Transmission, storage and regasification services and infrastructure

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Enagás, leader in construction and operation of gas infrastructure

Enagás is the sole transmission company for Spain’s primary natural gas transmission trunk network and Technical Manager of the Gas System. Since it was incorporated in 1972, Enagás has played a key role in introducing natural gas in Spain, building extensive infrastructures to transmit the gas throughout the country and making Spain’s gas system one of Europe’s best in terms of security and diversity of supply.

Enagás’s role as a transmission system operator (TSO)

By virtue of Royal Decree-Law 6/2009 of 30 April 2009, Enagás is the sole transmission company for the primary gas transmission trunk network, and is authorized to build, operate, and maintain liquid natural gas (LNG) regasification plants, and to transport natural gas and provide basic storage for this fuel.
The company is responsible for developing and expanding the transmission trunk network of the gas system, ensuring the infrastructure is maintained and improved in accordance with standard, coherent criteria and coordinating system planning.

The hive-down of Enagás, S.A. was approved recently, whereby this business will be named Enagás Transporte S.A.U. and stand as an independent economic unit.

Also, Enagás has been recognised as Transmission System Operator (TSO) by the European Union.

Enagás’s role as Technical Manager of the Gas System (GTS) in Spain

Enagás is also the Technical Manager of the Gas System, and is therefore required to guarantee continuity and security of supply and correct coordination between access, storage, transmission and distribution points.

Its primary duty is to ensure the Spanish gas system operates correctly, encouraging competition in a transparent and non-discriminatory fashion. Following the hive-down of Enagás, S.A., this business unit will now be named Enagás GTS S.A.U. and stand as an independent economic unit.

Enagás, both in its role as transmission system operator and Technical Manager of the Gas System is committed to quality, excellence and sustainability, and has obtained certification under ISO 9001, 14001 and 18001, the EFQM model and the DJSI World and FTSE4Good indexes.

In 2011, the company was selected as world leader in the utilities sector of the Dow Jones Sustainability Index, in further recognition of its firm commitment to sustainability.

Our infrastructure in numbers

9,540 Km of high-pressure gas pipelines.

4 regasification plants in Barcelona, Cartagena and Huelva in operation and one under construction in Gijón. Enagás holds stakes in the Bilbao (40%), Altamira (40%) and Quintero (20%) regasification plants.

5,450,000 Nm³/h equivalent to 1,298 GWh/day, of total emission capacity at Barcelona, Cartagena and Huelva plants.

18 LNG storage tanks with a total capacity of 2,337,000 m³ equivalent to 16,308 GWh.

3 underground storage facilities at Gaviota, Serrablo and Yela, which is scheduled to start operating in the fourth quarter of 2012.

International connections with France, Portugal, the Maghreb and Algeria.

1 Main Control Centre from which the Spanish gas system is coordinated.

ISO 9001, 14001 and 18001 certification for infrastructure.
The Spanish gas system

A liberalised system

The Spanish gas system is liberalised, enabling all end users to choose which natural gas shipper to use.

Access to the transmission grid is regulated, and it is managed in a transparent and non-discriminatory manner to ensure shippers can compete freely.

Royal Decree 949/2001 of 3 December 2001 regulating third-party access to gas facilities firstly establishes the facilities included in the access rules for third parties and those entitled to access these facilities. It also sets forth the procedure to follow to apply for and contract access to facilities, thereby restricting the number of contracts that have to be entered into. Furthermore, it establishes the possible reasons for rejecting access applications and it also sets third parties’ rights and duties affecting the various stakeholders in the system.

Regulated activities are remunerated through an integrated economic system.

Gas system

- **Basic network:**
  - \( P \geq 60 \text{ bar} \)
  - Primary, high-pressure gas transmission pipelines
  - Regasification plants
  - Underground natural gas storage facilities
  - Connections between basic network and gas fields or storage facilities
  - International connections

- **Secondary transmission network:**
  - \( 60 > P > 16 \ \text{bar} \)

- **Distribution networks:**
  - \( P \leq 16 \ \text{bar} \)

- **Support facilities:**
Prevailing regulatory framework

The main legislation regulating the Spanish gas system is as follows:

- Royal Decree-Law 6/1999 of 16 April 1999
- Royal Decree 949/2001 of 3 August 2001
- Planning and development of electricity and gas transmission networks of September 2002: Scope 2002-2011
- Royal Decree 1434/2002 of 27 December 2002
- Royal Decree 942/2005 of 3 August 2005
- Ministry of Industry, Tourism and Trade Order 3126/2005 of 5 October 2005 (NGTS)
- Ministry of Industry, Tourism and Trade Order 3354/2010 of 29 December 2010
- Obligatory Planning review
Enagás’s corporate purpose is to transport, store and regasify natural gas. Its regasification plants can also load and offload liquid natural gas (LNG).

The company performs its activities using high-pressure transmission infrastructure, regasification plants and underground storage facilities.

**Regasification plants**

With over 40 years’ experience, Enagás is a leader in the construction, operation and maintenance of regasification terminals. It is also a leading player in the LNG markets in Europe and worldwide.

Regasification plants play a crucial role in the gas system, as they work together in a network and provide flexibility. They are the only facilities that can raise or reduce output at the speed required to enable combined cycle thermal power plants to generate the electricity needed to cover peaks in demand.

The plants’ strategic location on the Atlantic, Mediterranean and Cantabrian coasts facilitates maritime transport and contributes to diversifying supply.

Spain is at the head of the European Union in terms of LNG storage and regasification capacities – boasting
40% and 32% of total capacity, respectively—and the number of plants. The addition of the El Musel LNG plant will also reinforce the LNG supply structure.

The regasification plants and improvements to international connections can ensure Spain becomes a gas transit country for Europe.

Approximately 75% of natural gas is supplied in LNG form.

Sources of supply

Services provided by regasification plants

- LNG methane tanker offloading
- LNG storage
- Natural gas regasification
- LNG truck loading
- LNG methane tanker loading
Regasification plants

Barcelona

Barcelona was the first plant to be commissioned in Spain. In operation since 1969, it is located on the flammables quay in the Port of Barcelona on the Mediterranean coast, enabling it to receive gas from countries such as Libya, Algeria, Oman and Egypt.

Docking capacity 80,000 - 266,000 m³ LNG
Number of LNG tanks 8*
Tank capacity 840,000 m³ LNG 5,754 GWh
Emission capacity 1,950,000 m³ (n)/h 544.3 GWh/day
LNG trucks loading 15 GWh/day (50 trucks/day)

* 2 at dismantling phase

1969
Opens with two 40,000 m³ tanks and a docking capacity of 80,000 m³

1975
Third 80,000 m³ tank

1981
Fourth 80,000 m³ tank

2003
Berthing of methane tankers with a capacity of up to 140,000 m³

2005
Fifth tank of 150,000 m³
2006
Sixth tank of 150,000 m³ and emission capacity of up to 1,650,000 m³ (n)/h

2009
Expansion of emission capacity in first phase to 1,800,000 m³ (n)/h, and to 1,950,000 m³ (n)/h in second phase.

2010
Seventh 150,000 m³ tank and docking for ships of up to 266,000 m³

2011
Eighth LNG storage tank of 150,000 m³
Regasification plants

Cartagena

The Cartagena plant, which was commissioned at the end of 1989, is located on the Escombreras Dock, in Cartagena, Murcia. It is situated on the Mediterranean coast, allowing it to service tankers from Libya, Algeria, Qatar, Oman, and Egypt, amongst others.

This plant started to play a more important role in the Spanish gas system after the Levante axis linking Barcelona to Cartagena was completed.

### Capacities

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Docking capacity</td>
<td>40,000 - 266,000 m³ LNG</td>
</tr>
<tr>
<td>Number of LNG tanks</td>
<td>5</td>
</tr>
<tr>
<td>Tank capacity</td>
<td>587,000 m³ LNG</td>
</tr>
<tr>
<td></td>
<td>4,021 GWh</td>
</tr>
<tr>
<td>Emission capacity</td>
<td>1,350,000 m³ (n)/h</td>
</tr>
<tr>
<td></td>
<td>376.8 GWh/day</td>
</tr>
<tr>
<td>LNG trucks loading</td>
<td>15 GWh/day (50 trucks/day)</td>
</tr>
<tr>
<td>LNG tanker loading</td>
<td>Medium sized/large vessels: 1,650 m³/h</td>
</tr>
<tr>
<td></td>
<td>Small vessels: 820 m³/h</td>
</tr>
</tbody>
</table>

**1989**

Opens with a 55,000 m³ tank, an emission capacity of up to 25,000 m³ (n)/h at 16 bar and 19,500 m³ (n)/h at 50 bar, and berthing for methane tankers of 40,000 m³

**1997**

Connection to basic gas pipeline network and increase in capacity to 150,000 m³ (n)/h at a pressure of 72 bar

**2000**

New dock for methane tankers with a capacity of up to 130,000 m³

**2002**

Second tank (105,000 m³) and expansion of emission capacity to 600,000 m³ (n)/h
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Third tank</td>
<td>of 127,000 m³</td>
</tr>
<tr>
<td>2006</td>
<td>Emission capacity of up to</td>
<td>1,200,000 m³ (n)/h</td>
</tr>
<tr>
<td>2008</td>
<td>Fourth storage tank</td>
<td>of 150,000 m³</td>
</tr>
<tr>
<td>2009</td>
<td>Emission capacity of up to</td>
<td>1,350,000 m³ (n)/h and docking for methane tankers with a capacity of up to 266,000 m³</td>
</tr>
<tr>
<td>2010</td>
<td>Fifth tank</td>
<td>of 150,000 m³</td>
</tr>
</tbody>
</table>
Regasification plants

Huelva

The Huelva plant is located at the mouth of the Tinto and Odiel rivers in Palos de la Frontera on the Atlantic coast. This enables it to service ships from Trinidad and Tobago, Nigeria, Peru and Guinea, amongst others.

Capacities

<table>
<thead>
<tr>
<th>Docking capacity</th>
<th>140,000 m³ LNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of LNG tanks</td>
<td>5</td>
</tr>
<tr>
<td>Tank capacity</td>
<td>619,500 m³ LNG 4,244 GWh</td>
</tr>
<tr>
<td>Emission capacity</td>
<td>1,350,000 m³ (n)/h 376.8 GWh/day</td>
</tr>
<tr>
<td>LNG trucks loading</td>
<td>15 GWh/day (50 trucks/day)</td>
</tr>
<tr>
<td>LNG tanker loading</td>
<td></td>
</tr>
</tbody>
</table>

Medium sized/large vessels: 2,500 m³/h
Small vessels: 1,900 m³/h

1988
Opens with a 60,000 m³ tank and an emission capacity of 100,000 m³ (n)/h

1992
Second tank of 100,000 m³ and emission capacity of 450,000 m³ (n)/h

2004
Third tank of 150,000 m³
Fourth tank of 159,500 m³

2006

Expansion of emission capacity to 1,350,000 m³ (n)/h

2007

Fifth tank of 150,000 m³

2010
Regasification plants

El Musel

The El Musel regasification plant (currently under construction) is located on land forming part of the expansion of the Port of El Musel in Gijón. Its location on the Cantabrian coast enables it to service ships from Norway, and to operate with the rest of Europe.

Capacities

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Docking capacity</td>
<td>65,000 - 266,000 m³ LNG</td>
</tr>
<tr>
<td>Number of LNG tanks</td>
<td>2</td>
</tr>
<tr>
<td>Tank capacity</td>
<td>300,000 m³ LNG, 2,055 GWh</td>
</tr>
<tr>
<td>Emission capacity</td>
<td>800,000 m³ (n)/h, 223.02 GWh/day</td>
</tr>
<tr>
<td>LNG trucks loading</td>
<td>10 GWh/day (30 trucks/day)</td>
</tr>
<tr>
<td>LNG tanker loading</td>
<td>Large vessels: 6,000 m³/h</td>
</tr>
</tbody>
</table>

2006
Tender awarded to Enagás by Ministry of Industry

2008
Environmental Impact Statement (EIS) obtained from Ministry of the Environment
• Planning approval obtained from Ministry of Industry
• Port administrative concession received
• Land officially handed over to Enagás
• Construction starts

2009

Expected completion date of construction

2012
Regasification plants

Altamira

The Altamira regasification plant is in Mexico. It is located on the Atlantic coast, allowing it to service ships from various places around the world.

Enagás is the plant operator and holds a 40% stake. The remaining 60% is held by the Dutch company Vopak.

Capacities

<table>
<thead>
<tr>
<th>Docking capacity</th>
<th>70,000 m³ - 217,000 m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of LNG tanks</td>
<td>2</td>
</tr>
<tr>
<td>Tank capacity</td>
<td>300,000 m³ LNG</td>
</tr>
<tr>
<td></td>
<td>2,055 GWh</td>
</tr>
<tr>
<td>Emission capacity</td>
<td>800,000 m³ (n)/h</td>
</tr>
<tr>
<td></td>
<td>223.02 GWh/day</td>
</tr>
</tbody>
</table>

2003
• Tender awarded
• Planning approval and operating permit obtained from Mexican Energy Regulatory Commission (CRE)
• Construction starts

2006
Construction completed and plant commissioned

2011
Acquisition of terminal by Vopak (60%) and Enagás (40%)
Transmission, storage and regasification services and infrastructure
Regasification plants

**Quintero**

The GNL Quintero regasification plant is located on Quintero bay, in Chile. Enagás has acquired 20% of the plant and the remaining shareholders are ENAP (Empresa Nacional de Petróleo de Chile), Endesa Chile, Metrogás and BG Group, each with a 20% interest.

### Capacities

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Docking capacity</td>
<td>120,000 – 180,000 m³</td>
</tr>
<tr>
<td>Number of LNG tanks</td>
<td>3</td>
</tr>
<tr>
<td>Tank capacity</td>
<td>334,000 m³ LNG 2,287.9 GWh</td>
</tr>
<tr>
<td>Emission capacity</td>
<td>625,000 m³ (n)/h 174.45 GWh/d</td>
</tr>
</tbody>
</table>

### Timeline

- **2006**: Project awarded to BG
- **2007**: Incorporation of the company owning the regasification plant, GNL Quintero S.A., whose shareholders are BG Group (40%), ENAP (20%), Endesa (20%) and Metrogás (20%)
- **2011**: Start of commercial operations
- **2012**: Enagás’s acquisition of 20% of the terminal shares to BG Group
Transmission, storage and regasification services and infrastructure
Transmission network

Enagás boasts an extensive transmission network in Spain enabling it to transport gas anywhere in the country. The gas infrastructure is interconnected through over 9,000 km of high-pressure gas pipelines, 18 compressor stations and 443 Regulation and/or Metering stations, securing the supply of natural gas even during peaks in demand.

Gas pipelines

Enagás gas pipeline network allows it to meet natural gas demand while ensuring there is sufficient margin to secure supply as per the criteria set forth in European legislation on Security of Supply.

System capacity will be boosted by the commissioning of new facilities, thereby eliminating possible congestion points and giving more flexibility to the system.

Enagás has a network of over 9,540 km, with 16 large gas pipelines. The average diameter of the pipes is 28” and 98.4% is piggable (e.g. can be controlled by electronic devices known as pigs).

<table>
<thead>
<tr>
<th>Gas pipeline</th>
<th>Length</th>
<th>Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al Ándalus</td>
<td>942.23</td>
<td>48-36-20-16-12-10-8-6</td>
</tr>
<tr>
<td>Algete-Haro</td>
<td>837.87</td>
<td>26-16-12-10-8-6-4</td>
</tr>
<tr>
<td>Algete-Yela</td>
<td>86.9</td>
<td>26</td>
</tr>
<tr>
<td>Almería-Chinchilla</td>
<td>336.41</td>
<td>42-20</td>
</tr>
<tr>
<td>Baleares</td>
<td>333.67</td>
<td>24-20</td>
</tr>
<tr>
<td>Córdoba-Madrid</td>
<td>1,255.60</td>
<td>32-26-20-16-12-10-8-6-4</td>
</tr>
<tr>
<td>Eje Levante</td>
<td>1,038.11</td>
<td>40-32-30-26-24-20-16-12-10-8-6</td>
</tr>
<tr>
<td>Eje Transversal</td>
<td>268.17</td>
<td>36-30</td>
</tr>
<tr>
<td>Extremadura</td>
<td>251.2</td>
<td>32</td>
</tr>
<tr>
<td>Huelva-Córdoba</td>
<td>494.3</td>
<td>30-26-20-16-10-8-6-4</td>
</tr>
<tr>
<td>Noroeste-Cantábrico</td>
<td>894.46</td>
<td>20-16-14-12-10-8-6</td>
</tr>
<tr>
<td>País Vasco</td>
<td>267.47</td>
<td>30-26-24-20-16-10-6</td>
</tr>
<tr>
<td>Ruta de la Plata</td>
<td>690.67</td>
<td>26-20-16-10</td>
</tr>
<tr>
<td>Tivissa-Barcelona</td>
<td>427.35</td>
<td>36-26-20-16-12-10-8-6-4</td>
</tr>
<tr>
<td>Valle del Ebro</td>
<td>1,165.6</td>
<td>30-26-20-14-10-8-6-8</td>
</tr>
<tr>
<td>Yela-Vilar de Arnedo</td>
<td>251.36</td>
<td>30</td>
</tr>
</tbody>
</table>
Enagás’s network also includes 282.7 km of off-shore gas pipelines, all with a diameter of 20”.

These are:

- Sea-line Puerto de Barcelona – Besós (Barcelona)
- Denia (Alicante) – S. Antoni de Portmany (Ibiza)
- S. Antoni de Portmany (Ibiza) – S. Juan de Dios (Mallorca)

**Transmission centres**

Enagás has 49 transmission centres across Spain, to carry out maintenance and control over the gas pipelines making up the transmission system.

These centres are grouped functionally into three transmission units: North, South and East.
Compressor stations

Enagás currently has 18 compressor stations which allow the gas to be sent through the gas pipeline network under a guaranteed pressure. At these facilities, the gas pressure is increased to a maximum of 72/80 bar so as to increase pipeline transmission capacity.

Each compressor station is tailored to the capacity of the gas pipeline in which it is situated and the power rating and design of its turbocompressors.

The compressor stations are operated remotely from the Main Control Centre (Dispatching) or through an in-house station control system (SCS).

### Technical specifications

<table>
<thead>
<tr>
<th>Compressor station</th>
<th>Compressors</th>
<th>Total installed capacity (kW)</th>
<th>Authorised flow (kNm³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcázar de San Juan</td>
<td>2+1</td>
<td>45,870</td>
<td>1,050</td>
</tr>
<tr>
<td>Algete</td>
<td>1+1</td>
<td>8,216</td>
<td>345</td>
</tr>
<tr>
<td>Almendralejo</td>
<td>4/1*</td>
<td>21,854</td>
<td>850</td>
</tr>
<tr>
<td>Bañeras</td>
<td>3/2*</td>
<td>27,200</td>
<td>1,125</td>
</tr>
<tr>
<td>Chinchilla</td>
<td>2+1</td>
<td>45,870</td>
<td>–</td>
</tr>
<tr>
<td>Córdoba</td>
<td>4+1</td>
<td>57,605</td>
<td>2,200</td>
</tr>
<tr>
<td>Crevillente</td>
<td>1+1</td>
<td>22,400</td>
<td>645</td>
</tr>
<tr>
<td>Denia</td>
<td>2+1</td>
<td>49,000</td>
<td>400</td>
</tr>
<tr>
<td>Haro</td>
<td>1+1</td>
<td>22,370</td>
<td>590</td>
</tr>
<tr>
<td>Montesa</td>
<td>2+1</td>
<td>33,555</td>
<td>800</td>
</tr>
<tr>
<td>Navarra</td>
<td>1+1</td>
<td>37,176</td>
<td>590</td>
</tr>
<tr>
<td>Paterna</td>
<td>3/1*</td>
<td>29,210</td>
<td>820</td>
</tr>
<tr>
<td>Puertollano</td>
<td>2+1</td>
<td>10,522</td>
<td>465</td>
</tr>
<tr>
<td>Sevilla</td>
<td>2+1</td>
<td>43,620</td>
<td>1,220</td>
</tr>
<tr>
<td>Tivissa</td>
<td>2+1</td>
<td>33,496</td>
<td>800</td>
</tr>
<tr>
<td>Villar de Arnedo</td>
<td>2+1</td>
<td>36,300</td>
<td>341</td>
</tr>
<tr>
<td>Zamora</td>
<td>2+1</td>
<td>21,817</td>
<td>375</td>
</tr>
<tr>
<td>Zaragoza</td>
<td>2+1</td>
<td>14,013</td>
<td>530</td>
</tr>
</tbody>
</table>

* Turbocompressors at these stations do not have the same characteristics as the others
Transmission, storage and regasification services and infrastructure

Compressor stations

Gas pipeline

Compressor station

Santa Cruz de Tenerife
Las Palmas de Gran Canaria
Compressor stations

Algete
Alcázar de San Juan
Almendralejo
Paterna
Córdoba
Denia
Navarra
Puertollano
Villar de Arnedo
Zamora
Regulation and/or Metering Stations (MS/RMS)

Enagás boasts 443 regulation and/or metering stations. The Metering Stations (MS) measure the natural gas entering and leaving the gas system, or exchanged by national and international operators.

The Regulation and Metering Stations (RMS) are located at the points at which gas is delivered to other transmission and distribution networks. In these stations, gas pressure is reduced to 16 bar, as a means of starting the process of adaptation to final pressure which is used by companies and private individuals.

These stations also measure the natural gas exchanged by national and international operators.

Facilities of this kind are constantly being built and brought into service, responding to requests for new delivery points from gas distribution and transmission companies and eligible customers connecting their direct line.
International connections

The Spanish gas system is connected by gas pipeline to France, Portugal, the Maghreb and Algeria.

Enagás, which is a member of the South Gas Regional Initiative alongside other European transmission companies, is working to expand the capacity to export natural gas to Europe through France, which is still limited.

Improved international connections with France would enable Spain—which has the most regasification plants in Europe—to position itself as a gas transit country and contribute to the security of supply to the rest of the continent.

International connections have Ultrasound Measurement Systems (MUS) with redundant capacity, which offer more precision than traditional metering through turbines. Additionally, meter supervisor systems have been installed to allow real time monitoring of natural gas parameters and warn through alarms of any deviation from established tolerance levels.
Underground storage facilities

Serrablo

The Serrablo underground storage facility is located in the province of Huesca, between the towns of Jaca and Sabiñánigo. It was the first gas field in Spain to be converted into a storage facility following the depletion phase in February 1989.

<table>
<thead>
<tr>
<th>Underground storage</th>
<th>Cushion gas (Mm³)</th>
<th>Working gas (Mm³)</th>
<th>Injection capacity Mm³ (n)/day</th>
<th>Withdrawal capacity Mm³ (n)/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serrablo</td>
<td>140</td>
<td>280</td>
<td>680</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.8</td>
</tr>
<tr>
<td>Total 1,100 Mm³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1978/1983

- Discovery of natural gas deposits at Aurín and Jaca (Huesca) by ENIEPSA (currently Repsol Exploración)

1984

- Start of operations at Serrablo field
1989
• End of the production phase and adaptation of the field. Start of underground storage activities

1991
• Contract signed for sale of the storage facility between Enagás and Repsol
Underground storage facilities

**Gaviota**

The Gaviota underground storage facility is located in the Bay of Biscay, 8 Km. off Cape Matxitxako, north east of Bermeo (Bizkaia).

The underground structure is 2,150 metres deep. It is accessed from a platform anchored to the seabed and connected by a gas pipeline to an onshore processing plant.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>Vizcaya B and C coastal exploration permits awarded</td>
</tr>
<tr>
<td>1980</td>
<td>First exploratory survey and discovery of the Gaviota natural gas field</td>
</tr>
<tr>
<td>1982/83</td>
<td>Feasibility studies confirming the possibility of commercial exploitation</td>
</tr>
<tr>
<td>1983</td>
<td>Gaviota I and II operating concessions awarded until 2013</td>
</tr>
<tr>
<td>1984</td>
<td>Start of construction of the platform and onshore installations. Laying on the pipelines joining the two facilities</td>
</tr>
</tbody>
</table>

### Cushion gas (Mm³)

<table>
<thead>
<tr>
<th>Underground storage</th>
<th>Extractable capacity</th>
<th>Non-extractable capacity</th>
<th>Operating capacity</th>
<th>Injection capacity Mm³ (n)/day</th>
<th>Withdrawal capacity Mm³ (n)/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaviota</td>
<td>567</td>
<td>1,134</td>
<td>980</td>
<td>4.5</td>
<td>5.7</td>
</tr>
</tbody>
</table>

**Total 2,681 Mm³**
Start up and commencement of drilling of first well

First commercial output of gas

Gaviota opens as underground storage facility after production ceases and necessary adaptation is complete

Enagás acquires Gaviota
Underground storage facilities

Yela

The Yela underground storage facility is located in the municipal area of Brihuega in the province of Guadalajara. It is a saline fossil aquifer 2,300 metres below the surface of the Earth.

Its strategic location in the centre of Spain makes it a key piece of infrastructure for guaranteeing supply.

<table>
<thead>
<tr>
<th>Underground storage</th>
<th>Cushion gas (Mm³)</th>
<th>Working gas (Mm³)</th>
<th>Injection capacity Mm³ (n)/day</th>
<th>Withdrawal capacity Mm³ (n)/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yela</td>
<td>950</td>
<td>1050</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Total 2,000 Mm³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1991  Seismic survey carried out in central Spain
1998/2004  Study of the Santa Bárbara structure using seismic and other exploratory surveys
2007  Enagás obtains the operating concession and recognition for public use for the Yela storage facility
2008
Environmental Impact Statement obtained

2009
Government Authorisation obtained and work starts

2012
Storage facility starts operating
Transmission, storage and regasification services and infrastructure
Enagás boasts the most cutting-edge natural gas measurement and quality control systems. In addition to traditional turbine flow meters, it uses ultrasound measurement systems (MUS).

Since 2006, Enagás’s measurement process has been ISO 9001:2000 certified by Lloyd’s (LRQA), guaranteeing the company’s commitment to continuous improvement, standardisation and traceability of processes.

The measurement of natural gas is carried out using appropriate equipment that has been metrologically approved and using the regulation in force for its calculation. The measurement unit for energy is kWh.

The reference units for volume are normal cubic metres \(m^3\) (n), or 1.01325 bar and at a temperature of 0º C.

Energy calculations are carried out according to the High Calorific Value (HCV) of natural gas, which is obtained through analysis of the natural gas using gas chromatography analysis equipment.

Measurements are carried out in Transmission–Transmission, Transmission-Distribution and Transmission–Direct line connections, underground storage fields, loading and offloading of tankers, loading of LNG trucks and international connections.

Natural gas chromatography equipment is used to show the composition of natural gas and the High Calorific Value (HCV) needed for the measurement units to calculate the energy distributed.

The Custody Transfer is carried out at the regasification plants, where the energy loaded or offloaded from methane tankers is determined according to procedures accepted and recognised by the parties.

Systems to measure levels, temperature and pressure on the tankers are used to do so, while the quality of the LNG is determined using gas chromatography, where the gas has previously been vaporised.
Furthermore, trucks are loaded with LNG at the regasification plant, to deliver to customers who are still not connected to the natural gas system network. Chromatography used for SCP is also used to determine the energy loaded, in addition to scales to weigh the LNG truck with metrological certification.

Natural gas pumped into the Spanish gas system must comply with quality standards established by the Technical System Management Regulations and the Detailed Protocol PD-01, “Gas Measurement, Quality and Odorization”.

The specifications that gases from non-traditional sources such as biogas, gas obtained from biomass or other gases obtained from microbe digestion must meet are also determined.

Among other services Enagás offers services related to Natural Gas Measurement and Quality. The company has several laboratories, functioning since 1987, located at kilometre 18 of the Madrid-Zaragoza motorway in Zaragoza.

The High-Pressure Meter Calibration Bed (LACAP) ranks among Enagás most important facilities.

This installation, which is a Spanish and international benchmark, has been accredited by the Entidad Nacional de Acreditación (ENAC) since February 2011.

The high-pressure meter calibration bed has the following features:

• Pressure from 3 to 50 bar
• Diameter from 2” to 24”
• Maximum flow rate of 10,000 Nm³/h (G-6500)
• Two calibration lines.

The laboratories also have the facilities to carry out meter calibration at atmospheric level (up to 20”), household meter calibration, gas samples analysis and instrument trials. This is also certified by ENAC.
### Third-party access (TPA) services

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regasification</td>
<td></td>
</tr>
<tr>
<td>LNG methane tanker offloading</td>
<td></td>
</tr>
<tr>
<td>LNG loading in methane tankers</td>
<td></td>
</tr>
<tr>
<td>LNG truck loading</td>
<td></td>
</tr>
<tr>
<td>LNG storage</td>
<td></td>
</tr>
<tr>
<td>Natural gas transmission</td>
<td></td>
</tr>
<tr>
<td>Natural gas Import/export</td>
<td></td>
</tr>
<tr>
<td>Natural gas storage</td>
<td></td>
</tr>
<tr>
<td>Regasification plants</td>
<td>Regasification plants</td>
</tr>
<tr>
<td>Gas pipelines</td>
<td></td>
</tr>
<tr>
<td>Underground storage facilities</td>
<td></td>
</tr>
</tbody>
</table>
Services provided at regasification plants

Regasification

Enagás offers a regasification service at its plants, which involves vaporizing the liquid natural gas transported in methane tankers to enable it to be pumped into the transport network as a gas. The natural gas therefore has to be stored in tanks.

Enagás has regasification plants in Barcelona, Huelva, Cartagena and El Musel –under construction– which can accept LNG from anywhere in the world.

Ship offloading

Before offloading the first shipment from a methane tanker, Enagás requests a report assessing the ship’s compatibility with the plant. Gas can only be offloaded if a ship has satisfactorily passed the vetting procedures set forth by internationally-renowned companies specialising in evaluating LNG transport vessels.

The Barcelona, Cartagena and, shortly, the El Musel plants boast docks that can accept the largest ships in the world –Qmax and Qflex– which have a capacity of up to 266,000 m³ of LNG.
LNG loading in methane tankers

The activity of loading methane tankers with LNG has increased substantially in recent years, driven by the international spot price for LNG.

In line with its commitment to customer service, Enagás has invested in its plants to cut loading times. The El Musel plant will have a higher loading rate, as it was designed during the engineering phase to provide this service.

LNG truck loading

Enagás has three truck loading facilities at its Barcelona, Huelva and Cartagena plants, and will have another two at El Musel. This service, which is continually growing, was initially contracted to meet the needs of supply of populations or customers that were still not connected to the transmission network. Subsequently, the emergence of solar thermal electric plants has led to a greater need for this service.

Currently, Enagás’s plants load an average of 140 trucks per day with LNG to transport it to the satellite regasification plants throughout Spain and abroad.

LNG storage

The LNG storage service includes the right of use of the installations necessary for the storage of LNG in the regasification plants.

This service is provided under regasification contracts.

### Loading rates

<table>
<thead>
<tr>
<th>Location</th>
<th>Large vessels</th>
<th>Small vessels</th>
<th>Medium/large vessels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huelva</td>
<td>2,500 m³/h</td>
<td>1,900 m³/h</td>
<td>1,650 m³/h</td>
</tr>
<tr>
<td>Cartagena</td>
<td>1,650 m³/h</td>
<td>820 m³/h</td>
<td></td>
</tr>
<tr>
<td>El Musel</td>
<td>6,000 m³/h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Services provided at the transmission network

Natural gas transmission

Enagás reserves the capacity in the transport and distribution network entry points, and transports the natural gas from these points until it is delivered to the connections with other transmission and distribution companies, direct pipelines and international connections.

This service offers customers use of the facilities required to transport the gas from the entry points to the delivery points, and to avail of storage capacity.

Enagás uses the following infrastructure with an entry point to the transmission system to provide this service:

- Barcelona regasification plant
- Huelva regasification plant
- Cartagena regasification plant
- Tarifa international connection (with the Maghreb pipeline)
- Almería international connection (with the Medgaz pipeline)
- Larrau international connection (with France)
- Badajoz international connection (with Portugal)
- Tuy international connection (with Portugal)

Natural gas import/export

Gas is imported through the entry points —international connections— and delivered through an exit point in the Spanish system.

Gas in transit service (export) includes transporting natural gas from an entry point in the system to the point of delivery via an international connection.

The access contract should include specifics regarding entry and exit points as well as the contracted flow rate.

Enagás is the owner of the following international connections:

- Larrau international connection (with France)
- Badajoz international connection (with Portugal)
- Tuy international connection (with Portugal)
- Almería international connection (with the Medgaz pipeline)
- Tarifa international connection (with the Maghreb pipeline)

Service provided at underground storage facilities

Natural gas storage

This service enables shippers to store natural gas underground, and use the services necessary to inject and extract this natural gas.
Requirements for contracting in the Spanish gas system

Parties must notify the pertinent authority and, in any event, the Ministry of Industry, Energy and Tourism, when they start or end operations, attaching a declaration to the notification affirming compliance with regulatory requirements (complete form set forth in Law 25/2009 of 22 December 2009).

If the company or the parent of this company’s group belongs to a country which is a non-EU member where analogous rights are not recognised, and it is considered that the principle of reciprocity may be affected for those companies operating in the national market, prior authorisation is required from the pertinent authority.

Once authorisation is published on the website of the National Energy Commission (CNE), a request can be made to contract a service.
Contracting capacity

A formal application is filed to initiate the process of contracting capacity. A contract is signed once the viability of the service is confirmed.

Application and contract templates can be downloaded from the Gas transmission/Contracts section of Enagás’s website.

- Gas trading
- Bilateral negotiation of exchanges

Counterflow, interruptible and firm capacity

Entry and exit capacities are reserved as firm capacity or as interruptible or counterflow capacities in the case of saturated international connections.

When a shipper contracts firm capacity, it is assured that the service will be fully available during the entire contract term. However, if it contracts interruptible capacity, the service could be temporarily suspended. Shippers may avail of this interruptible service by requesting access for a new consumer or to extend an existing consumption contract, as long as the gas pipeline is saturated.
Before 15 March each year and pursuant to the ruling of the Directorate General of Energy Policy and Mines, the Technical Manager of the Gas System must present an action proposal for the areas of potential congestion and the maximum volume of interruptible capacity for the period from 1 October to 30 September.

Contracting this form of access requires the signing of an agreement between the consumer, the shipper if necessary, and the Technical Manager of the Gas System. If the consumer is an electricity generator, the Electricity System Operator must also be party to the agreement.

In international connections, Enagás will offer unused capacity to third parties on an interruptible basis for each of the possible flow directions, provided the maximum capacity that can be contracted has been depleted.

Shippers may access counterflow capacity through international connections provided firm capacity is available in the desired direction of flow.

The capacities of Enagás’s facilities are provided on the company’s website (www.enagas.es).

**Short- and long-term capacity**

Long-term capacity consists of capacity contracted for a period of two years or more, while any capacity contracted for shorter periods is considered to be short-term.

As an owner of regasification, transmission and storage facilities, Enagás is obliged to reserve at least 25% of the total capacity of these facilities for short-term contracts.

Equally, an individual shipper cannot contract more than 50% of the capacities allocated for this purpose.
Tolls and fees

Access capacity can be contracted on a daily, monthly and annual basis. Different types of toll may be applied depending on the duration and timing of the contracted capacity.

Contracts of a year or more have an annual toll. A monthly toll is charged for contracts lasting for less than a year, provided that the contracts are in force for the entire month of invoicing.

The starting point for calculating the tolls set forth in Royal Decree 949/2001 of 3 August 2001 are annual tariffs, established by Ministerial Order, determining the tolls and fees for the six-monthly period in which the services are provided.

Transmission and distribution tolls for transmission components will depend on the connection and consumption pressure.

The reserve capacity component (TFrc), the fixed component of the toll (Tfr) and the fixed component of the transmission toll (Tfi) applicable to access capacities contracted for periods of less than a year are calculated using the rates set forth in the Ministerial Order determining the tolls and fees for the year in which the services are provided.

The prevailing transmission and distribution toll of 1.3 multiplied by a factor of 0.7 will be applied for natural gas earmarked for exportation through an onshore international connection.

The Gas transmission/Contracts section of the website provides a services simulator which can be used to estimate the cost (tolls and fees) of the different services.

Reduction of contracted capacity

Any access capacity contracted for periods of more than a year can be reduced once a period of 12 months has elapsed from the date on which the initial capacity was reserved and used or the contract amended. Three months’ notice must be given, or a month’s notice in the case of a loss of customers.

Contract cancellation

Contracts can be terminated under the same terms set forth for reductions. In the case of a transportation component, the shipper must notify the distributor and consumer of the contract termination giving at least six working days’ notice.
Capacity transfers

The transfer of capacity enables a shipper to divert contracted capacity from one regasification plant to another, provided that it does not harm the gas system or third parties.

The following conditions must be fulfilled for transfers to be authorised:

- They must be for the entire term left to run on the access contract.
- They must be executed at the start of a calendar month and notice must be given thereof with sufficient warning to avoid affecting the binding LNG tanker offloading schedule.
- As an alternative to capacity transfers, European regulations stipulate that the capacity may be traded on a secondary market to optimise short-term capacity.

Financial guarantees

Pursuant to prevailing regulations and in order to ensure the reserved capacity is used, irrespective of the payment of tolls, shippers must furnish Enagás with a guarantee. This deposit will be equal to 12 months of the corresponding fixed component of the toll (Tfr in the case of regasification, Tfe for transmission and distribution and Tf for storage), which will be applied to 85% of the contracted capacities, provided that the contracts run for a year or more.

No deposit is required for transportation component contracts.

If, six months after the contract start date or, where applicable, the date contracted capacity is amended, less than 80% of the capacity set forth in the contract is used, the contracted capacities shall be automatically reduced by the unused portion. The applicant will also lose an equal portion of the deposit provided under the terms set forth in the paragraph above.

It is deemed that 80% of the contracted capacity has been used when the capacity scheduled in one calendar month falling during the first six months from when the service commences is equal to or more than 80% of the contracted capacity.

Any unused or partially used deposit shall be refunded to the contracting party 12 months after the service commences.
Secondary capacity market

Capacity is contracted differently on the secondary market to the primary market, where capacity is contracted directly with the owner of the transmission network.

Enagás provides users with a tool to facilitate purchasing/selling the capacity contracted at its facilities, and afford agents the right to resell (recognition of transfer of rights and obligations of primary capacity) or sublease (rights not transferred) any unused contracted capacity on the secondary market.

All or part of the capacity contracted on the primary market, in terms of volume, can be traded on the secondary capacity market.

The terms and conditions of the secondary capacity market, application forms for submitting offers/requests for capacity, and a bulletin board on which sales and requests can be posted are available on Enagás’s website.

An organised secondary market also exists for capacity reserved in underground storage facilities.
Other services

Enagás also offers various unregulated additional services.

√ Laboratory certification services for quality and measurement of natural gas:

Enagás’s measurement service offers high added value to companies in the natural gas sector, customers and end consumers.

This service covers the entire chain, from the moment gas is received through a gas pipeline or in the form of LNG in methane tankers to when it is used by end consumers, with the guarantee of the certification entity.

• Calibration and testing of master equipment and instruments related to the measurement of flow and energy.

• Calibration and testing of equipment for analysing and calculating physical properties of natural gas.

• Energy and environmental audits and technical training.

• Testing of equipment and facilities to assess compliance with prevailing specifications and standards and with customer needs.

• Advisory and consultancy services in the area of natural gas measurement and quality.

• Technological support in obtaining samples and calculating the physical properties of natural gas and LNG, measuring flow/energy content, and assessing gas quality, security of LNG storage and natural gas transport.

For further information on Gas Measurement and Quality Services see page 38.

√ Training services management

√ Management of TPA commercial services

• General overview of the gas system

• Scheduling service

• Short- and long-term balancing services

√ Other services related to infrastructures

• Operational services
  • Emergencies
  • Loading intervention
  • Bringing new gas pipelines into service
  • Remote control/dispatching of facilities

• Maintenance services
  • Monitoring of gas pipelines
  • Leak detection
  • Preventive inspections of facilities
  • Corrective maintenance of facilities
  • Technical assistance and cryogenic equipment maintenance

• Cathodic protection services
  • Inspections and maintenance of cathodic protection
  • Cathodic protection reviews
  • Injection of operating gas
  • Technical support
Since 2005, as the Technical Manager of the Gas System (GTS), Enagás provides users with a gas exchange system which can be used for the following:

- Gas trading
- Bilateral negotiation of exchanges
- Supply of gas to redress imbalances

These operations can be performed at:

- COS: Commercial Operating Storage Facilities
- US: Underground storage facilities
- Regasification plants

The trading platform used to make sales, purchases or exchanges is called the TPA exchange system (MS-ATR).
This system offers similar services to those available in European organised markets, although it lacks liquidity and price transparency.

An effort is therefore being made to establish a hub in Spain, which will permit our country to become a leading centre for the south of Europe.
Network access. Connections

Connection points to distribution networks and other transmission networks

Through this service, it is possible to contract the construction or enlargement of a physical connection with the Enagás transmission gas pipeline.

Once this has been accomplished, transmission companies can connect their infrastructure to the basic gas pipeline network or the distributor can supply natural gas to their distribution network.

There are three types of connection:

- Transmission-Transmission connection: connecting one transmission company’s facilities with those of another.

- Transmission-Distribution connection: connecting a transmission company’s facilities with those of a distributor.

- Transmission-Direct line connection: connecting a transmission company’s facilities with those of a direct pipeline.

A direct pipeline is a gas pipeline that is solely for connecting the facilities of a qualified consumer with a transmission company’s gas system. Direct pipelines mainly connect with combined cycle thermal power stations.

This service makes it possible to contract the construction of a physical connection to Enagás’s transmission gas pipeline to which a direct line can be attached.

The provision of these services is governed by the legislation in force. Before authorising access to its facilities, a technical/financial viability report is drawn up on the conditions of the connection.
As Technical Manager of the Gas System, Enagás uses the TPA logistics system as a tool for exchanging information related with applications for capacity, measurements, allocation, etc. with system operators.

This system can be used to manage all the information needed for the gas market to function correctly.

In order to access the TPA logistics platform, an operating permit is required from the pertinent authority and a TPA logistics system terms of use agreement must be signed.

Shippers are able to access the following modules:

- Applications: requests for capacity, amendments or transfers.
- Scheduling: submission of scheduling by screen or file for monthly or weekly scheduling to regasification plants, transmission network or distribution network.
- Nominations: submission of nominations, by screen or file, to regasification plants or transmission network, these last ones divided by distribution network or as a total amount, based on records of the distribution network.
• Renominations: submission of renominations by screen or file to regasification plants, transmission network or distribution network.

• Measurements: submission of measurements by screen or file of exchanges (sale-purchase), direct lines, supply points where contract has been entered into.

• Queries: queries about existing contracts to which the user is party in regasification plants, transmission networks and distribution networks; queries regarding monthly and weekly scheduling, nominations and renominations, measurements, distribution, balancing and quality data in the RMS upstream from the contracted distribution points.

• TPA exchange system (gas secondary market): access to the module through a “User” and “Password” window, through which a user can also access the TPA logistics system using the same authentication.

• Matching process and N*M: Commercial operations for points in the RPCP, ICP, USCP and TTCP (Regasification plant, International connection, Underground Storage and Transport-Transport Connection Points, respectively) categories are sent indicating the counterparty in the infrastructure at the other end of the point (N*M points) and the quantities sent are also matched (matching process).

**Bulletin Board for secondary capacity market**

The Secondary Capacity Market Bulletin Board is currently the only place where authorised users can post bids for and offers of capacity contracted at the facilities operated by Enagás.

This document is owned and managed by Enagás.

**Enagás website**

Information on Enagás's infrastructure, services provided and how to contract these services is provided on the Enagás website (www.enagas.es).
Service quality

Committed to customers

Enagás’s customer management model revolves around a commitment to quality and excellence in the service provided.

Enagás has therefore set up various channels to encourage communication between customers and company, which also enable Enagás to address their requests, and collect information on customer expectations and their degree of satisfaction regarding their relationship with the company.

Customer satisfaction surveys

This is one of the main instruments underpinning the annual improvement plan, since it provides information on not only the importance of the services that Enagás provides to its customers, but also on their satisfaction with these services.

Account managers

Responsible for Enagás’s customer relationship. They monitor customers’ needs and provide them with advice on new products and services.

Regular meetings

Meetings with customers aimed at analysing their market position. These meetings cover any issues that could be in customers’ interests and are also used to present new options and new business opportunities for them to consider.

Main Control Centre (Dispatching)

As the Technical Manager of the Gas System (GTS), Enagás provides 24-hour/365-day cover for emergency situations and calls from customers regarding operations in the Spanish gas system from its Main Control Centre (Dispatching). Incidents may either be detected through Enagás systems (SCADA) or reported by external agents (third parties, control centres, security staff, etc.).

Third-party access Logistics System (SL-ATR)

This system provides flexible, real time communication between the various parties involved in the Spanish gas system, thus supporting the management of the entire gas cycle: applications for capacity, contracting, programming and nominations, viability responses, the underground storage rights market, measurements, gas quality, distribution, balancing and billing.

Enagás website

Includes up-to-date information required to manage the Spanish gas system and dealings between the different agents involved (shippers, transmission companies, distributors, etc.). It also features corporate information on Enagás and allows all stakeholders to contact the company.

Customer newsletter

Initiative rolled out in 2010 to supplement the standard channels of information, the ultimate aim being to offer customers a new direct channel through which to obtain information on third-party access (TPA) services, the current state of Enagás infrastructures and any other issues that may be of interest to them.
Sustainable Management Model

Enagás’s Sustainable Development Model rolled out across the company is a crucial tool for driving change through innovation and improvements in the organisation.

It uses evaluation mechanisms in the areas of Quality, Excellence and Sustainability, and has three main pillars:

- A governance model that defines responsibilities for Quality, Excellence and Sustainability in the various organisational levels and involves all departments of the company.

- Assessment tools to identify improvements in different areas of the company’s management and relations with our stakeholders.

- A specific action plan that sets out and integrates lines of action related to the areas of improvement identified.

Recognition of the Model
Editing
Enagás, S.A.
Communications Department

Design and typesetting
Global Diseña, S. L.

Reprography
Global Diseña, S. L.

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