



**Innovative tools,
methods and indicators
for optimizing
the resource efficiency
in process industry**

Industrial Case Scope

PETROGAL



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SPIRE WORKSHOP JAN 27th - BRUSSELS



"This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 604140"



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Exploration & Production

> Around 45 projects in portfolio

- Galp Energia's activity is growing fast, especially in Brazil, Angola and Mozambique with the recent discoveries;

- Production of oil is concentrated in Angola and in Brazil, with a WI production of 30.5 kboepd in 2014;

- At the end of 2014, 3P reserves NE stood at 833 mmboe; 3C contingent resources WI at 3,496 mmboe and exploration resources (unrisked) at 1,605 mmboe;

- The development of existing resources, will allow Galp Energia to significantly increase its production.



Refining & Marketing

> 1,449 service stations

- We process oil into refined oil products, mainly marketed by our own network in Portugal and Spain;

- We are the only refining company in Portugal, and we currently have a refining capacity of 330 kbopd;

- Refined products are primarily marketed in the Iberian Peninsula but also in Africa, with sales to direct clients hitting 9 mton in 2014;

- In 2014, the marketing network reached 1,449 service stations.



Gas & Power

> 7,472 mm³ sales of natural gas

- The main activities of this business segment are import, distribution and sale of natural gas and production of electricity;

- Natural gas is sold in Portugal and Spain to around 1.3 million customers;

- We plan to exploit current developments in our power business to increase our sales of natural gas;

- In the power business, our aim is to position ourselves in the electricity supply sector in the Portuguese market.





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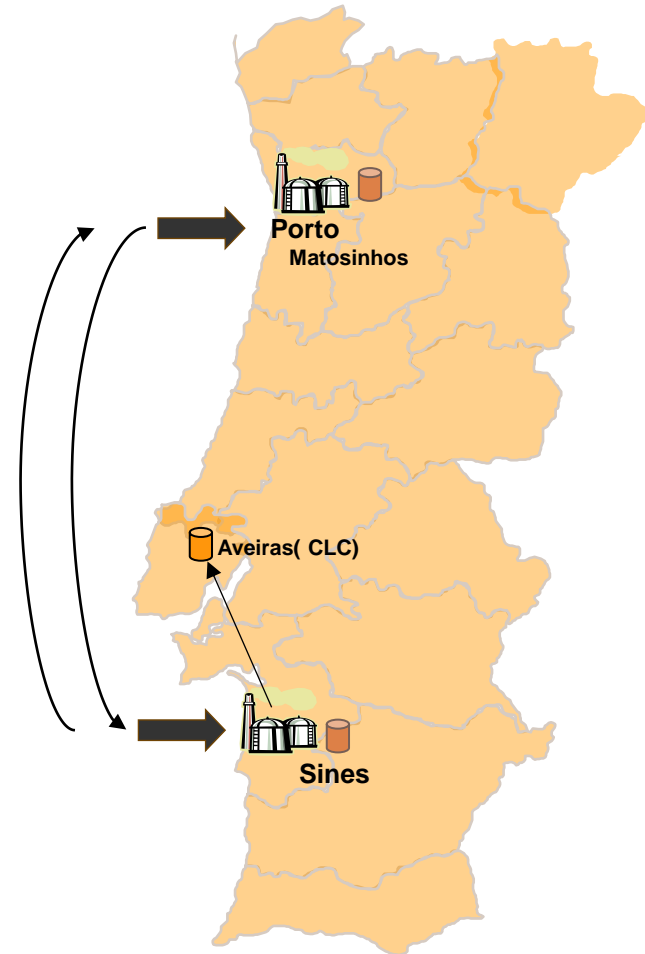
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Galp Energia's refining complex comprises the Sines and Matosinhos refineries which, together, have currently a crude processing capacity of 330,000 barrels a day. This equates to 20% of the Iberian refining capacity.

Sines Refinery which began operating in 1978. With a current refining capacity of approximately **220,000 barrels a day**, it is the main refinery in Portugal and accounts for almost 70% of the country's total refining capacity. This Refinery is where Galp Energia concentrates its Conversion Units .

Matosinhos refinery, located in Portugal's Northwest coast, began operating in 1969. Currently, it has a refining capacity of approximately 110,000 barrels a day. The Matosinhos refinery is a hydroskimming refinery, with an aromatic plant, a base oil plant and a lubricant plant.





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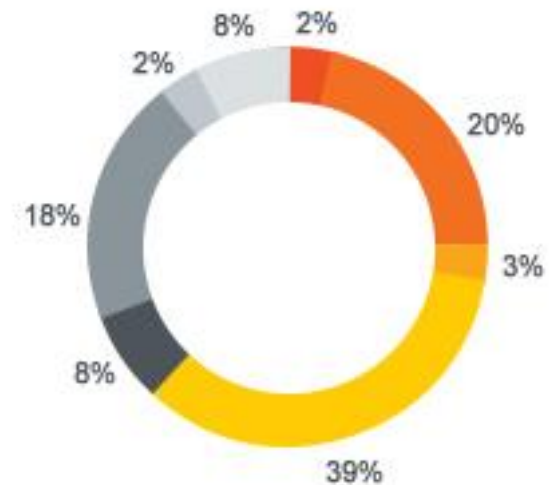
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Both refineries feature an integrated management system that maximizes the Company's refining margin. The characteristics of each refinery provide a balanced production mix, predominately in middle distillates, such as diesel and gasoline.

Regarding the future needs of its clients, Galp Energia implemented an upgrade project for its refineries, determined to ensure the Company's competitiveness in the medium and long term.

Galp Energia has a modern, highly complex and fully integrated refining system. This is the beginning of a new era in refining activity, with a more efficient, reliable and cost-effective operation.





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SINES REFINERY OVERVIEW

The Sines refinery is one of the largest refineries in the Iberian Peninsula. Its coastal location and port facilities make it ideal for crude supply and exporting products.

Sines refinery's processing configuration is oriented towards an increased conversion of the BoB products into middle distillates gasoline and diesel production, through:

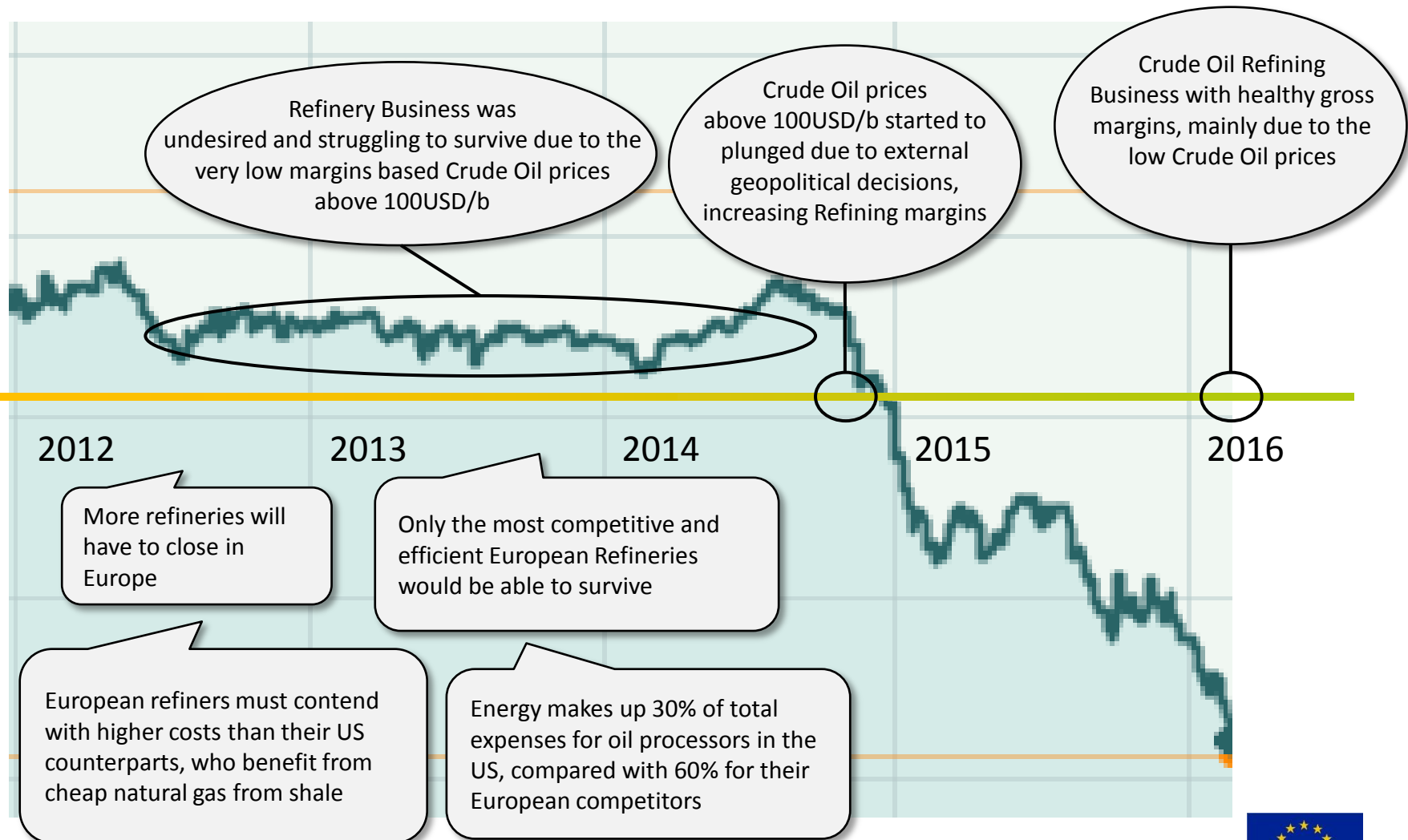
- **FCC - Fluid Catalytic Cracking**: **GASOLINE** oriented **CONVERSION** unit
- **HC – Hydrocracker**: **DIESEL** oriented **CONVERSION** unit.

This is the most recent part of the complex, which initiated operations in January 2013, designed with Energy Efficient focus and the BAT's (Best Available Technologies).





RECENT PASS BUSINESS OVERVIEW





WHAT TO EXPECT IN THE FUTURE?

Current low Crude Oil prices scenario is not considered sustainable and is very dependent on external geopolitical factors and decisions

CRUDE OIL PRICES... ANY BETS?

2016

2017

2018

2019

2020

- Mega Refineries in Middle East that are on the final construction/Starting-up phase that will enable Middle East countries to export cheap clean on-spec fuels to Europe.
- Upgrade on Russian refineries that will also enable Russia to export cheap clean on-spec fuels to Europe.





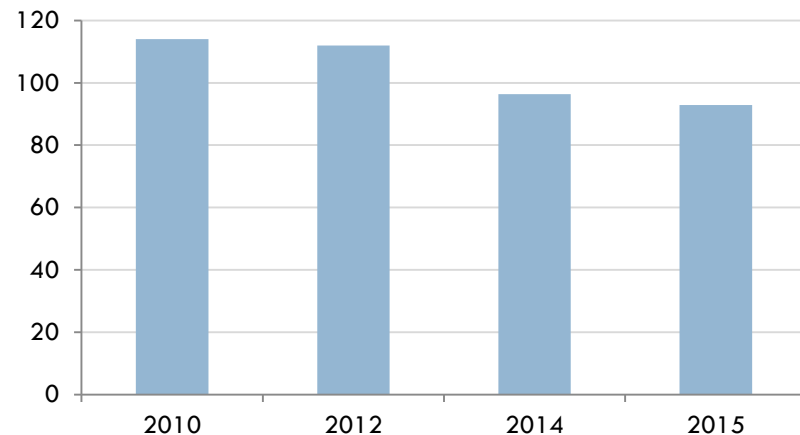
WHAT CAN WE DO TO ANTECIPATE WORST CASE SCENARIO (and probable) FOR REFINING BUSINESS (and others)?

Anticipate and adapt the European Refineries Industry to a possible high crude oil prices/low refining margins scenario, through the COMPETITIVENESS INCREASE:

- Increasing Energy Efficiency is the main objective of the Sector, since in Europe, Energy represents about 50-60% of the Operation Costs.
- Innovative processes and synergies to explore new products and processes to increase revenue.
- GALP Energia has implemented an Energy Efficiency Plan (EEP) in their Refineries, which had been resulting in an Action Plan.
- Results are visible on the Decrease of the Energy Consumption indexes. Further results are expected with the Actions Pipeline Pluriannual Plan.

EII - Energy Intensity Index

(Solomon Benchmark Index)





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CHALLENGES AND EXPECTATIONS ON TOP-REF PROJECT

- Main Challenge for GALP Energia TOP-REF team is to obtain effective decrease on Energy Consumption of Sines Refinery, through the cooperation with the development partners and the increasing in knowledge on Internal Utilities Network.
- TOP-REF project provides an internal bottom-up approach to the Utilities Network:
 - **Increased level of integrated knowledge between Steam Consumers and Production, supports the daily optimization**
 - Optimum Consumption and Production Profile for each different “Run Program” results from TOP-REF Analysis. **Deviations of Real Consumption and Production Profile, support Control Operators and Decision Makers** on the search of the Optimum Operating Point

Refineries are complex industrial systems hard to integrate :

Sines Refinery changes feed composition every week. This, together with the market demands changes, Equipment Maintenance plan, and unplanned shutdowns, makes the need for a continuous change in Units Operating parameters, causing Utilities Demand variations.



THANK YOU VERY MUCH FOR YOUR ATTENTION



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