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CEER Analysis on the role of LNG to improve security of supply

CEER Report

C15-LNG-25-03
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INFORMATION PAGE

Abstract

This document (C15-LNG-25-03) presents CEER's analysis on the role of LNG to improve security of supply (SoS).

This report investigates the potential contribution of LNG to EU SoS. In order to improve resilience to sudden disruptions in gas supplies, protect strategic infrastructure, and support the most vulnerable Member States, it is particularly relevant to consider the role of LNG markets in Emergency Plans, adopting market-based measures as primary actions to ensure security of supply wherever possible.

Target Audience

European Commission, energy suppliers, traders, gas customers, gas industry, consumer representative groups, network operators, Member States, academics and other interested parties.

Keywords

Gas; security of supply; emergency plans; national regulatory authorities; European Commission; storage; liquefied natural gas; supply disruption; strategic infrastructure.

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Related Documents

CEER documents

- "CEER Status Review on monitoring access to LNG terminals in 2009-2013", Ref: C14-GWG-111-03, September 2014
- "CEER Monitoring Report on Implementation of the Transparency Template in the European LNG Terminals", Ref.C13-GWG-102-04, 20 December 2013
- "CEER Status Review and evaluation of access regimes at LNG terminals in the EU", Ref. C12-LNG-15-03, 12 March 2013,
- "Monitoring the implementation of GGPLNG", June 2009, Ref. E09-LNG-07-03
- "Guidelines for Good Third Party Access Practice for LNG System Operators (GGPLNG)", Ref. E08-LNG-06-03, May 2008

External documents

- BP Statistical Review of world energy, BP, June 2015
- Quarterly gas report, European Commission, Q2 and Q3 2015
- World LNG report, International Gas Union, 2015
- The LNG industry in 2014, GIIGNL, 2015
- Medium Term gas report 2015, International Energy Agency, 2015
- Communication on the short term resilience of the European gas system, European Commission, October 2014

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EXECUTIVE SUMMARY

Regulation should facilitate a response from the internal gas market to risks that may threaten the security of energy supply of the European Union (EU). Over the past years, and more precisely since the last Russia-Ukraine crisis, the debate about EU security of gas supply has been reopened.

CEER actively contributes to the debate on security of supply (SoS). In particular, this report investigates the potential contribution of LNG to EU SoS. In order to improve resilience to sudden disruptions in gas supplies, protect strategic infrastructure, and support the most vulnerable Member States, it is particularly relevant to consider the role of liquefied natural gas (LNG) markets in Emergency Plans, adopting market-based measures as primary actions to ensure security of supply wherever possible.

Our current analysis of LNG terminals in Europe (available capacities, transparency in the access to rules, costs and services offered) and assessment of global LNG market dynamics (supply, demand, prices, trade and trend) explores the role that markets can play in attracting LNG when needed.

CEER analyses how LNG can be included in a regional framework and recommends what measures could be considered by policy makers in case of emergency. Actions are focused on giving more transparency and visibility to LNG availability and on providing further information about terminals, going beyond the valuable tools such as GLE Transparency Template, ENTSOG Transparency Platform and GLE Aggregated LNG Storage Inventory.

Cooperation between Member states could facilitate the management of a crisis by reinforcing regional cooperation through gas coordination groups and Emergency Committees and preparing regional emergency plans. A collaboration process between competent authorities and LNG undertakings (regulated and non-regulated) to implement the most cost-effective measures, as well as a common procedure between LNG operators to smooth transactions from one regasification plant to another would promote the use of LNG to meet energy demand in emergency conditions.

The creation of a common European LNG exchange platform could be explored as a possible tool for LNG deliveries to respond to a crisis, in particular for peripheral illiquid markets. This could go together with possible agreements by LNG operators, master agreements by suppliers and users, potential swaps between LNG shippers and NG shippers to facilitate the consumption of LNG where needed.

Finally, increased cooperation between LSOs and TSOs at EU level is of utmost importance. During a supply crisis, LNG could be the (interim) missing link to connect regions which are not adequately interconnected with major hubs. Coordinated services could be prepared in advance between LSOs and TSOs to cross several countries with a single capacity request. Use of LNG to address a supply disruption is largely conditioned by network interconnection levels. Innovation of LNG technology can contribute to SoS via floating storage regasification units (FSRUs) and virtual pipelines.

CEER will continue providing recommendations and information to stakeholders with the objective of ensuring that LNG can enhance the security and competiveness of gas supply in the EU.

1. Introduction

1.1. Background

The Russia-Ukraine crisis has reopened the debate about EU security of gas supply, which led the European Commission (EC) to adopt a European Energy Security Strategy in May 2014. To have a clear picture of the effects of gas supply disruptions from Russia, the EC published in October 2014 two communication documents. One on the short term resilience of the European gas system, named "gas stress tests", and one on the implementation of Regulation No 994/2010 and its contribution to solidarity and preparedness for gas disruptions in the EU. These reports provided a concrete diagnostic on EU security of gas supply since the implementation of the Regulation No 994/2010. The gas stress tests presented ENTSOG's modelling of supply disruptions on the EU-wide gas system according to different scenarios, one being a halt of all Russian gas imports into the EU for six months during a cold winter. The stress tests principally highlighted that cooperation between Member States would be key to alleviate supply interruptions. The results showed the importance of flexible sources of gas such as storage and LNG to replace missing Russian flows. Indeed, in the case of a six month supply disruption between September and February where Member States cooperate to share gas, the 95 TWh interrupted volumes would be replaced mainly with LNG (33% of missing volumes) and underground gas storage (28%). The reports concluded that the Regulation already has positive effects on EU security of supply. The reports also demonstrated that improvements, notably in terms of preparation and mitigation, could bolster EU gas security of supply further.

This led the EC to consider a review of Regulation 994/2010. The EC issued two public consultations. The first was held in early 2015 and was aimed at identifying some possible improvements. The second public consultation, on an EU strategy for LNG and gas storage was held in July 2015. In the wake of the EU communication on the Energy Union, the latter consultation should help in defining LNG's contribution to regional security of supply.

1.2. Regulation to reinforce security of supply

Supply risks can either be endogenous and linked with the functioning of the market under normal circumstances, or exogenous and thus depend on factors external to the EU. **Regulation should therefore ensure that the internal market can effectively respond to both endogenous and external risks**. In that respect, over the past years and more precisely since the last Russia-Ukrainian crisis, the setting up of Regulation 994/2010 has had positive effects on the reinforcement of the EU security of gas supply. It has provided common tools to Member States or competent authorities to deal with internal and external supply risks, both during prevention and mitigation phases. The implementation of common security standards (N-1 indicator, supply standards), the development of preventive and emergency plans and the increase of bidirectional cross-border interconnection points (IPs), where economically justified, contributed to this.

European energy regulators have also dedicated significant resources to contribute to the creation of a **common framework to increase security of gas supply**, via the implementation of network codes, the adoption of the gas target model, the coordination of network development plans and the setting up of a transparency platform.

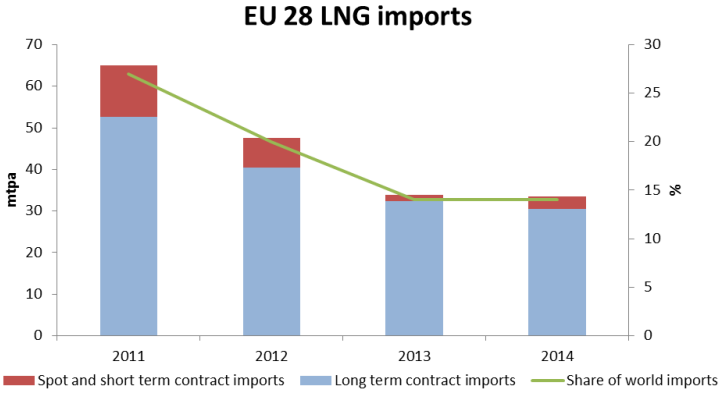
1.3. Objectives of the document

CEER actively contributes to the debate on security of supply. Insights and recommendations have been provided to the two mentioned public consultations held by the EC. In addition to those previous documents, in this paper the EU energy regulators investigate the potential contribution of LNG to the security of supply of the EU, differentiating prevention and mitigation. The purpose is to assess if and how LNG can be mobilised to reinforce security of supply from the short to the long term, taking into consideration that a transition to more dynamic and flexible LNG markets is currently under way. In addition, CEER analyses how LNG can be included in regional approaches to security of supply as well as how recommendations can be taken by policy makers in case of emergency situations.

2. LNG and the concept of security of supply

In a context of declining domestic gas production, the EU is dependent on a limited number of gas supply sources, (e.g. Russia and Norway respectively accounted for 40% and 28% of total EU gas imports in 2014[1]) which are likely to get an even greater market share in the future. In this respect, situations are very different across the EU, with some Central European countries being dependent on only a single supply source. For the past 15 years, **LNG has been a key driver of supply diversification** for the EU while being the principal instrument of gas market globalisation. LNG deliveries indeed increased strongly until 2011, peaking at 52.7 million tons, before sharply decreasing until 2014 to reach 33.4 million tons, many cargoes being re-routed and reloaded to the Asian basin where higher prices were offered. Since the third quarter of 2014, more LNG has come to Europe due to contracting price spreads between Asia and Europe, which led to an increase of EU LNG imports of 24%[2] during the first quarter of 2015 compared with last year.

Figure 1: LNG supplies to the EU



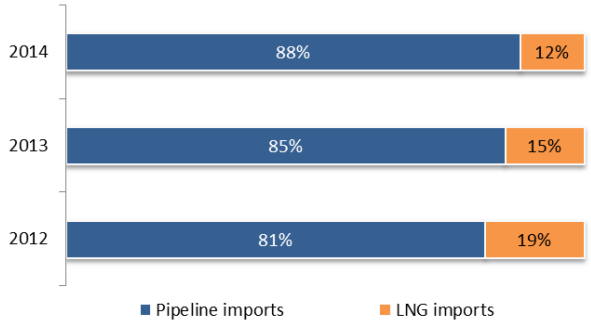
Source: GIIGNL

[1] Source: BP Statistical review

[2] Source: European Commission quarterly gas report, Q2 2015

In terms of security of supply, the EU has considered **LNG as a key source of flexibility and the main alternative to the historical suppliers**. In 2014, eight LNG exporters supplied the EU. In addition, at 201 bcm/year in March 2015[3], the EU can rely on highly developed regasification capacity, the bulk of it being located on the Western shores of the continent. However, the share of LNG supplies compared with pipeline imports is relatively small, fluctuating between 19% in 2012 and 12% in 2014.

Figure 2: LNG and pipeline imports in the EU28



Source: BP statistical review 2012, 2013 and 2014

The role of LNG in contributing to security of supply has to be considered in light of the characteristics of the LNG chain, where **logistics remain rather rigid upstream on a short basis** (it can take days or even weeks to get a spot cargo; destination clauses may slow the redirection of LNG volumes to high demand markets) **while terminals offer flexible services** based on LNG storage or trucks.

After a few years of tightness in the LNG markets, an LNG supply wave is expected in the next few months and years, notably from the US and Australia. LNG markets are expected to become increasingly flexible due to ample LNG supply coming online which is not matched by a comparable increase in demand. Higher destination and contractual flexibilities are expected as new volumes in the US in the past tended to be purchased by portfolio aggregators. This could potentially lead to increased responsiveness to market conditions. Due to Europe's ability to source pipeline gas, **Europe might remain the global balancing market for LNG**, importing what other regions do not need. **In a context of increasingly flexible and short-term oriented LNG markets** the question of the resilience of the EU LNG market remains to be seen.

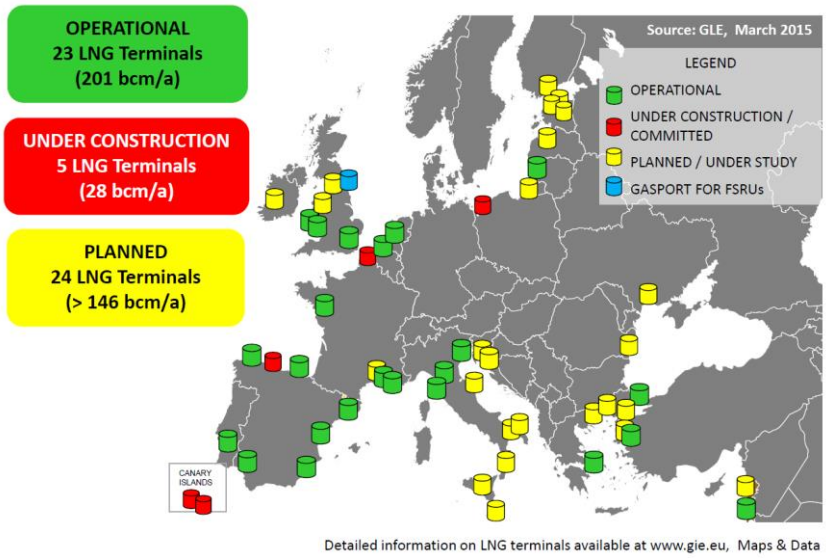
On one hand, increased flexibility may be very positive for the EU LNG market, because deliveries will respond to market conditions more easily. With an increasingly flexible global market, providing ample supply, LNG is likely to be available at a relatively low cost, notably because important shares of LNG volumes tend to be purchased by portfolio aggregators, without fixed destinations.

On the other hand, LNG may not fully contribute to the EU gas security of supply because prices will be the main driver for LNG destination. In the context of a crisis and depending on how much LNG other regions need to import, flexible LNG might not reach the EU when needed, unless markets are willing to pay marginal prices. In this case affordability could be an issue for some countries.

3. LNG terminals in Europe

In Europe the 23 LNG import terminals represent a total import capacity of 201 bcm/year. The five projects that are currently under construction represent an additional import capacity of 28 bcm/year. As a result, the total LNG import capacity of Europe will amount to 229 bcm/year.

Figure 3: Existing and planned LNG terminals in Europe



Source: GLE website

Of those terminals, two consist of FSRU's: the Offshore LNG Toscana (Italy) with a capacity of 3.75 bcm/year and the FSRU Independence (Lithuania) with a capacity of 4 bcm/year.

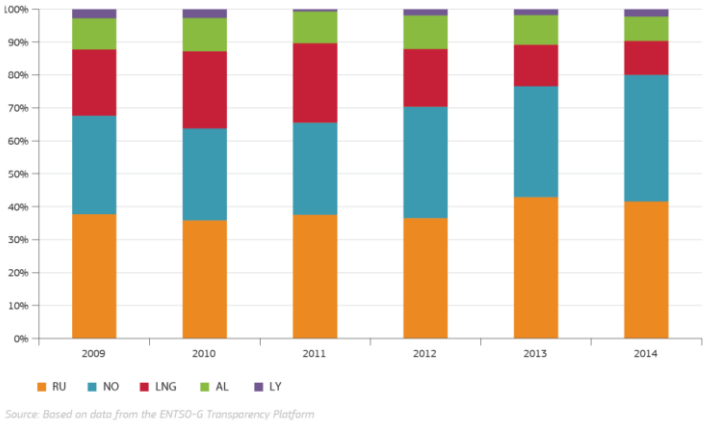
The average rate of LNG terminal utilisation in Europe (of total installed capacity) has decreased since 2010, from 53% to 25% in 2013 and just 19% in 2014 of total send out capacity. Indeed, **in 2014 unused regasification capacities amounted to 163 bcm**.

With regard to storage capacity, the various LNG terminals have a capacity of 4.9 bcm of which, on average, 2.7 bcm was in use in 2014. This shows 55% of unused storage capacity. However, there are a variety of uses (flexibility, buffer) of storage capacity depending on the terminal model that is applicable.

Compared with gas consumption in Europe in 2014 of 485 bcm, the above means that if the LNG terminals were fully used, LNG could represent 41% of the European gas market. Based on the data of the ENTSOG Transparency Platform and on the above figures **LNG accounted for around 8% of the European gas market in 2014.** This is illustrated by the figure below:

[3] Source : GLE, March 2015

Figure 4: Imports of natural gas by source, 2009-2014



Source: Quarterly Gas Report, European Commission

4. Transparency

4.1. Access rules to LNG terminals

LNG terminals are specific infrastructures whose position in the gas production chain may vary from one country to another. Formerly, they were considered to be essential infrastructures as part of the downstream gas infrastructures (like transmission gas pipelines) and are thus subject to regulated Third Party Access (rTPA). However, in order to encourage investment, most terminals planned in Europe have obtained regulated third party access exemptions.

Based on the above, it is clear that **the status and regulation of LNG terminals may vary depending on whether they are considered as either essential infrastructures or competitive facilities**.

In the case of new LNG terminals, Directive 2009/73/EC provides that major new gas infrastructure, i.e. interconnectors, LNG and storage facilities, may, upon request, be exempted for a defined period of time.

Exemption in the case of extension of an existing LNG terminal is also possible. This grant must be subject to certain governance rules including no cross subsidies, and provisional upon an assurance that it will reduce the incumbent operator's market share by opening up this infrastructure to third parties. **Co-existence of the two systems on the same LNG terminal should be examined by regulators with care**.

In the case of an exempt terminal, however, the regulator has to examine the exemption and ensure that the terminal's access conditions are sufficiently transparent and do not distort competition. Well-functioning use-it-or-lose-it and secondary capacity regimes can support this at exempt terminals. In both cases (rTPA and exemption), security of supply and market fluidity will be enhanced by greater information and more transparency.

4.2. Access to information

LNG terminals play an increasingly important role in European gas market in terms of security of supply, through diversification of our gas resources and routes in a highly import-dependent region. **Transparency on access to services and respective costs is crucial to improve market development and European security of supply**, as well as it is important to support new activities and to foster innovation at the LNG terminals.

Regulation 715/2009 requests LSO's to publish a standard level of information on their websites. However, to promote the access to any European LNG terminal CEER proposed GLE to develop a common facilitating tool that will make the already existing information more accessible to the market. This tool is **the Transparency Template**[4] and is currently in operation.

GLE members have agreed to implement the common Transparency Template on a voluntary basis, to facilitate access to this great amount of information. The Transparency Template has been installed on a relevant page of each LSO website (home page or any other appropriate page). The result thereof is that shippers and potential shippers of LNG terminals can be easily directed to the necessary information. **The Transparency Template** also respects the diversity of business models and regulatory conditions. Finally, it **makes the necessary information in LSO's websites more accessible to the market**.

Figure 5: LNG Terminals Transparency Template

LNG Terminals Transparency Template

	Macro Area	Submenu
1	CONTACT	Contact
2	TERMINAL CHARACTERISTICS	Facilities main characteristics
		Service Description
		LNG Quality
3	HOW TO BECOME A CUSTOMER / USER	Main steps for applying for access
		Contract information
		TSO information
		Ship procedures
4	CAPACITIES	Primary market
		Secondary market
5	TARIFF	Regulated terminals
		Exempted terminals
6	LEGAL DOCUMENTATION	Contracts/Codes
		Regulation/Legislation
7	OPERATIONAL DATA	Historical data
		Operational data
8	MISCELLANEOUS	Projects

Source: GLE

[4] http://www.gie.eu/index.php/maps-data/gle-transparency-template

5. Innovation on LNG and its contribution on SoS

In terms of LNG infrastructure in Europe, most of the LNG projects are **conventional projects**. The LNG industry is a rather conservative to the extent that it uses **proven technology**. Until recently, almost all new infrastructures in Europe are large scale projects which are capital intensive, require long lead times and for which safety is essential. As a result technology remains mostly unchanged and **European LNG infrastructure provides long-term capacity**.

However, in other parts of the world, in smaller gas markets, **innovation in LNG has been developed to cope with specificities of local gas markets.** Those consist of:

- Floating Storage and Regasification Units (FSRU's)
- Small scale LNG services and infrastructures

5.1. FSRUs

FSRU's are vessels which are used to store, transport and gasify LNG on-board. They can be "purpose-built" (i.e.: dedicated to a special project) or converted from old LNG carriers. FSRUs capacities represent 8.8% of total regasification capacity and are mainly located in South-America which has faced short-term supply issues in recent years. Two FSRUs are commissioned in Europe; in Italy and in Lithuania. There are approximately 21 FSRUs in the world, 16 of them functioning as transportation and regasification vessels, and five permanently moored units at a location, usually converted from old vessels, and used the same way as a conventional terminal. The main advantages of this technology lie in the construction timing (a floating solution can be commissioned within two years[5], compared to three to five years for land-based solutions of comparable sizes) and the social acceptance of those projects (lower environmental footprint due to less land use). FSRU's require less CAPEX than conventional infrastructures but face higher OPEX. FSRUs also do not have the same volume of storage as a land-based terminal, and so their send-out is less flexible. Conventional FSRU's usually consist of transportation and regasification vessels (eventually converted from previous LNG tankers) but **small scale FSRU's are under development**. They can be used on remote islands or coastal cities as an alternative to the use of diesel or heavy fuel oil, the location is then supplied with LNG which is stored and regasified on site by means of a small scale FSRU.

5.2. Small scale LNG services and infrastructures

EU regasification terminals have adapted their services to market conditions, providing flexibility services and developing small-scale LNG infrastructure.

Those new services and infrastructures that have been developed contribute to the implementation of the Clean Power for Transport Package, which is an EC communication of October 2013 on a European alternative fuels strategy. In many aspects, small-scale LNG services and infrastructure not only contribute to increasing regional SoS but also participate in reducing EU emissions.

[5] Some developers are going to be able to provide FRSUs in the short term.

The new services offered in Europe include:

- **Reloading**: transfer of LNG from the LNG storage of the terminal into a vessel. Reloading services are offered in 16 regasification terminals, located in Belgium, France, Lithuania, the Netherlands, Portugal, Spain and the United Kingdom (UK). According to GLE, the number of reloads has quadrupled in four years and the volumes reloaded in 2014 were approximately six times higher than in 2011, and reached 14 mcm in 2014.
- **Virtual gas pipelines** through truck loading (LNG is loaded on tank trucks which transport LNG in smaller quantities). Rail loading services (LNG is loaded on rail tanks which transport LNG in smaller quantities) are not offered in Europe yet.
  Virtual pipelines are in fact routes where LNG trucks bring LNG to remote areas, where LNG can then be regasified. This is particularly useful in countries where the pipeline network infrastructure has not been fully developed or where the investment cost for connecting gas users to the grid is uneconomic. A virtual pipeline infrastructure might consist of some of the following parts of the gas chain: liquefaction capacity with LNG satellite storage, truck loading station, LNG trucks to transport the LNG to remote locations using existing road infrastructure and finally regasification in satellite plants, usually industrial and transport consumers. According to GLE, around 42,600 trucks loaded 1.9 mcm of LNG at truck loading facilities at large scale LNG terminals in 2014.
- **Transshipment**: direct transfer of LNG from one vessel into another. This service is proposed in terminals in France, Spain, UK, and since 2015 in Belgium and the Netherlands.
- **Loading of bunker ships**: LNG is loaded on bunkering ships (stationary facility which bunkers LNG to be used as a fuel for vessels) which supply to LNG-fuelled ships or LNG bunkering facilities for vessels. There are 15 LNG bunkering stations in Europe. This service is proposed in Belgium, France, the Netherlands and Spain.
- **LNG refuelling stations,** which facilitates the use of LNG as a fuel.

6. Optimising infrastructure complementarities in Europe

6.1. Possibility to spread LNG onto adjacent market when needed

As noted above, Europe currently has significant volumes of underutilised LNG capacity. The question has been raised whether there would be enough interconnection capacities between European countries to transport LNG from the terminals to countries that would be impacted in case of a significant supply disruption. This question was also raised since European gas networks have been designed to flow gas from the East to West which brings a lack of reverse flow capacities.

An answer can be found in the stress tests modelled by ENSTOG, published in October 2014, which aimed to assess the short term resilience of the European gas system in case of disruption from Russia and Ukraine. According to the different scenarios chosen, the LNG contribution to the supply mix varies from 7% (business as usual scenario) to 16% (scenario with six months of interruption, from September to February with a two-week cold spell in February).

Table 1: LNG contribution in the case of disruption from Russia and Ukraine in different scenarios

Scenario	Disrupted demand	LNG contribution
Business as usual	--	7%
1 month disruption + solidarity	17 TWh (1.5 Gm3)	8%
6 months disruption + solidarity	95 TWh (8.4 Gm3)	14%
6 months disruption + cold spell	105 TWh (9.3 Gm3)	16%

Source: stress tests modelled by ENSTOG, October 2014

The use of LNG to compensate a supply disruption is largely conditioned by network interconnection levels. Some bottlenecks and a certain lack of reverse flow capacities can limit in certain areas the contribution of LNG to European SoS. According to the stress tests, if there is no transit through Ukraine during 1 month, there is no need for additional LNG. If there is no Russian supply during six months, additional need of LNG will mount to around 240 TWh over the period. Cooperation between Member States will not reduce the total amount of disrupted gas demand, but will facilitate the management of the crisis in each country, due to a lower percentage of gas disruption that can be better borne by flexible gas consumers. Some administrative barriers have been reported with regard to interconnection capacities and reverse flows and should be analysed in order to try and remove the barrier, if feasible. In cases where reverse flows are not developed, truck loading could connect regions that have access to LNG to areas facing supply disruptions, provided that enough loading facilities are developed in adjacent markets.

6.2. Development of new infrastructures in a context of declining demand

As LNG is a key source of supply diversification, how can we ensure that countries that do not have access to LNG can take advantage of it? Is there a need for every LNG entry point in the EU to be able to supply the whole region or should reinforcements be considered only close to market demand?

LNG could be crucial in contributing to SoS, as long as networks are sufficiently interconnected. Even if interconnection levels and reverse flows have improved since the implementation of the Regulation No 994/2010 following the 2009 Ukrainian crisis, **infrastructure reinforcements to resolve congestion should answer clear market needs and be subject to cost-benefit analysis, especially in a context of declining gas demand in Europe**.

7. Global market dynamics

7.1. Supply and demand

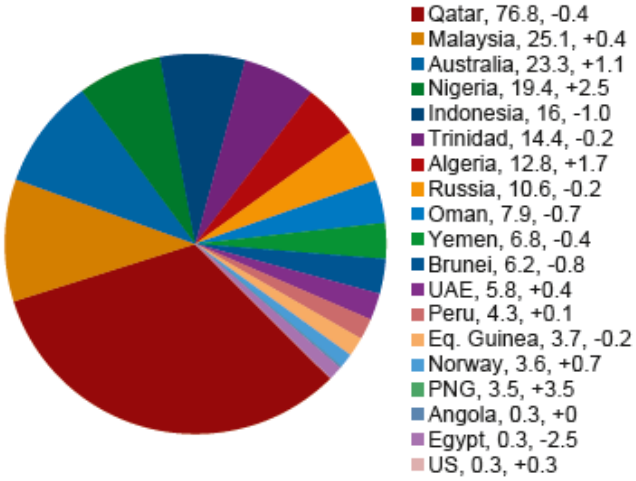
One of the key features of LNG is that it allows gas to be traded across large distances – connecting distant sources of supply with centres of demand. This means that markets with LNG capacity (and markets interconnected with them) are part of a globalised gas market. The pattern of LNG flows will be dependent on the balance between global LNG supply and demand.

Looking ahead, both LNG liquefaction capacity and demand for LNG imports are expected to increase. Approximately 175 bcm are actually under construction[6], mainly in Australia and in the US The relative size of these increases will determine the extent to which the global LNG market becomes more flexible, though some expect that the LNG market could loosen in the coming years.

Global LNG supply

Historically, the Asia Pacific region[7] has been the world's largest LNG supplier with countries such as Australia, Malaysia and Indonesia dominating the market. But since the mid-2000's these countries have been surpassed by the Middle East, largely driven by Qatar's increase in LNG production. By 2013, the Middle East was supplying 42% (136 bcm) of the world's LNG, while the Asia Pacific was providing 30% (98 bcm).

Figure 6: LNG exports by country (mtpa; 2014)



Source: IGU World LNG Report 2015

On the supply side significant changes are expected over the next few years. Worldwide 26 trains and four floating LNG terminals are under construction, spread across 16 projects which will increase supply capacity by 122 mtpa by 2020.

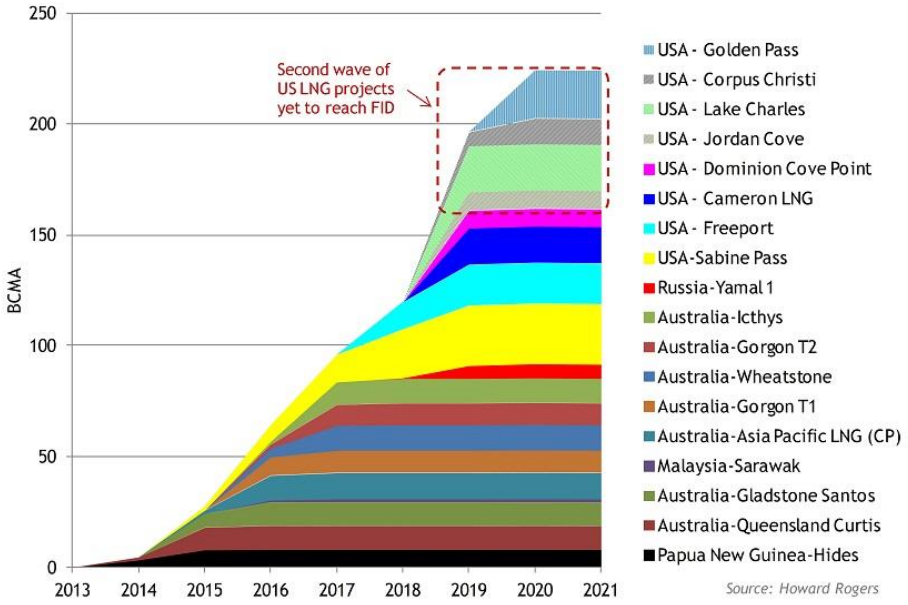
Moving into 2015-16, Australia is set to be the primary driver of additional global supply. Seven projects are expected to be online by 2019. Queensland Curtis (11.7 bcm/year) and Gladstone (10.7 bcm/year) have started loading cargoes, with AP LNG (12.4bcm/year) and Gorgon (21.5 bcm/year) expected to come online shortly. Assuming all planned projects will be realised – Australia's liquefaction capacity is set to have more than quadrupled from 42.7 bcm/year in 2013 to over 179.4 bcm/year in 2018.

US LNG export growth could then overtake that of Australia, as projects currently underway come online and start delivering on a significant scale. The International Gas Union (IGU) forecasts this could mean US export capacity of 44.1 mtpa of capacity by 2020 – with potential for further significant growth to follow. The first of these projects – Sabine Pass – is due to export first gas in Q1 2016. There is some uncertainty about US capacity expansions beyond 2020, as current price dynamics could make investment decisions more challenging.

[6] Source: AIE

[7] Encompasses all countries that border the Pacific Ocean

Figure 7: New supply over the next 5 years (Projected from March 2015)



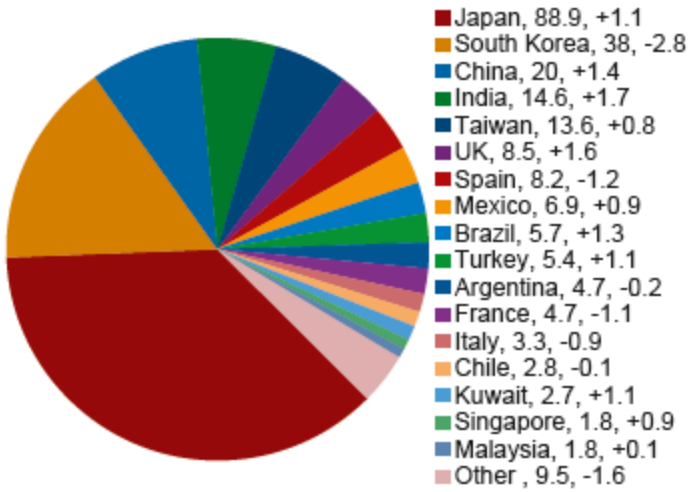
Source: Howard Rogers, Oxford Institute for Energy Studies

General expectations are for a significant increase in global LNG supply in the coming years, meaning more gas could be available for delivery to Europe in the medium term. There is more uncertainty around capacity expansions post-2020, and this is likely to be dependent on investors' response to current price dynamics.

Global LNG demand

Since 2000, global LNG demand has been generally rising. Global LNG trade reached 241 mtpa in 2014, according to the IGU. Japan is currently, by far, the biggest importer of LNG, importing more than three times that of the UK, Spain, France and Italy combined.

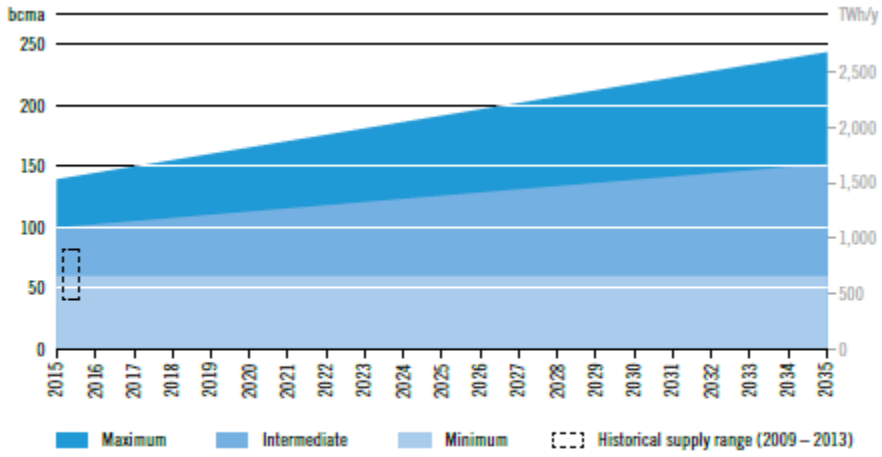
Figure 8: LNG imports by country (MTPA; 2014)



Source: IGU World LNG Report 2015

Expectations are that LNG will play an increasing role in meeting European demand. For example, ENSTOG expects an increase in LNG imports to Europe under their intermediate scenario (see *Figure 6*). Forecasts are that this increase in LNG imports will take the place of declining domestic production, though there is some uncertainty around the long term outlook.

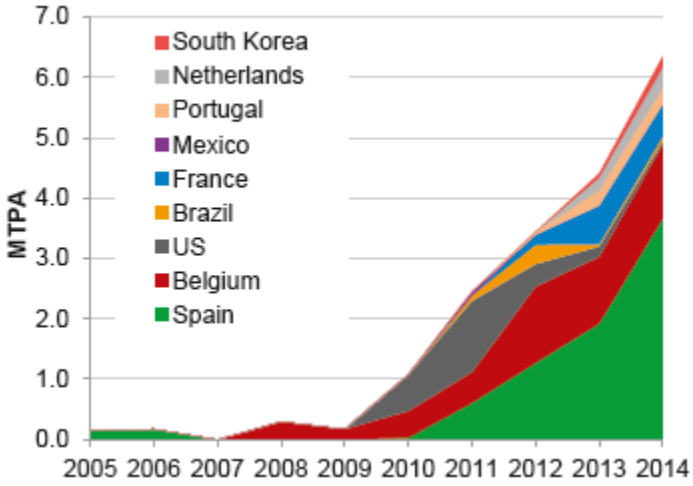
Figure 6: ENTSO-G potential LNG scenarios



Source: ENSTO-G Ten Year Network Development Plan 2015

The market has also seen an increase in regasification terminal capacity capable of performing re-loads. Re-loads grew 60% year on year to 6.3 bcm, bolstered largely by weak European demand and price attractiveness in other regions. Spain, Belgium, France had the three highest re-loading levels in 2014.

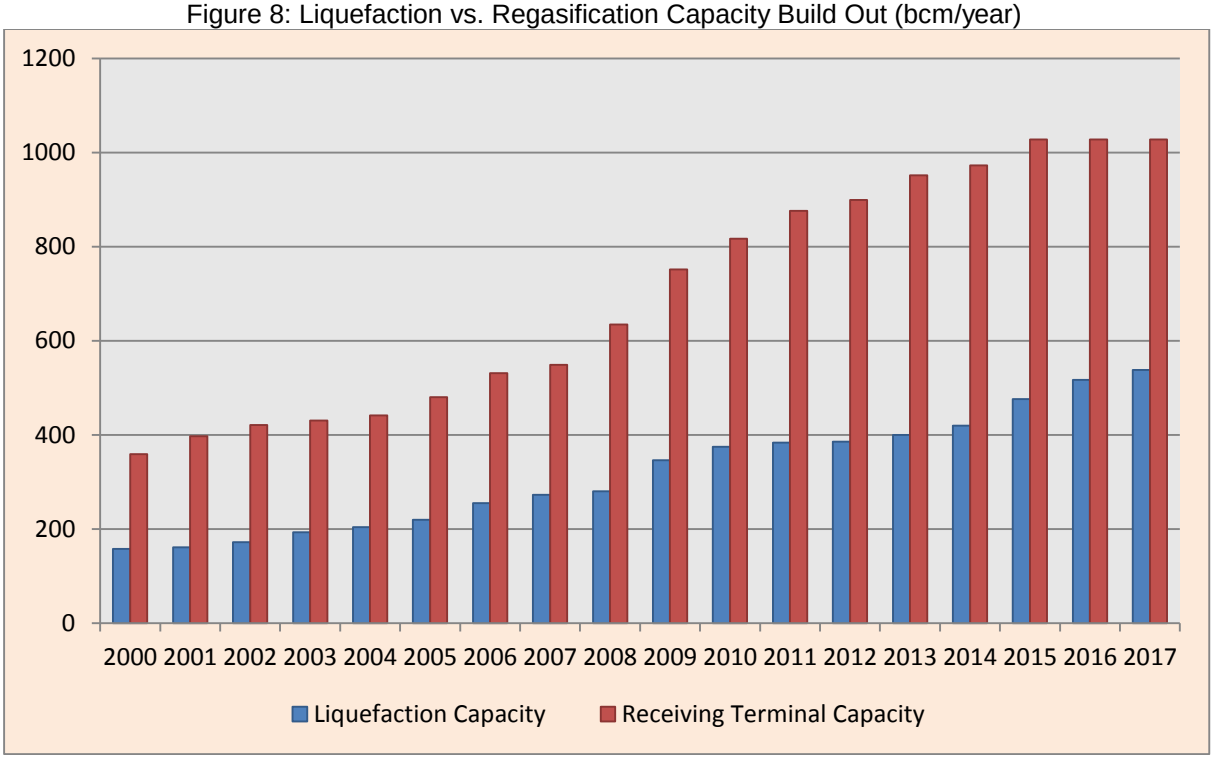
Figure 70: Re-load volumes by country



Source: IGU World LNG Report 2015

There has been a persistent imbalance between additions to liquefaction capacity and additions to regasification capacity. By the end of 2014, global liquefaction capacity was 301 mtpa while regasification capacity stood at 724 mtpa. This differential is to be expected, given the difference in capital costs between liquefaction and regasification terminal, and the optionality created by having an excess of regasification capacity compared to liquefaction capacity.

Figure 8: Liquefaction vs. Regasification Capacity Build Out (bcm/year)



Source: IGU World LNG Report 2014

This global imbalance between liquefaction and regasification capacity means that LNG import terminals have consistently low utilisation levels, averaging just 33% worldwide in 2014 (41% excluding the US) and 22% in Europe in 2014[8]

The outlook for global LNG demand in the future will be affected by several factors, including:

- European gas demand – driven by economic activity, impact of energy efficiency measures, demand for gas-fired power generation and relative price of alternative sources of gas supply to Europe.
- Potential nuclear restarts in Japan and South Korea, reducing demand for gas for power generation.
- Economic activity in China and India.
- New LNG importing countries, such as Egypt, Jordan, Pakistan and Poland.
- Coal prices, and consequential impacts on role of gas in electricity generation.

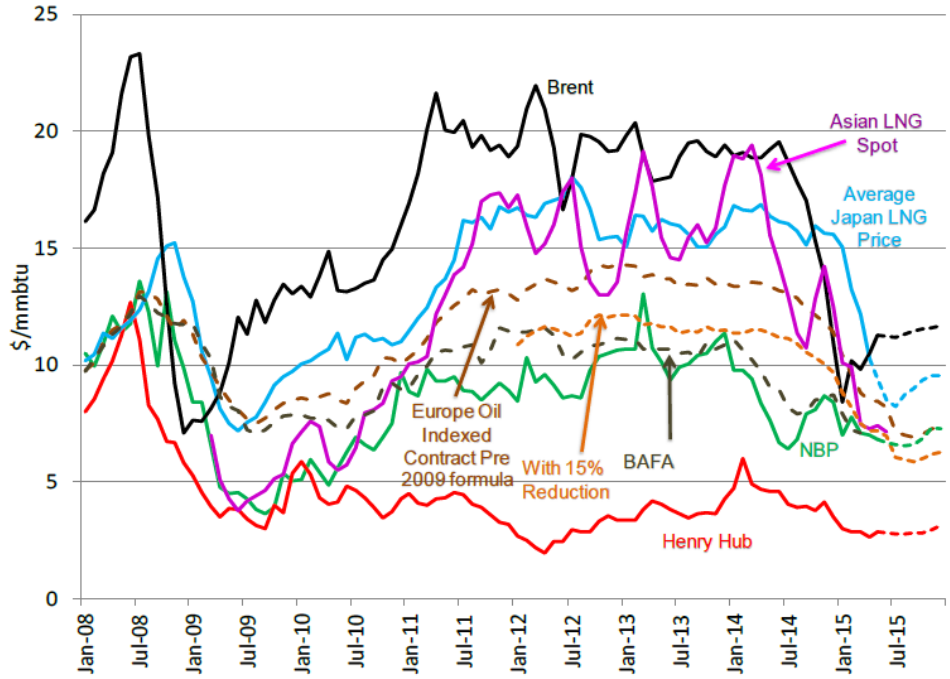
7.2. Prices and trade

Prices

Until recently, there had been a wide and sustained divergence in regional gas prices over the past few years, with three distinct price zones emerging: North East Asia, North West Europe and North America.

[8] Source : IGU 2014 report

Figure 9: Regional gas prices 2008-2015



Sources: Platts, EIA, Argus, CME

Notes: dashed lines post March 2015 are (or are derived from) futures prices. BAFA: German average border price for natural gas imports, reported at http://www.bafa.de/bafa/de/energie/erdgas/index.html.

Source: Howard Rogers, OIES

A number of trends have contributed to this. In North America, the rise of shale gas production reduced the country's need for imports and saw prices drop. From 2009 to 2015, Henry Hub prices generally remained between $2/mmbtu and $5/mmbtu. In Europe, low coal prices meant reduced use of gas in power generation, coupled with low industrial demand for gas. And in Asia, the March 2011 earthquake and subsequent loss of Japanese nuclear power altered both short and long-term demand dynamics, significantly increasing demand for LNG, and prices, in Japan.

This trend has been interrupted recently and prices have been converging. For much of 2015, National Balancing Point (NBP) and Asian LNG spot prices have been similarly priced. Dependent on shipping costs, the EU may currently be a more attractive destination than East Asia for some spot LNG cargoes. Driven by falls in the oil price, the average Japan contracted LNG price is expected to be maintained at the level of NBP. Henry Hub is expected to remain significantly cheaper than other markets, incentivising exports from the US.

LNG trade

Traditionally, LNG has been delivered under long-term contracts (five years+) and has only been marginally traded on a spot or short-term basis. Pre-2000, the spot and short-term market accounted for less than 5% of volumes traded. By 2013, it had reached 33% of global trade (106.7bcm/year). A number of factors have contributed to this:

- A lack of domestic production or pipeline imports in Japan, Korea and Taiwan, which makes these countries dependent on the spot market to cope with sudden changes in demand;

- A wide and sustained disparity between prices in different basins, making arbitrage extremely lucrative;
- A growth in contracts with destination flexibility, particularly from the Atlantic Basin and Qatar;
- A decline in the competitiveness of LNG relative to coal in Europe and shale gas in North America;
- Rapidly rising demand in Asia and emerging markets
- A surge in global regasification capacity;
- An increase in re-loading;
- An increase in the number of market players.

Formula-based contracts link the price of LNG to competing fuels (typically crude oil). Meanwhile, market-based contracts are more commonly seen in liquid markets where gas is traded at a transparent market price e.g. Henry Hub in North America or NBP in the UK. Many LNG projects have historically been financed on the back of long term oil-indexed agreements.

However, since 2012 there has been a notable shift away from formula-based pricing, and hub-pricing is being introduced into some supply contracts. In 2013, four US projects signed a number of long-term contracts worth over 69bcm/year based on HH indexation, mostly with Asian buyers. Here, buyers will pay fixed capacity charges and get the option to receive an LNG ship in any destination, as the LNG is sold on a 'Free On Board' (FOB[9]) as opposed to 'Delivered Ex Ship' (DES[10]) basis.

The trend is also visible in Europe. IGU recently reported that gas-on-gas competition now sets the price for 53% of European gas supplies, with oil indexation setting the price for 42%. This figure is even higher in North West Europe (80%). This is a complete reversal of the landscape in 2005, when oil-indexation was at 72% and gas-on gas competition at 27%.

7.3. The role of markets in attracting LNG

Well-functioning gas markets (with a high level of liquidity) provide the means for market participants to manage their portfolios effectively. Well-functioning gas markets will deliver price signals to enable market participants to strike a cost-effective balance between their options for determining the most efficient and least costly supply mix to meet gas demand.

Using LNG is one of a variety of ways to meet gas demand and to respond to these price incentives. A distinctive characteristic of LNG is that it allows gas to be traded across large distances, connecting distant sources of supply with centres of demand. This means that markets with direct or indirect access to LNG capacity are part of a globalised gas market.

The pattern of LNG flows depends on the balance between global LNG supply and demand. LNG flows respond to price signals inducing arbitrage between markets. If increased LNG flows are needed to meet demand or to resolve a crisis, then market prices should rise to the necessary level to attract these cargoes. The extent to which the LNG market is able to respond to these price signals is dependent on the proportion of LNG already under contract and hence the availability of spot cargoes. For instance, during the past few years, the LNG

[9] Under a FOB contract, the seller is required to deliver the LNG to a vessel designated by the buyer. All loading costs have already been paid, but the buyer takes responsibility for shipping and freight insurance.

[10] Under a DES contract, the passing of risk does not occur until the ship has arrived at the port of destination and the goods made available for unloading. The seller pays the freight and insurance costs, whilst unloading costs, duties and taxes etc lie with the buyer.

market has been tight. This can be explained by a surge in demand, mainly driven by Asian countries, notably Japan following Fukushima disaster, in a context were supplies remained stable. Nevertheless, the vast majority of volumes were diverted towards higher-paying markets, illustrating the flexibility of the LNG markets and the increasing tendency to short-term trading.

The above illustrates that markets play a crucial role in attracting LNG. The evolution of worldwide LNG markets is largely influenced by the development of global gas demand and supply. Therefore, access to LNG occurs according to market-based mechanisms and spread of prices. Those willing to pay the price will get access to LNG. Current market prices indicate that the necessary price to attract LNG is currently likely to be significantly lower than in recent years.

LNG flows to higher-paying and liquid markets. Access to LNG is linked to the liquidity of hubs, with liquid hubs capturing LNG volumes more easily than narrow markets. Liquid markets enable price formation through the participation of many buyers and sellers. Liquidity is demonstrated through high traded volumes relative to underlying demand, and a small difference between the buy price and the sell price (the bid-offer spread), as well as confidence in the stability of the market. In a global market dynamic a single European gas market, where gas can circulate freely, will most likely compete more effectively for LNG supply and attract LNG to Europe. This means that narrow markets, not very liquid or not providing price signals, might struggle attracting cargoes when they need it most, especially if they are competing with more liquid markets. In Europe, for instance, this situation might happen to countries that are poorly-interconnected to liquid markets.

8. Market measures in contribution to security of supply

Security of gas supply is based on two main pillars: **prevention** of any kind of problems related with supply, and **mitigation**, if the problem appears. The two pillars have a common objective of reducing the impacts that an emergency, disaster, unplanned situation, exceptional event[11] or a disruption in gas supplies would have on consumers, users and all gas markets participants.

The last stage of the mitigation phase is considered as a state of emergency when non market-based measures could be applied in order to solve the crisis and emergency (chapter 10).

One of the priorities for security of gas supply is to ensure the best possible preparation and plans in order to improve resilience to sudden disruptions in gas supplies, that strategic infrastructures are protected and that the most vulnerable Member States are supported. Besides, certain consumers, such as households and customers providing essential social services (healthcare, educational and other social services indispensable for the functioning of a Member State) are vulnerable and their protection[12] is another priority in Europe. The Emergency Plans made in advance have to be followed during the mitigation phase.

[11] 'exceptional event', as defined in the Interoperability network code, means any unplanned event that is not reasonably controllable or preventable and that may cause, for a limited period, capacity reductions, affecting thereby the quantity or quality of gas at a given interconnection point, with possible consequences on interactions between transmission system operators as well as between transmission system operator and network users.
The Commission Regulation (EU) 2015/703 of 30 April 2015 establishes a network code on interoperability and data exchange rules.

[12] 'protected customers' as defined in the Regulation on SoS means all household customers connected to a gas distribution network and, in addition, where the Member State concerned so decides, may also include: (see next page)

The objective of the Emergency Plans, as established in the Regulation on SoS, is to ensure that Member States are prepared to manage an emergency situation. Basically, the Emergency Plan contains the measures to be taken to remove or mitigate the impacts of a gas supply disruption (whereas the Preventive Action Plan contains the measures needed to remove or mitigate the risks identified in the risks assessment).

Gas markets of different maturities and different levels of dependence on single suppliers explain why some markets might move faster to mitigation phase than mature and well-interconnected ones.

As LNG is a global market, attracting additional gas from LNG is dependent on appropriate market signals. It is particularly relevant to reinforce the **role of LNG markets in Emergency Plans**, adopting market-based measures as first action to take for ensuring security of supply.

Emergency Plans as well as risks assessments could be developed at regional level. **Every involved party needs to participate** in the development of this regional plan: European Commission, competent authorities, national regulators, LNG operators, TSOs, network users and industrial customers.

It is essential that Member States **reinforce regional cooperation** where LNG terminals, interconnection points, balancing arrangements, congestion management procedures, capacity allocation mechanisms and market integration are contributing to energy security. Furthermore, coordination is also important in risk assessments and contingency plans.

LNG, as one of the flexibility tools to improve SoS, plays an important role in the development of the Emergency Plans. For this reason, in relation to LNG supplies the strategy to follow when an emergency is declared (at both national and regional level) would be the same as established in the adopted plans.

From the supply side, measures will be focused on LNG terminal capacity and send-out capacity; i.e. giving **more visibility to LNG availability** and providing further information on the regasification plant.

The current GLE Transparency Template provides a useful tool for LNG operators to provide much of this information on their websites. Consideration could be given to going beyond this template in some circumstances (and not only for GLE members who have implemented the template), and in particular in the short term. The information could include available terminal capacity, available slots in primary and secondary markets, data to facilitate LNG reloading, etc. Moreover, regarding the level of compatibility of regasification plants, European LNG operators should make maximum efforts to **increase transparency and accessibility.** A list of possible items includes:

(a) small and medium-sized enterprises, provided that they are connected to a gas distribution network, and essential social services, provided that they are connected to a gas distribution or transmission network, and provided that all these additional customers do not represent more than 20 % of the final use of gas; and/or
(b) district heating installations to the extent that they deliver heating to household customers and to the customers referred to in point (a) provided that these installations are not able to switch to other fuels and are connected to a gas distribution or transmission network.

1. Available slots at the LNG terminal for more than the next three months period time:
   1.1. Available slots in primary market
   1.2. Available slots in secondary market
   1.3. Contact details for primary capacity holders if authorized
2. Available LNG in storage facilities/tanks forecast for the next gas days.
3. Terminal tariffs and costs of the services offered.
4. Ship approval procedure.
5. List of compatible LNG carriers.
6. Requirements at the LNG terminal: suitability and compliance with vessels operations and ship vetting services in the facility.
7. Requirements for LNG reloading in the short term: technical needs, time required.

Additionally, in relation to transparency and the goal of delivering gas to where it is needed using transmission facilities, **introducing LNG information into the ENTSOG Transparency Platform[13] would provide a valuable tool to improve SoS**. In addition, the **GLE Aggregated LNG Storage Inventory[14]** makes available aggregated daily information at country level, which could be improved and extended offering information by terminal and near real time, as well as storage LNG forecast for the next gas days.

Furthermore, to ensure supply, whether in normal operation or a crisis, it is necessary to have effective price signals. If increased LNG flows are needed to meet demand or resolve a crisis, then market prices would rise to the level necessary to attract these cargoes. In the case of LNG, market participants may take actions such as:

- agreeing LNG contracts that provide for deliveries in times of supply disruption or extreme events,
- procuring additional LNG cargoes on spot markets where needed,
- using temporary storage at LNG terminals to provide flexibility, or
- procuring flexible delivery technology (such as FSRUs) and developing connection infrastructure for these.

From the demand side, the possibility to free up gas from other parts of the world should be enhanced in case of a supply crisis in Europe. Potential users of LNG in an emergency situation could consider signing **master agreements** with potential suppliers such as producers or shippers to increase flexibility. These could provide a framework for LNG deliveries to respond in a crisis situation.

LNG demand also can play a role in the management of gas demand in case of an emergency. Industrial customers, who are not connected to the main transmission network and are supplied by LNG road tankers, could manage their demand and release gas for vulnerable customers.

As an example, in Spain, the gas demand met by satellite plants in 2014 is destined mainly to industrial sectors: agri-food industry (30% in 2014), metallurgy (20%), power generation (9%), refining (5%), and construction (9%).

[13] https://transparency.entsog.eu/

[14] https://lngdataplatform.gie.eu/

Consequently, LNG demand management should be included in Emergency Plans. Some of the measures can be the development of:

1. Mechanisms to promote demand response to high prices.
2. Extension of interruptible demand and its application with a regional perspective.
3. Mechanisms of communication and sharing of information between countries:
   3.1. Response of the demand to market prices per balancing zone.
   3.2. Demand of vulnerable customers per country.
   3.3. Interrupted demand for balancing zone.
   3.4. Use of the interconnections.
4. Ex-post regional analysis of the crisis and ways to improve.

9. Technical solutions in contribution to security of supply

Gas markets that could be subject to supply disruptions are often little diversified and not very liquid which deteriorates their attractiveness to response from LNG imports (at a reasonable cost) in times of crisis. In those markets heavily dependent on a single source of gas supplies and potentially affected by political tensions, **the use of LNG and the use of small scale FSRUs or virtual pipelines could mitigate gas disruption impacts.**

When implementing FSRUs as a solution in case of emergency two main factors must be taken into consideration: availability and mobility. FSRUs are often “purpose-built”, which restricts the possibility to move these facilities according to LNG demand. Moreover, it takes on average five months to move an FSRU from one terminal to another in Europe, which limits the use of such technology in a supply crisis. Although FSRUs are built upon request, some of them can be delivered to a different destination if negotiated. Technical issues can also reduce the flexibility/mobility of FSRUs.

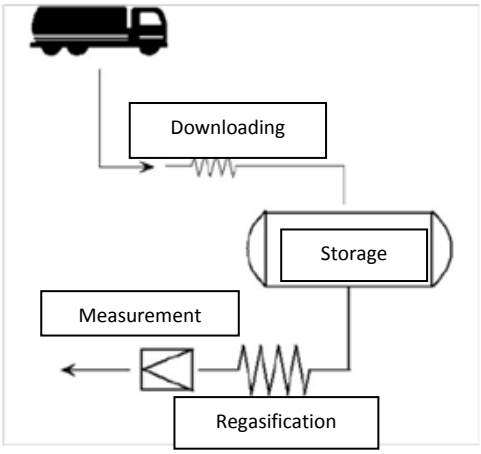
Some FSRUs are old LNG carriers converted into floating regasification units. In practice, such a conversion is a challenge, as it is difficult to replicate the design of the construction on different old LNG carriers, which require high operation and maintenance costs. Moreover, the mooring and the delivery of LNG from FSRUs can be constrained by technical incompatibilities between FSRUs and unloading arms for instance.

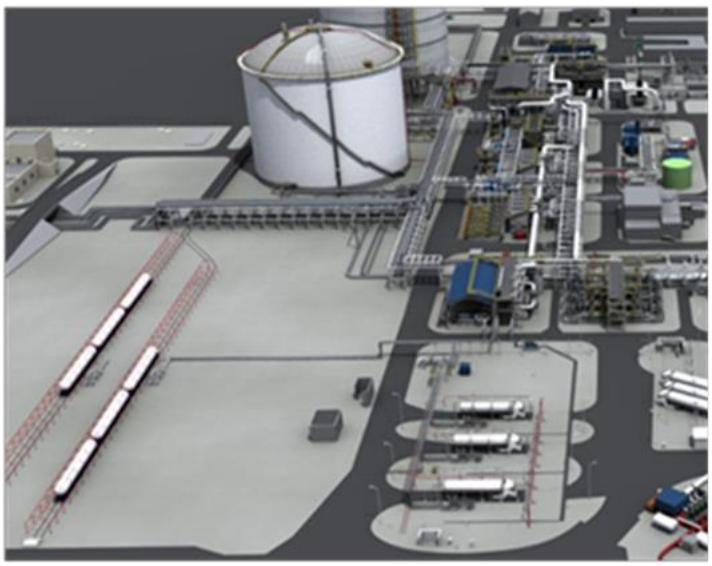
In this regard, working on the promotion for future **technical standardization of FSRUs** could increase the flexibility of this technology. Characteristics of the floating unit for instance length, breadth, depth, design draft, storage capacity, number of tanks and regasification capacity are important to know well in advance, to prepare the strategy in case of an emergency.

Virtual pipelines through small scale LNG or the supply flexibility associated with LNG trucks may mitigate gas disruption for most vulnerable customers included in Emergency Plans.

It is important that gas supply be maintained particularly for protected consumers, in cases in which the market cannot continue to supply them. Since there are many satellite plants in a number of countries, in case of a sustained emergency situation that would threaten supply to vulnerable consumers, LNG supply flexibility can play a role to meet their gas demand.

Figure 10: Illustrations of small scale services at LNG terminal and virtual pipeline (truck loading and satellite plant)





Source: ENAGAS, LNG terminal in Barcelona and national code in Spain.

10. Recommendations in case of emergency

When market-based mechanisms alone cannot ensure supplies, including to protected customers, to cope with the emergency situation, the contribution of non-market-based measures should be analysed.

Also, in circumstances where markets are not sufficiently developed to provide effective price signals, there could be a case for interventions to ensure cargoes are delivered where necessary.

When considered, such policy interventions should be limited to situations where there is clear evidence of market failure and these should be publically known, transparent, non-

discriminatory, temporary and reviewed on a regularly basis in order to minimise disruptions to the development of a well-functioning European gas wholesale market.

Regulators describe the following measures (which are summarized in figure 15) with the goal of providing recommendations for policy makers to consider in cases of emergency conditions. Consideration of these possible measures should take into account the specific circumstances of the market or region in question.

First of all, procedures to implement any such measures must be defined in Emergency Plans. The adoption of an exhaustive and detailed emergency plan at national and regional level strengthens the security of supply in Europe.

In terms of coordination, at national and regional level, **competent authorities should ensure that administrative and regulatory barriers** (such as shipper authorisation recognition) **are removed to allow LNG trades**, **terminal send-outs and natural gas flows** to respond to an emergency situation and cross several countries to supply gas when needed.

Regional cooperation also requires **public authorities and natural gas undertakings** (regulated and non-regulated) to implement the most cost-effective measures for the parties concerned.

In addition, an increased **cooperation between LSOs and TSOs** at EU level is of utmost importance. During a supply crisis, LNG could be the (interim) missing link to connect regions which are not adequately interconnected with major hubs.

Bundled services could be prepared in advance between LSOs and TSOs, to cross several countries with a single capacity request if appropriate in case of an emergency. Certain factors should be considered in the design of such a measure. These may include: (1) setting a tariff in advance, (2) the volume of available capacity, (3) the potential need for a short time response, (4) harmonization of terms of reference in the contracts to sign with different operators, (5) the interactions with current rules and regulation on tariffs, capacity allocation mechanisms, congestion management procedures, interoperability etc. This bundled service could be investigated as a way to facilitate flows from South and Western Europe into Eastern Europe for instance.

The **provision of information between countries** is the first step of this measure. As mentioned, a higher visibility of LNG stocks and flows could facilitate transactions from one regasification plant to another. To this respect, LNG operators could develop a common procedure of cooperation under crisis situations, in which they would provide all the information required to the market to mitigate the crisis. In this sense, LNG operators could provide detailed information about gas levels, existing and forecasted in the coming days, slot availability to unload and reload and a common list of vessels and compatibility with every regasification plant.

Whenever the market conditions are not adequate to attract LNG deliveries, LNG operators could facilitate market development through voluntary agreements to bid for LNG by regasification plant in a **common European LNG exchange platform**, in order to facilitate interchange of information and LNG trade.

Additionally, other market actions could be explored: **LNG and NG shippers could make different arrangements such as possible swaps between them**, giving the possibility to increase the consumption of LNG in places where is available (for instance in the West) and freeing gas pipelines to transport the gas where it is needed (i.e. East). This also could be facilitated through the European LNG exchange platform. TSOs and LSOs should cooperate to also provide capacity contracts.

Table 2 lists the recommendations which could be developed in case of emergency. The principles of transparency, non-discrimination, standardization and harmonization must be followed when designing the measures to take in emergency situations. Some of the suggested measures (in particular the Common exchange platform) will undergo further investigation by CEER, also through proper consultation processes, in order to better describe their functionalities and better assess their appropriateness for different market conditions.

Table 2: List of measures proposed to take in case of emergency and crisis situations

	Recommendations to be taken by policy makers in case of emergency situations
1.	**Removing any kind of administrative and regulatory barriers to allow LNG trades**, terminals send-outs and natural gas flows to cross several countries to supply gas
2.	Reinforcing regional **cooperation through appropriate gas coordination groups and Emergency Committees.**
3.	Common procedure of **cooperation between competent authorities and LNG undertakings** (regulated and non-regulated)
4.	Common procedure of **collaboration between LNG and TSOs**: Investigate the possibility of bundled service LSO-TSO to cross several countries with a single capacity request
5.	Common procedure of **cooperation between LNG operators** to provide information required to the market to mitigate the crisis involved and to facilitate the transactions from one regasification plant to another: • higher visibility of LNG stocks, • forecasted gas levels in the coming days, • slot availability to unload and reload, • common list of vessels, compatibility among LNG plants, • timing to deliver LNG • potential use of FRSUs and virtual pipeline: specifications by terminals.
6.	A voluntary agreement between LNG operators to bid for LNG by regasification plant in a **common European LNG exchange platform**.
7.	**Swaps between LNG and NG shippers to make possible** the consumption of LNG in places where it is available, freeing gas pipelines to transport the gas where it is needed. The European LNG exchange platform can be used to exchange information and to facilitate the capacity contracts between TSOs and LSOs.
8.	Regional plans should be prepared in advance, in a coordinated way and accessible for the market agents. The regional emergency plan should contain: • Detailed mechanisms to promote demand response to high prices in the region and by country. • Extension of the interruptible demand and its application with a regional perspective. • Detailed regional plans to increase information availability and cooperation through LNG cargos and management of the storage. • Regional plans for virtual pipelines through small scale LNG or LNG trucks. • Mechanisms of communication and share of information between countries: ○ Response of the demand to market prices per balancing zone ○ Demand of vulnerable customers per country. ○ Interrupted demand for balancing zone. ○ Use of the interconnections. • Detailed mechanisms to apply demand outage in the region and by country. • Ex-post regional analysis of the crisis and ways to improve.

11. Conclusions

European Union energy security is exposed to endogenous risks linked to the functioning of the market under normal circumstances, and exogenous risks dependent on external factors to the European Union. **Regulation should ensure that the internal market can effectively respond to both endogenous and external energy supply risks**.

The priorities for security of gas supply are to ensure the best possible preparation and plans in order to improve resilience to sudden disruptions in gas supplies, that strategic infrastructures are protected and that the most vulnerable Member States are supported.

LNG is a key source of gas supply diversification. The role of LNG in contributing to security of supply has to be considered in the light of the characteristics of the LNG chain, where logistics remain rather rigid upstream on a short term basis while terminals offer flexible services based on LNG storage and trucks.

Virtual pipelines (LNG trucks to deliver LNG to remote areas and use of satellite plants to be regasified) can mitigate the effects of gas disruptions for most vulnerable customers. These routes are particularly useful in countries where the pipeline network infrastructure has not been fully developed or where the investment cost for connecting gas users to the grid is uneconomic. According to GLE, about 42,600 trucks loaded 1.9 mcm at LNG at truck loading facilities at large scale LNG terminals in 2014.

When implementing **floating storage regasification units** (FSRUs) as a solution in case of emergency two main factors must be taken into consideration: availability and mobility. FSRUs are often “purpose-built” but it is possible to move them according to LNG demand. Working on the technical standardization of FSRUs could increase its flexibility of this technology and information in advance is important to prepare the strategy in case of an emergency.

Both in cases where LNG terminals are considered as essential infrastructure (subject to regulated third party access as part of the downstream national gas infrastructures) and as exempted facilities, **security of supply and market fluidity will be enhanced by greater information and more transparency**.

Transparency on access to LNG services and respective costs is crucial to improve the market development and European SoS. The current **GLE Transparency Template** provides a useful tool for LNG operators to provide information to the market. Consideration could be given to going beyond this template in some circumstances (and not only for GLE members who have implemented the template), and in particular in the short term. The information could include available terminal capacity, available slots in primary and secondary markets, data to facilitate LNG reloading, and level of compatibility among European terminals. Additionally, introducing LNG information into the **ENTSOG Transparency Platform** and offering information by terminal, near real time and including LNG stock forecasts for the next gas days in the **GLE Aggregated LNG Storage Inventory** would provide a valuable tool to improve security of supply.

Furthermore, it is particularly relevant to reinforce the **role of LNG markets in Emergency Plans**, adopting market-based measures as first action to take for ensuring security of supply. When market-based mechanisms alone cannot ensure supplies, the contribution of non-market-based measures should be analysed. The principles of transparency, non-discrimination, standardisation and harmonisation must be followed when designing the measures to be taken by policy makers in case of emergency. Consideration of these possible measures should take into account the specific circumstances of the market or region in question.

Cooperation between Member States will facilitate the management of the crisis in each country by reinforcing **regional cooperation through Gas coordination groups and Emergency Committees** and preparing **regional emergency plans**, accessible to market participants.

As LNG is a global market, attracting additional gas from LNG is dependent on appropriate market signals. To ensure supply, whether in a normal operation or a crisis, it is necessary to have effective price signals. From the demand side, potential users of LNG could consider signing **master agreements** with potential suppliers, which, prepared in advance, could provide a framework for LNG deliveries to respond in a crisis situation.

Also, a common procedure of cooperation between competent authorities and LNG undertakings (regulated and non-regulated) to implement the most cost-effective measures for the parties concerned could be developed, as well as a common process for LNG operators to facilitate transactions from one regasification plant to another.

The creation of a common European LNG exchange platform could be explored as a possible tool to support LNG deliveries to respond to a crisis in particular for peripheral illiquid markets. This could be accompanied by possible agreements by LNG operators, master agreements by suppliers and users, potential swaps between LNG shippers and NG shippers to facilitate the consumption of LNG where needed.

The use of LNG to compensate a supply disruption is largely conditioned by network interconnection levels. An increased **cooperation between LSOs and TSOs** at EU level is of utmost importance. During a supply crisis, LNG could be the (interim) missing link to connect regions which are not adequately interconnected with major hubs. Bundled services could be prepared in advance between LSOs and TSOs, to cross several countries with a single capacity request.

CEER will follow closely the open debate about the security of gas supply in Europe, in particular the adoption of the European Union Strategy for LNG and Gas Storage, and continue providing recommendations and feedback with the objective of ensuring that LNG can enhance security and competiveness of gas supply in the EU.

Annex 1 – List of abbreviations

Term	Definition
ACER	The Agency for the Cooperation of Energy Regulators
bcm	Billion cubic meters
CAPEX	Capital expenditure
CEER	Council of European Energy Regulators
Commission	European Commission
DES	Delivered Ex Ship
EC	European Commission
ENTSOG	European Network for Transmission System Operators for gas
FOB	Free On Board
FSRU	Floating Storage and Regasification Units
GLE	Gas LNG Europe
IGU	International Gas Union
IP	Interconnection point
LNG	Liquefied natural gas
LSO	LNG System Operator
mcm	Million cubic meters
Mmbtu	Million British Thermal Units
mtpa	Million tonnes per annum
NBP	National Balancing Point
NRA	National Regulatory Authority
OPEX	Operating expenditure
rTPA	regulated Third Party Access
SoS	Security of supply
TSO	Transmission System Operator
TWh	Terawatt-hours
UK	United Kingdom
US	United States (of America)

About CEER

The Council of European Energy Regulators (CEER) is the voice of Europe's national regulators of electricity and gas at EU and international level. CEER's members and observers (from 33 European countries) are the statutory bodies responsible for energy regulation at national level.

One of CEER's key objectives is to facilitate the creation of a single, competitive, efficient and sustainable EU internal energy market that works in the public interest. CEER actively promotes an investment-friendly and harmonised regulatory environment, and consistent application of existing EU legislation. Moreover, CEER champions consumer issues in our belief that a competitive and secure EU single energy market is not a goal in itself, but should deliver benefits for energy consumers.

CEER, based in Brussels, deals with a broad range of energy issues including retail markets and consumers; distribution networks; smart grids; flexibility; sustainability; and international cooperation. European energy regulators are committed to a holistic approach to energy regulation in Europe. Through CEER, NRAs cooperate and develop common position papers, advice and forward-thinking recommendations to improve the electricity and gas markets for the benefit of consumers and businesses.

The work of CEER is structured according to a number of working groups and task forces, composed of staff members of the national energy regulatory authorities, and supported by the CEER Secretariat. This report was prepared by the LNG Task Force of CEER's Gas Working Group.

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