

REGANOSA, TERMINALS OPERATOR AND GAS TRANSMISSION SYSTEM OPERATOR

Reganosa is a company engaged in the transmission and regasification of natural gas that has been authorised and designated by the Ministry of Industry, Energy and Tourism of Spain as transmission system operator (TSO), following a certification process approved by the National Markets and Competition Commission and the European Commission. The assets the company manages are essential in order to ensure the security of supply and source diversification within the European domain.

As LNG terminal operators, it mainly operates in the North Atlantic with a terminal located on a strategic site in north western Spain. The operations are governed by the principles of safety, efficiency and flexibility. Besides, Reganosa is authorised and designated transmission system operators (TSO). Its experience in the management of the Spanish core network is our guarantee to embark on more challenging undertakings.

Reganosa has developed infrastructures which include in their design safety criteria and a concern for the environment, with adequate sizing and using the latest technologies available. It guarantees compliance with quality standards, investment and deadlines through strict planning and supervision procedures.

The company operates and maintains infrastructures in a safe, efficient and flexible manner. It has in place strict management procedures and systems and also keeps an exhaustive control and measurement of the energy its entrusted with. Besides, takes every necessary measure to adapt and meet the ever growing logistical demands of the natural gas industry.

The day-to-day operations have given Reganosa a valuable experience that makes them able to provide expert advice to regulatory authorities and participate in infrastructure projects along with other operators in the industry.

Commitment to innovation

Reganosa is constantly seeking new ways and tools to do its work more effectively. It has created new methods for the measurement and control of environmental impact. It innovates in the daily work by developing proprietary computer applications for the management of work permits, shift management and monitoring of the safety, environment and quality integrated systems. Also, has developed tools that allow them to plan transmission systems minimizing investment and operational costs. Maintaining lines of study open for the application of LNG to new domains.

Reganosa can't conceive activities without the collaboration established with both institutions and companies. Given the nature of its work, cooperates with regulatory authorities and research centres in the pursuit of the best solutions to provide society with the energy it needs. The company believes in the value that results from joint collaboration between companies and universities, thus ensuring transfer of knowledge. It has promoted an alliance with shipyards, ship owners, industries and other companies within the energy industry, thus generating value.

Gas plant in operation since 2007

By the late 90s, the first steps were taken to set up an energy company in Galicia. The foundation of Reganosa made possible the development of the Galician gas system, 1,200 MW of power at combined cycle thermal power plants and the transformation of the processes at the main industrial premises within the autonomous community.

In 2007 the company began to operate with its first infrastructures, the Mugarodos terminal and the gas pipeline network. Since November of that year Reganosa has made a decisive contribution towards ensuring the security of the supply to the Spanish gas system, which has become more robust and flexible with the introduction of our infrastructures.

Reganosa, is currently authorised and designated as Transmission System Operators (TSO) by the Ministry of Industry, Energy and Tourism of Spain, following a certification procedure approved by the National Markets and Competition Commission and the European Commission. This means that the company is up to the same standards as any other gas transmission system operator within the European Union. Since July 2014 it has been member of the European Network of Transmission System Operators for Gas (ENTSOG).

Human Capital

Reganosa is an organization that rises to the challenges posed by day-to-day management with the ability to plan and develop projects in a global market and meet the new requirement of the sector. The highly qualified, deeply committed staffs make its work possible. Around seventy technicians are part of the staff of the company, but the direct employment is greater.

Shareholders: public capital and private capital

Public interest, deep roots in Galicia, knowledge of the energy industry and international financial solvency are the characteristics that define the Reganosa shareholders, in which are present both the private and public capital.

The 24,31 per cent stake of the Government of Galicia shows that we are a strategic company for the development of the autonomous community.

Grupo Tojeiro, the driving force behind the project, owns 50,69 % of capital share through its subsidiaries Gadisa and Forestal del Atlántico. It provides social roots and dynamism as a leader company in north western Spain.

First State Investment, owner of 15% of the capital share, is the major player in the global financial market.

Sonatrach, an Algerian public company, with a vast experience in the hydrocarbons sector, owns a 10 % stake.

Terminal at Ferrol's Port

The Mugardos terminal, at the Ferrol's Port, began to operate in November 2007. It provides the system with a capacity of 3.6 bcm (billion cubic meters) per year of natural gas (14% of Spanish natural gas demand for 2014). Its design stands out for the use of cutting-edge solutions that ensure the efficiency of the terminal.

Its berth is suitable for the docking of any gas carrier that currently makes up the world fleet. The unloading arms are connected to two tanks that can store up to 300,000 cubic metres of LNG and keep liquefied natural gas at a temperature of -160 °C at atmospheric pressure. The LNG stored can be loaded onto ships or tanks or sent to the regasification facilities of the plant. These facilities make the phase transition of the LNG to its gaseous state through two sea water vaporizers and a back-up submerged combustion vaporizer. Subsequently, natural gas is injected into the transmission system.

The terminal in numbers

Tank capacity: 2 x 150,000 m³
Vaporizers capacity: 3 x 160 t/h
Ship unloading capacity: 12,000 m³/h
Ship loading capacity: 2,000 m³/h
Tanks' loading capacity: 35 tanks/day
Compatible ships: 15,600-266,000 m³
Low pressure pumps: 4 x 440 m³/h
Sea water pumps: 3 x 5.500 m³/h
High pressure pumps: 4 x 380 m³/h
BOG compressor: 3 x 7 tons/h
Liquefied arm: 3 x 4.000 m³/h
1 return of vapor arm
Measurement station 800.000 Nm³/h

LNG transfer arms
Vapour return arm
Primary pumps
LNG tanks
Reliquefaction plant
Compressor
Secondary pumps
Sea water vaporizers
Submerged combustion vaporizer
Measurement station
Odorisation
Emission
Tanker loader
Combustor

Of the existing LNG tankers in the world fleet, the Reganosa terminal at the port of Ferrol, can moor those with capacities ranging between 15,600 m³ and 266,000 m³ (Q-Max).

Since 2013 the regasification plant of Mugardos maintains a regular audit scheme has been

in place under the strictest standards of the ship-land interface such as the Marine Terminal Management and Self Assessment (MTMSA), conducted by the most prestigious companies in accordance with the criteria of the Oil Companies International Marine Forum (OCIMF).

Transmission network

On the northwest of Spain Reganosa manages a section of the national core network. The knowledge acquired in the management of these gas pipelines has provided it with the expertise to design and operate transmission networks. The company is certified as TSO by the European Union.

The transmission infrastructure, which is 130 km long with a design pressure of 80 bars, is included in the core network as it is essential to ensure the security of the supply and the proper operation of the Iberian gas market. It connects with the LNG terminal of Mugaros and the Tui – Llanera gas pipeline at Guitiriz and Abegondo. Also part of our network is three measuring stations (MS), three control and measuring stations (RMS) and thirteen valve positions. The company transport gas directly to the combined cycle thermal power plants of As Pontes (800 MW) and Sabón (400 MW), to the refinery of A Coruña (120,000 barrels per day) and to the towns of As Pontes and Cerceda.

Here are the main points of the network:

- LNG terminal. EM G-4.000, 80/50 bar, 30".
- As Pontes: combined cycle thermal power plant (800 MW), supplies to the town, ERM G-160, 80/16 bar, 26". The town is a great industrial centre.
- Guitiriz: Connection points with transmission networks (PCTT) with Tui-Llanera gas pipeline, EM G-2.500, 80/40 bar, 20".
- Abegondo: Connection points with transmission networks PCTT with Tui-Llanera gas pipeline, EM G-2.500, 80/40 bar, 16".
- Sabón: combined cycle thermal power plant (400 MW), located at the great industrial park of A Coruña, 16".
- Pastoriza: supply to the oil refinery of A Coruña (120,000 barrels per day) ERM G-1.000, 80/50 bar, 16".
- Meirama-Cerceda: supply to the thermal power station of Meirama (550 MW), the industrial park and the town of Cerceda, ERM G-100, 80/16 bar, 10".

Simulation and optimisation tool for gas systems

Through a research programme in collaboration with scientists from the Department of Applied Mathematics and Statistics of the Santiago de Compostela's University, with over 2,550 hours of research, Reganosa has developed a proprietary tool. This tool optimises and simulates both statically and dynamically the different cost functions in gas systems with a user-friendly interface and adapted to Google Earth.

It analyses complex grids of gas pipelines with all their elements (compression stations, valve positions, regasification and liquefaction plants, underground storage facilities,...) by simulating their physical behaviour and searching for given demand scenarios, the optimisation of cost functions of the operation of the elements of the networks. Networks and their cost functions can be parameterised. It also makes it possible to calculate all the entry-exit tariffs for a given system, applying a variety of calculation models (Capacity

Weighted, Matrix, Virtual Point, Paul Hunt and Postage Stamp).

This tool is very useful for analyzing the management of gas pipelines systems and planning the development of gas infrastructures under strict criteria of efficiency, incorporating demand forecasting models, investment and operation costs of the planned infrastructures as well as simulating the implementation of a myriad of policies. Reganosa uses the simulations results for improving its daily operations, the collaboration with regulators and institutions and in order to contribute to the work of the different organizations in which participates. It has trained staff in its use and provides support to the different companies that request it.

It's about an open line of work, one which the company will continue to research on and to which it will continue to add new functionalities.

A project for the future, the LNG

Maritime freight is evolving towards a greater concern for the environment. Consequently, the authorities from different parts of the world have established navigation areas where there are stringent caps to the emissions of gases into the atmosphere (Emission Control Areas or ECAs.). Compliance with these new requirements means cleaner fuels and experts unanimously agree that clean navigation is linked to liquefied natural gas. LNG means a 100% reduction in sulphur oxides and particles emissions, 90% reduction of nitrogen oxides and 20% reduction of carbon dioxide. Furthermore, the foreseeable evolution of prices makes LNG the most competitive option.

It is in this context that in 2013 the project "LNG Hub on the north western of the Iberian Peninsula" emerged under the auspices of the Xunta de Galicia, the of Santiago de Compostela's University, the Authority Port of Ferrol-San Cibrao, Navantia and Reganosa. It is supported and financed by the European Commission within the framework of the TEN-T programme.

The overall goal is the analysis of demand and the design of facilities, infrastructures and procedures that ensure LNG availability through the establishment of a distribution centre in the area. This is a lever of growth for the community of Galicia and makes the Ferrol's Port into a benchmark in the supply of LNG. This project has led to a further, wider project that seeks to generate value in such sectors as the fishing industry, the shipping or the logistic industry, as well as place Galicia at the forefront of the transformation of the fleet, ensuring its environmental sustainability and competitiveness.

After signing a collaboration agreement with the Xunta de Galicia [Autonomous Government of Galicia], in 2015 Reganosa has designed a supply vessel with a capacity of 8,000 m³. It will be a key element in the logistics chain required to supply LNG to vessels.

Also, Reganosa signed a collaboration agreement with Ferrol Container Terminal and Gas Natural to analyse in detail the specific needs that container traffic will generate.

Every infrastructure defined as necessary in the first study, whose conceptual design phase has been completed, have been included in the Ten Year Network Development Plan 2015.

Accredited Laboratory by ENAC

In 2015 Reganosa will complete the implementation in its laboratory of a quality system in accordance with Standard UNE-EN ISO/IEC 17025, in order to obtain certification from the ENAC (Entidad Nacional de Acreditación [National Certification Agency]). This certification is another step in the pursuit of excellence in the measurement of the energy the clients entrust it with.

This laboratory provides analysis services for LNG compounds, natural gas and sulphur compounds, for both the users of the facilities and external companies and entities. To this end, it has perfectly calibrated and verified equipment.