



Europe as the New Frontier for LNG Exports

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Abstract

Europe is on a process of de-carbonization and diversification of energy sources.

If European policies will be implemented, the European Union will replace coal and oil with natural gas and renewable energy as sources of energy production.

Because Russia is currently the main gas supplier to Europe, and most of its gas is exported by pipeline, European diversification policy will increase gas imports from other countries.

Most new gas suppliers will not be able to use existing pipelines, either because they are very distant from Europe (as in the case of Qatar and the United States) or because their pipelines are not connected with the European gas grid (such as Algeria, which has two pipelines carrying gas to Spain, a country that is not connected with the rest of the European pipeline network).

Therefore, new gas exports to Europe will be in the form of liquefied natural gas (LNG), which can be shipped by sea.

New discoveries of natural gas in the East Mediterranean, the Leviathan in Israel and the Zohr in Egypt, will increase LNG supply to Europe. The United States is building the infrastructure to export LNG and European gas importers are subscribing the future production of new American liquefaction plants.

European countries already have the infrastructure to import LNG, with 21 on-stream storage and regasification terminals (including Izmir and Marmara terminals in Turkey), a further four are under construction and there are currently plans to build eight more. Several of these terminals, such as Livorno in Italy and Świnoujście in Poland, are underutilized.

Advanced liquefaction technologies have reduced LNG prices making it more competitive as an alternative to pipeline gas.

In the next future, Europe could become the new frontier for LNG exports.

Keywords: LNG, natural gas, European gas demand

1. INTRODUCTION

European gas demand is set to increase in the next 5 years. Such increase will be the result of following two factors:

a) Energy source diversification policy

The Energy Union Framework Strategy, adopted by the European Commission in 2015, is well attuned to security of energy supply [1]. Access to sufficiently diversified gas supplies and stronger infrastructure connectivity are two main pillars of Europe's future gas strategy.

The European Union considers LNG as a source of diversification that contributes to competition in the gas market and security of supply and encourages the construction of new regasification terminals in member countries [2].

One third of European gas is supplied by Russia through 12 pipelines, five of which pass through Ukraine. The frequent crises in Russia-Ukraine relations have caused disruptions in the supply of gas to European countries inducing them to look elsewhere to find reliable gas suppliers.

As a consequence of European diversification policies, new LNG suppliers will have access to the European gas market.

b) Self-imposed fossil fuel reduction

The European Union enacted rules to reduce carbon emissions, inducing the economies of its member nations to shift from coal to renewable energy and natural gas. Member countries that do not implement the carbon emission scheme face fines. European objectives are ambitious: at least 40% cut in greenhouse gas emissions compared to 1990 levels and at least a 27% share of renewable energy consumption [3].

Natural gas is the least polluting fossil energy. Its carbon emissions are lower than coal and several European countries are switching their sources of electricity production from coal to gas and renewable energy.

The International Energy Agency, in its 2015 annual medium-term gas market report [4], forecasted that by 2020, European gas production is expected to stand 25% below its 2010 level. Compounding the declining trend in production is a moderate recovery in demand. Higher gas usage in the power sector to compensate for the shutdown of coal-fired generation capacity is also a driver. As a result, European gas import requirements are set to increase by almost one-third between 2016 and 2020. With large quantities of inexpensive LNG supplies available, at least in the earlier part of the forecast period, Europe's growing import needs might well offer a welcome outlet to LNG exports struggling to find a home. Even in this context, however, Russian gas is not set to be meaningfully displaced. Russian deliveries to Europe are expected to remain locked in a 150-160 BCM range for the medium term. Some sources forecast that European LNG imports will increase from 38 million tonnes in 2013 to 107 million tonnes in 2025, about 70 million tonnes increase [5].

Potential new LNG applications (railroads, maritime, fuel) may further increase natural gas consumption in European countries.

The above factors are indicative of an increase in European gas demand, in particular LNG, between 2016 and 2020.

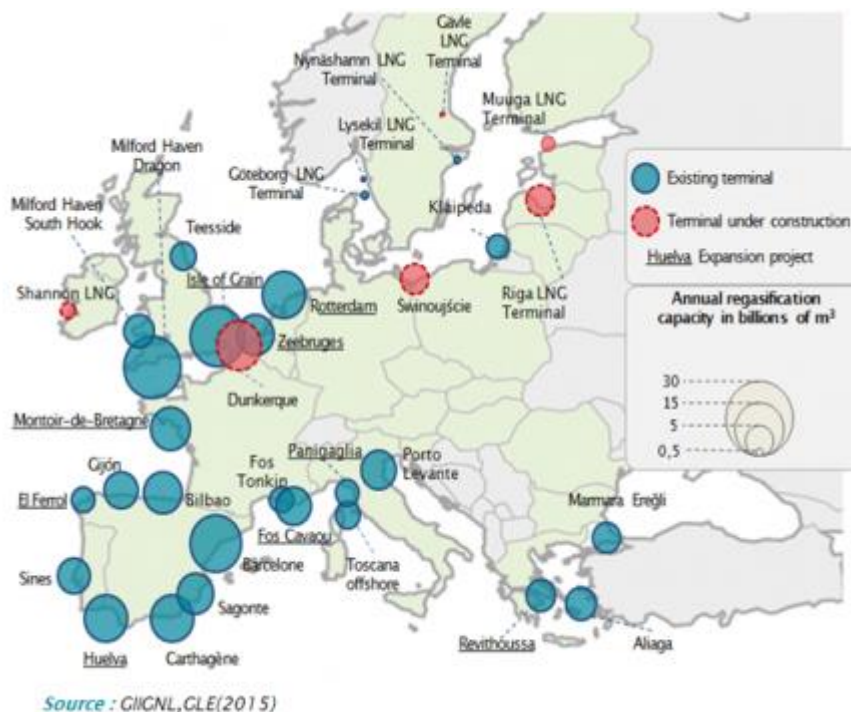


Fig. 1 GLE 2015, European regasification terminals

2. THE UNITED STATES IS SET TO BECOME A MAJOR LNG EXPORTER TO EUROPE

New techniques of natural gas extraction in the United States have released large volumes of gas and transformed the U.S. from a gas importing to self-sufficient energy economy with a gas surplus.

LNG trade between North America and Europe requires the development of an infrastructure on both sides of the Atlantic: liquefaction plants to reduce the volume of natural gas and regasification terminals to transform LNG back to gas and distribute it through the pipeline system.

Low gas prices have forced American energy companies to scale down their projects. Only a small number of planned liquefaction plants are expected to be completed.

Project completion will depend on a variety of commercial and political factors.

LNG producers will need considerable financial strength to pay for the regulatory process required to obtain the licenses to export LNG.

The Natural Gas Act of 1938 requires federal authorization for gas exports, which is granted by the Department of Energy (DOE).

While approvals for gas exports to countries with which the U.S. has a free trade agreement are easy to obtain, licenses for exports to countries that do not have a free-trade agreement with the U.S. (non-FTA) require a public interest determination, which has been a prolonged approval process with high legal costs.

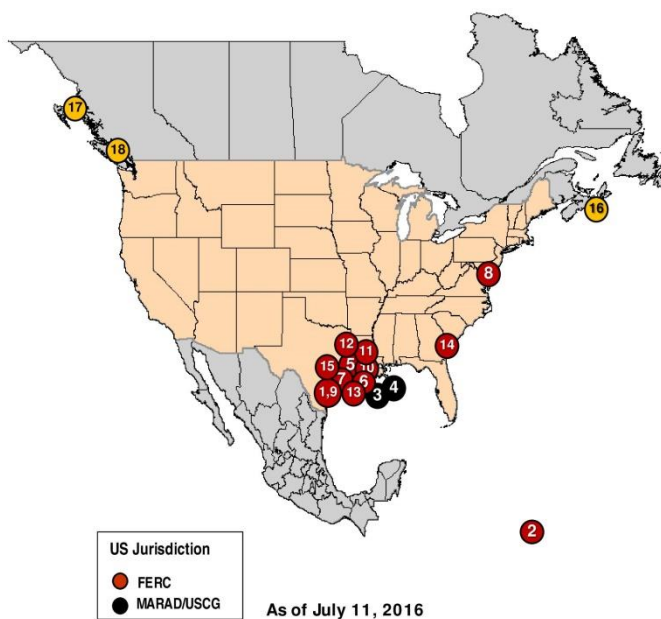
However, if the Transatlantic Trade and Investment Partnership agreement (TTIP) is ratified, most U.S. LNG producers will be able to export to Europe without going through the complex process to obtain licenses required for non-FTA countries.

The main obstacle to U.S. LNG exports to Europe is the need of American LNG companies to pre-sell their future output before building the liquefaction plants. In fact, the construction of the new infrastructure requires high upfront costs and financing can only be secured if the exporter enters long-term contracts with buyers. Many European buyers are unwilling to enter 15-20 year sale and purchase agreements.

The alternative for American LNG exporters is to receive funds from private equity investors that are willing to share the risk with plant operators. Such solution would allow U.S. LNG exporters to build liquefaction plants and sell LNG in the European spot markets. This way, European buyers would be able to purchase natural gas without entering long-term supply agreements.

New American LNG projects will look at Europe as the new frontier for U.S. energy exports.

North American LNG Import/Export Terminals Approved



Import Terminals

U.S.

APPROVED - UNDER CONSTRUCTION - FERC

1. Corpus Christi, TX: 0.4 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)

APPROVED – NOT UNDER CONSTRUCTION - FERC

2. Salinas, PR: 0.6 Bcfd (Aguirre Offshore GasPort, LLC) (CP13-193)

APPROVED - NOT UNDER CONSTRUCTION - MARAD/Coast Guard

3. Gulf of Mexico: 1.0 Bcfd (Main Pass McMoRan Exp.)
4. Gulf of Mexico: 1.4 Bcfd (TORP Technology-Bienville LNG)

Export Terminals

U.S.

APPROVED - UNDER CONSTRUCTION - FERC

5. Sabine, LA: 2.1 Bcfd (Cheniere/Sabine Pass LNG) (CP11-72 & CP14-12)
6. Hackberry, LA: 2.1 Bcfd (Sempra–Cameron LNG) (CP13-25)
7. Freeport, TX: 1.8 Bcfd (Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction) (CP12-509)
8. Cove Point, MD: 0.82 Bcfd (Dominion–Cove Point LNG) (CP13-113)
9. Corpus Christi, TX: 2.14 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)
10. Sabine Pass, LA: 1.40 Bcfd (Sabine Pass Liquefaction) (CP13-552) ★

APPROVED – NOT UNDER CONSTRUCTION - FERC

11. Lake Charles, LA: 2.2 Bcfd (Southern Union – Lake Charles LNG) (CP14-120)
12. Lake Charles, LA: 1.08 Bcfd (Magnolia LNG) (CP14-347)
13. Hackberry, LA: 1.41 Bcfd (Sempra - Cameron LNG) (CP15-560)
14. Elba Island, GA: 0.35 Bcfd (Southern LNG Company) (CP14-103)
15. Freeport, TX: 0.34 Bcfd (Freeport LNG Dev) (CP15-518)

Canada

APPROVED – NOT UNDER CONSTRUCTION

16. Port Hawkesbury, NS: 0.5 Bcfd (Bear Head LNG)
17. Kitimat, BC: 3.23 Bcfd (LNG Canada)
18. Squamish, BC: 0.29 Bcfd (Woodfibre LNG Ltd)

★ Trains 5 & 6 with Train 5 under construction

Fig. 2 FERC, Office of Energy Projects, American import-export terminals

3. PIPELINE GAS WILL FIND INCREASED COMPETITION FROM LNG SUPPLIERS

Gazprom, Russia's largest gas company has proposed to build a second pipeline to convey gas to Germany (Nord Stream II), in addition to Nord Stream, to double its export capacity to Europe. Such project finds opposition in the European Union because it is in contrast with European policy of energy source diversification. The cost of Nord Stream pipeline gas is very competitive, about \$4/MMBTU (DES German border [6], but Russian pipelines will not be able to cover the growing European gas demand.

In 2015, European consumption of natural gas in EU-28 increased by 4.3% in comparison with 2014. The increase coincided with a decrease of natural gas production by 9.3% over the same period [7].

The IEA forecasts that natural gas consumption in the OECD Europe region will grow by 1.3%/year on average until 2040, with the electric power sector accounting for more than one-half of the total increase. Natural gas consumption for power generation is forecasted to increase by 3.6%/year from 2020 to 2040. The share of natural gas in the power generation mix is projected to grow, as older nuclear and coal-fired units will be gradually decommissioned and replaced primarily by new natural gas-fired and renewable energy [8].

Many European countries are building new regasification terminals to import LNG. European LNG imports will increase, both for political and commercial reasons.

Eastern European countries such as Croatia, Estonia, Lithuania, Latvia, Poland and Turkey are seeking to diversify their gas supply and will likely import LNG to safeguard their energy security. Some European countries such as Hungary, Slovakia or Serbia are landlocked and without access to the sea. Therefore it is important to develop regasification terminals located in neighboring countries such as Croatia and Northern Italy. It is also essential to fully integrate the European gas market through the interconnection of existing national networks in line with European policy expressed in the Energy Union Framework Strategy.

Western European countries such as Spain and Portugal, which do not have direct pipeline access to Russian gas, will find LNG their least expensive choice. American gas producers offer highly competitive prices because they use the most advanced unconventional gas extraction techniques. Currently, the cost of American LNG is very low, based on Henry Hub index (which in 2016 is under \$3/MMBTU) plus liquefaction fee and cost of transportation. In comparison, Yamal LNG, a new liquefaction plant under construction in Siberia, Russia, is expected to break even at \$8.2/MMBTU [9].

Russian LNG is too expensive to compete with American, Algerian and Qatari LNG.

Algeria, an important gas supplier, has two pipelines carrying gas to Spain. However, the Spanish pipeline gas network is not connected with the European grid, therefore Algeria will need to either expand its pipeline infrastructure to France or increase its LNG exports.

Eni, Italian oil and gas producer, recently discovered a large natural gas field out of the coast of Egypt. The Italian company entered an agreement with the Egyptian government to use the gas exclusively for the domestic market until 2020. After that, the main recipient of Egyptian gas will

likely be Italy (Eni has planned to build a regasification terminal in Livorno, on the Italian coast). Because the construction of a pipeline from Egypt to Europe would take many years and find several geopolitical obstacles, Egyptian gas will probably be liquefied and shipped to Italy by sea.

Another Mediterranean country, Israel, has also discovered large volumes of natural gas and the Israeli government is assessing whether exporting such gas is in the country strategic interests. The probable outcome will be that part of Israeli gas will be stored and domestically consumed and part will be liquefied and exported. Because of its proximity to Israel, Europe will likely be the main recipient of LNG from Israel.

In the next future, LNG from Egypt, Israel, Mozambique and the United States will compete with Russian pipeline gas to fill the gap caused by the increase in European gas consumption and the decrease in European gas production.

4. CONCLUSIONS

Japan was the principal LNG buyer after the Fukushima nuclear power plant disaster halted nuclear energy production. Demand was so high that spot prices to Japan reached \$18 per MMBTU (Million British Thermal Units).

After Japan's nuclear energy production restarted, Japanese liquefied natural gas market became saturated. China's economic growth is slowing down and competition in the Asian markets has increased after the completion of new liquefaction projects in Australia.

Europe has the infrastructure to import LNG, it has a growing demand for this commodity and the political climate is favorable to import gas from different sources.

The United States and two countries in the Mediterranean Sea (Egypt and Israel) are building the infrastructure to export LNG to Europe. Their proximity to Europe is a competitive advantage over other exporters such as Australia, Mozambique and Qatar.

Russia will continue its pipeline gas exports to Europe but its share of the gas market will probably decrease and be replaced by LNG imports.

In the next future, Europe may be the new frontier for LNG exports.

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