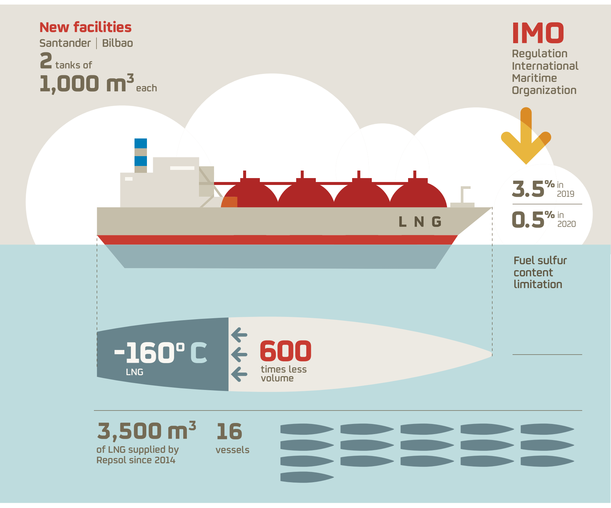


LNG makes headway as a marine fuel

Liquefied natural gas (LNG) is an alternative fuel that is increasingly valued by shipowners for use in maritime transport. It reduces emissions and complies with IMO 2020, the regulation of the International Maritime Organization (IMO), which will enter into force on 1 January 2020.

The IMO regulation will limit the sulfur content of fuels used for maritime transport, going from the 3.5% currently permitted to 0.5% in 2020. In this sense, Repsol has opted for LNG for its various advantages, above all its environmental ones. Since 2014, the company has supplied more than 3,500 m^3 of this fuel to 16 ships.

"As a multi-energy supplier, Repsol has added LNG to its extensive portfolio of marine fuels", explains Laura Rejón Pérez, Repsol's Wholesale & Gas Trading Director. This is "a product that is also aligned with our emissions reduction targets, as we consider gas to be a key fuel in the energy transition".

Repsol's bunkering business has supplied more than 3,500 m^3 of LNG to 16 different ships since 2014

Repsol recently signed an agreement with Brittany Ferries to supply its vessels in Spain. Part of its fleet will cover, starting in 2022, the route between the United Kingdom and northern Spain with LNG-fueled ferries. This agreement represents a new initiative by the company to develop its bunkering, or marine fuel supply, service.

Repsol has the experience to supply LNG at any Spanish port, a business that the company wants to focus on, both for one-off supplies and in long-duration contracts, as part its growth strategy in the gas sector, and in the low-emissions businesses.

A network with logistical flexibility

The volume of natural gas, when liquefied at a temperature of -160º C, is approximately 600 times smaller than in its gaseous state, which makes its transport by sea and storage in regasification plants possible. Spain, which has a leading infrastructure in Europe for supplying LNG, has six operative plants distributed along its coast. Before being regasified and sent by gas pipeline to households and businesses, LNG bunkering draws on that gas, still in liquid form, to supply it as fuel.

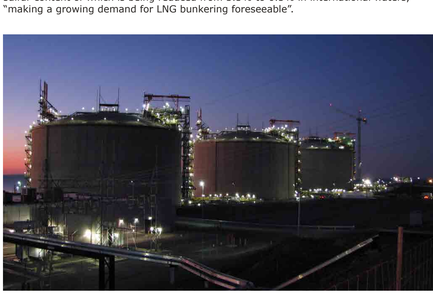
The operation can be performed from tanker trucks, the method Repsol has most often used to date; through supply ships that pull up alongside the receiving boat; or directly from the terminal. "For Brittany Ferries", continues Laura Rejón Pérez, "we are going to develop an intermediate storage facility that guarantees the supply". In the two Spanish ports where the shipping line operates, Santander and Bilbao, 1,000 m^3 tanks, filled by tanker trucks, will be installed for periodically refueling the vessels.

Repsol, "with technical experience in LNG and in conventional bunker supplies of fuel oil and marine distillates", has the capacity to supply using tanker trucks in any Spanish port. An operational flexibility recently exemplified "when a ship that we had to supply in the port of Ferrol ultimately had to anchor in Vigo due to a storm, and it was necessary to react quickly to be able to service it there. An operation that was carried out successfully thanks also to the agility of our suppliers and the Port Authority", explains Laura Rejón Pérez.

With LNG bunkering, the company is strengthening its commitment to gas as key fuel in the energy transition

Environmental advantages

LNG does not generate emissions of sulfur oxides (SOx) or particulate matter (PM), reduces CO_2 emissions by 20%, and emits 90% less nitrogen oxides (NOx). IMO 2020 "is especially strict with sulfur oxide emissions from fuels", the maximum sulfur content of which is being reduced from 3.5% to 0.5% in international waters, "making a growing demand for LNG bunkering foreseeable".



Supplying a ship in the port of Cartagena with 11 tanker trucks is the largest operation carried out by Repsol to date

There are two types of motorization for use of LNG: dual, which enables operation with fuel, diesel or LNG, and ships that consume only gas. "We supply both types of ships interchangeably, as we analyze in detail their characteristics prior to supply and adapt our methods". LNG occupies a larger volume than other fuels for the same energy content, but the autonomy of the ships "depends solely on their storage capacity and consumption. Any type of ship can use this type of fuel from a technical standpoint".

Infrastructure for regular routes

Vessels that follow fixed sea routes, like ferries, cruise ships and container ships, are the first ones to implement LNG. Their regularity facilitates the development of infrastructures and medium-term contracts that justify the investment by minimizing the risk. Moreover, Repsol also receives orders for one-off supplies.

The largest operation carried out to date by the company was of this type. Last December, using 11 tanker trucks, it supplied 430 m^3 of LNG, in the port of Cartagena to the Paul A. Desganés, a tanker measuring 135 meters in length and 23 in width. Having recently left the Turkish shipyard of Besiktas, the ship was refueling on its way to Canada, where it will be used to transport petroleum products.

Supply guarantee

According to data from Gasnam (Iberian Association of Natural Gas for Mobility), the worldwide LNG-powered shipping fleet will grow by 87%, to 254 in 2020, compared to the 136 ships in operation in 2018. The main challenge for making LNG a global marine fuel "is guaranteeing the supply to shipping lines and, up to now, the infrastructures were being developed mainly in North America and northern Europe", states Laura Rejón.

To boost the competitiveness of Spain's logistics system, "which has an ideal geographic location for supplying both Atlantic and Mediterranean traffic", Repsol has also collaborated on projects with European financing, such as Core LNGas hive, which in 2017 carried out the first direct supply of a ship from a regasification plant in Cartagena.

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