	17	20	18
CENSA2 (µg/m ³)	30	25	27	27
CENSA9 (µg/m ³)	---	33	---	14
Limit value*	40 µg/m ³ limit for protection of ecosystems			

*Limit value specified by Italian Ministerial Decree no. 60/2002; --- : data not available

CHART T15 (µg/m³)



[other pollutants]

No limits were exceeded for other pollutants measured by the public network, with the exception of ozone. The report issued by the Province of Cagliari emphasises that the problems relating to the presence of ozone can only be tackled on a vast scale, since this pollutant is known to travel over long distances.

Use of water resources and emissions into the sea

DATA ON THE USE OF WATER RESOURCES

The principal types of water resources used are the following:

- Seawater, treated by dedicated desalination units
- Fresh water, supplied by the industrial aqueduct, which is fed by the Flumendosa river reservoirs
- Water recovered by the wastewater purification system (water previously filtered)

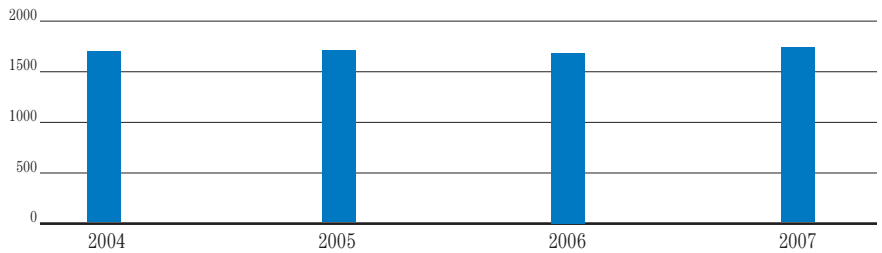
In the four-year period 2004 – 2007, the percentage contribution of desalinated water and recovered internal water in meeting the site’s water requirements reached levels that varied from 60% to 70%.

The site’s water withdrawals are given in table 16 and charts T16A and T16B, in absolute terms and in relative terms, i.e. compared with the raw materials processed.

TABLE 16 Site water requirements – absolute values and specific values

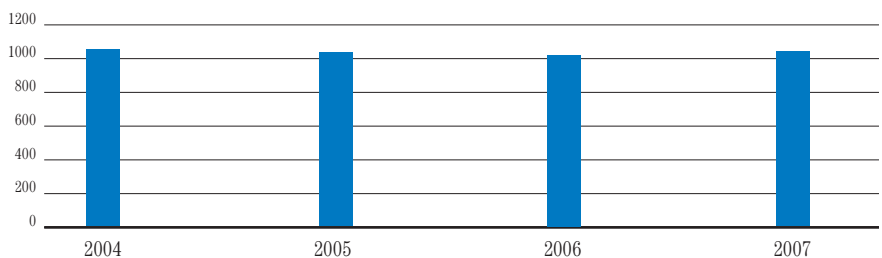
Parameter	2004	2005	2006	2007
Site water requirements - average flows (m ³ /hour)	1,686	1,697	1,682	1,727
Site water requirements/raw materials processed (m ³ /thousands of tonnes)	1,047	1,031	1,015	1,037

CHART T16A (m³/hour)



■ Site water needs

CHART T16B (m³/thousands of tonnes raw materials)



■ Site water needs/raw materials processed

For cooling the IGCC equipment, a closed-circuit seawater system has been installed which is equipped with a cooling tower.

DATA ON EMISSIONS INTO THE SEA

There are water treatment systems on the site to treat the water before it is discharged into the sea. The discharge points into the sea are located in the area shown in figure 6.



FIGURE 6. The Saras production site and the area where the sea discharge points are located

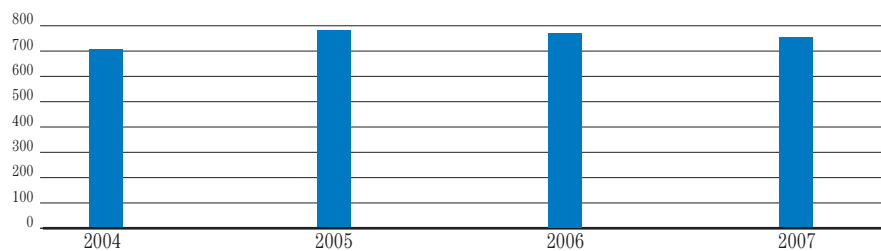


The most representative parameters of emissions into the sea from the wastewater treatment plants on the Saras site are: the flow of water discharged, the total hydrocarbons, and the Chemical Oxygen Demand (COD). The data for the four year period 2004 – 2007 are given below.

TABLE 17 Discharges from wastewater treatment units – Average flow

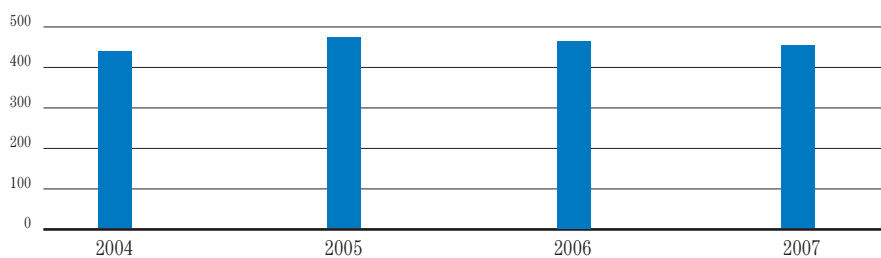
Parameter	2004	2005	2006	2007
Total water discharged – average annual flow (m ³ /hour)	703	776	767	750
Total water discharged/raw materials processed (m ³ /thousands of tonnes)	436	471	463	450

CHART T17A (m³/hour)



■ Total water discharged by wastewater treatment units

CHART T17B (m³/thousands of tonnes raw materials)



■ Total water discharged/raw materials processed

[flow]
[total hydrocarbons]

[COD]

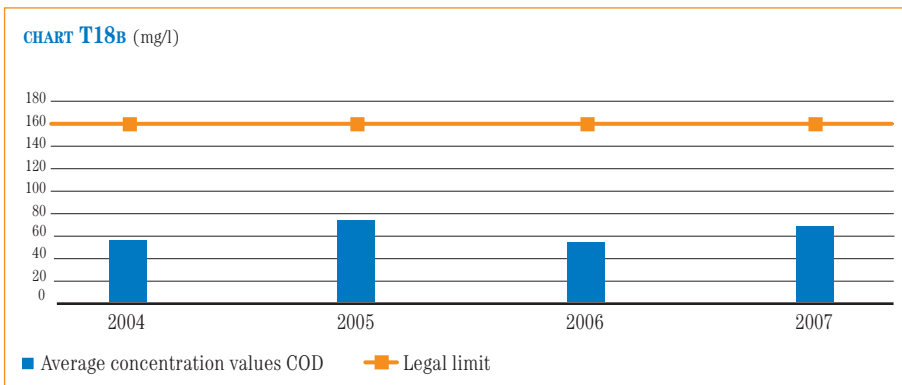
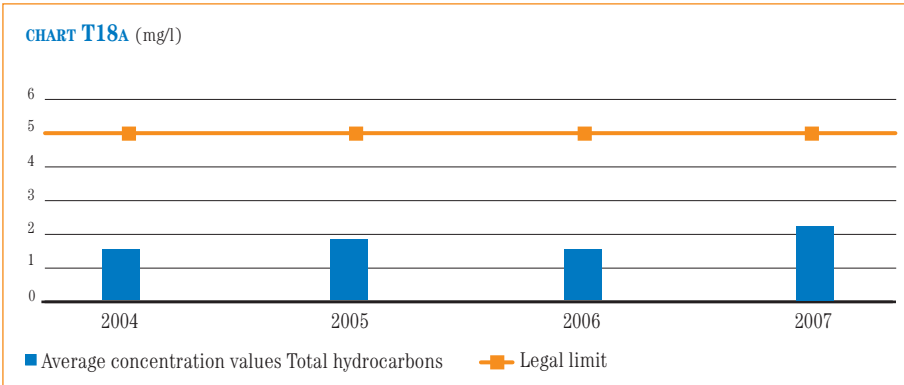
The flow figures show a substantially constant trend, with slight fluctuations. The total hydrocarbons trend in the following table shows average concentration values that are much lower than the legal limit. In the first half of 2007, due to the malfunctioning of part of the wastewater treatment system and a prolonged maintenance period, an increase was recorded for this parameter. The problem in the treatment system was solved in the second half of 2007, and values of the parameter then returned to their typical levels for the years 2004 – 2006. The COD trend in the following table shows fluctuations over the years, but always with average concentration values that are well below the legal limit.

TABLE 18 Discharges from wastewater treatment units – Total hydrocarbons and COD
Average concentration values

Parameter	2004	2005	2006	2007
Hydrocarbons (mg/l)*	1.5	1.8	1.5	2.2
COD (mg/l)**	54.60	72.30	53.10	66.80

* Limit value of 5 mg/l, specified by Italian Legislative Decree no. 152/2006 Part III, Enclosure 5.

** COD (Chemical Oxygen Demand): The quantity of oxygen necessary for the complete oxidation of organic and inorganic compounds present in a sample of water. Limit value of 160 mg/l, specified by Italian Legislative Decree no. 152/2006 Part III, Enclosure 5.



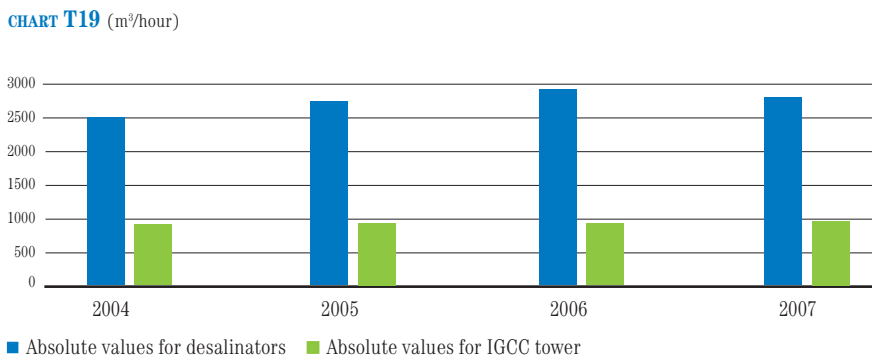
Other significant discharges into the sea derive from the operation of the following units:

- Desalinators
- Cooling tower of the IGCC

The representative parameters for these discharges are the flow and suspended solids, and these data are shown in the following tables.

TABLE 19 Discharges from desalinators and IGCC tower – Flow (m³/hour)

Parameter	2004	2005	2006	2007
Desalinators	2,478	2,716	2,893	2,778
IGCC Tower	894	918	928	977



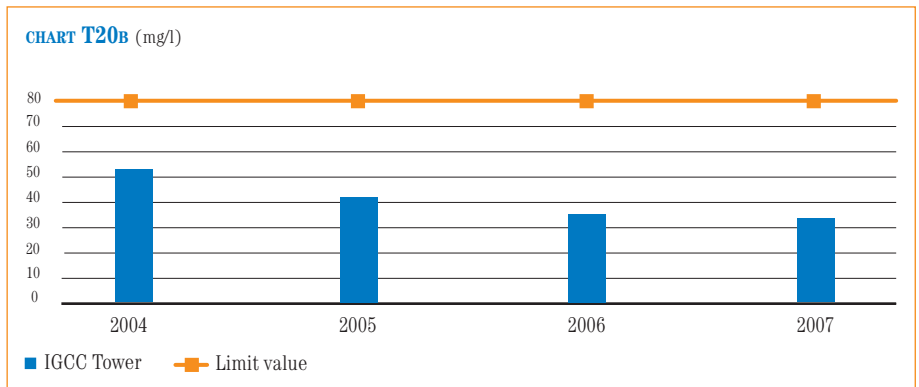
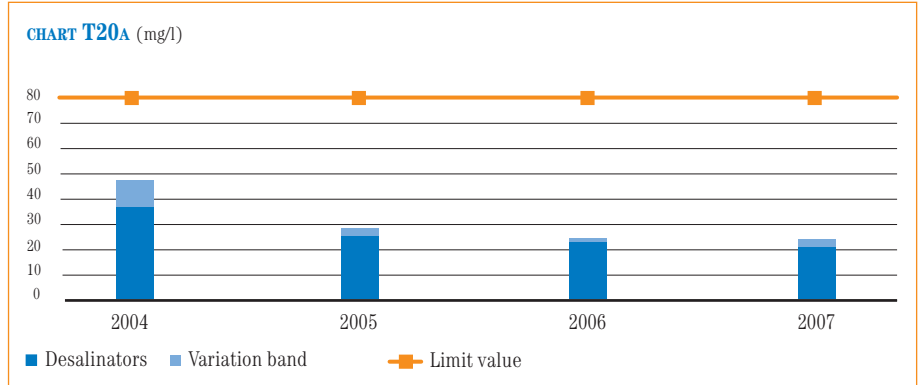
[suspended solids]

TABLE 20 Discharges from desalinators and IGCC tower – Suspended solids: average concentrations

Parameter	2004	2005	2006	2007	Valore limite*
Desalinators** (mg/l)	37.0 – 47.5	24.9 – 27.9	22.4 – 23.9	20.7 – 23.6	80
IGCC tower (mg/l)	52.5	41.5	34.8	33.0	80

* Limit value specified by Italian Legislative Decree no. 152/2006 Part III, Enclosure 5.

** The interval of minimum and maximum values for the three desalinators is shown.



The variations in concentration of suspended solids over the years are basically due to the differing content of suspended solids in the seawater withdrawn and input into the plants, and these variations are linked to the greater or lesser occurrence of sea storms over the course of the year.

Data on seawater quality

For several years, marine biologists have conducted half-yearly studies of the stretch of sea in front of the area occupied by the Saras site, to check the state of quality of the marine water. Specifically, the study includes the measurement of a great many chemical/physical values at varying depths, at a series of points positioned along lines perpendicular to the coastline. The description of the state of quality of the seawater is given by an indicator called the Trophic Index (abbreviated to TRIX), which considers chemical values (percentage of dissolved oxygen, concentrations of phosphorous and nitrogen) and biological values (chlorophyll “a”) found in the seawater. The state of quality found by the studies carried out is in the high end of the seawater quality classification table (“high/good” state of quality in the TRIX index).

Waste

Waste management at the Saras site is geared towards the twin primary objectives of minimising the quantities produced and progressively increasing the waste flows sent for recovery. A significant portion of the waste produced, which contains mainly hydrocarbons, is sent to a plant on site that separates the oily and watery phases contained in the waste, followed by an inertisation treatment. The recovered oily phase is returned to the refining cycle, and the watery phase is collected by the sewer system, through which it is ducted to the facility's wastewater treatment system. This system is managed by an authorised external company. Table 21 gives the data for the waste leaving the Saras site.

TABLE 21 Outgoing waste from the Saras site

Parameter	2004	2005	2006	2007*
Quantity of hazardous waste (t/year)	10,830	1,834	4,209	9,365
Quantity of non-hazardous waste (t/year)	30,479	32,465	35,678	22,862
Total quantity of waste (t/year)	41,309	34,299	39,886	32,227

* The increase in the quantity of hazardous waste in 2007 is due to a different classification assigned to inertised waste as a precautionary measure.

CHART T21 (t/year)

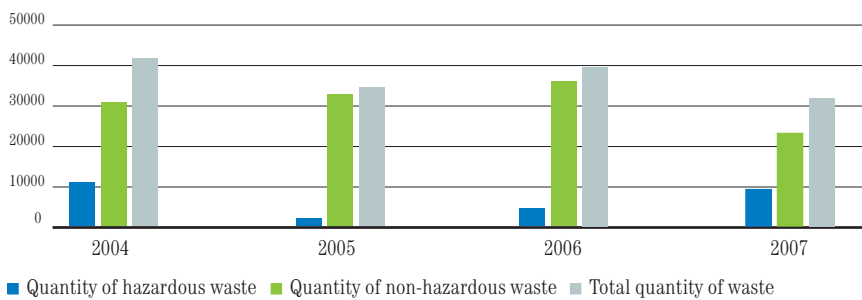


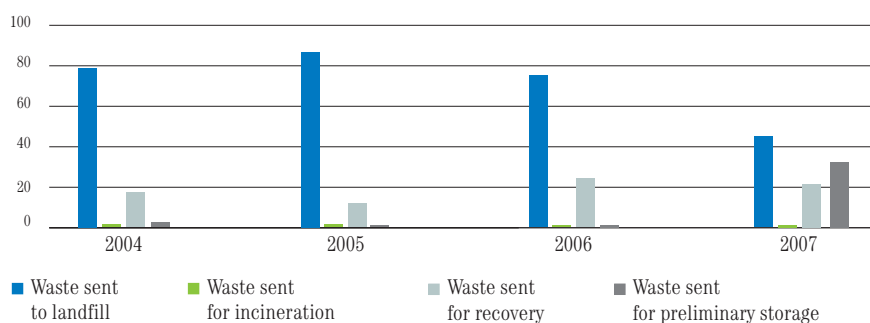
Table 22 shows, in percentage terms, the different types of final destination of the outgoing waste from the site. Note the reduction in waste sent to landfill, in favour of being sent for recovery.

TABELLA 22 Destination of outgoing waste from the Saras site

Destination of waste	2004	2005	2006	2007
Waste sent to landfill (% of total waste)	79.73	86.33	74.9	44.72
Waste sent for incineration (% of total waste)	1.01	1.09	0.94	1.31
Waste sent for recovery (% of total waste)	17.19	12.7	24.06	21.2
Waste sent for preliminary storage (% of total waste)	2.09	0.01	0.006	32.8*

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

CHART T22 (%)



Accidental spills on soil and subsoil

In observance of the provisions of Italian Ministerial Decree of 25 October 1999, no. 471 (regulations containing the criteria, procedures and methods for the safety containment, reclamation and environmental restoration of polluted sites), Saras has submitted its proposed Characterisation Plan for the state of the lands and groundwater underlying its site to the environmental authorities, pursuant to article 9 of the Decree.

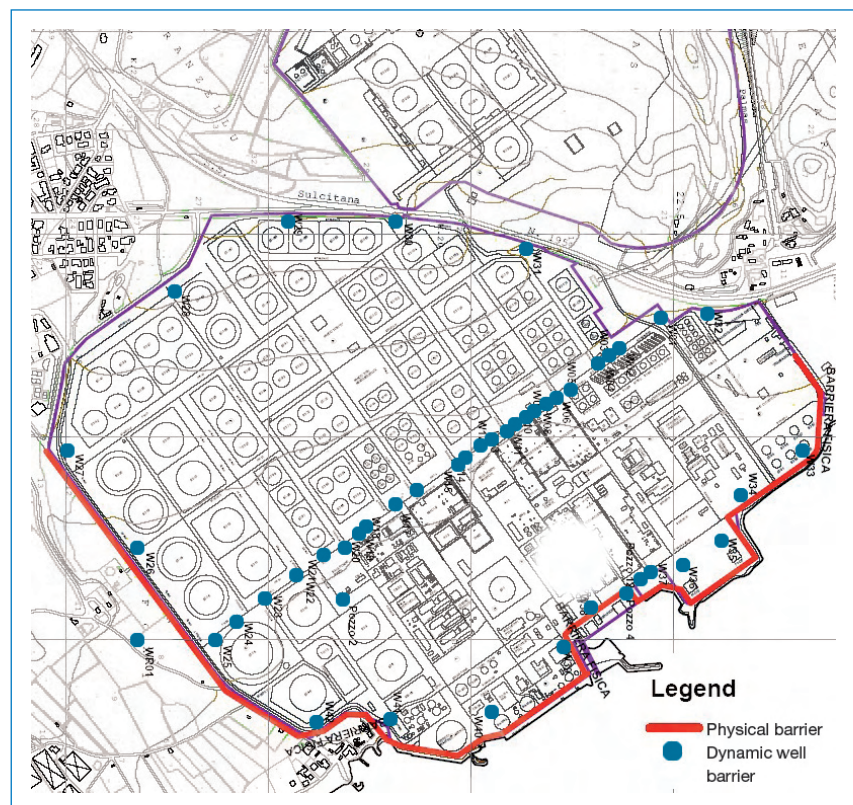
In 2004 work began on characterisation using various techniques. For the lands, this has enabled the site to substantially meet the parameters specified in the legislation for industrial sites, except for some points. For the underlying groundwater, the characterisation has identified the presence of floating hydrocarbons over the groundwater (“supernatant”) in a number of small areas.

In 2005 work began on recovering the supernatant, and a study was launched to set out a reclamation project. The project was submitted to the Ministry for the Environment and Land and Sea Conservation and, after appropriate modifications, was approved in April 2007. The definitive project calls for the construction of a “dynamic barrier” made up of pumping wells, and a “physical barrier”, which will be over 3 km in length and 20 metres in depth, as shown in figure 7.

The physical barrier will be used to confine the surface aquifer, which slowly flows towards the sea, within the site. The dynamic barrier will be used to keep the level of the aquifer constant and to remove and recover the supernatant present.

The dynamic barrier is currently being completed. Necessary work is in progress to precisely establish the construction method for the physical barrier.

FIGURE 7 Location of the wells comprising the dynamic barrier, and planned location of the physical barrier



Noise

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

These measurements have been repeated over the years at the same measurement points, some of which are located within the premises and on the roads running along the perimeter of the Saras site, while others are located on the access roads and within the inhabited centre of Sarroch.

The location of the measurement points can be seen in the map shown in figure 8.

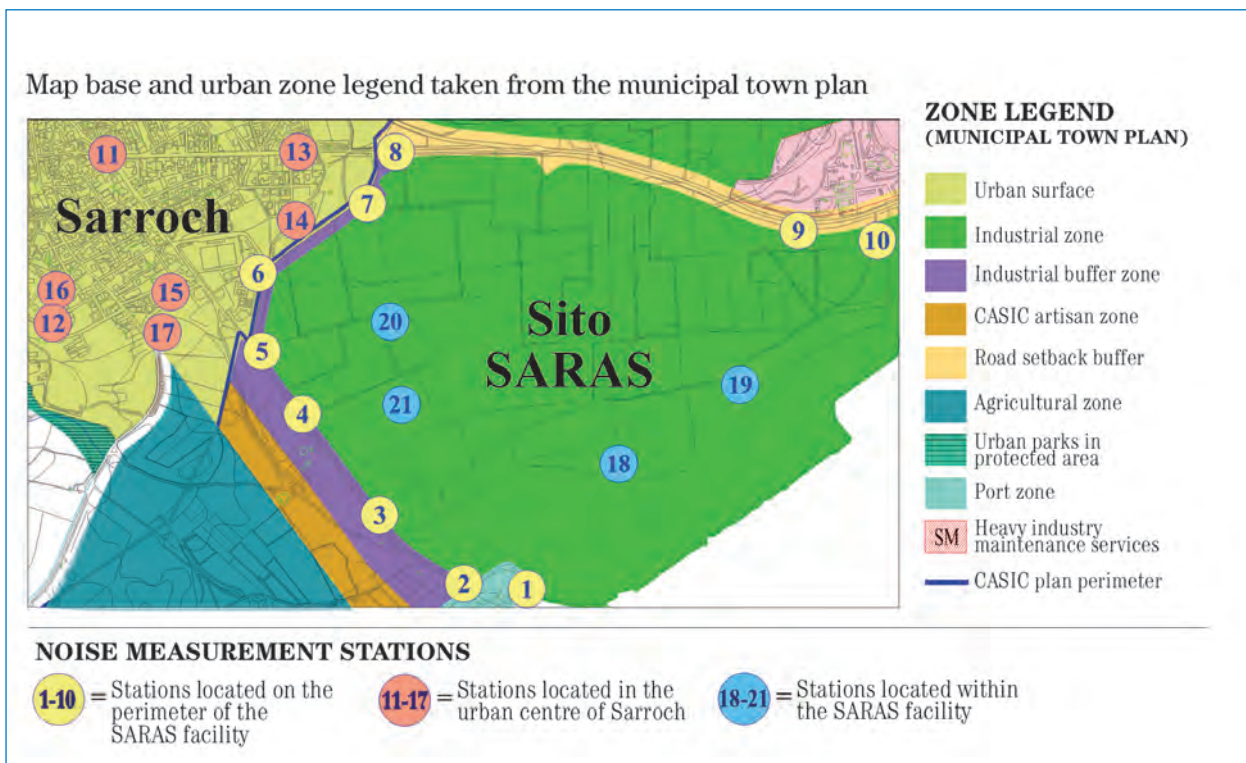
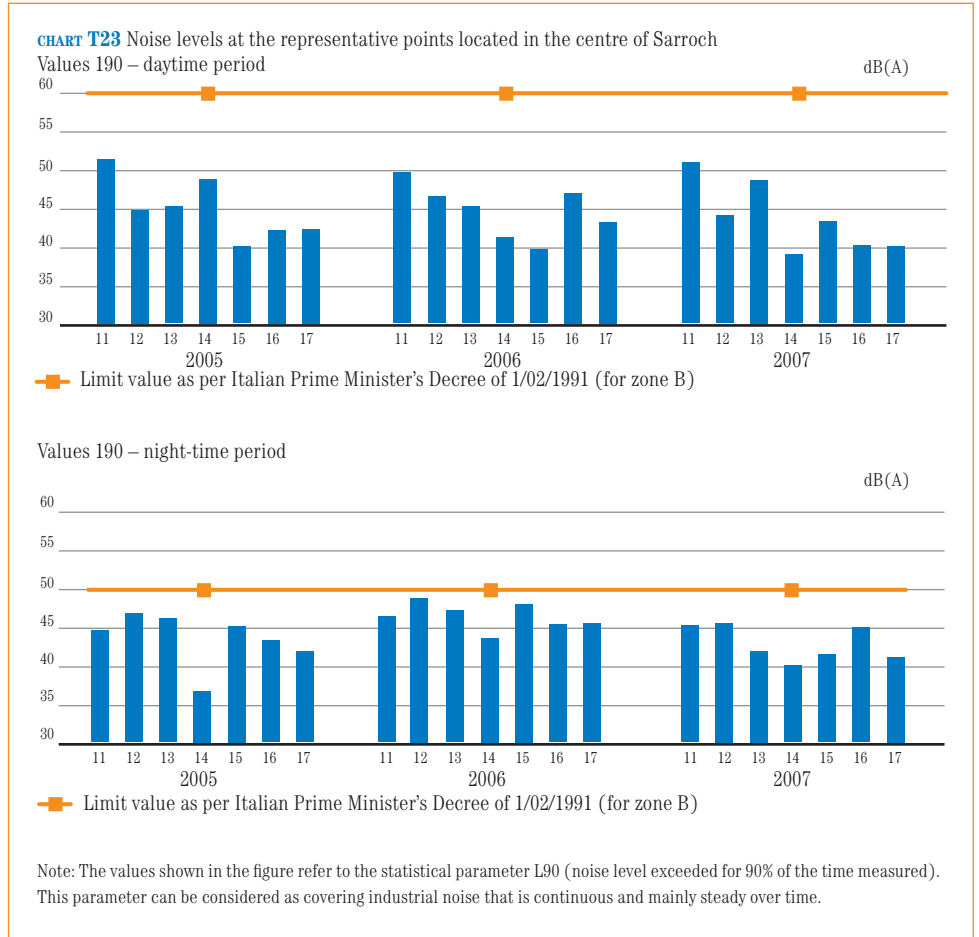


FIGURE 8 Location of noise measurement stations

Chart T23 gives the complete data series taken in all the measurement points located in the inhabited centre of Sarroch, and compares them with the currently applicable legal limits. Each bar in the histogram is labelled with the identification number of the corresponding noise measurement station, shown in figure 8.



Odours

In the past reports were submitted from outside Saras of the presence of unpleasant odours, following which a first instrumental investigation was conducted in 2004 and which did not find a particular connection between the measurements taken outside the facility and those taken inside.

Over the following years in in-depth study was conducted on analysis and evaluation methods that are more advanced and more appropriate to this particular case. In 2008 experimentation began using these methods, and this phase will continue until the end of the year, at which point the monitoring campaign proper will begin. The end objective of this work is to arrive at a preventive assessment of possible events that could generate an olfactory impact on the area outside the facility.

Maritime traffic transport

All raw materials entering the site and a significant portion of the oil products leaving the site are transported via sea. Because of the large number of ships (around 750 – 800 ships per year), for many years Saras has implemented a policy of selection and control of the ships used, with the aim of preventing accidents and spills at sea of dangerous substances. As of 2006 Saras had already met the 2010 deadline for European regulations banning the use of single-hulled vessels.

At the same time, Saras is greatly reducing the use of segregated ballast tank (SBT) ships, and it is planned to eliminate these by 2015. As can be seen from the data given in table 24, the percentage of double-hulled ships has increased notably in the space of a few years, while the percentage of SBT ships is falling sharply.

TABLE 24 Double-hulled ships

Parameter	2004	2005	2006	2007
Ratio of no. of double-hulled ships to total no. of ships (%)	84.1	88.6	95.0	95.8
Ratio of no. of segregated ballast ships to total no. of ships (%)	13.0	9.0	5.0	4.0

Data the potential seriousness of an accident at sea, Saras selects ships by consulting international databanks containing the results of inspections conducted on transport ships, and the company also has a programme of direct controls (both technical and management) on arriving ships.

ROAD TRAFFIC

The main component of heavy vehicle road traffic resulting from Saras's activities is comprised of tanker trucks for transporting refined oil products (approximately 47,000 vehicles/year). Since 2007 a program of controls has been in place, which aims to verify the conformance of the tanker trucks used for transporting products. Turning to traffic for transporting personnel (company employees and personnel from external companies operating on the site), collective transport facilities are organised (60 buses/day) with the result that car traffic, currently at approximately 800 vehicles/day, is contained.

5. Environmental objectives and programmes

Below are the environmental improvement objectives that Saras has set itself for the period 2008 – 2012. For each objective one or more actions have been defined, and indicators have been identified to monitor whether the objective will be reached by the end of the specified period.

no	Objective	Actions	Indicator	Implementation period
Significant environmental aspect: Atmospheric emissions (SO₂)				
1	Reduction of SO ₂ emissions by approximately 30% over current levels	A – Increase the yield of the Sulphur Recovery Plant and the abatement of SO ₂ emissions, by construction of the new Tail Gas Treatment Unit (TGTU)	Annual % reduction of SO ₂ emissions	Completion of work: end of 2008 Plant goes into operation: 2009
Environmental aspects: Energy consumption – Atmospheric emissions (SO₂, dust)				
2	Energy recovery and reduction of consumption of fuel oil by approximately 30% over current levels	A – Energy recovery interventions in the FCC plant and in the U500 and U700 desulphurisation units (by 2010) B – Installation of a boiler for energy recovery of sensitive heat of fumes from Topping Plant 1 (by 2011) C – Feasibility study for a boiler for energy recovery of sensitive heat of fumes from the following plants: Topping 2, RT2, VSB, Vacuum1 and Vacuum2, which will be ducted to the new centralised smoke stack (by 2009) D – Installation of the boiler for energy recovery of sensitive heat of fumes from the following plants: Topping 2, RT2, VSB, Vacuum1 and Vacuum2, which will be ducted to the new centralised smoke stack (by 2011)	Annual % reduction of fuel oil emissions	Completion of work: 2011
Environmental aspect: Atmospheric emissions (SO₂, NO_x, dust, CO)				
3	Extension of continuous monitoring methods to: – 65% of SO ₂ emissions – 50% of NO _x emissions – 65% of dust emissions – 60% of CO emissions	A – Installation of continuous monitoring system of emissions of SO ₂ , NO _x , PTS and CO on the smoke stacks of the following plants: Z3-F2 and Z4-F2 B – Installation of continuous monitoring system of emissions of SO ₂ , NO _x , PTS and CO on the smoke stack of the CCR/Alky plant	% of emissions continuously monitored	2008 2009
4	Verification of feasibility of a new centralised smoke stack and further extension of continuous monitoring methods to: – 85% of SO ₂ emissions – 70% of NO _x emissions – 99% of dust emissions – 85% of CO emissions	A – Draw up feasibility study B – Implement continuous monitoring system	% progress in activity % of emissions continuously monitored	2009 2011
Environmental aspect: Atmospheric emissions (dust)				
5	Use of fuel oil with carbon residue by weight lower than 9.5%.	A – Preparation of fuel oil with the required characteristics.	Annual average % carbon residue in fuel oil	2008
Environmental aspect: Atmospheric emissions (Volatile Organic Compounds)				
6	Reduction of diffuse and fugitive emissions of volatile hydrocarbons	A – Completion of the installation of double seals on the pumps to move petrol, beginning from the figure of 88% of replacements already made by the end of 2007. B – Installation of a system for sealing the calming pipes and support pipes in the tanks with floating roofs C – Application of a methodology for monitoring and repairing fugitive emissions in the refining plants through the use of: identification of the sources of emissions (via infrared (IR) videocamera), measurement of concentrations of volatile hydrocarbons at the sources (via flame ionisation detector (FID)), and subsequent repair of any leaks found.	% replacements made (cumulative figure) no. of tanks subject to intervention Avanzamento attività: I% progress in activity: IR 100%, FID 50%, FID 100%	88% in 2008 97% in 2009 100% in 2010 2011 2008 2009

no	Objective	Actions	Indicator	Implementation period
Environmental aspect: Atmospheric emissions – State of air quality				
7	Prompt identification of possible increases in concentrations of pollutants in emissions, to prevent the exceeding of alarm thresholds for the concentrations found at ground level by the public air quality monitoring network	A – Development of the simulation model of the ground level impact of atmospheric emissions from the Saras site, based on the climate conditions and the contours of the area, and on the concentrations measured by the air quality monitoring network in the external environment.	100 % Progress in activity	2008
Environmental aspect: Energy consumption – Visual impact				
8	Reduction of energy loss and of the visibility of the plume of vapours coming from the combined cycle boilers of the IGCC	A – Completion of energy recovery from the boilers in the combined cycle section of the IGCC for two of the three boilers (the third boiler was modified in 2007), by means of recovering heat and condensate, to be sent to the internal distribution network for demineralised water.	100 % Progress in activity	2008
Environmental aspect: Prevention of hydrocarbon spills on soil				
9	Reduction of risk of contaminating the soil and subsoil	A – Continuation of work on paving the retaining reservoirs for the crude oil and oil product tanks: from 24.4% of paved surface at the end of 2007, to 34.4%.	% surface paved over total surface of crude/product tank containment reservoirs	2008
		B – Completion to 100% of concrete paving of the Rio Mascheroni channel	% progress in activity	2009
		C – Execution of instrumental checks on the integrity of the pipes for transporting crude oil from the maritime terminal to the tanks, and the pipes for transporting hydrocarbons internally/externally	% controls conducted/controls planned	2008
10	Confinement of contamination from prior activities	A – Construction of the physical barrier outlined in the site reclamation project.	% progress in activity	2008 – 2012
Environmental aspect: Waste				
11	Increase to 15% of differentiated refuse collection of waste equivalent to urban solid waste (USW)	A – Execution of an awareness-raising campaign for personnel on differentiated refuse collection for plastic, aluminium, glass, and paper.	% USW differentiated	2008
12	Increase to 25% of the quantity of industrial waste sent for recovery	A – Increase in excavated soil being sent for recovery	% waste leaving the site being sent for recovery	2008
Environmental aspect: Noise				
13	Containment of noise emissions at source	A – Installation of sound-absorbent panels in the MHC-2 plant	% progress in activity	2009
		B – Design and installation of soundproofing of sheds 109 and 110, which contain the compressors for the hydrogen network		
Environmental aspect: Odours				
14	Monitoring of the presence of odours and identification of possible sources	A – Development of a monitoring methodology using a combination of analytical, modelling and assessment techniques by experts, and implementation of the monitoring.	% progress in activity	2008
Environmental aspect: Development of product design				
15	Reduction to 10 ppm (parts per million) of the concentration of sulphur in 100% of the petrol and diesel sent to the European market. Reduction of indirect emissions of SO ₂	A – Upgrading of petrol desulphurisation processes and optimisation of hydrogen production to support petrol and diesel desulphurisation processes.	% petrol and diesel at 10 ppm for the European market	Since 1 January 2009
Environmental aspect: Transport – Sea traffic: emergency prevention at sea				
16	Procurement of light crude via double-hulled ships in a percentage of at least 98%.	A – Continuation of selection of double-hulled ships for transportation of light crude	% double-hulled ships over total no. of ships	2008
17	Shipping of products via double-hulled ships in a percentage of at least 95%	A – Continuation of selection of double-hulled ships for shipping of products (diesel, kerosene, petrol)	% double-hulled ships over total no. of ships	2008
18	Execution of on-board controls of ships during loading and unloading	A – Continuation of inspections in accordance with the criteria adopted by Saras for safety and for protecting the environment (Minimum Safety Criteria)	% ships checked	2008
Environmental aspect: Transport – Road traffic: Accident prevention				
19	Execution of checks on at least 18% of the tanker trucks used to transport products	A – Continuation of controls in accordance with Saras's internal procedures	% tanker trucks checked	2008

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