

**ENVIRONMENTAL IMPACT ASSESSMENT OF PORTO REFINERY CONVERSION PROJECT**

**Volume I – NON-TECHNICAL SUMMARY**

**AUGUST 2008**

*These reports are an English translation of the original ones, filed at the competent authority and available in Galp Energia's site.*

*The Portuguese official version should also be read in order to confirm and evidence these data*

**PORTO REFINERY CONVERSION PROJECT**  
**ENVIRONMENTAL IMPACT ASSESSMENT**  
**VOLUME I – NON-TECHNICAL SUMMARY**

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PORTO REFINERY CONVERSION PROJECT  
ENVIRONMENTAL IMPACT ASSESSMENT  
**VOLUME I – NON-TECHNICAL SUMMARY**

**1. INTRODUCTION**

This document is the Non-Technical Summary (NTS) of the Environmental Impact assessment (EIA) covering the Porto Refinery Conversion Project which will be undertaken within the boundaries of that refinery. (Fig. 1)

The Porto Refinery, which began operating in 1970, is a crude oil industrial processing plant that has an annual installed capacity of 4.5 million tons and produces a wide range of products including fuels, lubricants, aromatics (BTX) for the petrochemical industry, industrial solvents and petroleum waxes.

The conversion project in question aims at modernizing and expanding the production process so as to provide a more suitable response to domestic demand.

The entity responsible for the project is Petrogal, S.A., a member of the Galp Energia Group, which brings together businesses in the oil, natural gas and electricity fields.

The licensing body is the Portuguese Directorate-General of Energy and Geology (DGEG).

The project was evaluated pursuant to the environmental legislation in force which requires that any planned change or extension to such plants be subject to an Environmental Impact Assessment (point 21 of annex I to Decree-Law nº 197/2005, which amended and republished Decree-Law nº 69/2000).

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Fig. 1 Project Location (scale 1/25000)

Key

Porto Refinery boundary

New Unit |

Revamping | Work under examination

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Fig. 2 Local Government Framework

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This Non-Technical Summary provides in a simple and concise manner the more significant information, conclusions and recommendations included in the Environmental Impact Assessment regarding the Porto Refinery conversion project.

The studies undertaken within the scope of the EIA began in July 2007 and were completed in May

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## 2. PROJECT RATIONALE

Porto Refinery has opened in 1970, is located in the municipality of Matosinhos and covers an area of approximately 290 hectares. It has an annual capacity of 4.5 million tons of fuels, lubricants, aromatics for the petrochemical industry, industrial solvents and petroleum waxes.

The conversion project will use the best available techniques in order to provide the plant with new heavy crude conversion units, so as to produce petrol and oil of high environmental quality, better suited to internal combustion engines.

Thus with greater refining conversion capacity Galp Energia will seek to re-establish the demand-supply balance and readjust its production to the needs of the domestic market.

Diesel production will therefore rise, at the expense of a significant fall in fuel oil production.

In fact petrol is produced in excess in Portugal and the surplus is exported to the USA, while there is a diesel shortfall of around 0.7 Mt/year which is made up by way of imports.

Since the demand for fuel is expected to continue to grow, while fuel oil consumption is likely to continue to fall as it is replaced by natural gas, the refinery's conversion is fully justified, as it will be able to adapt to current and future market demands.

In effect, and increasingly so for environmental reasons, there will be a rise in the use of diesel in order to reduce carbon dioxide emissions.

As a matter of strategy, Galp Energia, just like other European refiners, has decided to refit its refineries with conversion units for diesel production from the heavier fractions from crude, which until now were used as fuel oil, a product with little commercial value for which demand is falling as it is replaced by natural gas.

The project incorporates new units for producing high quality diesel. This type of processing also favours the handling of the more abundant and cheaper, heavier crudes in the Sines and Porto refineries. It is estimated that these two contributions (the increased distillate, in particular diesel oil, and the use of the heaviest crude) will cut Portugal's energy bill.

In 2011 total diesel production should go from 4.5 Mt/year to 7.4 Mt/year, practically equal to the Portuguese demand forecast for that year, at the expense of fuel oil production and the handling of the heaviest crudes.

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### 3. PROJECT DESCRIPTION

The Porto Refinery Conversion Project, to be implemented in the Porto Industrial Complex, will take place within the premises of the Porto Refinery, which is located in the parishes of Leça da Palmeira and Perafita in the municipality of Matosinhos.

The Porto Refinery is near the coast between Boa-Nova and Cabo do Mundo. It is about 200 metres from the coastline and is delimited on the west by the road called Rua Coronel Hélder Ribeiro which follows the beaches, on the south by the urban area to the north of Leça da Palmeira, on the east by the road called EN 107, and on the north and north-east by the road that links Aldeia Nova to EN 107 (Fig. 3).

[Fig. 3 – General view of Porto Refinery]

The imported crude oil is carried by tankers to the Leixões Oil Terminal which is connected to the refinery by a number of pipelines that run for around 2 km.

Porto Refinery is made up of a number of processing units spread across five factories, known as the Fuel Plant, the Base Oils Plant, the Lubricant Plant, the Aromatics Plant and the Utilities Plant, and has a large storage area for crude oil, fuels, aromatics and other end products and intermediate products.

Refinery produced products that are consumed internally are generally carried by tank vehicles, while products for external consumption are shipped by the aforementioned pipelines to the Port of Leixões where they are loaded onto tankers.

Figure 4 shows where the new processing units will be built and the revamping of the existing units and storage tanks.

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Figure 4 - Location of conversion projects to be carried out at the Porto Refinery

Key

New Storage Area

New Sulphur Recovery Unit II (SRU II – U10800)

New Sour Water Stripper II (SWS II – U10775)

New Tail Gas Treatment Unit (TGT – U10875)

New Vacuum Distillation Unit (DV – U10000) and New Visbreaker Unit (VB – U10100)

Revamping of Desulphurisation Unit (U – 3700)

Revamping of Diesel Desulphurisation Unit I (U – 1400)

Revamping of Atmospheric Distillation Unit (U – 3000)

The conversion calls for:

- building 2 new main units and 3 new auxiliary units, as well as the revamping of 3 existing Fuel Factory units, located in the west of the refinery;
- building 2 new diesel storage tanks, next to the aromatics storage area, in the northeast of the refinery. These tanks will be 60m diameter and 15.2m high and will have an individual capacity of 40,000m<sup>3</sup>;
- upgrading 4 existing tanks to store vacuum gas oil (VGO) and light cycle oil (LCO).

It should be mentioned that the Porto Refinery storage depot has a total storage capacity of around 1,800,000m<sup>3</sup>, so building 2 new tanks will represent an increase in the storage capacity of approximately 0.4%.

This revamping will increase the refinery's crude distillation capacity in the Fuel Factory from the current 3,388kt/year to 4,200kt/year, as well as raise diesel production, at the expense of a fall in fuel oil production in accordance with domestic demand.

It should be stressed that the project under review incorporates a series of Best Available Techniques recommended for the refining industry, which will minimize the project's impact and at the same time will allow the plant to continue to comply with the emission limits laid down in its Environmental Licence.

The conversion project will give rise to a slight increase in waste water production which will be absorbed by the Refinery's existing treatment system, since it has the necessary capacity.

The project calls for the building of a new chimney and there will be a slight increase in waste production of a similar nature to the currently produced, and it will be handled by the Refinery's Waste Management System ensuring a suitable final destination.

The project is scheduled to come online in 2010 and should create 70 new jobs.

As for maritime traffic, the project will produce an annual increase of 19 tankers for carrying crude and a fall of 5 in the number of tankers carrying distillates and vacuum gas oil/waste between the Sines and Porto refineries.

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The remaining maritime traffic associated with the transportation of products will be unaffected.

This project will not alter road traffic associated with the shipping of refinery products since it is mainly intended to supply fuel to Northern Portugal and is solely dependent on market demand.

The construction phase, which is expected to last a total of 23 months and hire an average of 554 people, will include the performing of a series of temporary tasks, in particular:

- the laying out and assembling of the building yard;
- civil engineering works such as foundations, underground infrastructure, utility networks, surfacing, etc.;
- the transportation of materials and equipment;
- the building of new processing units and tanks;
- the refitting of the Atmospheric Distillation Unit and Diesel Desulphurisation Units I and II;
- the expansion of the utility networks and the building of auxiliary infrastructure (electricity substations, pumping stations, etc.);
- the linking of the new units and infrastructure to the existing plant.

Major building works, which will take place within the precincts of the Porto Refinery, are to be undertaken in the western part of the refinery (next to the road known as Rua N), where the new Vacuum Distillation Units and Visbreaker are to be erected, as well as in the north-eastern section of the refinery which will house the new storage tanks.

The building yard will be divided into distinct sections and the main ones will be located near the areas where the major construction work is to be undertaken, that is near Rua N, in the western part of the refinery and in the northeast near the new storage tanks. Here a large part of the yard will be set aside for pre-production, welding and stripping, erecting changing rooms/washrooms and the refinery's works, vehicles and staff gatehouse.

Access to the yard will be via the road known as Rua da Guarda, and a car park with 197 places for employees' vehicles will be created on the opposite land which belongs to Galp Energia.

Other areas within the refinery's premises will be used for parking cars and vehicles transporting goods and to provide office space for project staff – Galp Energia employees, and those of the Contractor and main Subcontractors – in an existing 1500m<sup>2</sup> administrative building next to the Aromatics Factory.

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The various sections of the yard will be duly marked off and in general they will be fenced and have their own gate. They will be provided with the necessary infrastructure to ensure proper health and safety conditions.

Identification and information boards will be placed at the entrances with the main aim of preventing accidents involving traffic and cargo handling, and the use of safety equipment, etc.

The yard will be fitted with the necessary equipment to contain, treat and remove any effluent whenever the latter cannot be handled by the refinery's drainage system. It shall also be fitted with a temporary waste storage depot, having suitable containers for each type of waste properly identified.

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#### **4. DESCRIPTION OF THE CURRENT ENVIRONMENTAL SITUATION**

The study and analysis of the current environmental situation in the project area covered the more significant physical, quality, ecological and human factors, taking into account the local and regional features.

The legal constraints, reflecting national and municipal regulations, were compiled, field surveys were conducted and contacts made so as to obtain a detailed picture of the area. No constraints were identified in the project area.

The description given below covers the general features of the area within the Refinery, since the new units will be built in locations within the perimeter of the Refinery where other industrial units currently operate. In essence locations are levelled ground as is the case of the site for the new units next to the Fuel Factory in the western part of the Refinery.

[Photo: General View of the Site for the New Units in the Fuel Factory Area (Vacuum Distillation and Visbreaker)]

The Refinery site is subject to a markedly maritime climate, with frequent fog and fairly regular rainfall.

In geological terms it is located on granite formations that show various states of alteration and which are covered with different landfill materials.

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The soil is of a poor grade. The original soil has been greatly altered and is practically all paved. It is mainly made up of landfill materials associated with buildings and roads.

The region's hydro graphic network is dominated by the river Leça and its tributaries, and there are small water courses of no significant influence, that drain directly into the sea. Within the refinery there is no water course since the Boa Nova riverbed was filled and the Guarda watercourse was siphoned off when the Refinery was built in the 1960's.

Porto Refinery's operations produce various types of waste which have a suitable final destination which favours recycling whenever possible.

In regard to background noise levels they generally comply with the regulations.

In terms of terrestrial biology and ecology factors, the project direct influence is extremely reduced and has no feature worthy of mention. It is an active intervention area with little natural vegetation remaining and is home only to very resistant species with no protection value assigned.

In terms of marine biology and ecology factors, the project area does not belong to northern Portugal's most important biological areas of the northern coast.

The landscape of the area is devoid of any significant features, and is dominated by a highly humanized landscape where quality is associated with a very strong human presence.

From a heritage standpoint the municipality of Matosinhos is fairly rich and contains important archaeological remains from different periods but none of them is within the project's direct sphere of influence.

In socioeconomic terms the parishes of Leça da Palmeira and Perafita, where the Refinery is situated, and particularly the former, are home to a population from a high socioeconomic class in line with the quality housing, especially on the side where the Refinery is located. They also include a very important collection of factories. The coastal area is currently undergoing an environmental refurbishment aimed at upgrading the river front and making port and industrial activities compatible with use of the coast and beaches.

The Porto Refinery Conversion Project is classified as a project of Potential National Interest with Strategic Importance (PNI+) under an order issued by the Ministers of the Environment, of Spatial Planning and Regional Development, and of the Economy and Innovation. The project's compatibility with existing land management tools, such as the Matosinhos Municipal Master Plan and the Caminha-Espinho Coast Management Plan, is guaranteed.

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## **5. IMPACT ASSESSMENT, MEASURES AND MONITORING.**

The environmental consequences of the building and operating of the new units and the revamping of the existing ones which constitute Porto Refinery Conversion Project were assessed and examined.

The project nature means that the main negative consequences will be felt during the construction phase while the positive consequences will arise in the operating phase.

The negative impact of the construction phase will generally be small, with the exception of the noise level and impact on the landscape which will be moderate. The project is expected to have no impact on climate and heritage.

The negative consequences of the construction phase will mainly arise from yard operations, the transport of equipment and the works that will give the area a temporary visual disorganization and produce dust, noise, waste water and rubble.

The entire construction phase will impact on air quality, noise, waste and the landscape. However, with the exceptions of noise and traffic, the impact will have little significance and be temporary.

However it should be stressed that even in the case of traffic and noise; the impact will be minimized by appropriate management measures, so the consequences for the general public will not be significant.

To minimize the negative impact of the construction phase mitigation measures have been proposed that basically call for appropriate planning of construction and works management procedures.

Therefore it is recommended that excavation work for the installation of equipment be performed, whenever possible, by mechanical means, that all noisy activities be reduced to a minimum, that waste water and waste produced in the yard be correctly handed and controlled, and that the yard be properly fenced.

Water quality and environmental noise monitoring plans have been proposed for the construction phase.

The construction phase is required to have suitable environmental monitoring, so as to implement, oversee and control the measures laid down in the monitoring plans.

As for the operating phase, the negative consequences of the new units and the revamped ones will be low.

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As compared to the present situation operating Porto Refinery when the new units are on line, will have very important positive consequences in terms of air quality, as the emissions produced by the use of new technology will have a direct impact on air quality. There will be an indirect impact due to the production of cleaner diesel, the use of which will help to reduce atmospheric pollution produced by motor vehicles.

At the socioeconomic level the consequences will also be significant and positive, not only because new jobs will be created – an important outcome in local/regional terms – but mainly because it will lead to diminished diesel imports and therefore verify Portuguese production meet the country's demand for diesel. This project is therefore very important to the national economy.

During the operating phase, especially after the mitigation measures have been carried out, the negative consequences will be minimal and will mainly take the form of a small increase in the output of waste water, waste and additional noise, which will be confined to the area surrounding the new units and in general will remain inside the Refinery.

According to the Risk Analysis performed, risks to employees and the general public associated with the planned new units are considered to comply with internationally acceptable risk level limits.

On the other hand, the project in question will not lead to a significant increase in risk compared to the current situation.

During the operating phase the main measures relate to:

- The implementation of an Integrated Landscape Project along the western and north-eastern bands of the Refinery where the new units will be located and that stand opposite the Leça and Perafita coast road. The project is much larger than it would be necessary for the new units alone;
  - The incorporation of the new units in the Air Quality and Refinery Air Quality and Environment Noise Monitoring Plans;
  - The incorporation of the additional waste in the Porto Refinery Waste Management Plan;
  - Staff training and the adoption of suitable maintenance and operating procedures in the new units;
  - Updating of Porto Refinery's Internal Emergency Plan.
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The planned projects and measures will enable the new units and revamped units to operate efficiently and also contribute to safety and environmental insertion of Porto Refinery as a whole.

The Zero Alternative, which corresponds to the non-performance of the project, would have negative consequences that would be important at the socioeconomic and air quality levels, due to the continued use of more polluting fuels with higher sulphur levels, or, if it was decided to import the necessary fuel, it would lead to the closure of the Porto Refinery.

This latter option would have very negative strategic consequences for Portugal and for the region since part of the fuel supply would become dependent on other countries, jobs and skills would be lost, as Sines Refinery does not have the production capacity required to supply the whole country.

## **6. CONCLUSIONS**

Porto Refinery Conversion Project is essential to its continuity and its environmental improvement, ensuring that national and Community legal requirements are met and consequently to the refinery's viability and improved air quality.

Therefore the project is part of a strategy that will significantly and positively improve the current economic and environmental viability, at the national and local levels, without putting any significant environmental factor at risk.

It was possible to conclude that the project will be carried out in line with national and international standards applicable to this type of plant and use the most modern and up-to-date techniques of environmental protection and safety.

The new units and the revamping of existing units have been designed by international bodies with a great deal of refining experience and incorporate the best available technology, duly tested and approved internationally.