Study on Gas market upgrading and modernisation – Regulatory framework for LNG terminals

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Luc Van Nuffel, Trinomics
Natalie Janzow, Trinomics
Koen Rademaekers, Trinomics

Péter Kotek, REKK
Borbala Toth, REKK
Adrienn Selei, REKK

Gunnar Steck, Enquidity

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Contact: Lukasz Lisicki

E-mail: lukasz.lisicki@ec.europa.eu

European Commission
B-1049 Brussels

Directorate-General for Energy
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GLOSSARY OF ABBREVIATIONS

ACER – Agency for the Cooperation of Energy Regulators
ALSI – Aggregated LNG Storage Inventory
CAM – Capacity Allocation Mechanism
CEER – Council of European Energy Regulators
CEF – Connecting Europe Facility
CNMC – Comisión Nacional de los Mercados y la Competencia
DAT – Delivered At Terminal
EC – European Commission
EEPR – European Energy Programme for Recovery
EFET – European Federation of Energy Traders
EGMM – REKK's European Gas Market Model
ENTSO-G – European Network of Transmission System Operators for Gas
ERDF – European Regional Development Fund
EU – European Union
FID – Final Investment Decision
FSRU – Floating storage and regasification unit
GCV – Gross Calorific Value
GIE – Gas Infrastructure Europe
GLE – Gas LNG Europe
GWh – Gigawatt hour
IFIEC – International Federation of Industrial Energy Consumers
IOGP – International Association of Oil and Gas Producers
LBG – Liquefied biogas
LNG – Liquefied natural gas
LSO – LNG terminal service operator
LTC – Long-term contract
NBP – National Balance Point (UK)
NRA – National Regulatory Authority
PCI – Project of Common Interest
PVB – Punto Virtual de Balance (PVB)
PRISMA – Joint Capacity Booking Platform of major European TSOs
REMIT – Regulation on Energy Market and Transparency
RBP – Regional Balancing Platform
TAR NC – Network code on harmonised transmission tariff structures for natural gas
TEN-T – Trans-European Transport Network
TYNDP – Ten-Year National Development Plan
TPA – Third Party Access
TSO – Transmission System Operator
TTF – Title Transfer Facility (NL)
UIOLI – Use-it-or-lose-it
UIOSI – Use-it-or-sell-it

EXECUTIVE SUMMARY AND CONCLUSIONS

LNG plays an increasingly significant role in European gas supply. Over the past two years, EU imports of LNG have doubled and its share within total EU gas imports rose from 12% in 2018 to over 23% in 2019. This increase was driven by relatively low gas prices in competing Asian markets and the development of new liquefaction capacity in the United States and Australia, which increased supply.

LNG is currently imported at 24 large-scale terminals across 11 EU Member States. Plans have been announced for 18 additional large-scale LNG facilities to be constructed across 11 Member States, 6 of which do not yet have any terminals. Several of these projects are well-advanced, with plans to start up operations over the next five years.

To attract LNG imports, terminal operators have adapted and expanded their services and product offerings in recent years to meet demand for increased flexibility from shippers. They developed additional berthing, storage and regasification capacity, as well as specific services like ship and truck loading, with the aim to expand market opportunities for their users. Their expanding product ranges enhanced competition between terminals with access to the same gas markets; in the European LNG landscape today, not only do shippers compete for delivery slots at terminals, but terminals also compete to attract shippers to their facilities.

Ongoing efforts to support LNG development in the EU have strengthened the position of LNG in the gas supply of several Member States and have increased the attractiveness of the European market for LNG importers overall. This study analyses opportunities in the regulation of European LNG infrastructure and the wider market set-up to strengthen this welcome development further. The efficient use of LNG terminals contributes to enhanced security of supply and competition on the EU gas market, by enabling market access for new players and new gas sources. LNG terminals should in the future also be able to support the ongoing energy transition towards climate neutrality. In this context, it would be appropriate to assess the feasibility of using this infrastructure in the future also for importing and/or exporting renewable or decarbonised fuels. New investments in gas infrastructure should be future-proof and decarbonisation-fit, in order to avoid or minimise the risk for stranded assets in the long term.

After having highlighted the scope, objectives and methodology of the study in the introduction, the **first chapter** of this report presents relevant trends in the European LNG landscape before laying out the EU's current strategy and regulatory framework for LNG.

LNG operations in the EU are currently regulated according to Gas Directive 2009/73/EC. National law governs the oversight of terminal operations and practices, with supervisory principles varying significantly between Member States. As there is no specific regulation in place that sets harmonised rules for LNG terminal operation across the EU, some shortcomings in its markets persist and hinder productive competition between LNG terminals and between LNG market operators.

The **second chapter** of this report analyses major shortcomings in the EU's LNG market. Based on a comprehensive literature review, the results of a survey, and stakeholder interviews, shortcomings are identified and discussed in the context of key market elements that influence LNG entry into EU gas markets and impact competition between terminals (inter-terminal competition) and between users of a specific terminal (intra-

terminal competition). Barriers with the highest potential impacts on inter- and/or intra-terminal competition, categorised according to their relevant market elements, include:

- Gas market access and liquidity
  - Several gas hubs in the EU have not yet reached maturity, which limits trading opportunities for users of LNG terminals and hinders competition, especially if concentration levels are high in the concerned markets.
  - In some EU Member States with LNG terminals, the lack of available interconnection pipeline capacity still hinders downstream market opportunities for imported LNG. The concerned national authorities and TSOs are aware of these remaining infrastructural bottlenecks and are addressing them by ongoing and planned investment projects and by optimising the use of existing capacity.
- Terminal capacity allocation
  - At several terminals, all primary capacity is allocated to a few users via long-term contracts. Short-term access – which allows market participants to optimise their portfolios and would attract additional market participants – can only be secured by registered users via secondary markets and is not easily accessible for all potential users.
  - Several terminals are using first-committed-first-served principles to allocate primary capacity; this practice can obscure market signals.
  - Most terminals have rules in place to reallocate any unused capacity (various sorts of UIOLI procedures), but the actual reallocation of unused capacity is limited, and procedures vary considerably between terminals.
- Tariff structures and levels for terminal services and gas transmission
  - Lack of harmonised principles and structures for terminal services' tariffs, as well as limited transparency regarding tariff calculation methodologies, make tariff comparisons between terminals cumbersome, future tariff developments less transparent and can thus obscure market signals.
  - Although justified by LNG's contribution to market competition and security of gas supply, in particular in isolated markets, cross-subsidisation of LNG terminals through European or national co-funding, state-backed loss coverage, or discounts at transmission system entry points from LNG terminals can distort competition between terminals in an interconnected markets.
- Information provision and transparency of LNG terminals
  - The implementation of the GLE transparency template has improved transparency. Yet some information which is deemed important for market participants is still not publicly available for all terminals. Even where information is available, it is not standardised and often incomplete. Thus, the lack of adequate, user-friendly, and non-discriminatory information provision on tariffs, available capacities, services offered and contractual terms at some terminals still hinders market access, especially for smaller market parties and new entrants.
- Terminal exemptions from regulated tariffs and third-party access provisions
  - Exempted terminals can negotiate their tariff rates and are not obliged to publish them, which lowers transparency and leads to an unlevel playing field between regulated and exempted terminals.
- Flexible services offered at LNG terminals
  - Several terminals only offer standardised bundled services, while market parties would also appreciate unbundled services and more flexibility in contractual terms.
  - Development of new flexible services, e.g. additional storage, can be hindered due to inappropriately risk adverse regulation.
- Small-scale services offered at LNG terminals
  - Due to the low overall volumes of the small-scale LNG market, there is limited interest from LNG importers and shippers to supply LNG to the concerned retailers at competitive prices.

- Lack of harmonised capacity allocation procedures and limited transparency on capacities and tariffs for services to the small-scale market hinders further market development.

The **third chapter** of the report proposes measures to mitigate these shortcomings. Policy recommendations are proposed where identified barriers to competition could be removed through improved regulation. Several potential measures are developed in detail, the most important of which are:

- In gas markets with limited competition and liquidity, consider the possibility of requiring terminal users with a dominant share of contracted primary regasification capacity and a dominant overall market share to offer a minimum quantity of their imported LNG at regulated prices to suppliers or traders via the local wholesale gas market;
- Incentivise LSOs by adopting and monitoring relevant performance indicators to ensure a larger availability of different types of capacity products (next to bundled products also specific unbundled services, different contract durations, firm and interruptible capacity) in response to market requests;
- Review and adapt where necessary the specific storage regulation in order to allow and incentivise LSOs to offer additional storage capacity in response to market demand. This service could also be offered by using available underground storage capacity, via specific agreements between LSOs, TSOs and SSOs.
- Develop a cohesive, EU-wide transparency platform that should ideally be linked to the existing transparency platform implemented by ENTSO-G in order to have a consistent and efficient tool both for infrastructure operators and market parties:
    - All terminals should use this platform to publish information in a standard and user-friendly form on services offered, applicable tariffs, contractual terms, booking procedures and technical, booked and available primary and secondary capacity. This platform should also provide for all terminals the tariff for a standardised set of products, making it easy to compare tariffs for basic service offerings;
    - The first aim and priority of this platform is to enhance transparency, but it could also be used for booking purposes, including for small-scale services and secondary capacity transactions.
- Implement harmonised principles and market-based mechanisms for allocating available capacity at all EU LNG terminals by:
    - Introducing a set of standardised products;
    - Reserving a minimum share of capacity for shorter-term products;
    - Auctioning the available capacity on at least a single platform per market area.

In the **fourth chapter** of the report six proposed measures are analysed to determine how their implementation would quantitatively impact the EU's gas market. The tool used for this modelling (REKK's European Gas Market Model, or EGMM) assesses the potential impacts of the following measures compared to a baseline scenario (without measures):

- Implementation of primary capacity allocation at all terminals via auctions with three different reserve price levels;
- Implementation of a discount on the TSO entry tariff from LNG terminals;
- Uniform decrease by 50% of the current regasification tariffs at all terminals;
- Release of LNG commodity import contracts and market making obligation;
- Investments in pipeline infrastructure to connect isolated areas;
- Implementation of regulated tariffs for exempted terminals at the expiry of their exemption terms.

Other proposed measures cannot be modelled subject to lack of necessary data or lack of a possibility to quantify the effects.

The modelling results indicate that **the implementation of most measures tested would decrease the weighted average gas price for the EU-28**. The net benefits for end-consumers through decreasing gas prices exceed the cumulative negative impacts on revenues for regulated LSOs, TSOs and SSOs in all tested scenarios. This leaves room to recover potential missing money for infrastructure operators via other sources.

- Implementing **primary capacity allocation through auctioning** with a low reserve price (covering variable costs) would generate the highest benefits for European consumers. This measure would enable a more efficient utilisation of terminals and enhance competition in upstream and downstream market segments. Congestion rents would indicate the need for capacity expansions and could act as a source for their funding. In contrast, setting high reserve prices would hinder terminal utilisation and render LNG less competitive than pipeline gas. Depending on the market situation, an auction mechanism would lead to higher or lower revenues for LSOs compared to the reference scenario. Such income fluctuations can be mitigated via regulatory accounts in the first place. If the demand for terminal capacity would be structurally low and the auction outcome would not allow LSOs to recover their costs over a longer period, compensation via other mechanisms – tax, surcharges on end-users via the TSO grid tariff – would need to be considered, in particular if the concerned capacity is deemed necessary for security of supply and/or competition purposes.

- Implementing **decreased TSO tariffs** charged at entry points from LNG terminals has only a minor impact on market outcomes. This is due to the fact that the entry tariffs to the transmission system are currently low and hence in general not a barrier to entry for LNG.

- Implementing a uniform **50% decrease in regasification tariffs** would strongly increase LNG flows into EU markets and lead to lower gas prices and hence higher consumer benefit levels. Decreases in tariff levels would affect some terminals more severely than others, and increased volumes of gas influx would not necessarily fully compensate for the impact of the tariff decrease for LSOs.

- Implementing regulation that imposes **commodity import contract releases/market-making obligations** would (according to the modelling results) redefine the sources of gas supply for Europe and would replace long-term contracted flows with shorter-term supplies in the same volume.

Introducing the considered measures would in general positively impact terminal utilisation rates and market competition, but the effective size of the impacts would highly depend on global and European LNG market conditions, i.e. the global gas supply available to Europe and European gas demand levels. Implementing the measures in the short term would have a high positive impact, as global market conditions and trends in European gas demand are currently favourable. But most proposed measures would still provide benefits if market conditions would become less favourable (i.e., if the "LNG glut" would disappear, and/or the EU28 gas demand would stabilise or decline).

CONCLUSIONS:

1. LNG entry and trade is in some EU Member States hindered by **lack of competitive and liquid traded gas markets**. This weakness can be addressed by e.g. gas market mergers, imposing market-making obligations or gas release programmes on dominant gas importers into these EU Member States with limited competition (i.e. high market concentration) and less-developed wholesale traded markets (i.e. low trading volumes and/or limited numbers of active participants). However, this measure should not focus specifically on LNG; where implemented, its scope should be extended to the whole wholesale gas market as such.

2. In a few EU Member States (e.g. the Baltics and Croatia), **lack of adequate interconnection capacity** is still a barrier to LNG entry and trade; this issue is being addressed by ongoing or planned investments (delineated in TYNDPs and PCI lists) and by policy measures aimed at reducing infrastructural constraints, e.g., the market merger in the Baltic States.

3. The EU LNG market and its gas consumers would benefit from the development of an **EU-wide information platform** that ensures transparency on and comparability between terminal service offerings, tariff levels, and available capacities. Such a platform would facilitate progression towards market-based capacity allocation mechanisms and reduce inefficiencies in primary and secondary capacity markets.

4. To enhance competition and to provide robust price signals to infrastructure operators and market parties, implementing **primary capacity allocation via auctioning** of standard products is considered an appropriate measure. The current and planned practices in Italy and Spain can serve as a reference and provide stakeholder feedback.

5. Although UIOLI or similar principles are applied at almost all EU terminals, terminal usage could be improved by introducing harmonised reallocation procedures at all terminals, increasing transparency regarding available slots, simplifying and harmonising general access procedures and implementing a **centralised tool for secondary capacity bookings**.

6. Granting further **discounts on TSO tariffs for entries from LNG terminals** would have limited impacts according to the modelling results. TSO entry tariffs are currently low and do not act as barriers to LNG entry or trade. At present, only five Member States apply such discounts to TSO tariffs, justified by security of supply and competition considerations, or by lower entry costs for LNG compared to pipeline gas.

7. The co-existence of regulated and **exempted terminals** in the same market regions may lead to competition distortion between these terminals. Any new decision regarding exemptions should hence be carefully assessed to account for its potential impacts on competition in the relevant market areas. Decisions regarding subsidisation or cross-subsidisation of (regulated) LNG terminals should also account for potential impacts on inter-terminal competition. While in practice the application of negotiated tariffs by exempted terminals does not seem to negatively impact competition, mandating that future exempted terminals share relevant information via a proposed centralised transparency platform would improve market functioning. Ideally these transparency requirements should also be imposed on currently exempted terminals, where possible taking into account the terms of their existing exemption decisions.

8. In coordination with their NRAs, LSOs should systematically evaluate and adapt where necessary their **services portfolios**, in order to properly meet market needs for additional flexibility or specific (unbundled) services, such as storage or services that are specifically focused on the small-scale LNG market.

INTRODUCTION

The LNG market in the EU has evolved substantially in recent years, and thorough, up-to-date information and analysis on regulation and regional market dynamics are necessary to ground discussions regarding potential updates to the EU's LNG policy strategies. This report presents a contemporary overview of LNG regulation and market functioning within the EU. Its intent is to inform policymakers' understanding of identified shortcomings in the market and to present measures that might mitigate these shortcomings.

Scope of the study

The study focuses exclusively on large-scale LNG terminals in the EU. The small-scale facilities that currently exist in Finland, Italy, Sweden and the United Kingdom, are not included in the analysis, as their overall share and hence impact on market and competition is very small, and their business operations and competitive dynamics differ greatly from large-scale facilities.

Both existing and planned large-scale terminals are considered in the study. With respect to planned terminals, attention is mainly paid to those in further stages of development (i.e., projects for which final investment decisions have been taken, financing has been secured, and construction operations are being planned or have commenced).

The study primarily focuses on European LNG terminals and related markets at national and supranational levels. Market players from outside the EU did participate in the stakeholder consultation of the study. And context on global market dynamics as well as details on best practices deployed in other international LNG markets are included when they pertain to relevant trends in the EU market.

The study addresses two types of competition in the EU LNG market: competition between market operators that (potentially) use the same LNG terminals, as well as competition between terminal operators seeking to attract users to their terminal over any other.

The first kind of competition – referred to in the study as **intra-terminal competition** – concerns both importers of LNG, i.e., shippers competing to contract slots at terminals where they can unload and regasify LNG, and LNG suppliers competing to contract slots at terminals to load LNG onto trucks, ships or bunkering vessels to in turn supply their customers. Through intra-terminal competition, market players compete to use the limited services offered by a specific terminal.

The second kind of competition – referred to in the study as **inter-terminal competition** – concerns LNG System Operators (LSOs) in charge of terminal operations and their customers. Through inter-terminal competition, LSOs compete to attract LNG producers, shippers, suppliers and traders to their terminal instead of a competitor within the EU. Inter-terminal competition is strongest in regions where several terminals with similar capacities and product offerings are providing access to the same downstream market – for example in Northwest Europe, where terminals in the UK, France, Belgium and the Netherlands are competing to a certain extent to secure LNG deliveries.

As the study focuses on both types of competition, shortcomings are identified and potential measures are proposed in the scope of both intra- and inter-terminal competition.

Objectives

The first objective of the study is to analyse any market or regulatory shortcomings that could act as barriers to market entry and/or effective competition. Shortcomings are identified and described in the context of eight different factors that act as primary

determinants of market dynamics and impact competition within and between LNG terminals. They are ranked according to the scale and range of their impact within the broader EU LNG market. This ranking provides insight into which shortcomings most urgently require EU-level policy consideration. Shortcomings in the EU's LNG market are analysed in Chapter 2 of this report.

The second objective of the study is to propose policy recommendations and potential measures that could address those shortcomings. They are assessed according to their likely effectiveness, feasibility, proportionality and scale of market impact. This assessment is used to prioritise several key measures the European Commission (EC) might consider in order to address shortcomings and remove barriers to competition in the EU's LNG market. Potential measures to address identified shortcomings are presented in Chapter 3 of this report.

The third objective of the study is to model the possible impacts of implementing prioritised measures and quantitatively assess how new regulation might impact the functioning of the LNG terminals and market. Impacts of proposed measures are tested and evaluated using REKK's European Gas Market Model (EGMM). The results of this analysis are included in Chapter 4 of the report.

Methodology

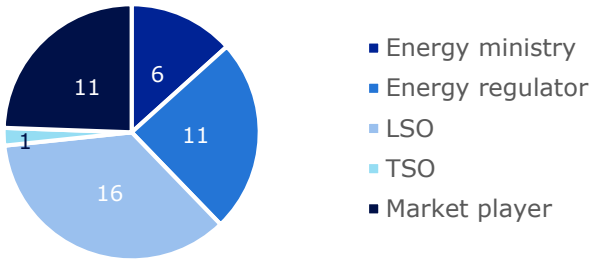
The data and information presented in this study were collected through a literature review and desk research, through bilateral discussions and interviews with stakeholders, and from the results of an online stakeholder consultation survey.

Bilateral discussions with stakeholders were held in August, September and October 2019. Terminal operators, national authorities, and industry associations were consulted. Several LSOs, market-party and regulator organisations, individual LNG suppliers/traders, and small-scale LNG market operators provided useful input for the study.

The online consultation was circulated to stakeholders in late August and early September 2019. Operators of gas infrastructure (including LSOs and TSOs), national authorities (including NRAs and energy ministries), and market players (including LNG suppliers, gas traders, and industrial end-users of gas) were invited to provide responses to the survey. The organisations Eurelectric, ENTSOG, GIE, EFET, Eurogas, CEER, IFIEC, and IOGP were asked to circulate the survey to their members, many of whom then submitted individual responses on behalf of their respective companies. National energy ministries and regulatory authorities were contacted on an individual basis.

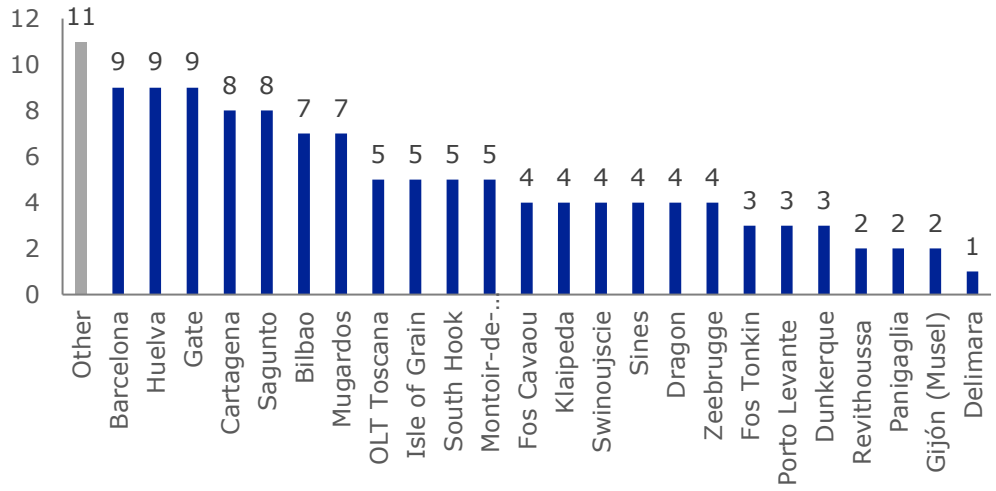
In total, **45 stakeholders** provided responses to the online survey: 17 national authorities, 17 operators of gas infrastructure and 11 market parties. A more granular distribution of survey respondents is depicted below, where national authorities include energy ministries and NRAs, operators of gas infrastructure include LSOs and TSOs, and market parties are gas importers/shippers, traders and suppliers.

Figure 1: Responses to the online consultation by stakeholder type



With respect to the geographic areas of operation, stakeholders were well-distributed. They identified which terminals were relevant to their responses, and multiple stakeholders provided input regarding operations at each active terminal in the EU (as can be seen in the figure below). Several stakeholders also provided answers not directly related to any operational terminal in the EU (those who indicated "Other" in the figure); these stakeholders indicated that their responses related to planned LNG terminals.

Figure 2: LNG terminals identified selected by stakeholders as relevant to their responses



The responses provided by stakeholders to the online survey informed the study's analysis of shortcomings in the EU LNG market as well as measures that could be implemented to address shortcomings. An analysis of stakeholder positions, as provided for in survey responses, is included in Chapters 2 and 3 of this report. A full-text copy of the questionnaire circulated to stakeholders is included in the Appendix.

In December 2019, the intermediate study results have been presented and discussed at a workshop with a large panel of representatives from national ministries and energy regulators, LNG terminal operators and market parties. Their feedback has been used to revise the findings and proposed measures in this report.

Structure of the report

The report consists of four chapters:

- Chapter 1 provides an overview of the European LNG landscape, current trends in LNG markets and the EU strategy and regulatory framework regarding LNG
- Chapter 2 provides details on important LNG market elements, identifies shortcomings in the context of these elements, and analyses instances of these shortcomings

- Chapter 3 proposes potential measures that could be adopted to address the shortcomings identified in chapter 2
- Chapter 4 includes modelling results that quantitatively indicate potential impacts of proposed measures

CHAPTER 1. LIQUEFIED NATURAL GAS IN THE EU

THE EUROPEAN LNG LANDSCAPE

EU Member States with direct or indirect access to imports of liquefied natural gas (LNG) benefit from enhanced diversity and security of supply, and also from increased competition in their gas markets. For five decades, LNG terminals in the EU have served as entryways through which international producers and traders provide an additional supply of natural gas to European markets. Europe's potential for LNG import and trade has grown in recent years as new terminals have come online; and with terminal new-builds and expansion projects planned in several EU Member States, the market is expected to continue growing.

Currently, 24 large-scale LNG terminals operate in 11 Member States across the EU (2 additional Member States – Finland and Sweden – have small-scale terminals). Most of these terminals have onshore berthing, storage and regasification facilities, though 2 are floating storage and regasification units (FSRUs) and one is a floating storage unit with an onshore regasification facility.[1]

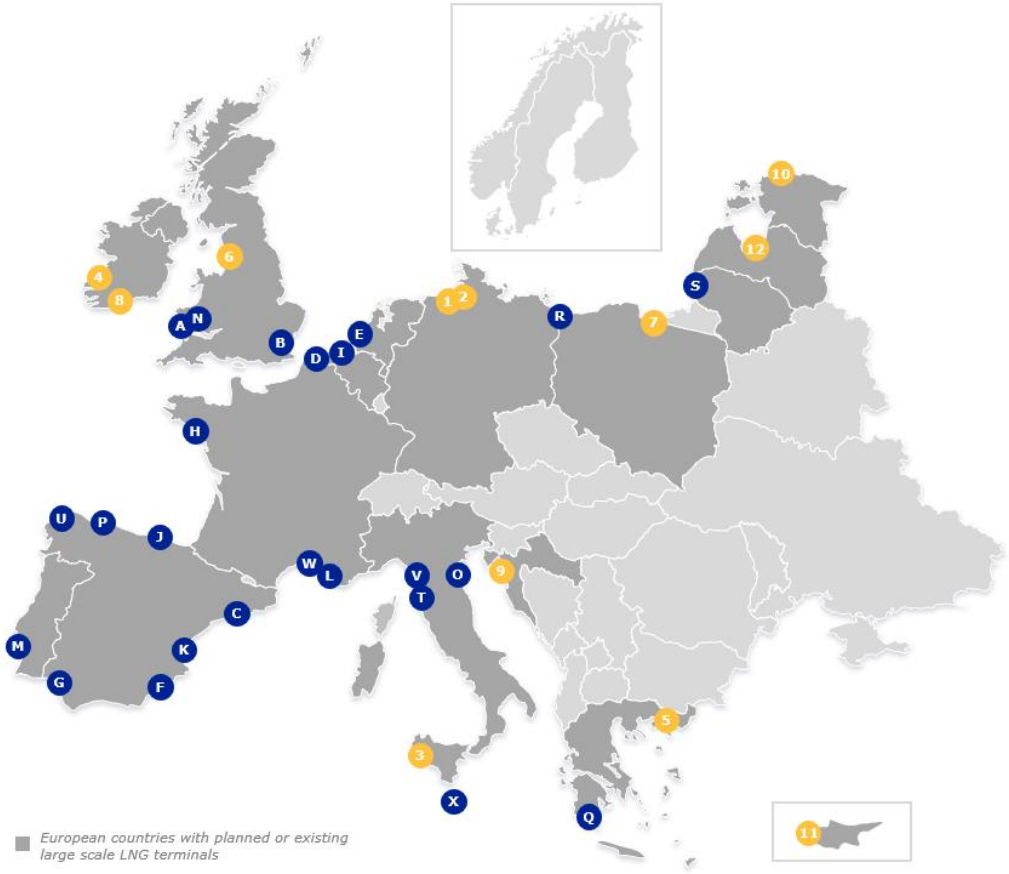
In addition to these existing terminals, 18 operators have announced plans to construct new LNG facilities across 11 different Member States, 6 of which do not yet have any terminals. Though it's possible that not all planned terminals will be constructed, several projects are well-advanced and intend to start-up terminals within the next five years.[2]

The locations of existing terminals as well as projects in the final stages of planning are mapped in Figure 3. The terminals are ordered in the key according to their nominal annual capacity (from largest to smallest). The UK's South Hook terminal is the largest operational facility in the EU, with a nominal annual capacity of 21 billion m^3N. Malta's Delimara terminal is the smallest (large-scale) facility in the EU, with a nominal annual capacity of 0.7 billion m^3N. The maximum nominal capacity in the plans for new terminals is 10 billion m^3N/year.[3]

There are EU Member States without LNG terminals which are geographically isolated from the seashore (Austria, Czech Republic, Hungary, Slovakia), while others are limited in their ability to access the global LNG market despite their access to the sea (Bulgaria, Romania). This is due to the limitation on LNG carriers to sail through the Bosporus strait. The LNG plans on the Black Sea hence relate to project plans that intend to ship gas from Georgia to the EU (AGRI). The other EU countries that have the physical option to build an LNG terminal usually have plans for small- or large-scale terminals in different stages of implementation (Croatia, Estonia, Germany, Ireland, Latvia). The only exception is Slovenia, that has a very short seashore and a very small gas market and no plans to build an LNG terminal.

[1] "GIE LNG Import Terminals Map Database," May 2019.
[2] "GIE LNG Import Terminals Map Database," May 2019.
[3] "GIE LNG Import Terminals Map Database," May 2019.

Figure 3: Planned and existing LNG terminals in the EU (2019)[4,5]



KEY

Operational terminals

A	South Hook	M	Sines	1	Wilhelmshaven
B	Isle of Grain	N	Dragon	2	Brunsbüttel
C	Barcelona	O	Porto Levante	3	Porto Empedocle
D	Dunkerque	P	Gijón (Musel)	4	Shannon
E	Gate	Q	Revithoussa	5	Alexandroupolis
F	Cartagena	R	Świnoujście	6	Port Meridian
G	Huelva	S	FSRU Independence	7	FSRU Polish Baltic Sea
H	Montoir-de-Bretagne	T	FSRU OLT Toscana	8	Cork
I	Zeebrugge	U	Mugardos	9	Krk Island
J	Bilbao	V	Panigaglia	10	Paldiski
K	Sagunto	W	Fos-Tonkin	11	Vassiliko
L	Fos Cavaou	X	Delimara	12	Kundzinsalas (Riga)

Planned terminals

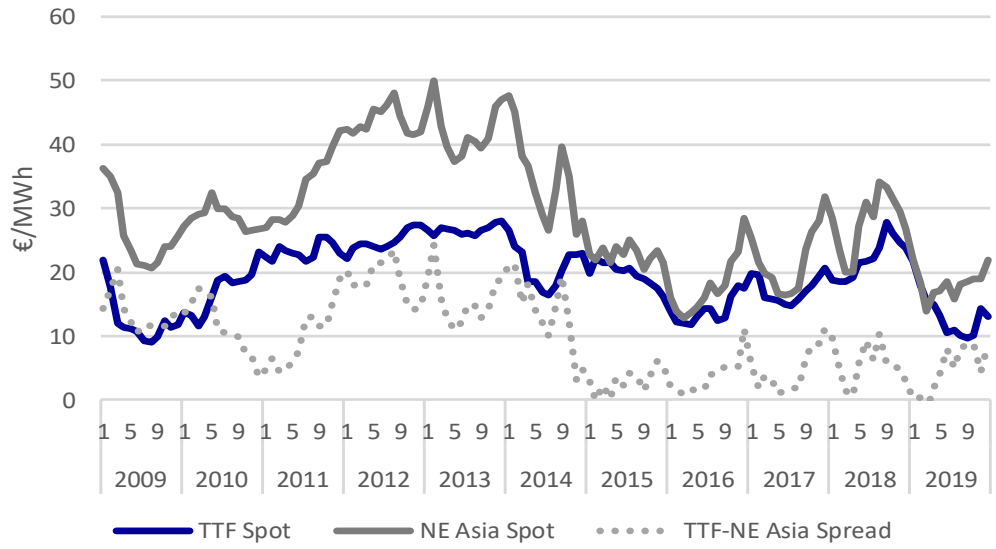
TRENDS IN INTERNATIONAL AND EU LNG MARKETS

Increased LNG imports to terminals across the EU

The recent expansion of European LNG trade can be attributed to two dominant trends in today's global gas markets. LNG prices in Asia have fallen since 2017 and demand for gas has decreased in Japan and South Korea, traditionally strong importers of LNG. The past decade has therefore seen a decreasing spread between prices in Asian and European natural gas markets, as depicted in the figure below. Thus, suppliers in the Middle East, Northern Africa, and the United States have favoured Europe as the more attractive and liquid market which they could also access with lower transport costs.[6]

[4] "EU-U.S. LNG Trade," European Commission, 10 July 2019
[5] "GIE LNG Import Terminals Map Database," Gas Infrastructure Europe, May 2019.
[6] "Quarterly Report on European Gas Markets," Market Observatory for Energy – DG Energy. Volume 12, Issue 2. 2019.

Figure 4: Evolution of natural gas spot prices in Europe (proxy: TTF hub) and in Asia (proxy: LNG spot NE Asia), 2009-2019[7]



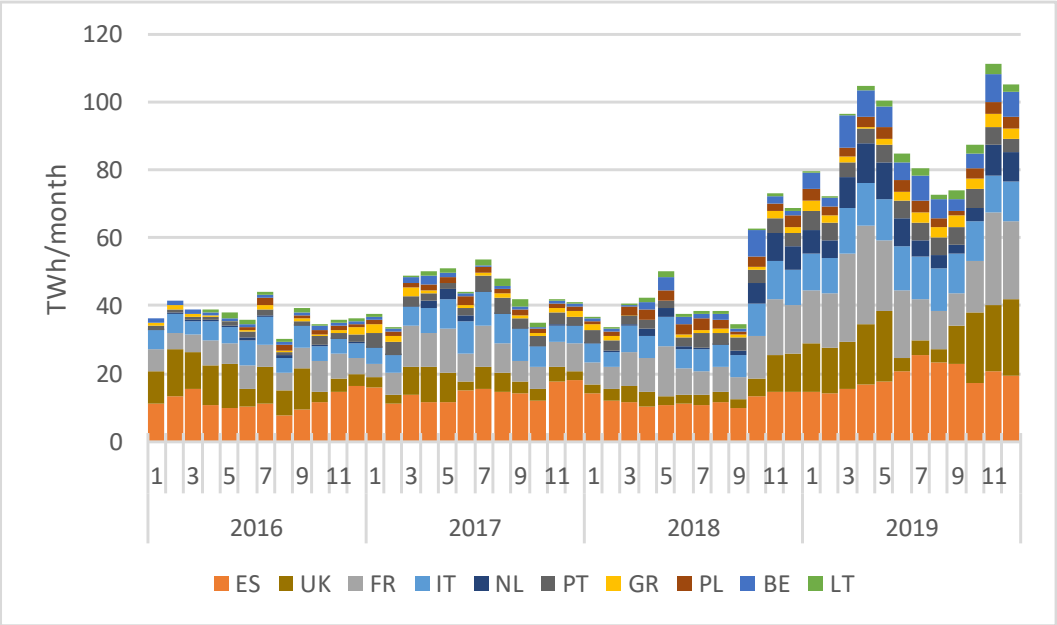
At the same time, both the United States and Australia have significantly expanded their liquefaction capacity, increasing global LNG supply. US exports of LNG to the EU rose by 181% over 9 months in 2019.[8] At the end of 2019, the US was the third largest supplier of LNG to Europe, behind Qatar and Russia but ahead of Nigeria, Algeria, Trinidad and Tobago, and Norway;[9] by January 2020, the US was the primary supplier of LNG to the EU, and is likely to maintain this position in the short-term.

These trends led to significant increases in European LNG imports since October 2018, as depicted in Figure 5. In Q2 2019, all countries with large-scale terminals in the EU showed double- or triple-digit percentage increases in their LNG imports compared to Q2 2018. In the Netherlands and in Greece, imported LNG increased by more than 300% over the course of the year.[10]

Increased LNG imports from the US will likely continue; in fact American companies have already signed long term sale and purchase agreements with companies in Poland and in Spain to supply additional LNG to their terminals.[11] Market prices, however, remain dynamic, and it is not guaranteed that Europe will remain as attractive as today. Provided LNG market prices in Europe remain closely aligned with those in Asia, European markets will likely remain competitive, especially if transport costs are also considered by suppliers. In Q2 2019, LNG prices in Europe dipped below prices in Asia, but imports into the EU remained high, implying that Europe offered a competitive destination for LNG cargos and will continue to do so if price divergence between the markets stays low.[12] Given increasing imports from the US and a steady level of competitiveness with Asian markets, growth in EU LNG trade is likely to persist.

[7] Monthly exchange rate provided by ECB. Hub prices reported in each month are built as the monthly average of the daily price quotes for the MA product. https://aegis.acer.europa.eu/chest/dataitems/52/view
Data from 2019 June: Spot LNG price statistics, Ministry of trade and Energy, Japan (calculated with ECB reference exchange rates). https://www.meti.go.jp/english/statistics/sho/slng/index.html. TTF spot prices from PEGAS.
[8] Howell, Nina. "LNG in Europe: Current Trends, the European LNG Landscape and Country Focus," The National Law Review, 16 September 2019.
[9] "Quarterly Report on European Gas Markets," Market Observatory for Energy – DG Energy. Volume 12, Issue 2. 2019.
[10] "Quarterly Report on European Gas Markets," Market Observatory for Energy – DG Energy. Volume 12, Issue 2. 2019.
[11] Howell, Nina. "LNG in Europe: Current Trends, the European LNG Landscape and Country Focus," The National Law Review, 16 September 2019.
[12] "Quarterly Report on European Gas Markets," Market Observatory for Energy – DG Energy. Volume 12, Issue 2. 2019.

Figure 5: LNG imports (TWh/month) to the EU by Member State[13]



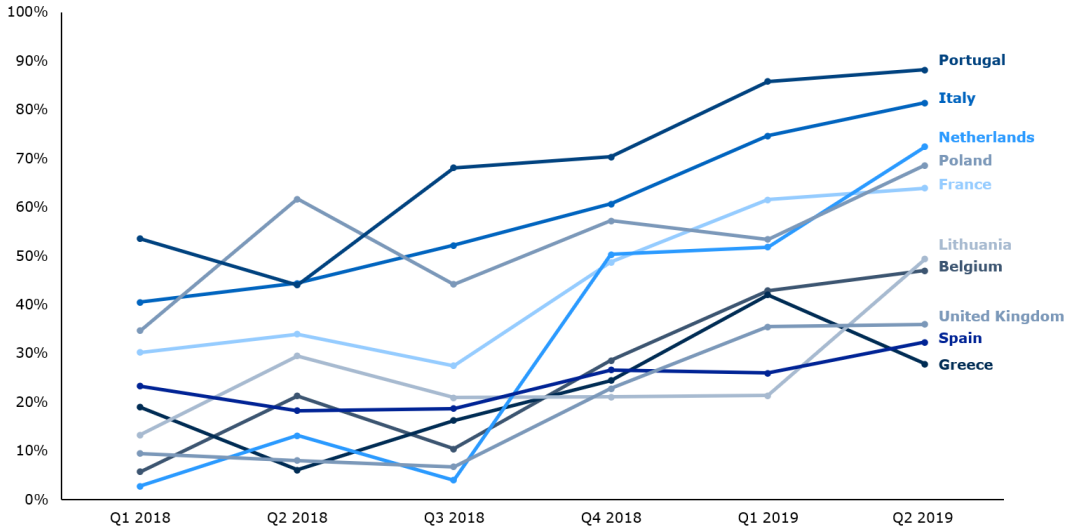
Increased terminal utilisation rates

As LNG imports have increased over the past year so too have terminal utilisation rates. While most EU terminals were accustomed to operating at relatively low levels of utilisation, many have seen significant increases in their storage and send-out capacity utilisation rates since late 2018.

The utilisation rates of regasification facilities in EU Member States with LNG terminals are depicted in the figure below. For countries with more than one LNG terminal, the utilisation rate represents the average national rate across all terminals.

[13] ALSI database (https://alsi.gie.eu)aggregated gas flow out of the LNG facility, send-out during gas day.

Figure 6: Daily send-out utilisation rates in EU countries with operational LNG terminals[14,15, 16]



Increased integration and competition within regional market zones

LNG markets in the EU historically operated to a large extent at national level, such that LNG imported into one country was mainly consumed in the same country. However, in the past decade gas systems and market areas have become more interconnected, enabling increased gas flows between different countries in the EU. In recent years, competition has also intensified between terminals with similar capacities in the same regions, as LNG imported in the Netherlands can, for example, be easily transported to Belgium, and vice versa.

Partly due to this increased integration, Europe's LNG market has gained momentum and prominence in the global LNG market, attracting market participants interested in the broader market with efficient risk-managing instruments that its increasingly liquid trading platforms can now offer. Terminals in interconnected regions – Northwest Europe and the Iberian Peninsula – offer LNG shippers expanded downstream distribution opportunities.

Rise of the LNG spot market and increased terminal flexibility

Traditionally, shippers were booking capacity at European LNG terminals through long-term contracts (which on average were set to span periods greater than 4 years). With imports increasing, however, and new supply and purchase arrangements on offer, many shippers are moving away from long-term agreements, contracting "spot" cargos – and booking their unloading slots at terminals months or weeks in advance, rather than years.

Terminal operators are accommodating this shift by offering opportunities for shippers to take shorter-term positions at their facilities. The growth of the LNG spot market has allowed for smaller players to engage in the market and trade LNG without being exposed to long-term commitments or having to make significant up-front investments. Spot markets also create opportunities for portfolio players and commodity traders to engage in LNG trading, contributing to the liquidity of LNG trade in Europe.

In addition to flexible bookings, LNG shippers increasingly choose terminals that offer multiple services. Terminals across Europe have expanded their service offerings in recent

[14] Utilisation rates calculated as realised daily send-out divided by daily send-out capacity, averaged per quarter
[15] For Italy, France, United Kingdom, and Spain, utilisation rates depicted are the average of quarterly rates calculated for all domestic terminals
[16] Aggregated LNG Storage Inventory database, GLE Transparency Template, October 2019.

years, developing further storage and regasification capacity in addition to products like small-scale reloading, transhipment, and truck loading.

These trends towards flexibility have contributed to increased competition between terminals with access to the same markets, just as competition between terminals has reinforced these trends. For example, terminals in the UK, the Netherlands, Belgium and France have developed market-leading service offerings and flexible contracts as they compete to attract LNG that can be sent out to markets across Northwest Europe.

Spot market dynamics and capacity bookings as well as service offerings at terminals are discussed in further detail in Chapter 2.

Rise of the small-scale LNG market

Small-scale LNG products – bunkering/small-scale ship loading, truck loading, and rail loading – are increasingly included in terminals' plans to expand their service offerings. Small scale LNG can be sourced from a conventional large-scale LNG terminal or from a specific small-scale liquefaction facility. The operations of several small-scale LNG market players have grown significantly over the past five years. Small-scale LNG market players purchase gas from importers and contract truck loading or small-scale ship loading services at terminals to pick up LNG which they redistribute to their retail clients. Small-scale market players deliver LNG to end-users in the transport sector and to industrial customers that cannot rely on traditional gas pipelines.

Partly driven by the expectation that environmental regulations will become stricter – many clients of small-scale LNG companies replace pollutant and carbon-intensive fuels with natural gas to reduce their NOx, SOx and CO2 emissions – the interest in the small-scale LNG market is growing. Small-scale market players are building relationships with importers and terminal operators as their own businesses grow. The increased interest in the small-scale market has motivated terminal operators to expand their services (as described above) to respond to the growing demand in this market segment.

The dynamics related to the small-scale LNG market are detailed further in Chapter 2.

THE EU REGULATORY FRAMEWORK FOR LNG TERMINALS

LNG import terminals located in the EU must operate – unless exempted - under a regulated regime in line with the requirements established in the Gas Directive 2009/73/EC of the European Parliament and of the Council concerning common rules for the internal market in natural gas. The Gas Directive lays out general rules for the organisation of the sector and establishes governance and allowed practices for gas transmission and storage, including for the delivery, storage, and regasification of LNG.17

The key provisions of the Gas Directive address infrastructural ownership unbundling, third-party access requirements, non-discriminatory tariffs and transparency requirements.

Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks, also comprises some provisions that apply to LNG operations.

Unbundling requirements

The Gas Directive 2009/73/EC does not require ownership unbundling for LNG terminals, which means that they can remain part of vertically integrated undertakings; keeping separate accounts for the LNG activities is however required (accounting unbundling according to article 31 of the Gas Directive).

[17] "Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 Concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC," Official Journal of the European Union, 14 August 2009.

Third-party access requirements

Article 32 of the Gas Directive states that third-party access (TPA) to LNG facilities based on published tariffs must be guaranteed for all eligible customers and without discrimination between system users. The regulatory authority may however under certain conditions and on a case-by-case basis, grant an exemption on this legal requirement. LSOs that do not dispose of such an exemption are hence required to offer regulated, non-discriminatory third-party access to their terminals.18

Transparency requirements

Transparency requirements for LNG terminals are delineated in Article 19 of Regulation No 715/2009 on conditions for access to the natural gas transmission networks.19 It states that LSOs must – in a meaningful, quantifiably clear and easily accessible way – publish detailed information on:

- The services they offer, and relevant conditions applied;
- The technical information necessary for LNG terminal users to gain access to facilities;
- Their contracted and available storage capacities;
- The amount of gas in each facility;
- Their specific product prices, the tariff calculation methodologies and the structure of tariffs for the use of their infrastructure[20].

Exempted status for LNG terminals

The EU internal gas market legislation contains a possibility for authorities to grant exemptions from specific legal requirements to operators of new gas infrastructure. The option to apply for exemptions was established under Directive 2003/55/EC with the aim of promoting infrastructural investments, particularly in gas pipelines, storage facilities and LNG terminals.[21]

Article 36 of the Gas Directive 2009/73/EC (repealing Directive 2003/55/EC) allows for LNG facilities to be exempted from regulated and non-discriminatory TPA based on published tariffs and/or from tariff regulation by NRAs for a defined period of time upon request, provided that their operators can prove:

- Investments will enhance competition and security of gas supply in its relevant market;
- Investments would not be made unless exemptions were granted;
- The infrastructure will be owned by an entity which was legally unbundled from the system operators in whose systems the infrastructure would be built;
- Charges will be levied on users of the infrastructure and not on end consumers;
- The exemption will not negatively affect competition or the functioning of the internal natural gas market, or the functioning of the regulated system to which the infrastructure is connected.[22]

While the terms of compliance differ for each exemption granted to gas infrastructure, exempted terminals in general do not have to comply with Article 32 of the Gas Directive, which sets the rules for regulated TPA at LNG facilities (see above).[23] They generally do not have to comply with Articles 41(6) and 41(10), which require LSOs to seek NRA approval for their tariff calculation methodologies and their tariff levels. Exempted terminals are mostly obliged to comply with the transparency requirements laid out in

[18] Ibid
[19] "Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005," Official Journal of the European Union, 14 August 2009.
[20] "Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 Concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC," Official Journal of the European Union, 14 August 2009.
[21] "How to Foster LNG Markets in Europe," Liquefied Natural Gas Work Stream of the Gas Working Group for the Council of European Energy Regulators, 24 July 2019.
[22] "Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 Concerning common rules for the internal market in natural gas nad repealing Directive 2003/55/EC," Official Journal of the European Union, 14 August 2009.
[23] Ibid

Article 19 (see above), except for the requirement to publish information on tariff levels and calculation methodologies. The specific terms of each terminal's exemption are included in the European Commission decisions approving or rejecting exemption applications.

Capacity allocation

Article 17 of Regulation No 715/2009 on conditions for access to the natural gas transmission networks lays out the principles of capacity allocation mechanisms and congestion management procedures concerning LNG facilities. It specifies that:

- The maximum LNG capacity shall be made available to market participants, taking into account system integrity and operation;
- LSOs must publish non-discriminatory and transparent capacity allocation mechanisms that provide appropriate economic signals for the efficient and maximum use of capacity and are compatible with market mechanisms, including spot markets and trading hubs, and with the connected network access systems;
- LNG contracts shall include measures that prevent capacity hoarding: LSOs must offer unused capacity on the primary market without delay and LNG terminal users must be entitled to sell contracted capacity.[24]

Article 22 of Regulation No 715/2009 requires LSOs to take reasonable steps to allow capacity rights to be freely tradable and to facilitate such trade in a transparent and non-discriminatory manner. LSOs shall develop harmonised contracts and procedures on the primary market to facilitate secondary trade of capacity and shall recognise the transfer of primary capacity rights where notified by system users.[25]

LSO tariffs

LSO tariffs for regulated terminals, while calculated and set by LSOs, must be reviewed and approved by NRAs as specified in Article 41(6) of the Gas Directive, which states:[26]

> *The regulatory authorities shall be responsible for fixing or approving sufficiently in advance of their entry into force at least the methodologies used to calculate or establish the terms and conditions for:*
>
> *(a) connection and access to national networks, including […] terms, conditions and tariffs for access to LNG facilities*

According to Article 41(10) of the Gas Directive 2009/73/EC, "Regulatory authorities shall have the authority to require […] LNG system operators, if necessary, to modify the terms and conditions, including tariffs and methodologies referred to in this Article, to ensure that they are proportionate and applied in a non-discriminatory manner."[27]

NRAs are also tasked with "ensuring that there are no cross-subsidies between transmission, distribution, storage, LNG and supply activities" according to Article 41(1)(f) of the Gas Directive.[28]

TSO tariffs

Article 23 of the Gas Directive 2009/73/EC grants TSOs the authority to set, subject to approval by the NRAs, and publish tariffs for system entry points from LNG regasification

[24] "Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005," Official Journal of the European Union, 14 August 2009.
[25] Ibid
[26] Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 Concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC," Official Journal of the European Union, 14 August 2009.
[27] Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 Concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC," Official Journal of the European Union, 14 August 2009.
[28] Ibid

facilities into transmission systems. The TSOs are also bound by the TAR NC – the Commission Regulation (EU) 2017/460 establishing a Network Code on Harmonised Transmission Tariff Structures for Gas – which entered into force on 6 April 2017.[29] This code both complements and acts as an integral part of the Gas Regulation 715/2009 by further harmonising the rules initially set out in its articles, and by setting principles for tariff calculation and transparency provisions required by the Regulation.[30]

The TAR NC describes reference price methodologies (RPM) for setting tariffs at entry and exit points within TSO systems. It does not prescribe the levels which must be applied by TSOs, but rather details the requirements for allowed methodologies. Article 9 of the TAR NC allows for adjustments to TSO tariffs at entry points from LNG facilities.[31] Discounts to tariffs are sanctioned on the grounds that the presence of an LNG terminal within a gas system increases security of supply and ends the isolation of the concerned Member State in respect of its gas transmission system. The article does not set maximum nor minimum discount rates, nor does it provide principles for determining the level of discount. Discounts must be approved by NRAs. NRAs also, as mentioned above, are tasked with monitoring potential instances of cross-subsidisation between gas infrastructures.

[29] Official Journal of the European Union (2017), Commission Regulation (EU) 2107/460 of 16 March 2017 establishing a network code on harmonized transmission tariff structures for gas, accessible via https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R0460

[30] ENTSO-G (2018), Implementation Document for the Network Code on Harmonised Transmission Tariff Structures for Gas, Second Edition (revised), accessible via https://www.entsog.eu/sites/default/files/2019-10/entsog_TAR_NC_2017_2nd_ed_update_1910_web.pdf

[31] Official Journal of the European Union (2017), Commission Regulation (EU) 2107/460 of 16 March 2017 establishing a network code on harmonized transmission tariff structures for gas, accessible via https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R0460

CHAPTER 2. SHORTCOMINGS IN THE EU LNG MARKET – IDENTIFICATION AND ANALYSIS

Though LNG imports and trade in Europe have substantially increased, there are still opportunities to further improve the market and regulatory design to facilitate LNG entry into and trade within the EU market. Several remaining shortcomings are terminal-specific, while others are Member State- and/or EU gas market-specific. Each area of concern, if left unaddressed, could breed barriers to LNG entry and/or trade and hinder competition within a specific terminal (i.e., amongst the users of a single terminal), competition between different terminals, and competition between gas sources, i.e. LNG vs. pipeline gas, in the broader EU gas market.

These shortcomings are experienced in the context of the following key market and regulatory elements that influence LNG entry into the EU gas market as well as competition between different terminals and between users of the same terminal.

A. Market access and market liquidity (including terminal location, physical grid connections, and proximity to a liquid gas trading hub);
B. Capacity allocation mechanisms and terminal liquidity;
C. Tariff levels (including LSO terminal tariffs and TSO transmission tariffs) and terminal financials;
D. Information provision and transparency;
E. Terminal exemptions from regulated TPA and tariff setting requirements[32];
F. Gas quality restrictions;
G. Primary services offered at terminals and flexibility to adapt them to market needs;
H. Small-scale LNG services offered at terminals.

To gain a nuanced understanding of the different shortcomings related to each factor, the report's general analysis is complemented by a more detailed evaluation of 3 selected LNG terminals: Barcelona LNG terminal, Gate Terminal Rotterdam, and Świnoujście terminal.[33] These terminals were chosen to represent a spectrum of:

- Regulatory regimes: one terminal is exempted while two are regulated;
- Market dynamics: Gate serves Northwest Europe while Barcelona serves Southern Europe/the Iberian Peninsula and Świnoujście serves Eastern Europe;
- Levels of technical progression and service offerings: Gate and Barcelona have developed advanced technical capacities and offer a wide range of services in rather mature and competitive markets, while Świnoujście is still planning to expand its services in a less liquid and competitive market.

Specific characteristics and lessons learned from these cases are included in each section with the intent to illustrate how issues are experienced in practice across different terminals.

Furthermore, the results of a wide stakeholder consultation regarding the EU's LNG market are included to offer insight into how different players in the market – infrastructure operators, market parties and national authorities – experience identified shortcomings. Data on stakeholder views was collected via a survey to which 45 stakeholders provided responses. A detailed description of the survey is included in the appendix. The study team

[32] Exemption principles from regulated TPA to gas infrastructure were introduced in 2003 under Directive 2003/55/EC with the aim of promoting infrastructural investments, particularly in gas pipelines, gas storage facilities and LNG terminals. Exempted terminals do not have to comply with Article 15 of Regulation 715/2009, which sets the rules for Third-Party access services concerning LNG facilities, as stated in Article 30 of the same regulation.

[33] These terminals were selected as they operate in distinctive regions across the EU, where LNG plays different roles; they operate under different regulatory terms (one is exempted from TPA while the others are regulated), and are connected to markets at different levels of maturity and liquidity.

has also had multiple bilateral contacts with national regulators, terminal operators and market parties, both via their associations as directly with individual companies and organisations. Relevant results of the stakeholder consultation are summarised in each section as "Stakeholder views."

A synthesised analysis of case studies and stakeholder views contribute to the identification of the most important barriers to LNG entry and trade and to competition between/within LNG terminals. Collectively, market shortcomings are assessed and ranked according to their impact on the competitiveness of LNG, the scale of their market impact, the market players they affect and the urgency with which they should be addressed. This assessment is included at the close of the chapter.

A. MARKET ACCESS AND MARKET LIQUIDITY

Overview

Access to liquid gas markets – both via physical network connections and virtual connections to trading hubs – is one of the most vital features of terminal competitiveness. Terminals that can easily access liquid and mature gas markets provide attractive risk management opportunities to shippers of LNG.

Access to virtual liquid trading hubs

Competitive LNG terminals also require access to virtual liquid gas trading hubs. Liquid hubs offer expanded downstream LNG distribution opportunities, and shippers appreciate proximity to gas hubs that provide strong market price signals.

In general, the existence of liquid wholesale markets has an important impact on reducing barriers to LNG entry: a producer or importer of gas can sell on the wholesale market without the need to develop a customer base, using transparent price signals over several years ahead to decide where and when to send cargos and at what prices – optimising its portfolio. Gas providers and large customers can thereby manage their business risks by leveraging financial instruments offered in the futures and forwards markets. In the same way, access to well-functioning gas markets also affects the ability of LNG terminals to attract cargos.

In the EU, two highly liquid gas hubs have thrived over the past decade – NBP and TTF – and multiple interconnected sub-regional gas markets have developed, with LNG predominantly supplying the marginal unit and thereby setting price caps for pipeline gas. Due to its developed level of liquidity, its ease of access and its transparent prices, Europe is considered a global LNG balancing market, offering a last resort in case of global oversupplies, and exporting reloaded cargos in case of high demand in the Pacific basin.
To maximise distribution opportunities, it's vital for LNG terminals to have reliable access to liquid and mature gas trading hubs. Reliable access is largely contingent upon geography and existence of adequate infrastructure connecting terminals to one or preferably several transport systems (in this way, access to liquid gas trading hubs is contingent upon physical access to gas grids, as discussed above).

While many European LNG terminals do have access to adequately mature trading hubs, some terminals are still isolated from liquid hubs and cannot exploit the same trading opportunities as their competitors. Access to highly liquid hubs will become even more important for terminals if price signalling across international LNG markets develops further in upcoming years, as anticipated by price-reporting agencies like S&P's Global Platts platform.

An overview of EU countries with existing or planned LNG terminals and their respective trading hubs is included in the table below. In several countries, including Greece and Portugal, gas hubs are still developing. In others, like Croatia, Cyprus, Estonia, Ireland and Latvia, LNG terminals are planned but gas hubs do not yet exist. But just as terminals benefit from access to liquid gas markets, hubs mature and increase in liquidity due to the presence of LNG terminals, which increases supply competition and flexibility in their markets.

Physical access to domestic and cross-border transmission networks

All operational terminals in the EU are physically connected to their respective domestic gas market, and terminal users are guaranteed access to the transport system through standard regasification packages. Access to flexible and easily managed gas markets (with

longer-term balancing requirements, for example) is considered advantageous for LNG terminal users.

Physical access to cross-border transmission networks varies across terminals in the EU. Some terminals – like those in Northwest Europe – are well connected to neighbouring markets and present ample downstream distribution opportunities to their users. Well-managed pipelines connect France to Belgium, Belgium to the Netherlands, and the UK to all three countries. These physical interconnections have bred strong inter-terminal competition in the region, as shippers can elect to use any of the terminals to serve the same markets.

Other terminals in more isolated areas – including several in Southern and Eastern Europe are not yet well connected via pipelines to neighbouring markets. As market access is highly valued by terminal users and operators alike, and in order to enhance security of supply and gas markets' integration, the concerned TSOs are investing in or have planned expansions to their domestic and cross-border gas systems.. For example, major expansions of gas infrastructure connecting eastern European markets – including the Trans Balkan corridor, the Poland-Lithuania gas pipeline, and the Baltic Pipeline connecting Norwegian Gas fields with Poland via Denmark and Eastern European countries[34,35,36] – are expected to bolster the attractiveness of and competition between LNG terminals in Eastern Europe.

[34] Baltic Pipe Project, 2019. Information accessible via https://www.baltic-pipe.eu/
[35] "Poland-Lithuania Gas Pipeline," Gaz System, 2018.
[36] "Gas Interconnection Poland-Ukraine," Gaz System, 2018.

Table 1 : Overview of gas hubs in EU countries with existing or planned LNG terminals

Country	Existing LNG terminals	Planned LNG terminals	Gas hubs[37]		Average suppliers' gas sourcing costs (€/MWh)[38]		TSO entry tariff (€/MWh)[39]	
			Name	*Maturity*	*Import pipeline price at border (2017)*	*Hub price (2017)*	*Pipeline entry*	*LNG entry (*without regas)
Belgium	1	0	Zeebrugge Trading Point (ZTP)	Active	17.812	17.446	0.11	0.2
Croatia	0	1	*None*	-	20.243	-	-	-
Cyprus	0	1	*None*	-	-	-	-	-
Estonia	0	2	Baltic gas hub	Developing/low	20.015	-	-	-
France	4	0	Trading Region France (TRF)	Active	-	17.724	0.24 (BE); 0.31 (DE, ES, NO)	0.31
Germany	0	4	NetConnect Germany (NCG) and GASPOOL (GPL)	Active	17.202	17.365	0.28	-
Greece	1	1	GR virtual trading point	Developing/Low	18.076	-	0.75	0.23
Ireland	0	2	Irish balancing point (IBP)	Planned	18.245	-	-	-
Italy	3	1	Punto di Scambio Virtuale (PSV)	Active	17.460	19.029	0.65 (AT); 1.42 (DZ); 0.52 (CH)	0.44
Latvia	0	2	Baltic gas hub	Developing/Low	17.590	-	-	-
Lithuania	1	0	Baltic gas hub	Developing/Low	17.770	-	-	-
Malta	1	0	*None*	-	-	-	-	-
Netherlands	1	0	Title Transfer Facility (TTF)	High	18.610	16.919	0.13 (DE, NO); 0.24 (BE)	n.a,
Poland	1	1	Polish Power Exchange (TGE)	Developing/Low	-	18.725	0.38 (Yamal entry), 0.78 (other entries)	0.78
Portugal	1	0	MIBGAS	Developing/Low	18.380	-	0.37	0.37
Spain	7	2	PVB	Active	17.564	19.956	0.4	0.4
United Kingdom	3	1	National Balancing Point (NBP)	High	18.069	17.868	0.7 (NL), 0.93 (BE) 0.99 (NO)	0.19

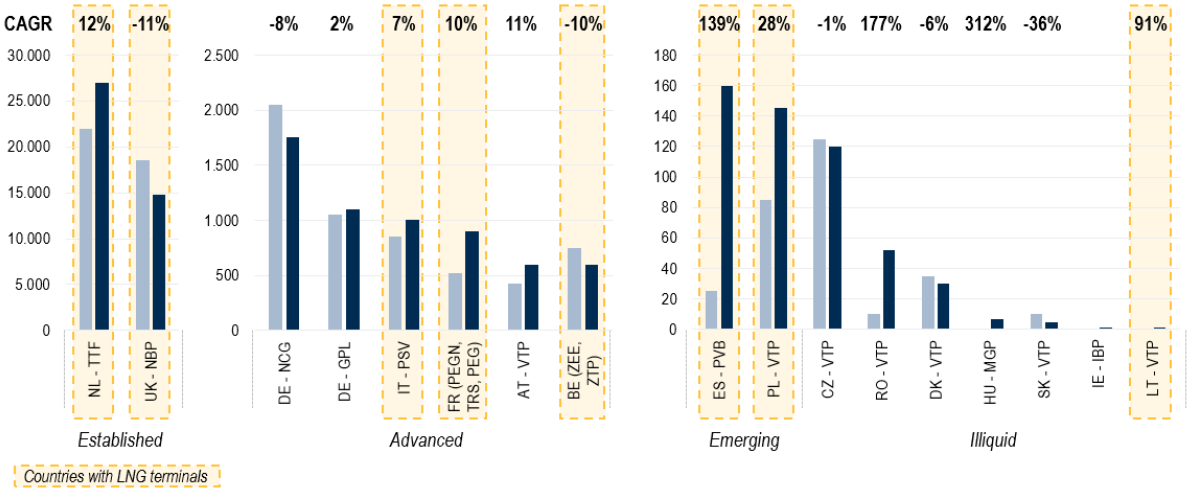
Note: Cells highlighted in dark grey indicate lack of comparable data.

[37] "European Gas Hub Development Study: Individual Hub Assessments," European Federation of Energy Traders, 23 November 2018.
[38] "Estimated average suppliers' gas sourcing costs in euros/MWh by EU MS and EnC CP for 2012_2017," ACER based on Eurostat Comext, Platts, and NRA's, 2018.
[39] REKK data collection based on TSO websites.

The table depicts for 2017 the gas import prices at interconnection points and the gas hub hedging prices.[40] In countries with highly developed hubs, procurement prices for gas are intuitively lower due to increased levels of competition.

The following figure depicts the traded volumes of gas at EU hubs in 2016 and 2018, as well as the compound annual growth rate (CAGR) of traded volumes over those years. The most advanced hubs in the EU are the TTF (in the Netherlands) and the NBP (in the UK). Other hubs in Germany, Italy, France, Austria and Belgium are advanced, while those in the Czech Republic, Romania, Denmark, Hungary, Slovakia and Ireland are still emerging or illiquid. Among the countries with active LNG terminals (highlighted in yellow), hubs in Spain and in Poland have experienced significant growth in traded volumes since 2016. In fact, Spain's hub was in 2019 considered "Advanced" by the national regulator.[41] Additionally, GET Baltic – the hub where gas imported to Lithuania's terminal can be traded – substantially increased in liquidity in 2019.[42]

Figure 7: Traded volumes at EU hubs (TWh/year, CAGR, 2016-2018)[43]



Continued development of less liquid trading hubs will be facilitated by appropriate market design and commissioning of new infrastructure connecting markets in Southern and Eastern Europe. The further development of hubs with low maturity and liquidity in Greece, Portugal, Ireland and the Baltics will increase competition amongst market players and the competitiveness of gas in these regions. This will facilitate LNG entry and trade into these countries and increase the attractiveness of their LNG terminals.

Case studies

Gate terminal has access to the TTF, one of the most liquid hubs in Europe, while Barcelona's hub – PVB – is somewhat mature and Świnoujście's – the Polish Power/Gas Exchange – is still developing. Details on how these hubs impact the concerned terminals are included below.

[40] "ACER Market Monitoring Report 2017 - Gas Wholesale Markets Volume," 3 October 2018.
[41] "Informe sobre el funcionamiento del mercado mayorista de gas en 2018 y recomendnaciones para el incremento de la liquidez, la transparencia, y el nivel de competencia del mercado organizado," Comisión Nacional de los Mercados y la Competencia, 25 July 2019. https://www.cnmc.es/sites/default/files/2600523.pdf
[42] "Archive 2019," GET Baltic. https://www.getbaltic.com/en/archive/2019/
[43] Adapted from figure 15 in ACER's Annual Report on the results of monitoring the internal natural gas markets in 2018

Access to gas trading hubs from Barcelona, Gate and Świnoujście

Gate

- Imported LNG is traded at the virtual trading hub for the Dutch natural gas market, TTF (Title Transfer Facility)
- TTF is the leading hub in the European gas market and has since 2011 seen compound annual growth rates of 23% in traded volumes
- TTF received strong support from the government early on its development:
  - Created a market-friendly environment by allowing for open access to the Dutch network of gas pipelines and storage infrastructure, as well as access to pipelines connecting NL to its neighbours and to Norway and the UK
  - Enforced transparent rules for trading and defending level playing fields for actors across the industry
- Shippers, suppliers and traders use TTF to import from and export to a wide variety of countries in the global gas market including Algeria, Angola, France, Norway, Peru, Qatar, Russia and the U.S.
- Gate benefits of its access to TTF which has become a reference pricing mechanism for European natural gas markets due to its high liquidity
- TTF's growth can be attributed in part to its role as a reference point for LNG market participants, as global LNG portfolio players use TTF to set main European benchmark prices and optimise their destination-free cargoes

Barcelona

- Imported LNG is traded at the virtual trading hub for the Spanish natural gas market, PVB (Punto Virtual de Balance)
- LNG shippers and traders are using PVB to trade imported LNG on Spanish market as well as for exporting it to Portugal
- Trade at the PVB has substantially improved since it was created in 2015, but it still lags behind the most liquid and mature European traded gas hubs
- Spain aimed to build the PVB into a "gateway hub for Europe," but analysis suggests that despite ample capacity, it is unlikely to develop as such
  - PVB is not yet deep or liquid enough gas hub to enable traders to buy and sell large quantities of natural gas on the market; once liquidity grows, gas flows will be further commercially optimised and more LNG imports can be attracted.
  - Given recent trends it is more likely that the PSV (Punto di Scambio Virtuale) in Italy will become the reference hub for Southern Europe, that its price signals will be referenced to attract LNG, and that it might become over time the leading supply route for pipeline gas into northern Europe

Świnoujście

- Imported LNG is traded on the TGE (Polish Power Exchange) but cannot easily be traded at any major European hub due to lack of interconnection capacity
- Since its launch in 2013, Polish PX's trade dynamics have increased significantly as interest in natural gas has grown and trade has become more flexible
- Poland's gas infrastructure is solidly established and will be expanded according to ambitious Polish gas network development plans (Baltic Pipe, GIPL, PL-SK and PL-CZ with additional internal pipeline developments)
- There are proposals to develop Poland's gas exchange into a hub for north-eastern and central Europe, with the aim to:
  - Make prices more competitive
  - Increase demand for gas imports by giving access to more buyers
  - Develop liquidity in the market place and generate strong pricing signals for north-eastern Europe
- Potential Polish gas hub could cater to markets currently underserved, including the Baltic States that are linked amongst each other but not yet linked to the other EU markets
- This market could also potentially be served by the development of a German natural gas hub

Sources: Harris, Dan and Chou, Ying-Chin, "Gas Transport Tariffs and the Dutch Gas Market," The Brattle Group as prepared for Gasunie Transport Services B.V., 26 September 2017; Heather, Patrick, "'A Hub for Europe': The Iberian Promise?" Oxford Institute for Energy Studies, March 2019; "Benefits of Natural Gas for Poland – Needs for the Development of a Gas Hub," Shell, 7 March 2018.

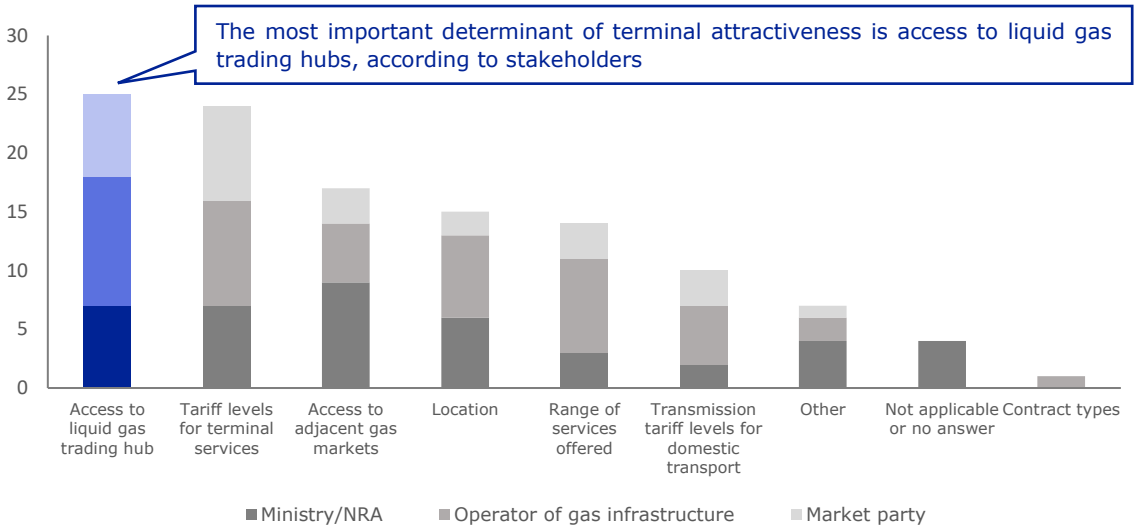
Stakeholder views

Virtual access to liquid trading hubs

Stakeholders agree that access to a liquid gas hub has a high impact on competition between terminals and is the most important determinant of terminal selection by shippers. They indicate a need for more liquid hubs, particularly in Southern and Eastern

Europe. Several stakeholders allude to hub development in Spain, Italy, and the Baltics and anticipate that as these hubs advance and become more liquid, LNG terminals in those regions will become more attractive for shippers. Strong price signalling driven by more liquid hubs will attract additional shippers who can rely on hub dynamics to gauge market prices in their estimates; this will likely lead to increased utilisation of terminals and more dynamic gas prices in regional markets.

Figure 8: Factors selected as one of the three most important reasons why shippers choose a specific LNG terminal for importing LNG[44]



Market parties consider access to liquid trading hubs especially important – all regarded it as having a high to very high impact on competition. They acknowledge that LNG terminals connected to the most liquid hubs in the EU (NBP and TTF) have a competitive advantage over their counterparts in other areas.

Regarding access to virtual trading hubs, one market player indicated that "from an EU perspective, this can be an issue in some markets and is a key driver in terminal utilisation decisions. Full implementation of existing EU Network codes could help." Another indicated that "More flexibility in balancing regimes and availability of higher liquidity can facilitate LNG entry and trade."

Several national authorities in Southern and Eastern European markets indicated that while their hubs lack maturity, they are making efforts to attract more users and increase liquidity. They affirm LNG terminals play a key role in providing diversity of sources and increasing competition in their gas markets and believe that more mature hubs will in turn benefit the terminals.

Physical access to domestic and cross-border transmission networks

Stakeholders indicate that access to national transmission systems is generally not an issue in the LNG market, as shippers are guaranteed entry capacity into the network across markets. In some countries, national transmission systems are even re-designed and expanded where necessary to facilitate send-out from LNG terminals. However, some LSOs indicate that TSOs' unwillingness to expand infrastructure can act as a barrier to expanding capacity at terminals.

[44] Responses from stakeholders in the consultation on the EU regulatory framework for LNG, September 2019

Access to the national transmission system and to cross-border networks is considered particularly important by stakeholders active in the Spanish market, where the development of a virtual storage tank is intended to increase LNG liquidity within the country.

Generally, cross-border interconnection capacity is not considered an issue except in specific regions. For example:

- Multiple stakeholders identified issues with interconnection between Spain and France, related to scarce capacity and limited availability due to historic long-term bookings;
- The TSO in Poland noted that lack of pipeline infrastructure currently limits downstream market opportunities, but that it is expanding its interconnection capacity towards Lithuania and Ukraine to increase the competitiveness of Świnoujście.

Potential barriers

On the basis of this analysis, the possible barriers to competition related to gas hub access are summarised in the next table.

Table 2 : Potential barriers to LNG entry into the EU gas market – Access to liquid gas market and hubs

Intra-terminal competition	
Inter-terminal competition	• Several gas hubs in Europe are still developing or have not yet reached maturity or liquidity, limiting trade opportunities for users of LNG terminals in the concerned markets • Lack of connection pipeline infrastructure limits downstream market opportunities for gas imported at more isolated terminals

B. CAPACITY ALLOCATION MECHANISMS AND TERMINAL LIQUIDITY

Overview

Capacity at LNG terminals in the EU is allocated along four dimensions, i.e., long-term and short-term capacity bookings are offered to terminal users via primary and secondary capacity allocation mechanisms. Primary capacity is any capacity that is available or allocated to primary capacity holders, while secondary capacity refers to capacity that is allocated but remains unused and is hence offered by the concerned capacity holders to other market parties. Through typical capacity bookings, users secure berthing rights, storage capacity and regasification capacity. "Capacity" as used in this chapter refers to this combination of provided rights, unless otherwise specified, as in most markets, all three services are guaranteed to capacity holders to whom are assigned slots for terminal use.

Long-term terminal capacity typically refers to bookings allocated for periods longer than one year. Long-term capacity can be booked years ahead of scheduled unloading slots; for example, in September 2019, Qatar Petroleum booked all available primary capacity at Zeebrugge terminal in Belgium with its contract set to commence in 2023 and last until 2044.[45] The booking was the result of a subscription window opened by the terminal's LSO in early 2019. Several other LSOs allocate their long-term capacity in similar ways (see section on "Primary capacity allocation mechanisms" below). Shippers typically book long-term capacity between five to one year ahead of when they're planning to use terminals; while there is no maximum year-ahead limit for booking long-term capacity, the booking by Qatar Petroleum is particularly long-term.

Short-term capacity refers to bookings allocated for less than one year, with bookings taking place up to one month before berthing slots are scheduled. Short-term capacity bookings are sometimes favoured by shippers that base their LNG deliveries on spot natural gas market prices[46]; it is not uncommon that traders keep tanker cargoes on the water hoping that cooler weather would boost prices. The flexibility to book short-term capacity enables them to optimise their deliveries based on market price signals.

In theory, both long-term and short-term capacity can be booked in terminals' primary capacity markets. In practice, several terminals allocate all their primary capacity via long-term bookings, such that short-term capacity can only be booked in their secondary capacity markets, i.e. from primary capacity holders who initially booked the slots in terminals' primary markets. When primary capacity holders are unable to use all their scheduled slots, these slots are made available to other shippers on secondary markets. Usually, their availability is publicised by LSOs on their websites (for further details, see the section below on "Secondary capacity allocation platforms and terminal liquidity"). LSOs have set individual policies that govern their primary and secondary capacity allocation processes.

These processes are not standardised beyond their required compliance with EU Regulation 715/2009 (the Gas Directive – see Chapter 1 for further details), which sets general conditions for primary and secondary capacity allocation in LNG terminals.

Primary capacity allocation mechanisms

Currently, there are mainly three mechanisms used by EU terminals to allocate their primary capacity: Open Season procedures, First-Committed-First-Served procedures; and Open Ascending Auctions. Several terminals combine First-Committed-First-Served

[45] "Qatar Terminal Limited and Fluxys LNG sign long-term agreement for Zeebrugge LNG terminal," Fluxys,
[46] "Position on the Proposed CNMC Reform of the Spanish LNG Market," Shell Energy Europe, March 2019.

principles with Open Season procedures to attract shippers and contract out their primary capacity. The primary allocation mechanism currently used in each terminal is included in

Table 3.

Through **open season procedures**, market parties interested in securing primary capacity can approach LSOs and express their intent to enter into a contract. LSOs can then approve requests for capacity bookings, up to the technical limits of the terminal. If they receive more interest in booking capacity than technical constraints will allow, typically a hierarchy for allocating slots is adopted, such that:

- Requests for longer durations bookings are given precedence over booking requests for shorter durations
- For booking requests with the same duration, those with earlier start dates are prioritised
- For booking requests with the same duration and start date, capacity can be allocated pro rata.[47]

In some Member States like Lithuania and Poland, LSOs are required to favour users with certain characteristics by awarding them contracts before their competitors. The concerned LSOs are prompted by their NRAs to give preference to shippers that import gas for their own consumers, increase security of supply through differentiation of sources, or increase competition.[48] Ultimately, though, LSOs have the discretion to award primary capacity to the shippers they see as best fit, provided the shipper has engaged in the open season procedure in accordance with set rules.

First-Committed-First-Served principles are used by many terminals to allocate primary capacity. Interested parties can engage in over-the-counter contracts with LSOs to secure the use of their terminals at long-term or short-term timescales.[49] Capacity is then allocated sequentially to committed market parties until slots at terminals are fully booked. Some terminals (e.g., Gate) rely on First-Committed-First-Served principles to allocate any capacity still available after open season procedures are concluded.[50]

The **Open Ascending Auction** mechanism for allocating primary capacity was recently implemented in Italy following a regulatory reform. The mechanism references market-based signals and prices to auction off long-term capacity slots. Terminals in Italy do not run coordinated auctions; rather, the auctions are run via a single platform, but are specific to each terminal and managed by the respective market area managers to ensure transparency and non-discrimination. The auction mechanism for allocating capacity is favoured by market players and is considered to have successfully increased utilisation rates at Italian terminals.[51]

Soon, there will be an similar mechanism through which primary capacity will be contracted out to users – via Spain's planned "**auctions for long or short-term bookings of standard products**." Though Spain's terminals currently rely on First-Committed-First-Served principles to allocate their primary capacity, the Spanish NRA – the CNMC – has proposed reforms that would standardise allocation procedures at all its terminals. Under the existing regime, market parties in Spain have concentrated their bookings primarily at single terminals to obtain commercial advantages through bilateral agreements and build their profiles in local regions. The system is seen to favour larger shippers.

Under the proposed new regime, shippers could still choose to book unloading capacity at specific terminals but would contract primary storage and regasification capacity via a virtual platform that combines the capacities of all Spanish terminals. Users will only have

[47] "Details on open season," Gate Terminal, March 2019.
[48] "How to Foster LNG Markets in Europe," CEER, 2019.
[49] Ibid
[50] "Details on open season," Gate Terminal, March 2019.
[51] "How to Foster LNG Markets in Europe," CEER, 2019.

to indicate the amount of storage or regasification they require without relating these capacities to a specific location. Spain's combined TSO and LSO ENAGAS will then have the discretion to decide on terminal send-outs and hence optimise gas flows in the system. The aim of the regulator is to create a single LNG hub in Spain available to users of all its terminals, replacing the six regional LNG "market areas" – tied to terminals – that dominate the country's LNG trade under the current regime.[52] While one of the risks of the reform is less commercially driven flows, it is generally perceived positively by market players, who believe that the virtual model could increase liquidity in the Spanish market and lead to a more balanced utilisation of the terminals and hence a greater efficiency of the system.[53]

Primary capacity markets mainly facilitate the allocation of long-term slots, but it's also possible to book short-term capacity in the primary markets of terminals in some Member States. Terminals in both Spain and Italy, for example, have recently seen increased short-term capacity bookings that are tied to fluctuating spot market prices. Short-term bookings are expected to become more prevalent in global LNG markets, especially as increasingly liquid traded hubs in Europe provide robust and transparent price signals. Italy's Open Ascending Auction mechanism and Spain's proposed virtual allocation model are well-suited to facilitate short-term bookings. Primary capacity allocation mechanisms at terminals in other countries might need to be adjusted if the trend towards short-term bookings expands to other markets in Europe.[54]

[52] Ibid
[53] "Position on the Proposed CNMC Reform of the Spanish LNG Market," Shell Energy Europe, March 2019.
[54] "How to Foster LNG Markets in Europe," CEER, 2019.

Table 3: Primary capacity allocation mechanisms at LNG terminals in the EU

Country	Terminal	Primary capacity allocation mechanism	Number of primary capacity holders[55]	Proportion allocated via long-term contracts (>1 year)[60]	Proportion allocated via short-term contracts (<1 year)[60]
Belgium	Zeebrugge	First Committed, First Served[56]	4	90%	10%
France	Dunkerque	First Committed, First Served[57,58] Open Season procedure for possible new capacity[59] Open Subscription for existing capacity[60]	4	-	-
	Montoir-de-Bretagne		37	100%	0%
	Fos Cavaou			90%	10%
	Fos-Tonkin			100%	0%
Greece	Revithoussa	First Committed, First Served[61]	-	-	-
Italy	Porto Levante	Open Ascending Auction[62,63,64]	2	80%	1%
	FSRU OLT Toscana		4	25%	75%
	Panigaglia		1	0%	100%
Lithuania	FSRU Independence	First Committed, First Served[65]	-	-	-
Malta	Malta Delimara	-	-	-	-

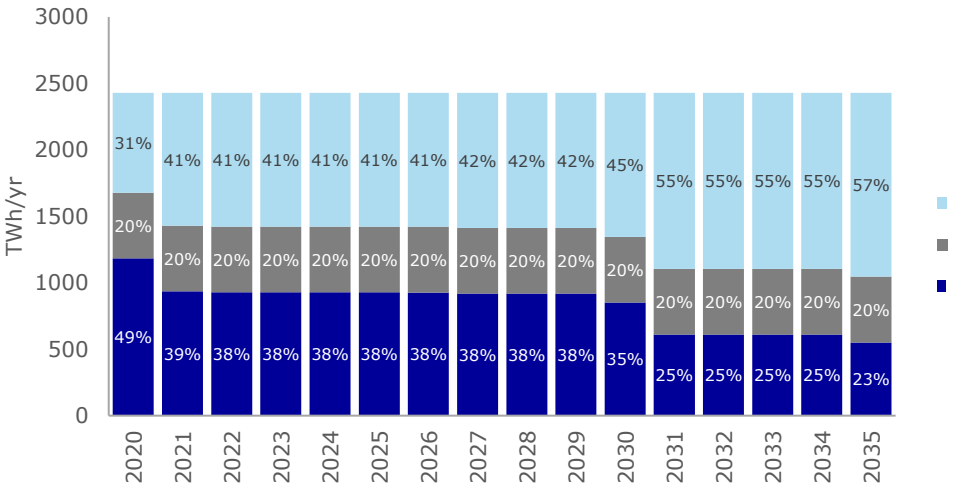
[55] Data provided by LSOs via GLE, January 2020. "-" indicates where no data was provided by the relevant LSO
[56] "Primary & secondary market – Zeebrugge/Dunkirk," Fluxys, 2019.
[57] Prieto,Rocío, Esnault, Benoit, "Congestion management procedures and anti-hoarding mechanisms in the European LNG terminals," ERGEG & CEER, 17th Madrid Forum.
[58] "Primary capacities," Fosmax LNG, 2019.
[59] https://www.elengy.com/images/pdf/commercial/FOS2021_InformationNotice.pdf
[60] https://www.elengy.com/images/pdf/commercial/Elengy_2019-07_Montoir-Information-Notice.pdf
[61] Prieto,Rocío, Esnault, Benoit, "Congestion management procedures and anti-hoarding mechanisms in the European LNG terminals," ERGEG & CEER, 17th Madrid Forum.
[62] "How to Foster LNG Markets in Europe," CEER, 2019.
[63] "Regasification Code Chapter 3.2 – Capacity Transactions (Courtesy English Translation)," OLT Offshore Toscana, 2018.
[64] "Regasification Code – Allocation of Regasification Capacity," GLE Transparency Template, SNAM, 2019.
[65] "How to Become a User," Klaipeda Nafta, 2019.

Country	Terminal	Primary capacity allocation mechanism	Number of primary capacity holders[55]	Proportion allocated via long-term contracts (>1 year)[60]	Proportion allocated via short-term contracts (<1 year)[60]
Netherlands	Gate terminal	Open Season & First Committed, First Served[66]	4	92%	0%
Poland	Świnoujście	Open Season procedure[67]	1	100%	0%
Portugal	Sines	Open Season procedure[68]	-	-	-
Spain	Barcelona	First Committed, First Served[69] (This will switch to allocation by auctions via virtual platform if new proposal by regulator is approved) [70]	69	0.07%	99.93%
	Cartagena		56	0.00%	100.00%
	Huelva		52	0.29%	99.71%
	Bilbao		47	0.00%	100.00%
	Sagunto		60	-	-
	Gijón (Musel)		-	-	-
	Mugardos		-	-	-
United Kingdom	South Hook	Open Season procedure[71,72,73]	-	-	-
	Isle of Grain		-	-	-
	Dragon		-	-	-

[66] "Primary Market," Gat terminal, 2019.
[67] "Capacities – Primary market," Polskie LNG, 2016.
[68] "Manual de Procedimentos da Gestao Tecnica Global do SNGN," Entidade Reguladora Dos Servicos Energéticos, September 2016.
[69] "Infrastructure capacities," Enagas, 2018.
[70] "How to Foster LNG Markets in Europe," CEER, 2019.
[71] "Commercial arrangements at our Terminal," South Hook LNG Terminal Company Ltd., 2019.
[72] "Primary capacity," Grain LNG, National Grid 2015-2019.
[73] "Guide to capacity access at dragon LNG terminal," Dragon LNG Limited, 2019.

The forward-looking data in the figure below depicts the proportion of long-term primary capacity that has been booked across all EU terminals, for all publicised terminal use scheduled between 2020 and 2035. More capacity is scheduled to become available progressively from 2020 onwards; this long-term capacity might be booked several years ahead by shippers, or it might be allocated several months up to one year ahead as shorter-term slots. Where capacity is indicated to be booked, it is through long-term contracts secured through open season procedures. Bookings pertain to berthing rights, storage capacity and regasification capacity.

Figure 9: Long-term primary capacity booked at terminals across the EU (2020-2035)[74]



Secondary capacity allocation platforms and terminal liquidity

Contracted slots that cannot be used by primary capacity holders are offered to interested parties via secondary capacity allocation platforms. Secondary markets facilitate an optimal capacity use at terminals, and as nearly all terminals have a system to make unused capacity available to the market, contractual congestion is in general not experienced. In Poland there is not yet a functioning system for secondary capacity allocation, and the whole primary capacity has been allocated to one market party. The Polish LSO has indicated that it is currently updating the Terminal Code and implementing additional measures to ensure that any unused capacity is made available to other interested parties.[75]

[74] REKK data collection based on terminal operators website. Capacity: Aggregated data from the ALSI template. Long-term booking data was obtained from LNG terminal operators website (data consulted in October 2019).
Spanish terminals:
https://www.enagas.es/enagas/en/Gestion_Tecnica_Sistema/Contratacion_de_Capacidad/Capacidades_Disponibles.
Fosmax (FR): https://www.fosmax-lng.com/images/pdf/FOSMAX-LNG_2019-10-09_Capacit%C3%A9s__2019__publi%C3%A9es_CSV_V3.pdf.
Montoir de Bretagne (FR):
https://www.elengy.com/images/contenu/contratsetoperations/capacitesprimaires/ELENGY_publications_Montoir_2019__2019-09-25.pdf
FSRU OLT (IT): http://www.mercatoelettrico.org/En/Esiti/PAR/EsitiParOLT.aspx
Porto Levante (IT): https://www.adriaticlng.it/wps/wcm/connect/20a9bcb4-a7c5-4916-9e56-f16fa9d649eb/Terminal+Rigasification+Capacity+2019.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE-20a9bcb4-a7c5-4916-9e56-f16fa9d649eb-mHz.j2P
FSRU Independence (LT): https://www.kn.lt/en/our-activities/lng-terminals/klaipeda-lng-terminal/559
Świnoujście LNG Terminal (PL): https://en.polskielng.pl/client-zone/lng-terminal/lng-terminal-capacities/
Sines (PT): https://www.ign.ren.pt/en/capacidade-disponivel-para-fins-comerciais?p_p_id=listGasYear_WAR_renatrportlet&p_p_lifecycle=0&_listGasYear_WAR_renatrportlet_implicitModel=true
Isle of Grain: http://grainlng.com/operational-information/capacities/
South Hook (UK): https://www.southhooklng.com/commercial/secondary-capacity/
No data on Zeebrugge (BE), Dunkerque (FR), Revythoussa (GR), Panigaglia (IT), Dragon LNG (UK).

[75] Information provided in January 2020 by Polskie LNG to Trinomics

All terminals – including those that have secured exemptions from regulated TPA – are expected to deploy adequate procedures to ensure that available capacities are optimally utilised and mitigate any obstacles to the flow of LNG into EU markets, according to Article 22 of EU regulation 715/2009. Most terminals have adopted some variation of use-it-or-lose-it (UIOLI) principles that are deployed to enforce secondary capacity allocation. UIOLI rules require shippers to trade or sell any capacity they don't plan to use to other shippers approved by relevant LSOs. UIOLI variations include:

- "Use it or sell it" principles as deployed in Belgium and in Poland, which require primary capacity holders to sell any unused slots to shippers on the secondary market. If these shippers are unwilling or unable to sell these slots on their own, the LSO allocates them on the secondary market and reimburses the primary capacity holder after charging them a small administrative fee.
- Slot trading/capacity transfer mechanisms deployed in the UK and in the Netherlands, where primary capacity holders are encouraged to trade or transfer their unused slots to approved shippers in an active secondary market overseen by LSOs. Trading and transfers are facilitated via an online platform, run by the LSO, that notifies relevant users when additional slots become available at the terminal.

In addition to UIOLI procedures, several other principles are applied in practice at terminals to disincentivise capacity hoarding, including:

- "Use it or pay it" principles as deployed in Spain, which require primary capacity holders to pay the fixed term of the TPA tariff for terminal services, independent of terminal use. Primary capacity holders are thereby incentivised to sell any unused capacity to shippers on the secondary market, as otherwise they must absorb the full costs of their scheduled terminal use.
- Penalty principles for unused slots as deployed in Lithuania, where terminal users that fail to use 20 or more percent of their contracted capacity over any period of six months can be penalised by the LSO. The LSO has the right to reduce the amount of capacity allocated to the user by the amount of its unused slots in the current gas year. While this punishes capacity hoarding, it does not directly contribute to increased liquidity in secondary markets.

At most terminals, shippers that wish to participate in the secondary markets are required to sign statements of intent with LSOs and subject their vessels to rigorous approval processes before they can obtain secondary capacity slots. Descriptions of approved terminal users, approved vessels, and active traders in terminals' secondary markets are included in Table 8. Timing is crucial in the secondary capacity market, and some stakeholders report that by the time unused slots are made available to other market parties, they do not have sufficient time to procure supplies and plan deliveries.

Secondary capacity markets by nature facilitate the allocation of short-term capacity bookings. Slots that become available at terminals are marketed to relevant alternative users at time scales ranging from 1-6 months before unloading is scheduled to take place. However, secondary capacity markets are not necessarily conducive to LNG market-price trading, as there is no guarantee that short-term capacity will become available at commercially advantageous time periods when spot prices for LNG are higher.

Table 4: Secondary market practices and liquidity at LNG terminals in the EU

Country	Terminal	Number of shippers with registered access to secondary market	Proportion of total capacity offered in secondary market on a yearly basis (estimate for 2019)
Belgium	Zeebrugge	12	25%
France	Dunkerque	96	-
	Montoir-de-Bretagne	There is no need to be registered to gain access to the secondary markets (31 Interested Parties published on website in 2019)	0% (Though some slots may have been offered OTC without the LSOs knowledge)
	Fos-Tonkin		
	Fos Cavaou		
Greece	Revithoussa	-	-
Italy	Porto Levante	23	0%
	FSRU OLT Toscana	16	0%
	Panigaglia	8	0%
Lithuania	FSRU Independence	-	-
Malta	Malta Delimara	-	-
Netherlands	Gate terminal	10	27%
Poland	Świnoujście	0	0%
Portugal	Sines	*Information unavailable*	
Spain	Barcelona	176	Up to 100%
	Cartagena		
	Huelva		
	Bilbao		
	Sagunto		
	Gijón (Musel)		
	Mugardos		
United Kingdom	South Hook	*Capacity information notices are placed on the South Hook LNG Bulletin Board which can be accessed by approved additional users*	-
	Isle of Grain	*Primary capacity holders can trade among themselves for secondary capacity, and registered users can request secondary market capacity when it becomes available from Grain's primary capacity holders.*	-
	Dragon	*Primary shippers have the right to sell or sublet their capacity rights to third parties, and primary shippers must allocate any unused slots 12 days before berthing is scheduled or anti-hoarding mechanisms are triggered.*	-

Case studies

Gate, Barcelona, and Świnoujście all rely on similar mechanisms for primary capacity allocation, but their secondary capacity allocation procedures are quite different, as detailed below.

Primary and secondary capacity allocation mechanisms at Barcelona, Gate and Świnoujście

Gate

- Contracts out primary capacity to shippers, with terms determined through bilateral negotiations
- Principal users include Dong Energy, EconGas OMV International, RWE Supply & Trading, Eneco, and E.ON Ruhrgas
- Primary capacity allocation:
  - 92.5% (11.1 out of 12 billion m^3) of the terminal's yearly capacity is contracted, while the remaining 7.5% is still available
  - In March 2019, Gate launched open season procedure to allocate 1 billion m^3/year available + 2 billion m^3/year additional capacity. Notwithstanding several expressions of interest, no contracts were signed by the deadline in April 2019. This capacity will now be allocated on a first-come-first-served basis
- Capacity rights can only be transferred from primary capacity holders to permitted transferees who consent to a throughput agreement with Gate
- Gate enforces UIOLI whereby unused slots are offered on the secondary market:
  - Unused slots are published by Gate on behalf of concerned capacity holders
  - Registered users interested in the slot can contact Gate and agree on terms and conditions
  - After agreement and provided the buyer is a permitted transferee, the new capacity holder is entitled to a berthing slot in a specified arrival window, to storage capacity and to gas delivery rights during a pre-determined period
- Primary capacity holders can also directly transfer the whole or a part of their contracted slots to another contracted user or to a permitted transferee

Barcelona

- Under Spain's current model, primary capacity is allocated via FCFS over-the-counter contracts
- Many shippers in Spain opt for short-term over long-term primary capacity slots
- If the new framework for LNG proposed by the regulator is approved in Spain, capacity will be allocated via the virtual model, through which shipper can still book unloading slots at the terminals of their choice, but will contract for storage and regasification through a single platform that combines the capacities of all Spanish terminals
- This new system is designed to facilitate market signalling and increase the attractiveness of Spanish terminals to shippers
- To facilitate secondary capacity allocation, Enagás currently provides a "bulletin board" tool that posts information on any available capacity in Enagás infrastructure facilities, including Barcelona terminal; under the new system it will continue to do so for any available unloading capacity

Świnoujście

- Allocates its primary capacity by approving applications from interested parties and engaging in bilateral agreements
- Conducted an open season procedure between June 2009 and February 2010 to allocate its regasification capacity to Polskie Górnictwo Naftowe i Gazownictwo S.A. (PGNiG SA)
- PGNiG SA contracted the entire terminal regasification capacity in October 2017, through an agreement that will remain in force until 2034
- Secondary capacity market is not yet developed, but PGNiG has several contracts with different suppliers, so it has been able to deliver spot cargoes within planned delivery windows

Sources for case studies: "Capacities," Gate Terminal Commercials, 2019; "Leader in natural gas infrastructures: LNG, transmission and underground storage services," Enagas, 2019; "Capacities," Polskie LNG, 2019.

Stakeholder views

Stakeholders were asked to provide their views on contractual congestion at terminals, UIOLI enforcement at terminals, and the possibility of standardising capacity allocation mechanisms.

Nearly all stakeholders reported they were not aware of instances of contractual congestion at terminals. Only one national authority disclosed that "Some companies active [in the] market are interested in obtaining regasification slots [at the domestic terminal], however currently LNG terminal is fully booked by an incumbent, but regasification capacities are not fully used," and concluded that, "UIOLI mechanism[s] should be improved" in the market.[76]

Stakeholders confirmed that UIOLI or a variation of UIOLI provisions are enforced at nearly all terminals. The only reported instances where UIOLI was not enforced were in Poland's Świnoujście terminal. Most stakeholders are in favour of continued enforcement of UIOLI mechanisms, but several terminal operators and users raised concerns about enforcing standardised capacity congestion management. One market player stated that "While we regard as acceptable not to seek deep harmonisation in this area, we are convinced that to avoid possible congestion in high demand periods it would be better to ensure that all terminals [deploy] some effective form of such mechanisms." Another warned "Any attempt to enforce UIOLI must respect the rights of the primary capacity holders to try to utilise their capacity."[77] One LSO is against UIOLI enforcement altogether and believes "UIOLI is red tape for terminals with multiple users and even detrimental due to timing effects."[78]

With respect to standardising capacity allocation mechanisms, stakeholders were divided in their opinions. Many mentioned that standardisation would be difficult as terminals operate within different markets and experience different limiting factors. But on the other hand, many affirmed that standardising capacity allocation mechanisms would strengthen the European market overall. Selected opinions are listed below, to give an overview of the diversity of viewpoints in the market.

In favour of standardisation:

- "Harmonised allocation procedures in LNG terminals will ease trading among market zones, especially when interconnectors are fully booked." – National authority
- "The construction of LNG terminals in Europe is controlled by different interests. While higher security of supply is increasingly the focus of higher gas imports, other countries / terminals are looking for a political alternative to existing supply via pipelines. In other cases, LNG terminals and supply via pipelines are in economic competition. In order to create a level-playing field for LNG imports to Europe independently of these motivations, harmonized capacity allocation methods are to be used." – National authority
- "The creation of a harmonised gas market requires a level playing field. Among others, harmonisation of capacity allocation methods is an important condition" – Market Player
- "Harmonisation of capacity allocation methods across EU would allow to use the best practice, shippers will be familiar with methods so the learning curve for them, in case of entering the new market, will be reduced. Therefore it would stimulate the liquidity on LNG markets across the EU." – LSO

Neither for nor against EU-wide standardisation:

- "Rules need not be identical, but it should be guaranteed that there are non-discriminatory and transparent rules to allocate capacities. Such rules should be defined and available to the market." – Market Player
- "Harmonised/standardized procedures may make sense at regional level, where intra-terminal competition might be more noticeable." – Market Player
- "Among the regulated regimes we regard the Italian capacity allocation model as the best suited to ensure the maximum level of attractiveness for the European

[76] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019
[77] Ibid
[78] Ibid

LNG market, provided that long-term capacity can be booked (up to 15 years). Consistently we would welcome the introduction of market-based capacity allocation methodologies at all terminals, i.e. auctions with price mechanisms that are linked to global price dynamics. Such design would allow markets to respond to price signals in the most efficient way possible while preventing that the regasification costs stand in the way of more volumes. At this stage, further harmonization, for instance with respect to allocation calendars, may not be appropriate given the high level of fragmentation currently in existence." – Market Player

Against standardisation:

- "We believe that terminal owners/operators are best placed to respond to customers' capacity requirements. Market forces are the most appropriate mechanism for driving responsive and innovative capacity products and allocation methods. Conversely, we believe that a requirement to harmonise access arrangements could stifle commercial flexibility. Different users will require different capacity products and allocation methods depending on their particular business model." – Market Player
- "The situations and regimes (exempted or not-exempted) differ substantially within Europe. Therefore, one size fits all for CAM is not always favourable." – National Authority
- "It doesn't appear appropriate to seek to harmonize capacity allocation methods, because LNG plays different roles in different countries (e.g. LNG can be first supply source, a way of diversification of supply, break bulk supply for small-scale services, etc.) and their characteristics as well as their environment may be rather different between each other)." – LSO
- "Competition will improve services not uniform EU-wide red-tape." – LSO
- "The storage and regasification capacities are different in different terminals and the needs may be different in different markets, therefore a standardised procedure may not fit all LNG terminals and may result in lower capacity utilization at some terminals." – LSO
- "Terminalling infrastructures are cash intensive investments and offer a large variety of services (unloading, storage and regasification, trans-shipments, loading of large and small scale vessels and trucks). It should be up to national regulators to evaluate the best allocation method depending on the service considered." – LSO

Potential barriers

Based on this analysis, the possible barriers to LNG entry into the EU gas market, related to terminal capacity allocation mechanisms are summarised in the next table.

Table 5 : Potential barriers to LNG entry – Capacity allocation

Intra-terminal competition	• Some LNG terminal operators seem not properly incentivised to maximise the capacity made available to market parties and to optimise its use via UIOLI/UIOSI • Short-term third-party access to terminals can only be secured by registered users at several terminals in secondary markets, where most primary capacity is booked by one or a few users engaged in long-term contracts • Existence of long-term bookings with ship-or-pay clauses
Inter-terminal competition	• Not all capacity allocation mechanisms are market-based, which can obscure market signals • Some LNG terminal operators seem not properly incentivised to maximise the capacity made available to market parties and to optimise its use via UIOLI/UIOSI (e.g. Poland where an adequate secondary market mechanism is not yet deployed in practice) • Existence of long-term bookings with ship-or-pay clauses

C. TARIFF LEVELS & TERMINAL FINANCING

Overview

There are two tariff types relevant to LNG entry and trade in the EU: the tariffs levied by LSOs for the use of terminal services (LSO tariffs) and the tariffs levied by TSOs for entering the transmission system and hence the traded market (TSO tariffs). LSO tariffs impact LNG suppliers — the shippers that use terminals for unloading, storage and regasification — while TSO tariffs more broadly impact all network users, including the users of gas storage facilities.

Terminal users must pay both tariffs to market their LNG. They calculate their costs by factoring in both LSO and TSO tariff levels, in addition to shipping and commodity costs. It is important to understand the financial dynamics shaping gas tariff levels in the EU, as aggregated tariff rates (LSO tariffs + TSO tariffs) are reported to be one of the most important determinants of terminal attractiveness for LNG shippers. And tariff levels diverge substantially between terminals, even for those connected to the same entry-exit system and market.

The tariff calculation methodologies deployed by LSOs and TSOs in the EU (can) vary by Member State, though all consider incurred costs as a basis. LSOs set tariff rates – subject to approval by their respective NRAs - for similar products based on diverging calculation approaches, applying fixed and variable terms to base fees for different services. TSOs also use different tariff setting methodologies (which have also to be approved by NRAs) and recover costs from entry and exit points at varied proportional splits.[79]

There are also several financial incentive schemes deployed in different gas markets that impact LSO and TSO tariff levels across EU regions. LSO tariff levels, for example, can be impacted by national and EU-level subsidies awarded to LSOs to defray construction expenses and reduce the rates operators need to charge in order to recover their costs. TSO tariff levels can be impacted by regulator-approved discount rates that favour gas sourced from LNG terminals or from storage sites.

In general, there are two kinds of financial incentive schemes that impact tariff levels relevant to LNG imports:

- Direct subsidies that impact LSO tariffs: funding provided to infrastructure investors by national governments or by the EU based on EU Regulation 347/2013;
- Indirect subsidies that impact LSO and/or TSO tariffs, e.g. regulatory measures allowing discounts to terminal connection or transmission system entry tariffs that make gas from LNG terminals more competitive. Such indirect subsidies result in cross-subsidisation of tariffs by other network users as the TSO is entitled to recover all of his efficiently incurred costs.

Both types of subsidies are usually allowed by regulatory bodies to ensure diversity and security of gas supply and to enhance competition. Entry tariff discounts at entry points from LNG facilities were in particular designed to facilitate the construction and use of infrastructure developed with the purpose of ending the isolation of Member States that lack interconnection with other EU gas systems.[80]

LSO tariff levels

The LSOs of regulated terminals generally apply three different tariff calculation methods to determine their rates for terminal services, charging either:

- A fixed rate per cargo;

[79] Art 8 (1) e EU Tariff Network Code
[80] Art 9 (2) EU Tariff Network Code

- A combination of a (fixed) charge applied to the send-out capacity, and a variable charge depending on the amount of gas actually regasified, or to the number of cargoes unloaded;
- Different tariff coefficients applied to base rates for storage/send-out capacity, unloading, and metering services, respectively.

Additionally, terminals often include "gas in kind" terms in their tariff calculations, ranging from 0.2% to 1.7%, that accounts for gas shrinkage and own use by the terminal facilities.

Partly due to structural differences in the calculation methodologies, the charges applied by terminals for the same services vary widely. As it is difficult to compare tariffs calculated via different methodologies, CEER calculated in its 2017 study the fees that would apply for a standard bundled service related to a 1,000 GWh LNG cargo regasified and sent-out over a period of fifteen days. According to this study, the overall fee ranged from 0.10 €/MWh (SC Klaipedos Nafta in Lithuania) to 3.87 €/MWh (Rovigo in Italy), a fee nearly 40 times as large.[81] Since 2017, most tariff levels across the EU have been updated (some increasing and others decreasing), though they have not converged. As reported by LSOs in 2020, comparable standardised tariff rates for regulated terminals currently range from 0.35 €/MWh (SC Klaipedos Nafta in Lithuania) to 4.04 €/MWh (Rovigo in Italy). The Spanish regulator has taken steps to standardise LSO tariffs for all terminals in the country, but tariff levels in neighbouring markets still vary significantly. Tariff calculation methodologies and levels (as reported by LSOs) in EU Member States are depicted in Figure 1010.

The wide range of tariffs charged by terminals is driven by individual terminal and Member State characteristics. Technical and commercial aspects of terminals impact tariff levels, and variations in rates due to different costs and economies of scale in terminals should not be considered as barriers to competition in a functioning market. These variations do not indicate regulatory or market failures but can rather be attributed to different characteristics and capacities of terminals, or to economies of scale and established supply chains that the terminals rely on. However, some variations in tariff levels across regulated terminals can also be attributed to the direct and indirect subsidies deployed in different Member States.

Several LSOs received funding directly from the EU or from their national authorities to finance the construction or development of their terminals. The EU co-financed LNG infrastructural development in Italy, Lithuania, France, Poland, Malta, and Greece between 2013-2018, and has committed to fund new terminals in Croatia, Cyprus, and Greece. In addition to funding from the European Commission, terminals in Lithuania, Greece, and Croatia have received funding from their national authorities. An overview of direct government funding provided for LNG infrastructure in EU Member States is depicted in Table 6. This funding offsets costs incurred by LSOs and enables them to charge lower tariffs than their "competitors".

[81] "Removing LNG barriers on gas markets," Council of European Energy Regulators, 1 December 2017.

Table 6 : Public funding for LNG infrastructural development in EU Member States

Country	Terminal	Status	EU-level subsidies	Amount of EU funding	National subsidies	Amount of national funding
Belgium	Zeebrugge	Existing	None	-	None	-
Croatia	Krk Island terminal	Planned	PCI funding for development of LNG terminal in Krk	€108 million[82]	Direct financial contribution to investment costs allocated in the Croatian State budget	€100 million[83]
Cyprus	Vassiliko	Planned	PCI funding for development of gas infrastructure (LNG FSRU) in Cyprus, known as Cyprus Gas2EU	€115.7 Million[84]	None (Capacity is contracted by the state owned incumbent electricity producer on a long term basis)	-
Estonia	Paldiski	Planned	Designated PCI, but no funding as of yet[85]	-	None	-
France	Dunkerque	Existing	None	-	None	-
	Montoir-de-Bretagne	Existing	Funding for truck loading capacity development and expansion[86]	Unkown	None	-
	Fos Cavaou	Existing			None	-
	Fos-Tonkin	Existing			None	-
Germany	Wilhelmshaven	Planned	None	-	New government strategy for fuel diversification will free up ~ €16million in additional funds, from which subsidies for LNG terminals might be allocated[87] Energy minister announced a new regulatory approach in 2/2019 that aims to make a connection from the LNG port of Brunsbüttel to the German grid a priority, so that the connection could potentially be supported by public funds[88]	-
	Brunsbüttel	Planned	None	-		-
	LNG Stade GmBh	Planned	None	-		-

[82] "Development of LNG terminal in Krk (HR) (Phase I) and connecting pipeline Omisalj – Zlobin (HR)," PCI fiche: Project of common interest 6.5.1, European Commission, December 2018.
[83] "EU-U.S. Joint Statement: Liquefied Natural Gas (LNG) imports from the U.S. continue to rise, up by 181%," European Commission – Press Release, 8 March 2019.
[84] Ibid
[85] "Project of Common Interest," Baltigaas, accessible via https://baltigaas.eu/en/project-of-common-interests/.
[86] "The LNG Tanker-Truck Loading Service," Elengy, 13 January 2015.
[87] "Liquefied gas – Does LNG have a place in Germany's energy future?" Clean Energy Wire, 12 February 2019.
[88] "Bald neu in Deutschland? Besuch beim geplanten LNG-Terminal Brunsbüttel," SPD-Landesgruppe Schleswig-Holstein, 19 December 2018.

Country	Terminal	Status	EU-level subsidies	Amount of EU funding	National subsidies	Amount of national funding
Greece	Revithoussa	Existing	EC Cohesion policy funding for capacity expansion of the terminal	€50.8 million[89]	Direct state contribution to terminal upgrading and expansion projects	€12.8 million[90]
	Alexandroupolis	Planned	PCI funding for studies to prepare for the development of the terminal	€1.8 million[91]	Project investments overseen by state-owned DEPA (Public Gas Corporation of Greece)[92]	-
Ireland	Shannon	Planned	Designated PCI, but no funding as of yet[93]	-	None	-
	Cork	Planned	None	-	None	-
Italy	Porto Empedocle	Planned	None	-	None	-
	Porto Levante	Existing	None	-	Italy's government has placed "LNG terminals" on an official list of strategic assets, but has not directly invested in any[94]	-
	FSRU OLT Toscana	Existing	None	-		-
	Panigaglia	Existing	None	-		-
Latvia	Kundzinsalas	Planned	None	-	None	-
Lithuania	FSRU Independence	Existing	PCI funding for connecting pipelines to the terminal	€27.4 million[95]	State-owned enterprise Klaipedos Nafta invested 70% of funding for development and Lithuanian state directly compensated LNG supplier LITGAS for providing a mandated quantity of LNG to the terminal	€100 million[96]
Malta	Malta Delimara	Existing	PCI funding for studies to prepare for the development of the FSRU	€0.7 million[97]	None	-
Netherlands	Gate	Existing	EC/TEN-T funding to support the Rotterdam-Gothenburg	€34 million (TEN-T)[98]	None	-

[89] "EU-U.S. Joint Statement: Liquefied Natural Gas (LNG) imports from the U.S. continue to rise, up by 181%," European Commission – Press Release, 8 March 2019.
[90] "State aid SA.35165 (2013/NN) – Greece/State aid SA.35977 (2012/N) – Greece: Upgrade of the Liquefied Natural Gas (LNG) Terminal in REvithoussa," European Commission C(2013) 6700 Final, 16 October 2013.
[91] "EU-U.S. Joint Statement: Liquefied Natural Gas (LNG) imports from the U.S. continue to rise, up by 181%," European Commission – Press Release, 8 March 2019.
[92] "Greek firm Gastrade signs LNG deal with state-owned DEPA," Reuters, 12 October 2017.
[93] "EU-U.S. Joint Statement: Liquefied Natural Gas (LNG) imports from the U.S. continue to rise, up by 181%," European Commission – Press Release, 8 March 2019.
[94] "Italy's Iren mulling sale of stake in LNG plant, had contact with Snam: sources," Reuters, 27 May 2019.
[95] "EU-U.S. Joint Statement: Liquefied Natural Gas (LNG) imports from the U.S. continue to rise, up by 181%," European Commission – Press Release, 8 March 2019.
[96] "Floating LNG terminal 'Independence' sails into Klaipeda," Patreon|The Lithuania Tribune, 27 October 2014.
[97] "EU-U.S. Joint Statement: Liquefied Natural Gas (LNG) imports from the U.S. continue to rise, up by 181%," European Commission – Press Release, 8 March 2019.
[98] "Gate terminal signs EUR 76 million project financing agreement for LNG break bulk facility," News, Gate Terminal, 30 October 2014.

Country	Terminal	Status	EU-level subsidies	Amount of EU funding	National subsidies	Amount of national funding
			LNG initiative and develop small-scale LNG chain			
Poland	Świnoujście	Existing	PCI funding/Cohesion Policy funds for construction and expansion of terminal	€333 million[99]	Polish Infrastructure and Environment Operational Programme (POIiŚ) grants	€204 million[100]
	FSRU Polish Baltic Sea Coast	Planned	Designated PCI, but no funding as of yet[101]	-	None	-
Portugal	Sines	Existing	None	-	None	-
Spain	Barcelona	Existing	None	-	None	-
	Cartagena	Existing	None	-	None	-
	Huelva	Existing	EC funding to boost use of LNG as fuel for maritime and rail transport by expanding services at Huelva and Sagunto	€3 million (CEF) distributed between Huelva and Sagunto projects[102]	None	-
	Sagunto	Existing			None	-
	Bilbao	Existing	None	-	None	-
	Gijón (Musel)	Existing	None	-	None	-
	Mugardos	Existing	None	-	None	-
	Gran Canaria	Planned	None	-	None	-
	Tenerife	Planned	None	-	None	-
United Kingdom	South Hook	Existing	None	-	None	-
	Isle of Grain	Existing	None	-	None	-
	Dragon	Existing	None	-	None	-

Notes:

- *CEF: Connecting Europe Facility*
- *EEPR: European Energy Programme for Recovery*
- *ERDF: European Regional Development Fund*
- *PCI: Projects of Common Interest*

[99] "EU-U.S. Joint Statement: Liquefied Natural Gas (LNG) imports from the U.S. continue to rise, up by 181%," European Commission – Press Release, 8 March 2019.
[100] Written responses from Polskie LNG provided following a stakeholder interview, November 2019.
[101] "Gas candidate projects submitted to be included in the new Union list of Projects of Common Interest," European Commission.
[102] "Enagás-led LNG-fueling project gets EU funding," LNG World News, 15 November 2018.

LSO tariffs are also impacted by indirect public subsidies, which manifest as regulator-approved TSO tariff discounts and state-backed "loss coverage" schemes or provisions to guarantee LSO cost recoveries by taxes. The two factors are interrelated, as loss coverage enables discounting. Indirect public subsidisation mostly results in cross-subsidisation between LSO and TSO tariff levels, as LSO costs are typically recovered not from terminal users but from end-users of the gas grid.

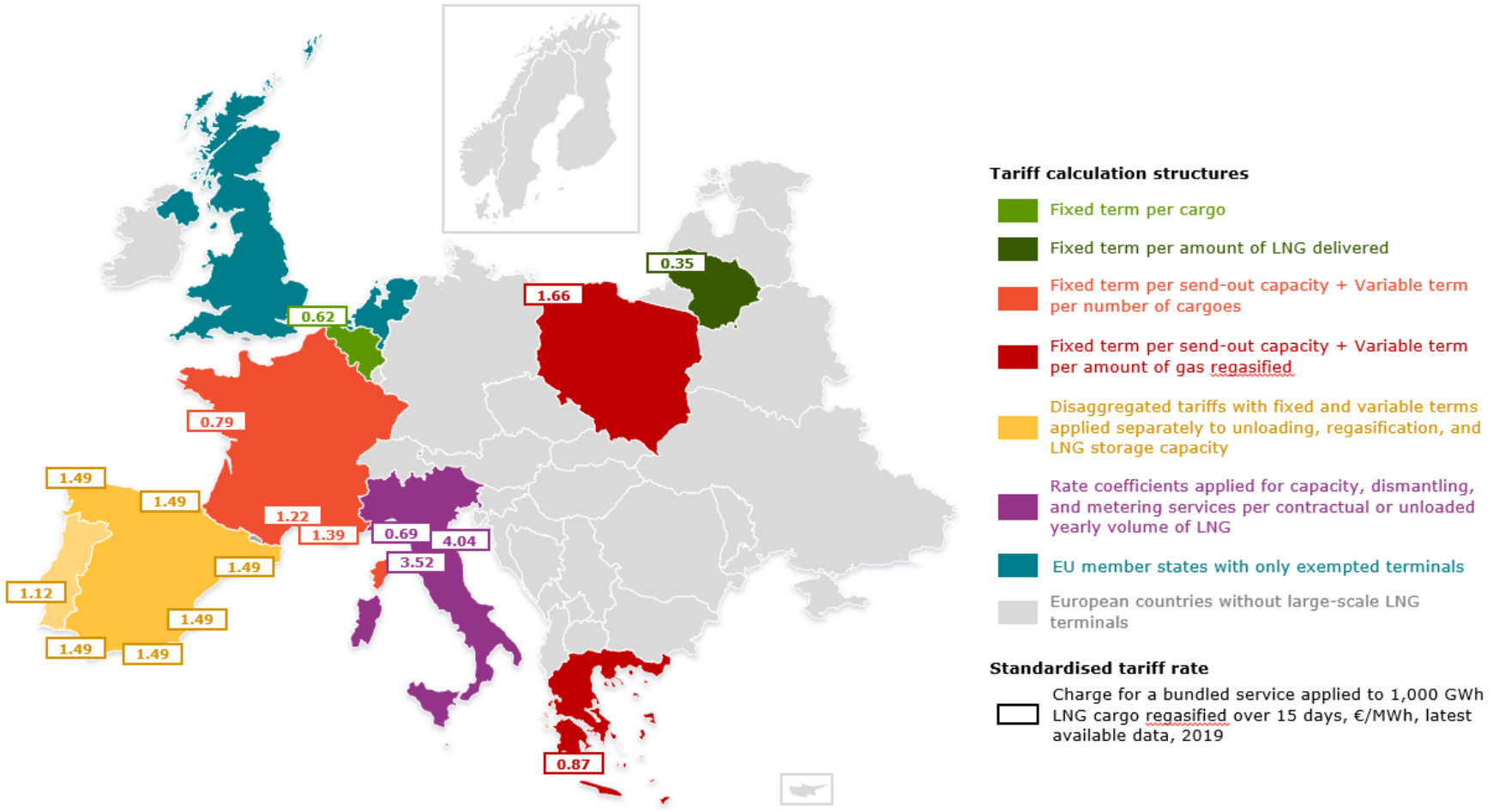
Regulator-approved discounts are structurally embedded into tariff calculation methodologies, which require system operation costs to be reviewed and approved on a regular basis by relevant regulatory bodies (NRAs in principle, though in Spain this was previously the responsibility of the Ministry of Energy). Within the framework provided by the respective national tariff code, the regulator has usually the discretion to allow for discounts. The regulator in Lithuania, for example, approved substantial discounts to LNG tariff levels to ensure that LNG was consistently supplied to the country. This discount was justified based on LNG's contribution to end the isolation of the Lithuanian gas market and enhance the security of supply in the Baltic region, where previously all gas was imported from Russia. The costs of the LNG terminal which would have typically been assumed by the LSO, as well as costs for connecting the terminal to the national transmission network which would have typically been assumed by the TSO, were reallocated for recovery by charging higher TSO tariffs at exit points from Lithuania's transmission network, as facilitated by the regulator. This redistribution of costs to network rather than terminal users explains why the charges for a standard bundled service package in Lithuania are comparatively low (see Figure 10).[103] In 2018, the Portuguese NRA approved discounted LSO tariff rates at Sines terminal and compensated lower specific tariffs with increased utilisation of the terminal. This strategy proved successful but allegedly led to a lower utilisation of Spain's Atlantic coast terminals.

State-backed "loss coverage" is offered to LSOs in several, but not all, Member States with regulated terminals. France does not offer coverage to its terminals, such that regulated LSOs are exposed to market risks.[104] Italy does offer a "revenue coverage factor" to its fully regulated terminals, whereby a limited proportion of total reference revenues is guaranteed by the government in case of temporary and transitory situations in which the terminal operator is unable to allocate an adequate share of the regasification capacity.[105,106] Funding for this coverage is sourced from additional charges to end-users of Italy's gas network. Spain offers a similar coverage factor to its terminals (all regulated), reimbursing LSOs in times of underutilisation, to ensure regasification capacity remains online for security of supply purposes. This kind of indirect subsidy guarantee reduces the risk exposure for LSOs and facilitates the financing of new investments.

The different discount and subsidy practices impact tariff levels and hence competition not only between regulated terminals, but also between regulated and exempted terminals. However, it is difficult to isolate the effects of costs versus subsidies on the tariff rates ultimately charged by LSOs. Different capital and O&M costs, calculation methodologies, funding sources, and (cross-)subsidies all influence LSO tariffs; the combined effects of these elements result in widely divergent tariff levels for terminal services, as depicted in the figure below. These varied tariffs are then factored into shippers' decisions to use specific terminals.

[103] The Lithuanian tariff has been raised from 0.10 €/MWh in 2017 to 0.35 €/MWh in 2018.
[104] Written responses provided by ELENGY following the Stakeholder Workshop, January 2020.
[105] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019
[106] "How to Foster LNG Markets in Europe," CEER, 2019.

Figure 10 : Tariff calculation methodologies and charge for a standardised bundled service (€/MWh) in EU Member States with regulated LNG terminals[107]



[107] Figure adapted from "Removing LNG barriers on gas markets," Council of European Energy Regulators, 1 December 2017. Tariff levels were updated according to LSOs' input received in January 2020. Fees cover standard berthing rights, storage and regasification. They do not cover entry fees into transmission system networks.

TSO tariffs

Shippers also consider TSO tariff levels to be important differentiators of market competitiveness, as they influence the overall costs of delivering LNG to wholesale markets or end-users. General characteristics of transmission tariff regulation across EU Member States are included in Table 7. The structure of transmission tariffs does not directly affect LNG trade however, as general tariffs are applied to gas from all sources. Rather, variations – and specifically, discounts for LNG entry – to standard transmission tariff rates can impact LNG trade.

Article 9 of the Commission Regulation (EU) 2017/460 on the Gas Tariff Network Code (TAR NC) allows for discounts to transmission tariffs at entry points from LNG terminals. It was implemented with the aim to end the energy isolation of specific Member States and increase security of supply. However, the regulation does not explicitly outline the conditions for applying this discount, nor does it define a maximum scale for it. Thus, the precise justification for and size of the discount applied is left to the discretion of NRAs. Such a regulator-approved discount is an indirect subsidy for gas sourced from LNG terminals, and facilitates its market entry. Member States that apply such a discount are in general connected only to one third-country pipeline system and therefore qualify as isolated gas markets. They rely on LNG to increase security of their gas supply, and also to enhance competition on their gas market. The discount levels applied by Member States at entry points from LNG terminals are included in Table 7. Taking into account that the entry fee amounts on average to about 0.3 €/MWh (it ranges from 0.2 to 0.8 €/MWh), and that a discount is only applied in 4 Member States, the overall impact of this provision on inter-terminal competition is limited.

France applies as of 1 April 2020 a discount of 10% on the TSO entry fee for gas imported via LNG terminals; this tariff differentiation is however not based on Article 9 of the Commission Regulation (EU) 2017/460.[108] The discount in France reflects the lower entry cost of LNG, resulting from the fact that the average distance covered by gas from LNG terminals is lower than the average distance covered by gas from pipeline interconnection points.[109] It is considered a technical parameter for implementing a distance-based tariff setting methodology. The tariff differentiation is hence cost-reflective and does not lead to cross-subsidisation; the regulator anyhow acknowledges the contribution of LNG to security of supply in France.[110] ACER has on 4 December 2019 published its analysis of the consultation document on the gas TSO tariff structure for France, which comprised this proposed discount, and recommended that CRE would assess the justification provided for its proposal. The French regulator CRE has on 23 January 2020 decided to implement the proposed tariff differentiation as of 1 April 2020.

Article 9 of Commission Regulation (EU) 2017/460) requires TSOs to apply a discount of at least 50 % to capacity-based transmission tariffs at entry points from and exit points to storage facilities, unless and to the extent a storage facility which is connected to more than one transmission or distribution network is used to compete with an interconnection point. Gas sourced from storage facilities competes with regasified LNG in the flexibility market, so this discount can be considered a "competitor subsidy". It does not directly impact TSO tariffs relevant to LNG distribution, but bolsters the attractiveness of a

[108] "ACER Consultation Template – France," October 2019. Published by ACER in the collection "Harmonised transmission tariff structures," accessible via https://acer.europa.eu/en/Gas/Framework%20guidelines_and_network%20codes/Documents/France%20TAR%20template_R.pdf

[109] CRE, Délibération de la Commission de régulation de l'énergie du 12 décembre 2019 portant projet de décision sur le tarif d'utilisation des réseaux de transport de gaz naturel de GRTgaz et Teréga, page 67

[110] Information provided by ELENGY and contact with CRE, January 2020.

competing source of gas in the short-term, i.e., as a source of flexibility. Discounts at entry and exit points from storage facilities across the EU are depicted in Table 7.

TSO tariff levels are slightly less important to LNG shippers than LSO tariff levels, but they are still determinants of terminal attractiveness as they impact the total costs of LNG distribution in gas markets.[111] Transmission discounts applied at entry points from LNG terminals are considered to facilitate LNG entry into more isolated markets.

For those countries that do not have an LNG terminal on their territory, access to global LNG markets is constrained not only by the level of tariff at the nearest LNG terminal and at the entry to the respective TSO, but also by TSO tariffs at the interconnection points between the respective countries. Any bundling of these LSO capacities with TSO capacities would hence reduce the risk of tariff pancaking on the respective borders or infrastructure points.

[111] Responses to the stakeholder consultation on the EU regulatory framework for LNG, September 2019

Table 7 : Characteristics of transmission tariff calculations in EU Member States[112]

Country	Choice of reference price methodology for setting tariffs[113]	Period of regulatory review (years)[114]	Entry/exit split	Application of discount at entry/exit points from storage facilities	Application of discount at entry points from LNG facilities
Austria	Virtual point-based approach	4	Varied	100%/50%	0%
Belgium	Capacity weighted distance	4	33%/67%	50%/100%	0%
Bulgaria		3			
Croatia	Postage stamp	5	60%/40%	90%/100%	**15%**
Cyprus					
Czech Republic	Capacity weighted distance	5	20.35%/79.65%	50%/50%	0%
Denmark	Postage stamp	1	Varied	100%/100%	0%
Estonia	Postage stamp		9%/91%	0%/0%	0%
Finland		4			
France	Based on booked capacities and distance between the different main network entry and exit points	4	Varied	80%/80%	(as of 1 January 2020) **10%**
Germany	Postage stamp	5	Varied	75%/75%	0%
Greece	Postage stamp	4	50%/50%	0%/0%	**34%**
Hungary	Postage stamp	5	40%/60%	90%/100%	0%
Ireland	Matrix	5	33%/67%	0%/0%	0%
Italy	Capacity weighted distance	4	28%/72%	50%/50%	0%
Latvia	Postage stamp	1	50%/50%	100%/100%	0%
Lithuania	Postage stamp with asset-costs split for transmission services to 3rd country	5	70%/30%	0%/0%	**75%**
Luxembourg		4			
Malta					
Netherlands	Postage stamp	5	50%/50%	50%/50%	0%
Poland	Postage stamp	1	50%/50%	80%/80%	**100%**
Portugal	Modified capacity weighted distance	3	40%/60%	95%/95%	0%
Romania	Postage stamp	5	50%/50%	50%/50%	0%
Slovakia	Postage stamp	5	50%/50%	0%/0%	0%
Slovenia	Matrix	3	16%/84%	0%/0%	0%
Spain	Capacity weighted distance	6	50%/50%	100%/100%	0%
Sweden	Postage stamp	4	0%/100%	100%/100%	0%
United Kingdom	Varied	8	Varied	0%/0%	0%

[112] Data per country collected based national tariff consultation documents submitted by Member States to ACER; templates with country-level data available at https://acer.europa.eu/en/Gas/Framework%20guidelines_and_network%20codes/Pages/Harmonised-transmission-tariff-structures.aspx.
[113] As defined in the TAR NC
[114] "Methodologies and parameters used to determine the allowed or target revenue of gas transmission system operators," Economic Consulting Associates, Submitted to ACER in September 2018.

Case studies

Tariff structures and levels applied by LNG terminals Barcelona, Gate and Świnoujście

Gate

- Gate is exempted from tariff regulation, tariffs are set based on commercial negotiation and tariff related information is exchanged with its customers during the contracting process
- Gate is legally not required to publish details on its tariff structures or levels
- Gate has benefitted from EU funding for expanding its services, but has not benefitted from any indirect subsidies or state-backed compensation

Barcelona

- Applies tariffs based on disaggregated fixed and variable terms covering unloading, regasification, and storage services
- Tariff terms are set annually and include:
    - Unloading rates based on a fixed term charged per ship and a variable term charged per GWh
    - Additional Storage rates based on a variable term applied per GWh
    - Regasification rates based on a fixed term applied per GWh/day/month and a variable term applied per GWh
    - A gas in kind term that accounts for the gas reserved from a delivery and held to compensate for losses and consumption by the terminal facilities
    - Reloading (fixed amount per ship + variable term per energy downloaded)
    - Truck-loading (fixed term per capacity and variable term per energy loaded)
- To calculate tariffs for shorter terms than a full year, a capacity multiplier is applied to the fixed term in the regasification charge
- Current tariff levels for a standardised product offering are slightly below the European average
- Offers a tariff simulator that estimates the tariff level for selected services within the current year
- The Spanish tariff setting methodology was redesigned for 2019 and 2020 so that they are the same at all terminals
- Spain's regulated terminals, including Barcelona, are reimbursed by the state if their costs are not covered by tariff revenue – this results in tariff cross-subsidisation and is paid for by users of the Spanish grid

Świnoujście

- Tariff terms are set annually and include:
    - A fixed fee for contracted capacity applied per MWh/h/h to the ordered contracted capacity and the number of hours in the settlement period
    - A variable fee for regasification applied per MWh to the quantity of gaseous fuel sent out to the set exit point within the settlement period
- The Polish state and the EU have subsidised Świnoujście, and the NRA responsible for tariff oversight has allowed for a discount on entry fee for gas from the LNG terminal, to account for its contribution to security of supply
- Still, current tariff levels for a standardised service offering are typically above the

Sources: "Tariffs," Gate Terminal Commercials, 2019; "Leader in natural gas infrastructures: LNG, transmission and underground storage services," Enagas, 2019; "LNG Regasification Services Tariff rev. 4," Polskie LNG S.A., 2019.

Stakeholder views

LSO Tariffs

Most stakeholders agree that tariff levels for standard bundled services have an impact on competition, with more than 25% agreeing they have a high impact on terminal competitiveness. They are aware that many different factors can affect tariff levels, resulting in different charges for similar services across terminals in the same market zones. Numerous stakeholders maintain that in their experience, tariff levels do not act as barriers to competition but rather as differentiators that influence which terminals are optimal for their use.

When considered as a standalone factor on the decision of market players to select a specific terminal for use, the tariff level for LNG terminal services is considered to have a high or medium impact by all stakeholders. And when compared to other factors, the LSO

tariff level is considered to have the highest impact on shippers' terminal selection decisions, as can be seen in Figure 11.

TSO Tariffs
Most stakeholders report that TSO tariff levels for domestic and cross-border gas transport have a medium to high impact on market players' selection of LNG terminals. They note that the impact of TSO tariff levels depends on regional factors, and that while in some markets TSO tariff levels can impact terminal utilization, in other markets they are less influential.

Regarding transmission tariffs, one terminal user believes that "entry tariff levels are much more relevant than exit or cross border tariffs."[115] Another reports that "tariffs play a role in determining which terminal in the region is selected once overall EU LNG prices become sufficiently competitive compared to other regions."[116] And an LSO acknowledges that "TSO tariff levels including the cross-border tariffs may have a major influence on final natural gas price and may influence natural gas traders to choose different supply options instead of LNG."[117]

Interestingly, when compared to other market factors, transmission tariff levels are not considered one of the most important determinants of terminal selection. Only 10 stakeholders in total included it as a top-three factor that motivates shippers to choose a specific terminal, with proportionally more LSOs considering it an important determinant than national authorities or market parties (see Figure 11).

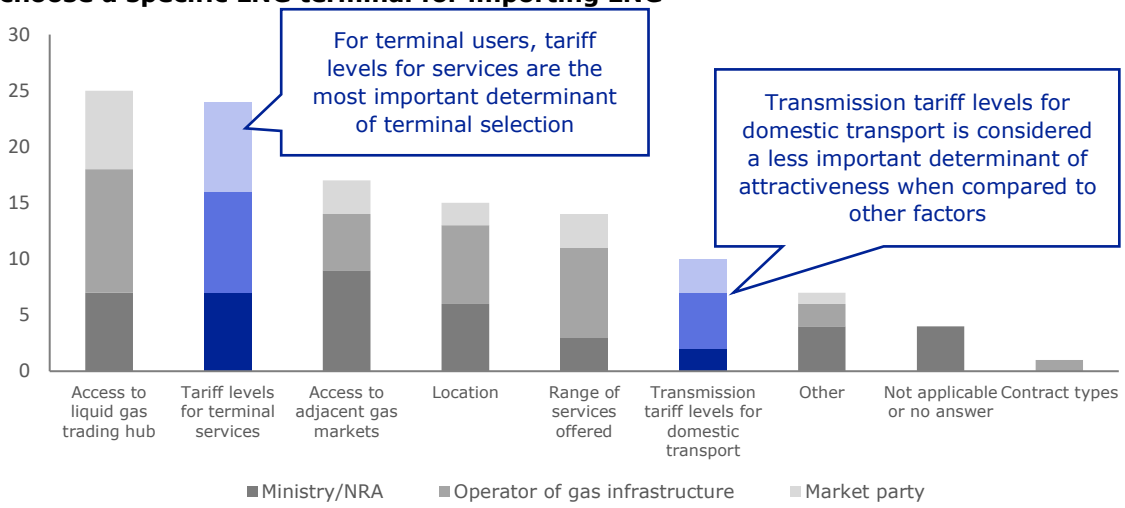
With respect to standardising discounts applied to entry points from LNG terminals, most stakeholders are NOT in favour of harmonisation. Many note that discounts are applied for reasons highly dependent on regional factors and believe it's important for certain countries to apply a discount to ensure security of supply where necessary.

Those who are in favour of harmonisation recommend one of two strategies: some suggest harmonisation by setting the rate to zero percent in all Member States, effectively removing the provision for a discount at LNG terminal entry points. Others (two market parties and one LSO) believe that regasified LNG should compete fairly on a level playing field with domestic production and import pipeline supplies and as such, should not receive a specific discount at transmission system entry points.[118]

Others favour harmonising the process to determine the discount rates, rather than adopting standardised levels. Most national authorities are against standardisation, with only one authority expressing support for harmonised discount principles. A market player reflects that "Harmonising a discount rate may not necessarily be a key determinant as ultimately the relevant cost will depend on several other factors. A soft harmonisation via a minimum discount level may be more appropriate."[119]

[115] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019
[116] Ibid
[117] Ibid
[118] Ibid
[119] Ibid

Figure 11: Factors selected as one of the three most important reasons why shippers choose a specific LNG terminal for importing LNG[120]



Cross-subsidisation between LSO and TSO tariffs

Many stakeholders are aware of cross-subsidised tariffs and indicate that tariffs are rarely fully cost reflective. They view cross-subsidisation as highly dependent on terminal location and regional factors and recognise that instances of tariff cross-subsidisation can be appropriately justified by arguments related to ensuring security or diversity of gas supply and enhancing competition.

A national authority acknowledges that "not all the LNG terminal costs are recovered through LNG tariffs [in the domestic market]." Another national authority reports that in its market, "most of LNG terminal costs are paid by TSO grid users through the security of supply component as [the] LNG terminal created conditions for access to other countries' markets and for diversification of natural gas supply sources."[121]

According to stakeholders, instances of cross-subsidisation nearly always result in the costs of LNG terminal operations being re-allocated to TSO grid users. The impact of this cross-subsidisation on tariff level varies by region and market size (e.g., in Germany, it is not expected to have a high impact).

Stakeholders also indicate that recent policy reforms in Spain have sought to address cross-subsidisation to ensure tariffs are fully cost-reflective, but cross-subsidisation is still experienced in practice. The decision to implement as of 1 April 2020 a harmonised tariff for all LNG terminals in Spain leads de facto to some level of cross-subsidisation. Recent reforms in Italy have incorporated a cross-subsidisation factor into their capacity auctioning mechanism, providing coverage to regulated terminals that do not contract out all of their capacity – because of this factor, the auction mechanism allows for greater flexibility in capacity price levels and is appreciated by market players.

So while stakeholders acknowledge tariff cross-subsidisation, they do not regard it as an issue in the market and even consider it necessary, in some cases, to facilitate the entry of LNG as a source of security of supply and competition. In fact, when considering direct and indirect subsidies nearly all Member States report instances of cross-subsidised tariffs.

Potential barriers

Based on this analysis, the possible barriers to competition related to tariff rates and calculation methodologies are summarised in the next table.

[120] Responses from stakeholders in the consultation on the EU regulatory framework for LNG, September 2019
[121] Ibid

Table 8 : Potential barriers to LNG entry into the EU gas market – Tariff structures and levels

Intra-terminal competition	• Lack of transparency regarding tariff calculation methodologies and relevant input data at terminals might obscure competition distortions amongst users of the same terminal, and especially might impact small-scale shippers
Inter-terminal competition	• Cross-subsidisation through regulator-approved discounts, state-backed loss coverage, and discounts at entry points from LNG terminals *could* lead to competition distortion with terminals in neighbouring MSs where these indirect subsidies are not present • Lack of harmonised tariff principles and structures between LNG terminals, makes any tariff comparison very cumbersome and might hinder competition • Fewer transparency obligations regarding tariff levels for exempted terminals might disadvantage regulated terminals that cannot access their exempted competitor's tariff information

D. INFORMATION PROVISION AND TRANSPARENCY LEVELS AT TERMINALS

Overview

Transparency is essential to ensure fair competition and a well-functioning LNG market. All regulated terminals in the EU use the GLE transparency template, published on the GIE website, to provide the information required by regulation. The template requires details on terminal characteristics, procedures for using the terminal, capacity availability and operational data. Some exempted terminals use the GLE transparency template as a reference for publishing information on their sites as well, though they do not comply with all of its requirements.

The accessibility of information varies widely by topic.[122] While there is information readily available on services offered at terminals and the levels of gas in their facilities, it can be difficult to find comprehensive information on contracted capacities, capacities that become available on secondary markets (see the section on capacity allocation mechanisms), and even technical and legal requirements for using terminals. It can be difficult to track down specific information on practical capacity availability and the contractual requirements for using certain terminals.

Examples of information linked to the transparency template by LSOs in Italy and in France are included in the figures below. They include straightforward details that are indeed useful to potential terminal users, but they do not provide a complete picture on the conditions of using different terminals and terminal accessibility.

Figure 12 : Examples of information published on LSO sites using the GLE transparency template

Fosmax LNG[123]

[122] "GLE Transparency Template," Gas Infrastructure Europe, 2019.
[123] "LNG terminal transparency template," Fosmax LNG, 2019.

LNG terminal transparency template

Menu	Submenu	Subject
1. Contact		
	Contact	Contact form
2. Terminal characteritics		
	Facilities main characteristic	LNG Fos Cavaou terminal
	Service description	Regazification services
	LNG quality specification	LNG Fos Cavaou terminal
3. How to become a customer/user		
	Main steps for acces	Contract for access to the Fos Cavaou LNG terminal
	Contract information	Contract for access to the Fos Cavaou LNG terminal
	Ship procedures	Contract for access to the Fos Cavaou LNG terminal
	TSO info	GRTgaz
4. Capacities		
	Primary capacity	Primary capacity
	Secondary market	Secondary market
5. Tariff		
	Regulated terminal	Description of tariffs
	Exempted terminals	Description of tariffs
	Online calcullator	Online calculator
6. Legal documentation		
	Contracts	Contract for access to the Fos Cavaou LNG terminal
	Ethics & compliance	Fosmax LNG
	Regulation/legislation	Fosmax LNG
7. Operational data		
	Monthly summary of operations completed	Usage data
	Daily send-out allocations and provisional send-out quantities	Usage data
	Maintenance work	Maintenance schedule
	Unplanned unavailabilities	Unforeseen non-availability
	Available and subscribed capacities	Primary capacity
	Secondary market	Secondary market

Adriatic LNG[124]

REGASIFICATION CODE

The Regasification Code regulates access to service and process of allocation of the regasification capacity, according to the requirements that must be met by all users.

Approved by the Italian Regulatory Authority for Energy, Networks and Environment (ARERA) on May 12 2011 under Resolution ARG/Gas 57/11, pursuant to Article 24 Paragraph 5 of the Legislative Decree of May 23 2000 n. 164, which is updated periodically.

Download the Chapters of the last version approved:

Chapter I	General Principles »
Chapter II	Terminal Specifications, Access Procedures and Scheduling »
Chapter III	General Terms and Conditions for provision of the service »

LSOs for both regulated and exempted terminals are required to provide information at least daily regarding their contracted and available storage capacities and the amount of gas in their facilities. This information is collated and published in the Aggregated LNG Storage Inventory (ALSI), hosted on the GIE website. The inventory's database provides

[124] "Regasification code," Accessed via "GLE Transparency Template," Adriatic LNG, 2019.

detailed figures on LNG inventory and daily send-out at all terminals in the EU (save South Hook) at a daily level spanning back to 2011.[125]

Tools like the GLE transparency template and ALSI have improved transparency in the EU LNG market, but several key market features could still benefit from increased transparency. Information on relevant regulations and regulatory requirements related to gas quality, for example, is still lacking in certain Member States. And information on capacity bookings is still limited at most terminals.

Exempted terminals are in general perceived to be less transparent than their regulated counterparts[126], partly because they are not legally required to comply with certain transparency provisions. As discussed in the section on terminal exemptions from regulated TPA, exempted terminals do not have to publish their tariff levels or information on their contract structures. Information on contracts is in general more readily available for regulated terminals than for exempted terminals.[127] Though some exempted terminals publish information about the structures of their agreements with primary capacity holders, others do not. Confidentiality agreements are required for contract holders.[128] Several stakeholders believe this distorts the level playing field in markets where exempted terminals compete with regulated terminals.

Since the implementation in 2014 of the EU Regulation on Energy Market and Transparency (REMIT), LNG market parties and infrastructure operators have mandatory registration, disclosure and reporting obligations to the national and EU energy regulators. Despite a number of clarifications issued by ACER, there seems still some confusion about the concrete reporting obligations for some LNG transactions, in particular for bilateral trades with a delivery point within the EU (i.e. on DAT terms).[129] The publication by energy regulators of anonymised, aggregated data resulting from these reporting obligations, could further enhance the transparency of the LNG sector.

[125] "Historical Data," Aggregated LNG Storage Inventory, GIE, 2019.
[126] Consultation with the co-chairs of CEER's LNG workstream, 3 September 2019
[127] "GLE Transparency Template," Gas Infrastructure Europe, 2019.
[128] "Gate terminal extends primary capacity allocation timing," Gate Terminal Rotterdam, 29 April 2019.
[129] The National Law Review, LNG in Europe, 16 September 2019

Case studies

Details on the transparency practices of Gate, Barcelona, and Świnoujście terminals are included below.

Information transparency at Barcelona, Gate and Świnoujście

Gate terminal

- Publishes no information on tariff rates or structures and is not required to do so as it is exempted from TPA regulations
- States only that tariffs are based on commercial negotiation and exchanged during the contracting process
- Signs confidentiality agreements with market parties interested in contracting its capacity
- Complies with Article 19(4) of Regulation 715-2009 and publishes daily information on:
  - The amount of gas in its facility
  - Inflows and outflows at its facility
  - Its available capacity
- Provides this information to the Dutch gas TSO to include and publish in its aggregated system analysis
- Publishes most of the information required in the GLE transparency template, except for information regarding tariff rates and calculations

Barcelona

- Publishes more information than required in the GLE transparency template, including among others details on:
  - Contacts for communication and TPA contacts
  - Information on its facilities
  - Descriptions of services offered
  - Requests to apply for terminal access
  - Standard and simplified contract models (though only available in Spanish)
  - Information related to the Spanish TSO Enagas
  - Vessel compatibility and unloading
  - Capacities, available capacity and interruptible offers
  - Tariffs, tolls and charges including a tariff simulator
  - Relevant national and European regulation (national in Spanish)
  - Historical data on gas system operation
  - Operational data on system statuses and planned system operation

Świnoujście

- Provides simple, straightforward information as required in the GLE transparency template, all in English, including details on:
  - Terminal contacts
  - Terminal characteristics
  - How to become a customer/user of the terminal
  - Capacity
  - Tariff regulations and levels as approved yearly by the Polish NRA
  - Relevant legal documentation (though some forms and regulation only available in Polish)
  - Operational data and statistics (also relayed to the Polish TSO Gaz-System)

Sources: Commercial information as published on Gate terminal's website, 2019; "Gate terminal extends primary capacity allocation timing," Gate, 2019; "Regasification plants – Transparency template," Enagas, 2019; "Transparency template," Polskie LNG S.A., 2019.

Stakeholder views

Thirty-four (77%) of the surveyed stakeholders consider terminals sufficiently transparent. Many praised the implementation of the GLE transparency template and noted its usefulness in standardising the provision of information by regulated (and for some topics, by exempted) terminals. However, the survey sample did not include many potential users, who could experience a lack of sufficient information as an obstacle (especially information on terminal use conditions and capacity availability).

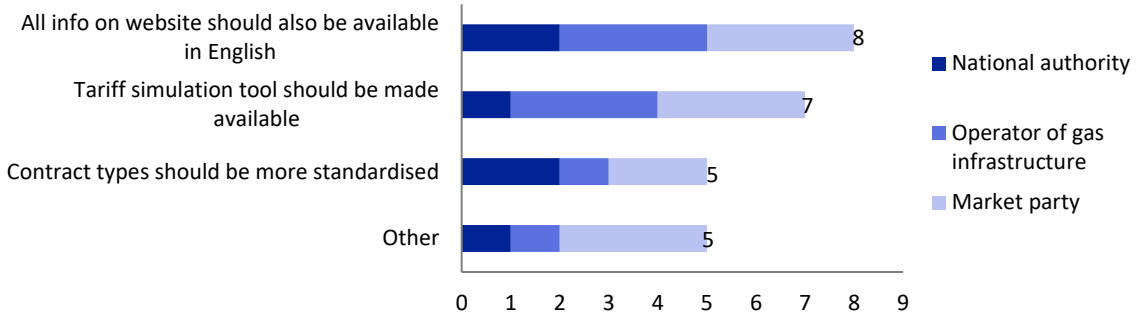
Large shippers did acknowledge that while it was not difficult for them to collect necessary information from LSOs, it would be more difficult for smaller LNG shippers to gain access to the same information, as they do not have the same long-standing relationships and commercial negotiating power with terminal operators – this might especially distort

competition between shippers at exempted terminals. This presents a barrier to competition, as potential users are incapable of finding the information they need on terminal terms of use, tariffs, and open capacity slots.

Several stakeholders did in fact report insufficient transparency at certain terminals. These stakeholders supported making all information available in English on LSO websites and providing tariff simulation tools, as depicted in the figure below. Few stakeholders overall suggested that terminal contracts should be more standardised. Some stakeholders offered other suggestions for improving transparency, which included:

- Providing more info on contracts and services offered in general
- Providing further information on contract conditions with LNG suppliers for gas quality specifications
- Requiring that exempted terminals provide public information on tariffs and contract structures

Figure 13 : Support for additional transparency measures as reported by stakeholders who consider current information provision insufficient[130]



One market player active in markets across Europe expressed its opinion that transparency regarding contract structures, in particular, might be "one area of improvement when it comes to regulated terminals." It explains that

> *"Terminal codes have their own specific format and while some terminals prefer an all-encompassing code, others choose contracts as a way to formulate terms and conditions. The differences may limit the comparability among the different terminals and lead operators to make sub-optimal choices. Terminal codes, approved by NRAs, also in the case of exempted terminals, following a pre-defined structure may help."*

Potential barriers

Based on this analysis, the possible barriers to LNG entry and competition related to information transparency are summarised in the next table.

Table 9 : Potential barriers to LNG entry into the EU gas market – Information provision

Intra-terminal competition	• Lack of adequate, user-friendly, and particularly non-discriminatory information provision on available capacity, tariffs, services and contractual obligations at some terminals (e.g. exempted) lead to an unfair playing field between existing and potential users, especially smaller scale shippers and new entrants to a market
Inter-terminal competition	• Lack of adequate and user-friendly information provision affects inter-terminal competition, as terminal operators have unequal access to details on each other's commercial practices

[130] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019

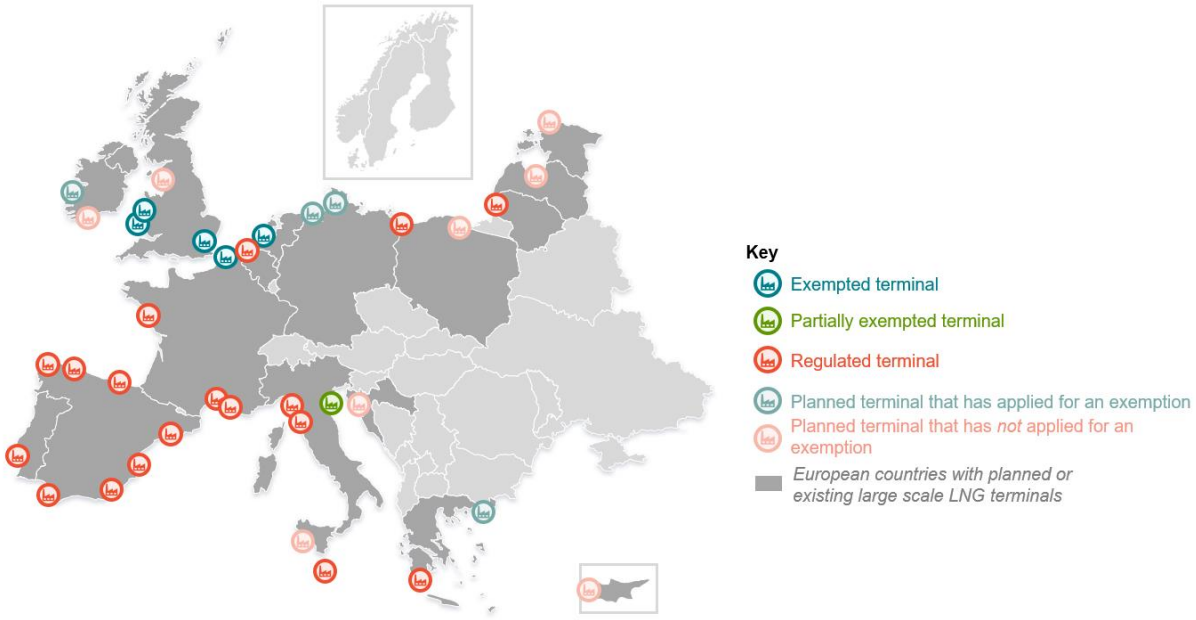
E. TERMINAL EXEMPTIONS FROM REGULATED TPA AND TARIFF APPROVAL REQUIREMENTS

Overview

There are currently only six LNG terminals spread across the UK, the Netherlands, France, and Italy which are exempted or conditionally exempted from TPA regulations and from tariff-setting oversight requirements. These terminals were all commissioned after 2005 and were required to meet strict regulatory conditions in order to gain their exempted status (see Chapter 1 for a full description of the requirements).

The locations of the exempted terminals are shown in the figure below. Fully exempted terminals are located in the same highly integrated west European market. They compete with several regulated French and Belgian terminals that serve the same region. Italy's Porto Levante terminal is subject to a hybrid exemption regime such that 80% of its capacity is exempted. It competes with two other terminals in Italy, both regulated.

Figure 14 : Location of exempted LNG terminals in the EU



An overview of existing terminals that are fully or partially exempted and planned terminals that have applied for exemption status is included in the following table. Exemptions are granted for set periods of time; as regulation currently stands, terminals cannot reapply for exempted status at the end of this period. This will not be an issue for any terminal until 2025, when the exemption period for Isle of Grain's LNG terminal will expire.

Table 10: Exemption regimes at LNG terminals in the EU

Country	Terminal	Status	Start-up	Capacity exempted	Term of exemption (year exempted until)	Scope of exemption[131]
France	Dunkerque	Existing	2016	100%	20 years (2036)	Required to publish ALSI data; service expansion subject to reg. approval
Greece	Alexandroupolis	Planned	-	TBD	TBD	-
Ireland	Shannon	Planned	-	100%	20 years (TBD)	-
Italy	Porto Levante	Existing	2009	80%	25 years (2034)	Required to publish ALSI data; service expansion subject to reg. approval
Germany	Brunsbuettel	Planned	-	Up to 8 bcm	TBD	TBD
	Wilhelmshaven	Planned	-	TBD	TBD	TBD
Netherlands	Gate terminal	Existing	2011	Up to 16 bcm	20 years (2031)	Required to publish ALSI data; service expansion subject to reg. approval
United Kingdom	South Hook	Existing	2009	100%	25 years (2034)	Required to publish ALSI data
	Isle of Grain	Existing	2005	100%	20 years (2025)	Required to publish ALSI data
	Dragon	Existing	2009	100%	25 years (2034)	-

Exempted terminals are not required to seek regulatory approval before setting their tariff levels or contracting out their capacity. They are not required to publish information regarding their tariffs, as regulated terminals are compelled to do.

Consequently, exempted terminals do not publish commercially sensitive information on tariffs or contracts, information that regulated terminals include in a GLE transparency template available on each of their respective websites.[132,133]

While the EC's decisions approving terminal exemption applications are publicly available, these documents do not always provide details on the specific terms of exemption regimes. The terms vary per terminal, and information regarding transparency requirements or compliance with specific legal provisions is not readily available for all terminals.

Only a few published decisions on applications offer insight into the explicit terms of an approved exemption regime. For example, before approving Shannon LNG's application for an exemption, the Commission required the Irish regulator (CER) to amend its decision and mandate Shannon LNG to "ensure, under the supervision of CER, that it will not sell more than 50% of its gas in long-term contracts to an undertaking that supplies more than 50% in any of the Irish retail gas markets."[134] This is one illustration of a restraint that is included in a a specific exemption decision to ensure the market remains competitive. There is also an example of the Commission explicitly *not* imposing allocation restrictions in another exemption decision: "the fact that the Commission does not request GATE

[131] See section D for further details on information transparency and provision
[132] "How to Foster LNG Markets in Europe," Liquefied Natural Gas Work Stream of the Gas Working Group for the Council of European Energy Regulators, 24 July 2019 ; "Contracts/codes," Gate Terminal Rotterdam, 2019.
[133] "Contracts/codes," Gate Terminal Rotterdam, 2019.
[134] "Notification pursuant to Article 297 of the TFEU," European Commission Secretariat-General, 2010. https://ec.europa.eu/energy/sites/ener/files/documents/2010_shannon_decision_en.pdf

terminal to reserve a certain percentage of terminal capacity for short term trading in the context of this exemption request cannot be construed to mean that the Commission will also refrain from doing so in other exemption requests," is published in its decision regarding Gate terminal's regime.[135]

Though accessible information on the commercial terms of their exemption regimes is lacking, it is known that most exempted terminals are required to provide public information (ALSI data) on their terminal operations. Like their regulated counterparts, all save Milford Haven's Dragon terminal report on the volumes of LNG in their storage facilities and the volumes of LNG regasified at their send-out facilities by the end of each gas day.[136] This information is collated in the Aggregated LNG Storage Inventory (ALSI) database, which is publicly accessible. Several exempted terminals are also required to secure regulatory approval for any plant expansions they undertake.

As the dynamics of future gas markets are difficult to anticipate in detail, it is considered important to monitor how exempted and regulated terminals continue to compete as market integration and trading patterns evolve. The specific competitive advantages of exempted terminals might be diluted as new terminals enter the market, as many will be concentrated in regions dominated by regulated terminals (see Figure 14).

[135] "Exemption decision No. G/2006/01," European Commission Directorate-General for Energy and Transport, 2007. https://ec.europa.eu/energy/sites/ener/files/documents/2007_gate_terminal_decision_en.pdf
[136] Aggregated LNG Storage Inventory, https://alsi.gie.eu/#/

Exempted Gate terminal versus regulated terminals at Barcelona and Świnoujście

Gate

- Exemption from certain obligations of the Dutch Gas Act granted as of September 1, 2011 for 20 years by the Dutch Minister of Economic Affairs, approved by the European Commission
- Exemption based on the following conditions:
  - Gate must apply a UIOLI system offering its unused capacity on the secondary market
  - Gate cannot assign 50% or more of its primary capacity to a party with a dominant position in the gas market
  - Gate must set up a procedure for future capacity expansion that offers all market parties the possibility to show interest in contracting capacity
  - Any changes relevant to the exemption application and exemption decision must be reported immediately to the Ministry
- Notwithstanding its exemption, Gate is required to comply with certain transparency requirements according to Article 19(4) of Regulation 715-2009: It must at least daily publish the amount of gas in its tanks and the available capacities of its facilities and communicate this information to the TSO
- Gate must also secure regulatory approval before implementing plans to expand its facilities

Barcelona

- Ineligible to apply for exempted status, as terminal was commissioned in 1969, before the exemption principles were introduced into regulation in 2003.
- Terminal activities overseen by the Spanish NRA in charge of energy market oversight – la *Comisión Nacional de los Mercados y la Competencia (CNMC)*
- Because it is a regulated terminal, it is a NRA responsibility to approve LNG tariffs for all the Spanish LNG terminals, including Barcelona, on a yearly basis and publish its rates in an easily accessible and transparent manner.
- On the other side, all Spanish LNG terminals (including Barcelona) are obliged to comply with transparency mandates and publish information on its operations, including the amounts of gas in its facilities and the available capacity of its facilities. Spanish LNG Terminals have also to comply with Spain's recently redesigned gas market codes and frameworks

Świnoujście

- Did not apply for exemption status, as commissioning was expected to contribute to security of energy supply and therefore its investment costs were included in the regulatory asset base and recovered from Polish gas consumers.
- Terminal activities overseen by the Polish NRA in charge of energy market oversight – the Urząd Regulacji Energetyki (Energy Regulatory Authority)
- Because it's a regulated terminal, Świnoujście's LSO Polskie LNG is required to:
  - Seek regulatory approval for its tariffs on a yearly basis and publish its rates in an easily accessible and transparent manner
  - Comply with transparency mandates and publish information on its operations, including the amounts of gas in its facilities and the available capacity of its facilities
  - Involve its regulator in developing new business strategies and seek regulatory approval for plant expansions

Sources: "Regulation," Legal Documentation – Gate Terminal, 2019; "Spanish Energy Regulator's National Report to the European Commission 2018," CNMC, 19 July 2018; "Information about the company," Polskie LNG S.A., 2019.

Stakeholder views

Stakeholders are relatively split in their opinions on whether terminal exemptions act as barriers to inter-terminal competition; approximately 60% indicate that it has no impact on competition, while 40% indicate that it does indeed impact competition. They all strongly defend their diverging positions, whether they believe that exemptions foster competition or prevent it.

There is some concern that the lack of transparency regarding tariff levels at exempted terminals could distort the level playing field between users of the same terminal and also between different terminals, especially in the case of inter-terminal competition between

regulated and exempted terminals that offer similar services and serve the same regional markets.

There is further concern that differences in tariff levels between regulated and exempted terminals might increasingly impact competition in evolving markets. As Europe has become an increasingly attractive destination for LNG cargos, terminals with access to the same end-use gas markets compete with each other more and more to attract shippers to their spot markets. As tariff levels of regulated terminals are published, exempted terminal operators can use this info to determine (slightly) lower tariff levels allowing them to gain a competitive edge in attracting the same shippers. Moreover, confidentiality clauses required by exempted terminals on terminal access tariffs and conditions allow for the terminal operator to price-discriminate among terminal users.

Some stakeholders argue that a level playing field cannot exist in connected markets that include both exempted and regulated terminals. One terminal user active in markets across Europe believes that because "in terminals exempted from regulation, individual tariff levels [are] possible, shippers are not treated equally."[137] And an LSO reports that although "[our terminal] is not exempted, in our opinion [exemption] can be important competition distortion as the gas market integration is increasing."[138]

Most stakeholders who believe that exemption regimes result in competition distortion think that regulated terminals are disadvantaged in integrated markets where exempted terminals are present. However, at least two terminal operators expressed the opinion that regulated terminals actually have an advantage, as they have 'guaranteed' revenues while exempted terminals cannot recover losses resulting from tariffs that would be set below effective cost levels. One of the operators of an exempted terminal outlines how it might be disadvantaged in a market where competing terminals are regulated:

> *"[Our terminal] does not benefit from the so-called 'revenue coverage factor' on the regulated portion of its revenues. The revenue coverage factor is granted by the State and covers [a portion] of regulated revenues even if capacity is not allocated. Therefore, [the exempted terminal] does not burden the system (i.e. the end users), as opposed to the other two [regulated] competing terminals. Furthermore, it is not possible for [our terminal] to compete with the other 2 LNG terminals since these last can discount their tariffs and still be remunerated by the State while for [our terminal] it may end in a net loss."*[139]

This topic is further discussed in the section regarding cross-subsidisation between gas tariffs (see Section C).

Even given these diverging opinions, terminal operators and users agree that in principle, regulated and exempted terminals should be able to co-exist in competitive environments. They acknowledge that only few market distortions are observed in practice, even in regions where exempted terminals compete with regulated ones.[140]

Several stakeholders defend the necessity for exemptions and do not believe they distort competition. One terminal user active in Spain, Italy, the Netherlands and the UK, concludes "No barriers [related to terminal exemptions] have been identified. TPA exemptions are granted in recognition of the security of supply and competition benefits LNG brings to the market and reflect the level of risk, such that the investment would have not been made without the exemption. This has proven to be a successful model in [relevant] markets."[141]

When asked whether the option to grant exemptions should be maintained for future investments in LNG terminals, 27 stakeholders responded "yes," while only seven responded "no." Stakeholders opposed to exemption regimes included a relatively even distribution of LSOs, NRAs, and terminal users.

[137] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019
[138] Ibid
[139] Ibid
[140] Stakeholder consultation with Gas LNG Europe, Brussels, 8 August 2019.
[141] Ibid

Several parties believe that the conditions applied for granting terminal exemptions should be reviewed by the Commission over the next few years as additional terminals are constructed and commence operations. Most agree that the allocation of exemptions should be carefully assessed taking into account the regional market context. Restructuring conditions for exemption might help to prevent the kind of backtracking that took place in 2013 when Toscana OLT Offshore terminal, which had been granted exempted status, was eventually "rescued" by the Italian state and regulated to ensure its continuity. This was considered to negatively impact the credibility of the current exemption regime.

Some market players and LSOs offered suggestions on how to modify the existing exemption regime to address shortcomings they perceived. One market party that is invested in one terminal and ships gas to others suggested that terminals move to a "negotiated regime," whereby terminals could better "flex their services to meet customers' needs." An LSO suggests that "Where possible and compatible with relevant market conditions, at the end of an exemption period terminals should be moved under a regulated regime to ensure third party access unless it can be proven that maintaining a negotiated regime has no negative implications on market functioning." The LSO believes that "this will guarantee the most competitive circumstances for the LNG market in Europe preventing consolidated commercial positions to become a barrier for new entrants."[142]

While most stakeholders say that they are not aware of any negative effects on market functioning due to exemptions, several did report negative impacts related to tariffs and transparency. One national authority believes that "lower tariffs in exempted LNG plants not related to real costs can reduce competitivity of LNG plants complying with tariff codes. LNG plants without [the] obligation of TPA can attract key shippers [and are] able to manage more easily their LNG stocks."[143]

Overall, stakeholders seem to agree that there is no need for substantial changes in the current regulatory framework regarding exempted and regulated TPA. But most also believe that certain provisions should be re-considered and potentially adjusted, especially the provision that regulated terminals must publish their tariff levels while exempted terminals are not required to do so. This disparity is considered the primary source of distortion among stakeholders who acknowledge that exemptions do impact competition within interconnected markets.

Potential barriers

Based on this analysis, the possible barriers to LNG entry and competition related to TPA exemptions are summarised in the next table.

Table 11 : Potential barriers to LNG entry into the EU gas market – TPA regime exemptions

Intra-terminal competition	• Exempted terminals are not required to charge the same rates to all their users, such that shippers at the same terminal may not be able to compete on a level playing field • As exempted terminals have more autonomy to select their terminal users, and face less scrutiny in allocating their primary and secondary capacity, all (potential) users may not be treated equally
Inter-terminal competition	• Regulated terminals in several countries benefit from state-sponsored revenue coverage factors that reduce potential losses in times of lower terminal utilisation, while their exempted counterparts in the same market area do not receive this coverage • There is unequal access to commercial information between terminals, as exempted terminals are not required to publish their tariff levels but can access the tariff levels of their regulated competitors

[142] Ibid
[143] Ibid

F. GAS QUALITY RESTRICTIONS

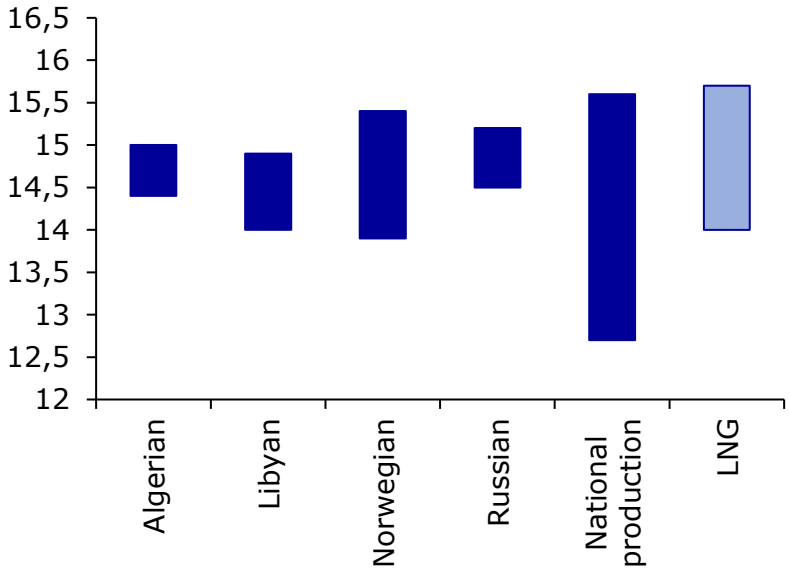
Overview

Regasified LNG injected into the EU gas network must comply with several technical specifications, including calorific value ranges on the one hand and chemical composition such as impurities in the form of content of S, Hg, O_2 on the other hand. The gas quality characteristics, parameters and their limits are described in the CEN H-gas standard (EN 16726:2015 + A1:2018). These standards are important to ensure a proper functioning of the gas infrastructure, including end-user appliances. Nonetheless, national gas standards ultimately determine the allowed ranges of the properties of the gas that can be injected into the network, often depending on the quality of their main (historical) gas supplies and the characteristics of their end-user appliances. A CEN group has for several years worked on including the Wobbe Index in the H-gas standard, and a new proposal is under preparation.

To comply with different standards across Member States, specific treatment of regasified LNG is sometimes necessary at terminals so that it can be injected into the gas grid (the need for treatment is subject to the origin of the cargo).

LNG entry and trade flows are not more or less impacted by diverging gas quality standards than pipeline imports – i.e., gas quality standards apply to gas indiscriminately of its source. The figure below shows that LNG Wobbe indices are typically measured at a broader range of levels than pipeline gas from North Africa, Norway, or Russia; still, LNG quality as measured within the depicted range would not prevent its entry into any of the EU Member States with published standards, as the range falls within the bounds of all countries with terminals (see Figure 16 for a Member State-level depiction of allowed Wobbe index ranges).

Figure 15: Measured Wobbe index ranges by gas source (kWh/m³)[144]

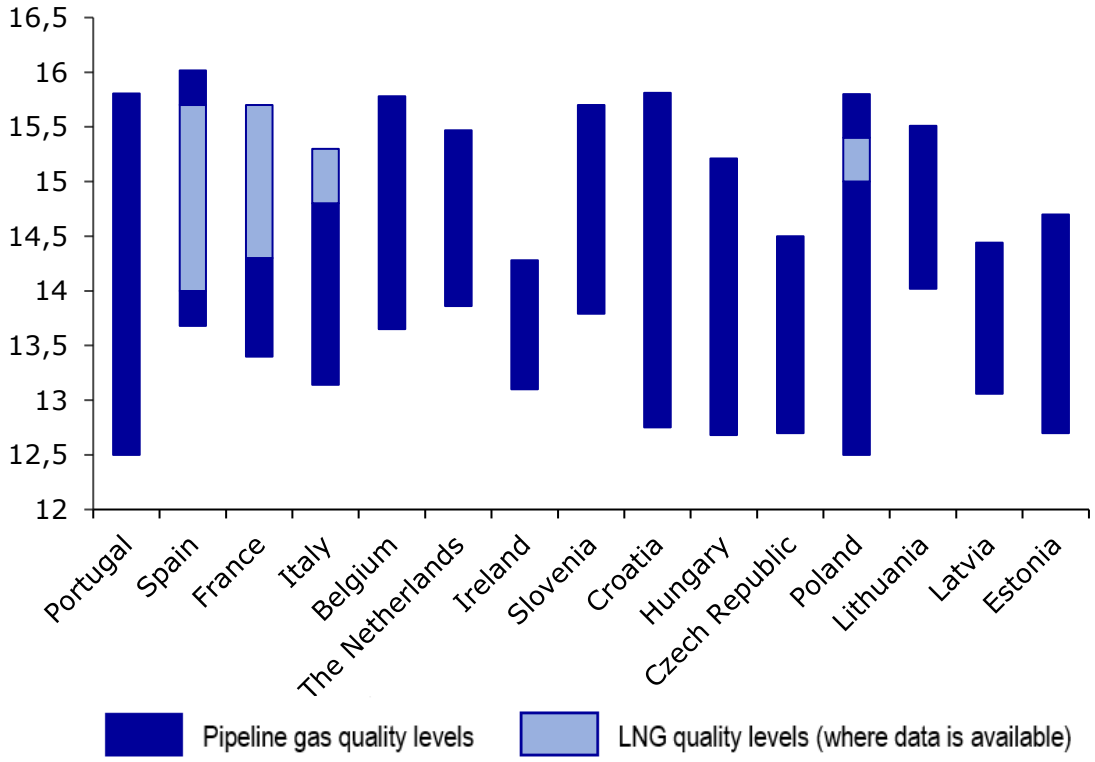


The 6th CEER benchmarking report on the quality of gas supply comprises an overview of the national ranges for the Wobbe Index value, which is the main indicator of interchangeability of gas. The subsequent figure shows how standards vary between Member States in regional proximity, as well as the range of LNG quality typically measured in countries with terminals and for which data is available. Gaps in the gas quality ranges of bordering countries indicate potential areas where gas flow and trade might be more complex than it would be if standards were harmonised. Additionally, LNG imported into countries with standards at the lower range of Wobbe values (e.g., Ireland, where the

[144] Adapted from figure 4 of ENTSO-G's "Wobbe Index and Gross Calorific Value in European networks: Analysis of ranges and variability," published 18 September 2017.

construction of two LNG terminals is planned) might require additional treatment before it can be circulated in domestic markets.

Figure 16 : Wobbe index ranges for EU Member States with published standards (kWh/m³)[145]



According to the same CEER report, all European countries with LNG terminals require that regasified LNG be odorised; in some countries TSOs are responsible for odorisation, while in most other countries, DSOs are responsible for it.[146]

Due to diverging national standards, quality adjustments are sometimes necessary before gas can cross national borders. Though in theory this could limit possibilities for export and trading for LNG terminal users who might not have access to facilities needed to treat the gas, in practice gas shippers and traders do not experience varied quality specifications as barriers to gas flow. This is partly because gas producers have financed installations for gas quality treatment at multiple LNG terminals to enable gas export to a wider range of markets (e.g., Zeebrugge terminal has the capacity to adapt regasified LNG to UK quality standards).[147]

Substantial variations between gas quality standards *could* limit inter-terminal competition, especially where there are LNG terminals located in adjacent gas market areas with access to the same Member States. However, operators do not report that quality standards prevent competition or inhibit trade flows.

Still, standardising gas quality specifications would affect the competitiveness of LNG terminals not only within the European market, but also within international LNG markets (e.g., Asia, USA) where gas quality is not as strictly regulated as in most European countries. Standardisation would reduce uncertainty and costs for suppliers. It should be noted, however, that gas quality standards are determined based on safety requirements and on ensuring the safe and efficient use of end-use appliances, and safety limits can prevent major revision or broadening of standard ranges. In the past, the Wobbe index

[145] Data from "6th CEER Benchmarking Report on the Quality of Electricity and Gas Supply," Council of European Energy Regulators, 2016; Belgian data provided by Fluxys
[146] "6th CEER Benchmarking Report on the Quality of Electricity and Gas Supply," Council of European Energy Regulators, 2016.
[147] Stakeholder consultation, 12 August 2019.

range could not be included in the CEN H-gas standard because of different interests in certain economic sectors, as well as limited knowledge on how broadening the range might impact the integrity, efficiency and safe use of appliances in some countries.

Case studies

Impact of gas quality standards on the Barcelona, Gate and Świnoujście terminals

Gate

- The regulation regarding gas quality levels in the Netherlands is contained in the "Regeling gaskwaliteit," set by the Ministry of Economic Affairs
- Dutch Wobbe Index standards fall within the average range for European gas markets, though they set a narrower range for quality than many EU counterparts
- Physically, two separate natural gas networks are used to transmit high caloric value gas to power plants, refineries, and blast furnaces and low caloric value gas to residential and commercial sectors
- At the Dutch hub (TTF), gas is traded assuming a standard calorific value
- The cost of gas quality conversion is socialised, and shippers can inject low calorific value gas at entry points and extract high calorific value gas at exit points without having to pay for additional quality conversion services
- Gate offers gas quality conversion at its facilities as an additional service for its users

Barcelona

- Gas quality measurements are carried out at:
  - Transmission-Transmission, Transmission-Distribution, and Transmission-Direct line connections
  - Underground storage fields
  - The loading and offloading of tankers
  - The loading of LNG trucks
  - International connection points
- LNG shippers or traders who inject gas into the transmission network are responsible for the quality of the gas injection
- Barcelona's terminal does not offer gas quality conversion services to shippers at its facilities
- Spanish Wobbe index range is similar to that of its closest export markets, Portugal and France

Świnoujście

- Poland has the widest Wobbe index range in the EU
- LNG calorific value levels range from 14.72 to 15.67 kWh/m^3
- Gas quality measurements are carried out at all entry and exit points of the Polish transmission system and monitored in the separate low caloric and high caloric value gas pipelines

Sources: Honore, Anouk, "The Dutch Gas Market: Trials, Tribulations, and Trends," Oxford Institute for Energy Studies, May 2017; "Gassamenstelling," Rijksdienst voor Ondernemend Nederland, 2019; Harris, Dan and Chou, Ying-Chin, "Gas Transport Tariffs and the Dutch Gas Market," The Brattle Group as prepared for Gasunie Transport Services B.V., 26 September 2017; "6th CEER Benchmarking Report on the Quality of Electricity and Gas Supply," Council of European Energy Regulators, 2016; "Transmission, storage and regasification services and infrastructure," Enagas, 2013; "Gas Trading – Poland Wholesale," PGNiG, 2014.

Stakeholder views

Stakeholders consider gas quality standards in domestic markets to be important, and to have a medium or high impact on terminal attractiveness. Many report that Member States with less stringent quality standards are more easily able to attract international suppliers to their terminals. "[The] Spanish gas system has the broadest range of admissible gas quality in the EU. It has definitely contributed to attract more LNG sources from different countries," reports one market player active in several European markets.

However, stakeholders also reflect that gas quality variations do not in practice inhibit trade flows of natural gas within the EU. They acknowledge that while standardisation could potentially increase market liquidity, it's difficult to attempt to harmonise levels across the EU ("Ideally [gas quality standards would be] harmonised but [non-standardisation] is a fact of life," reported one terminal operator regarding gas quality standards).

One gas market player warns that "An important factor is the gas quality of the shipped LNG. This quality should serve the quality specifications that end users need. This will be even more important in the future when other gasses will be in a mixture with natural gas/LNG."[148]

Potential barriers

Based on this analysis, we can conclude that strict and diverging national gas quality standards *can* hinder import and trade of LNG and hence inter-terminal competition. The effective impact of this barrier is however limited and does not pertain specifically to LNG entry and trade as it also applies to pipeline gas.

Table 12 : Potential barriers to LNG entry into the EU gas market – Strict and diverging national gas quality standards

Intra-terminal competition	
Inter-terminal competition	• Strict national specifications *can* hinder LNG imports. Variations in national gas quality standards *can* also restrict the free flow across EU Member State borders, limiting supra-national trade of gas imported via LNG terminals. However, stakeholders indicate that gas quality variations currently do not inhibit gas trade flows within the EU in practice.

[148] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019

G. PRIMARY SERVICES OFFERED AT TERMINALS AND FLEXIBILITY TO ADAPT THEM TO MARKET NEEDS

Overview

LNG terminals can increase their competitiveness and attract additional LNG volumes and terminal users by expanding the range of services they offer, and by making these services more flexible and user-friendly. All European terminals offer a primary set of services – a package or bundled product that includes unloading + storage + regasification of an LNG cargo. Some additionally offer the option to book individual parts of that package in an unbundled way. Beyond these primary products, services vary widely between terminals, and increasingly include specific services which focus on the small-scale LNG market (i.e., truck loading, additional LNG storage, small-scale ship loading, and rail loading – see the following section). Descriptions of the general services offered at terminals are listed below, followed by an overview of which services are currently offered at each terminal.

Table 13: Descriptions of services offered at LNG terminals[149]

Basic Services	**Unloading**	Services strictly necessary for the regasification process, i.e. the unloading of discrete quantities of LNG and their regasification into a continuous flow of natural gas.
	Operational Storage	
	Regasification & send-out	
Other Services	**Gas quality conversion**	Service whereby the Wobbe Index of LNG or of the associated natural gas is corrected if such Wobbe Index is out of the applicable range accepted by the LSO or by the TSO.
	Additional Storage	Service whereby LNG storage capacity at the terminal is offered to users above the basic operational storage capacity.
	Additional Send-Out	Service whereby send-out capacity from the terminal to the transmission network is offered to users above the basic send-out capacity.
	Capacity pooling	Service whereby a user that has reservations at a terminal can have access upon certain conditions to one or more other terminals.
	Reloading (large scale ships)	Service whereby LNG is transferred from the terminal's LNG storage tank(s) into a large-scale LNG ship (where large scale is considered a capacity of 30,000 m^3 or more).
	Transhipment berth to berth	Service whereby LNG is transferred from one ship to another, with both vessels moored at separate berths.
	Transhipment ship to ship	Service whereby LNG is transferred from one ship to another, with one vessel moored at a berth and the other one moored alongside the first one.
	Small-scale ship loadings	Service whereby LNG is transferred from the terminal's LNG storage tank(s) into a small-scale LNG ship (where small scale is considered a capacity less than 30,000 m^3).
	Truck Loading	Service whereby LNG is loaded into tank trucks.
	Rail loading	Service whereby LNG is loaded into rail tanks.
	Cooling down	Service whereby tanks and piping are super-cooled down to cryogenic temperature prior the vessel being able to be loaded with LNG.
	Gassing up	Service whereby inert gas is removed from the ship's cargo tank(s) by displacing it with warmed up LNG vapor and subsequently the ship's cargo tank(s) are cooled down by a controlled spray of LNG.

[149] Adapted from the GLE List of Services Database, October 2019

Table 14 : Services offered at LNG terminals in the EU

Country	Terminal	Services offered												
		Standard bundled package (Unloading + Storage + Send-out)	Gas quality conversion	Additional storage	Additional send-out	Capacity pooling	Reloading	Transhipment (berth to berth)	Transhipment (ship to ship)	Small-scale ship loadings	Truck loading	Rail loading	Cooling down	Gassing up
Belgium	Zeebrugge	X	X	X	X		X	X		X	X		X	X
France	Dunkerque	X		X	X		X			Planned	Planned		X	X
	Fos Cavaou	X	X	X	X	X	X		X	X	Planned		X	X
	Fos-Tonkin	X	X			X	X		Under study	X	X	Under study	X	
	Montoir-de-Bretagne	X	X	X	X	X	X	X		X	X	Under study	X	X
Greece	Revithoussa	X		X	X		Planned			Under study	Planned		X	X
Italy	FSRU OLT Toscana	X	X				Under study			Planned				
	Panigaglia	X	X				Planned			Planned	Planned			
	Porto Levante	X		X	X		Under study							
Lithuania	FSRU Independence	X		X	X		X			X				
Malta	Malta Delimara	X												
Netherlands	Gate terminal	X	X	X	X	X	X	X	Under study	X	X	Under study	X	X
Poland	Świnoujście	X		X	X		Under study	Under study	Under study	Under study	X	Under study		
Portugal	Sines	X		X	X		X			Under study	X		X	X
Spain	Barcelona	X		X	X		X	X		X	X	Under study	X	X
	Bilbao	X		X	X		X			X	X		X	X
	Cartagena	X		X	X		X	X	Planned	X	X		X	X
	Gijón (Musel)	X		X	X		X		Under study	Under study	X		X	X
	Huelva	X		X	X		X			X	X		X	X
	Mugardos	X		X	X		X		Under study	Under study	X		X	X
	Sagunto	X		X	X		X			Under study	X		X	X
United Kingdom	Isle of Grain	X	X	X	X		X	X		Planned	X		X	
	Milford Haven Dragon	X												
	Milford Haven South Hook	X												
Total terminals offering services		*24*	*8*	*18*	*18*	*3*	*16*	*6*	*1*	*10*	*10*	*0*	*16*	*14*

Sources: GLE's List of Services database, October 2019; GLE's List of Services database, July 2018

A certain amount of storage capacity (basic storage) is offered by all terminal operators as a necessary component of the standard bundled package. Shippers using basic storage capacity must regasify their LNG within a set timeframe and subject to commercial penalties for noncompliance. Several terminals offer additional short-term LNG storage capacity at levels above the basic operational storage capacity. These flexibility options increase business opportunities for terminal users, allowing them to optimise their portfolio better and react more quickly to price signals, thereby contributing to system adequacy via participation in the EU's flexibility market.[150]

LNG terminals offer unloading, storage and regasification slots in the short-term at scales ranging from day-ahead to month-ahead (for further details on capacity allocation mechanisms at terminals, see Section B). The flexibility that can be provided by LNG terminals to gas markets varies by region. The total LNG storage capacity of all EU regasification terminals represents only ~5% of total European underground gas storage capacities, but in markets like Spain and Portugal, the proportion of storage at LNG terminals can represent up to 40% of total gas storage capacity.[151,152,153,154]

Over recent years most LNG terminals in the EU have substantially expanded their range of services to meet market needs, increasing their competitiveness in the EU and in the global LNG market. Though LNG terminals in Asia have also started to expand their range of offered services (several terminals in Asia now offer truck loading services, for example), European terminals are still outpacing their international competitors in terms of the number and range of services they offer.[155]

Terminals have developed their service offerings based on national or regional market demands. While some terminals (like the UK's Milford Haven Dragon and South Hook) only offer bundled packages and no additional services or products, others have invested in supplementary services like gas quality conversion or truck loading based on shipper requests. Providing additional unbundled services has made the concerned terminals more versatile and enhanced their attractiveness to a wider range of potential clients.

Importantly, service expansion can impact the levels of terminal tariffs charged by LSOs. Services like bunkering and truck loading, for example, can provide additional revenue sources to terminals and enable LSOs to lower their tariffs for "basic" services. But if the specific equipment is underutilised, the related investment costs may (partly) be recovered via the tariffs charged by LSOs for their standard services. In this way, investments in new services can impact inter-terminal competition, as terminal tariff levels strongly influence shippers' decisions to use one terminal over another (see Section C).

Still, service expansion is considered vital to contribute to the competitiveness of LNG terminals and of LNG within the gas market, and to facilitate the use of LNG in specific markets that cannot be supplied via pipeline gas. Many European terminals have over the past 3-5 years expanded their range of services, and nearly all have plans to further develop their product ranges. In July 2019, sixteen of Europe's twenty-four large LNG terminals offered reloading services; seven offered transhipment services whereby LNG was unloaded from one barge and reloaded onto another. Truck loading is offered as an unbundled service at fifteen terminals, and further small-scale LNG services are provided at eight.[156]

As more terminals expand their product offerings, services which are now differentiators will become standard. Terminals will increasingly differentiate themselves not only by the

[150] "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an EU strategy for liquefied natural gas and gas storage," European Commission, Brussels, 16 February 2016.
[151] "European LNG terminals are entering a renewed era of attractiveness", Emerton, October 2015.
[152] Prieto, Rocío, "General overview of Spanish LNG sector," Comisión Nacional de los Mercados y la Competencia, 27 November 2018.
[153] Gasunie Unit Converter, accessible at https://unit-converter.gasunie.nl/
[154] GIE LNG Import Terminals Map Database May 2019
[155] "Singapore launches first LNG truck-loading facility," China-ASEAN Expo, 14 April 2017.
[156] "How to Foster LNG Markets in Europe," Liquefied Natural Gas Work Stream of the Gas Working Group for the Council of European Energy Regulators, 24 July 2019.

type of services they offer but also by capacity levels and charges for these services. For example, an LSO that can offer 50 truck loadings per day to its users might be more competitive than one that can only offer 5 per day. And LSOs that incorporate discounts for services into their contracts for standard offerings might be more competitive than those that charge flat supplementary fees for the same products.

Terminal operators – including those for exempted terminals – are required to submit any planned service expansions to their national regulator, which then approve development plans after factoring in technical constraints and economic opportunities. Terminal operators that report to responsive and agile regulators are at a competitive advantage when they want to develop new services, as they can quickly secure approval for any planned expansions. Some NRAs reportedly provide comprehensive but quick oversight of terminals' business strategies. NRAs in other Member States reportedly take more time to process and approve requests, such that terminal operators are less able to quickly and flexibly respond to new market demands.[157] Offering additional services, in particular small-scale LNG solutions, can make a significant contribution to improving the (traditionally) low utilisation rates and to attracting new and varied market parties.

In July 2019, the availability of truck loading capacity in the Iberian Peninsula was lower than demand, which led to congestion and indicates that the terminals in this market area are not yet equipped to meet increasing market demand for this service. Greater availability and also flexibility (regarding e.g. booking terms) would enhance inter-terminal competition and also support the development of the small-scale LNG market.

In practice, market parties tend to opt for certain terminals over others due to the specific services offered but also due to the attractiveness of the gas market(s) to which the terminal is connected (see Section A). Terminals' service ranges are thus drivers of inter-terminal competition, but not the principle drivers.

The services offered at Gate, Barcelona, and Świnoujście are summarised below.

[157] Stakeholder consultations with CEER, Enagas, Polskie LNG.

Case studies

Services (including storage) offered at Barcelona, Gate and Świnoujście

Gate

- Offers one of the widest ranges of services in the EU, while its regional competitors in Belgium and France offer a similar range of services
- Provides berthing and unloading services at two jetties for LNG carriers with sizes between 65,000 m^3 and 267,000 m^3, which covers the majority of modern vessels (typically between 125,000 m^3 and 175,000 m^3 capacity)
- Began constructing a third berth in 2016 which will accommodate vessels with capacities between 1,000 m^3 and 20,000 m^3, increasing to 40,000 m^3 in the long term
- Increased the ship loading flow rate at jetties for large ships from 2,300 m^3/hour to 4,000 m^3/hour in summer of 2019
- Offers storage of LNG at three full containment tanks with a capacity of 180,000 m^3 each and plans to expand its storage capacity from 540,000 m^3 to 720,000 m^3
- Processes and regasifies LNG with eight Open Rock Vaporisers enabling a firm redelivery capacity equivalent to 12 billion m^3 of gas per year
- Provides transhipment, bunkering and truck loading services, and offers in combination with truck loading services, also cooling services for trailers and containers and services to render trailers and containers inert
- Developing rail loading capacity is under study
- Provides Wobbe quality adaptation services for adjusting gas to relevant standards in the Netherlands

Barcelona

- Barcelona offers a broad range of services, providing particularly high levels of capacity for truck loading
- Offers berthing and unloading at two docks to LNG tankers carrying minimum of 80,000 m^3 and a maximum of 266,000 m^3 of LNG, which covers the majority of modern vessels (typically between 125,000 cubic metres and 175,000 cubic metres capacity)
- Offers LNG storage in six tanks with a combined capacity of 760,000 m^3
- Offers transhipment services and LNG truck loading at three bays, supplying LNG to up to 50 trucks per day
- Railloading services are currently under study.

Świnoujście

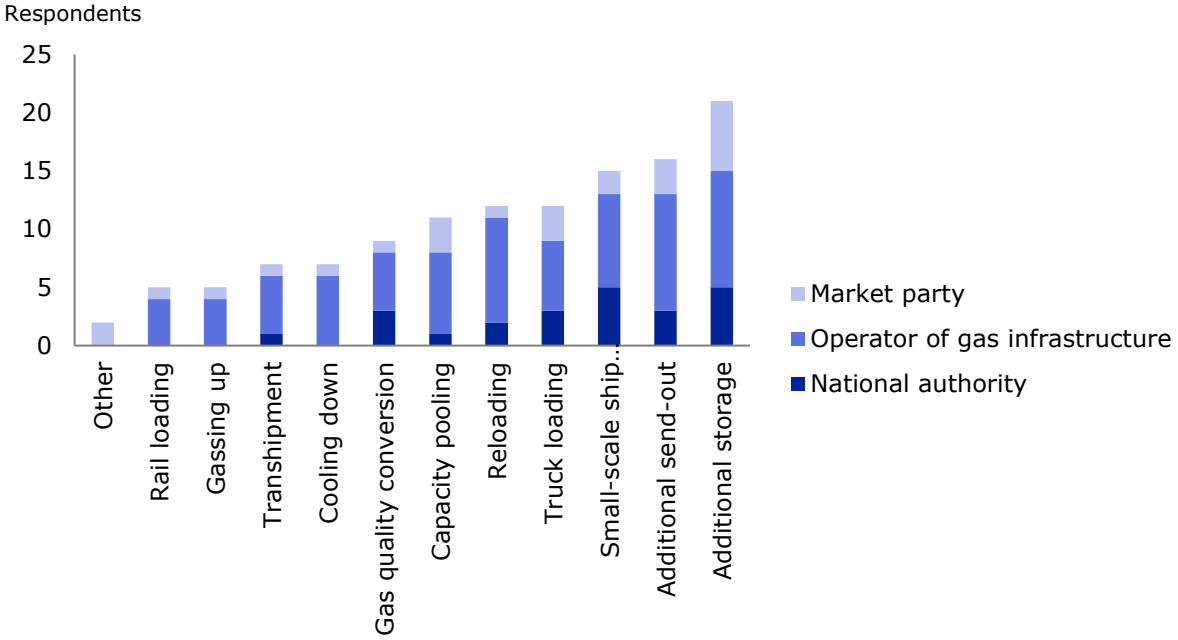
- Provides services including unloading LNG from carriers - process storing in cryogenic tanks – regasification - send-out of regasified natural gas to the National Transmission System - transhipment onto tanker trucks and ISO containers
- Max docking size for vessels is 217,351 m^3 of LNG and there are plans to expand facilities
- The terminal is currently expanding its capacity and services: additional regasification facility, increasing the nominal capacity to 7.5 billion Nm^3 per year - third LNG process storage tank, increasing the operational flexibility of the terminal - LNG-to-Rail transhipment infrastructure, extending the range of services by providing transhipment onto ISO containers and rail tankers - second jetty for loading and unloading LNG carriers, for LNG transhipment and for handling LNG bunker vessels and providing bunkering services
- Currently offers 320,000 m^3 of LNG storage (including unbundled additional storage) with plans to expand capacity to 500,000 m^3 in 2023

Sources: "Facilities main characteristics and Truck Loading," Gate Terminal, 2019; "Regasification plants – Barcelona Plant," Enagas, 2019; "LNG Terminal in Świnoujście," Polskie LNG, 2019; "LNG Information Paper #3," GIIGNL, 2019; "Gate terminal expands to include a third berth especially for small vessels," Gate Terminal, 2016.

Stakeholder views

Stakeholders indicated the services they consider the most important differentiators between terminals. Additional storage (within the terminal, at levels beyond the standard offering) and additional send-out (provided by the terminal at levels beyond the standard offering) are considered most important, in particular by market players and operators of gas infrastructure. Several market players indicated that in addition to the standard services depicted in the figure below, "other" services like LBG production/blending also act as differentiators.

Figure 17 : Service offerings designated most important in choosing specific terminals for importing LNG[158]



Stakeholders indicate that overall, the range of services offered by a terminal is neither the most important determinant of terminal selection, nor the least important. About one-third of respondents listed it as a top-three factor that motivates shippers to use a specific terminal. Responses indicate that LSOs regard services expansion as a means through which to enhance competitiveness not only in the LNG market but also in the broader EU gas market. Market players expect that services like short-term LNG storage and bunkering will increasingly be offered by terminals and point out that the lack of certain services can reduce terminal attractiveness.

Potential barriers

Based on this analysis, the possible barriers to LNG entry into the EU gas market, resulting from the terminals' range of service offerings are identified in the next table.

Table 15 : Potential regulatory or market barriers to LNG entry into EU gas market – Terminal services

Intra-terminal competition	• Provision of a limited range of services or only bundled services might reduce market demand for a specific LNG terminal, reducing the competitive range of shippers interested in using that terminal
Inter-terminal competition	• Development of new services in a timely, flexible and efficient way can be hindered due to regulation and required upfront investment in infrastructure without sufficient certainty regarding its use • Development of new services can also be hindered by strict and inflexible regulatory oversight • Lack of adequate external infrastructure (e.g. rail- or waterway connection) can render the development of specific new services unfeasible and hence hinder deployment of new LNG activities

[158] Responses to the stakeholder consultation on the EU regulatory framework for LNG, September 2019

H. SMALL-SCALE LNG SERVICES OFFERED AT TERMINALS

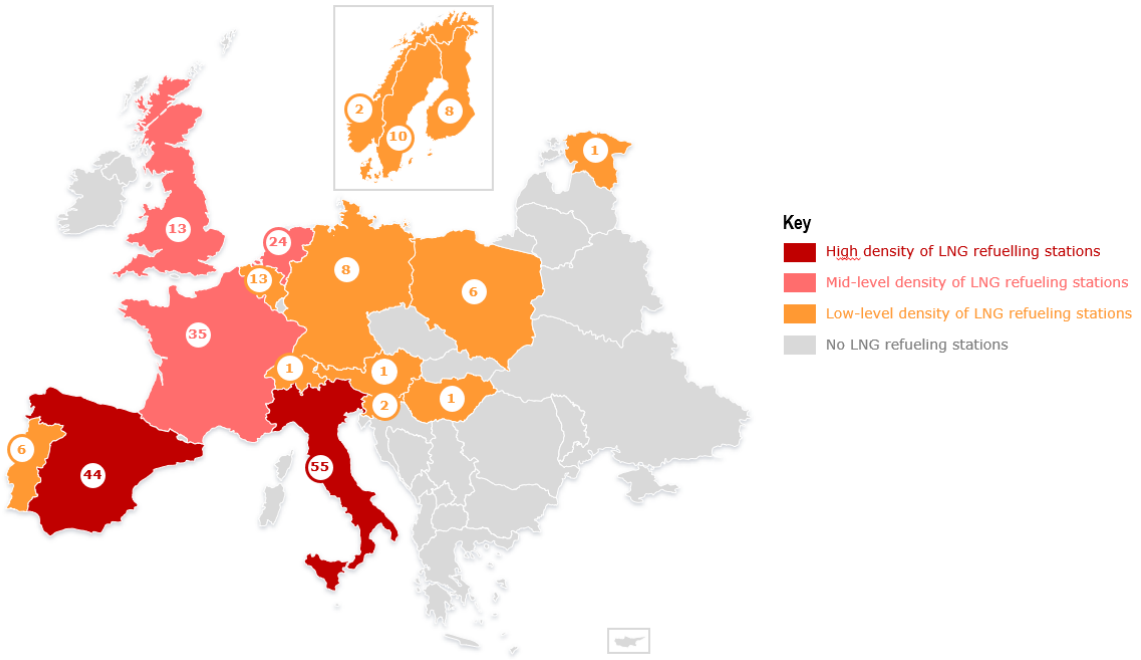
Overview

Small-scale LNG products – bunkering/small-scale ship loading, truck loading, and rail loading – are increasingly included in terminals' plans to expand their service offerings. Small scale LNG can be sourced from a conventional large-scale LNG terminal or from a specific small-scale liquefaction facility. It typically serves a wider range of end users than those included in the conventional large-scale LNG value chain.

The small-scale LNG industry, though still developing, is already scalable within the EU. Several LSOs regard the rising small-scale market as an opportunity to enhance demand for LNG in Europe and diversify their revenue streams. Small-scale LNG suppliers offer specific products and services for ships and road vehicles (mainly trucks), enabling emission reduction of pollutants and carbon dioxide in the transport sector. These small-scale players – typically SMEs – are mainly using truck-loading and small-scale ship-loading services at terminals to pick up and deliver LNG to their clients.

The rise of small-scale LNG deliveries is driven by increasing demand in the transport sector. For example, small-scale players provide LNG to the refuelling stations depicted in the figure below, which provide LNG directly to consumers with LNG-fuelled vehicles. Demand for these services will develop along with demand for LNG in downstream transport markets and will be strongest in regions where LNG refuelling stations are concentrated.

Figure 18 : Concentration of LNG refuelling stations in EU Member States (2019)[159]



Small-scale LNG players also supply LNG to off-grid industrial users in remote locations; in 2018, an indicative small-scale LNG company provided ~70% of its total supply to smaller industrial players.[160] As demand for LNG rises along with the development of the small-scale market, terminal operators are adding small-scale products to their service offerings, allowing shippers, traders and suppliers to generate new business in these downstream markets.

[159] "Stations map," Natural Gas Vehicle Association Europe, 2019, https://www.ngva.eu/stations-map/
[160] "Small going big – Why small-scale LNG may be the next big wave," Strategy&, PwC. 2019.

Specific small-scale LNG services are developed at terminals and in the downstream distribution part of the LNG value chain, i.e., in distribution and storage or satellite plants. A growing number of intermediary companies are developing in Europe; these companies sign contracts with both terminal operators and LNG shippers to book (truck) loading slots and acquire LNG at terminals, then deliver LNG to consumers in the industrial and transport sectors. These intermediary companies run logistically complex cross-border operations to move LNG from terminals to end users. For instance, one major operator in the European small-scale LNG market is servicing terminals in Belgium, the Netherlands, France, and the UK. It has developed 93 satellite LNG facilities in France, Spain, the UK, Germany, and Austria and is also delivering small-scale LNG supplies to users in Poland, Italy, Slovenia, and Ireland.

Small-scale LNG companies select terminals based on the availability and cost of the relevant services and on the commodity price for LNG that they can offer; it's therefore important to small-scale players that terminals have contracts with multiple shippers with whom they can negotiate to achieve the 'best' price for LNG. Terminals with only one shipper offering such LNG supply contracts are hence less attractive to small-scale LNG companies. Tariffs for truck-loading services themselves and terminals' locations also influence small-scale players' decisions.

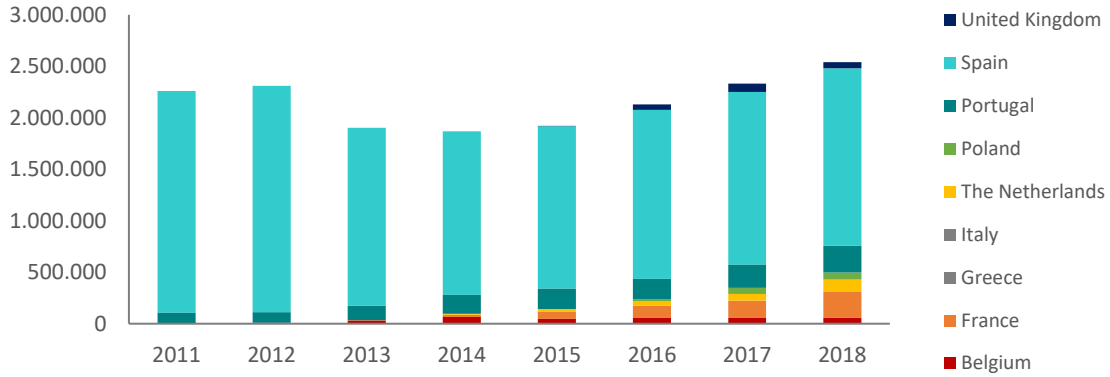
The complexity of slot-booking platforms impacts small-scale operations; the concerned market parties have to coordinate across different systems used by LSOs and book slots efficiently, as demand for truck-loading is rising and available slots fill up quickly. As not all LNG terminals in the EU have developed functional truck loading services (though nearly all are planning to do so), small-scale LNG providers often need to transport LNG over long distances; for example, one major player delivers LNG to customers in Italy, but sources the LNG from Gate terminal in the Netherlands and Fos Tonkin in France. Transport of LNG from terminals to small-scale markets is in most EU Member States still hindered by unavailable specific infrastructure or services, but also by a lack of harmonised standards; the maximum allowed gross transport weight, for example, varies from country to country: 50 tons in the Netherlands, 44 tons in the UK, France, Belgium and Italy and Spain, Germany, Austria, Poland, Switzerland and Slovenia allow for 40 tons.[161] There are no EU-wide minimum standards that govern these restrictions.

Logistical problems at terminals can complicate small-scale LNG operations; for example, one company scrambled to secure sufficient supply for its users, incurring steep last-minute costs, when operations at terminals in France ceased following labour strikes. The availability of such services at multiple terminals would limit the negative impact of such events. Despite these obstacles, small-scale LNG companies have shown significant growth over the past three years in particular; since 2017 for example, one indicative small-scale company doubled the scale of its operations and turnover. These companies are expected to continue scaling up their businesses.

Spain and Portugal are highly developed markets for truck loading, as their terminals have offered the service for decades. In 2018, more than 40,000 LNG trucks were loaded at Spanish LNG terminals, supplying more than 1 bcm to small LNG receiving satellite plants not connected to the main transmission grid, both in Spain and abroad. In Portugal in 2016, more than 4,600 LNG trucks were loaded at the LNG terminal of Sines. Several other European terminals have mimicked their success and rapidly developed their own truck loading services over the past five years. But in terms of truck loading slots and capacity offered, they still lag behind terminals in the Iberian Peninsula, as can be seen in the figure below. This can be partly attributed to Spain's fragmented gas network, in which truck deliveries of LNG are substituted for traditional pipeline delivery of regasified natural gas.

[161] Songer, Rob. "Small-scale LNG and the implications for the wider LNG market," ICIS. March 2019.

Figure 19: Truck loading activities at LNG terminals in the EU
Cubic metres of LNG loaded, 2011-2018



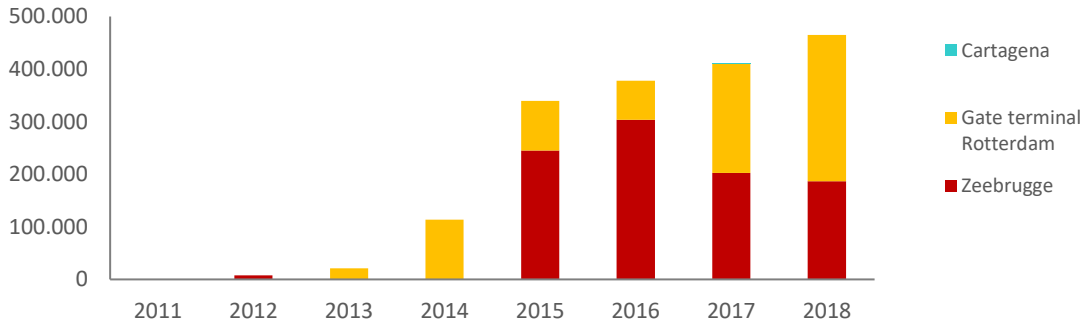
Sources: GIE New LNG Services Inventory, 2019

Truck-loading capacity has expanded from southern Europe across the continent, but small-scale ship-loading capacity is still relatively limited. Still, in shipping the imminent imposition of environmental regulations regarding the sulphur content of marine fuel is increasingly driving demand for LNG as a bunkering fuel. The supply of LNG to different types of ships has for many years been constrained by a lack of refuelling vessel capacity, but this is increasing at many terminals throughout Europe. It is expected that more major shipping operators will begin to contract LNG once capacity for fuel bunkering becomes more widely available and environmental regulations are enforced.[162]

Small-scale intermediary companies that provide LNG for maritime customers also enter into contracts with both large-scale LNG providers and terminal operators. LNG is loaded onto bunkering ships or onto trucks which then deliver the fuel to vessels in nearby harbours. LNG Terminals close to active harbours are considered ideal locations for the growth of ship-loading services – but services within a range of 100 km are not uncommon.

Many terminals have developed and commenced operations to load small-scale bunkering vessels using stores of LNG delivered to the terminals. And two terminals in particular – Belgium's Zeebrugge and the Netherlands' Gate terminal – have already developed significant small-scale ship loading activities (see subsequent figures). The service is under development or under study at most other terminals.

Figure 20: Small-scale ship loading activities at LNG terminals in the EU
Cubic metres of LNG loaded, 2011-2018



Sources: GIE New LNG Services Inventory, 2019

Opportunities to expand into the small-scale LNG market can only be exploited at terminals that offer additional services like truck-loading, rail-loading, and bunkering. Terminal

[162] Songer, Rob. "Small-scale LNG and the implications for the wider LNG market," ICIS. March 2019.

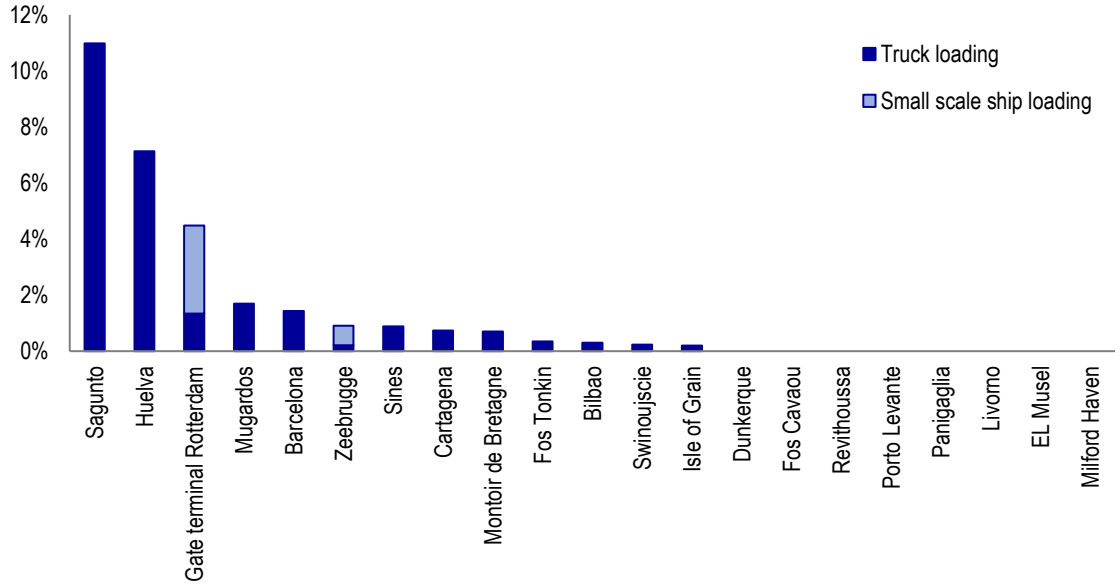
competitiveness within the small-scale LNG market will therefore also depend on the agility and responsiveness of NRAs who need to approve expansion plans drafted by LSOs.

Several LNG terminals in Europe are currently expanding their service offerings with the explicit aim to cater to the growing small-scale LNG industry, and have obtained regulatory approval to do so. Elengy, for example, has launched plans to develop ship bunkering infrastructure at its three terminals in France. The LSO has developed this strategy based on its experience building up truck-loading capacity at two of its terminals since 2013-14. Its three terminals will be re-engineered to provide bunkering and reloading to smaller vessels, while 1 terminal (Fos Tonkin) would likely be redesigned to operate as a "small-scale terminal".[163] Greece's Revithoussa has started construction of ship reloading and truck loading infrastructure and is estimated to commence offering these services in 2020. In Italy, where terminals currently do not offer any small-scale services, truck loading and small-scale ship loading expansion is under study with FID expected in 2020.[164]

Projects on rail loading are under study at five LNG terminals in the EU, including Montoir de Bretagne and Fos Tonkin in France, Gate terminal in the Netherlands, Świnoujście in Poland and Barcelona in Spain. Rail loading, when enabled at these terminals, could expand the size of the small-scale market and introduce new opportunities for downstream deliveries.

Still, it should be noted that **small-scale LNG activities on average account for only 1.5% of total terminal throughput**. At terminals with advanced truck-loading and ship-loading capacities, they can account for up to 11%. The proportion of gas diverted to small-scale services compared to total gas imported into each terminal in 2018 is depicted in the figure below.

Figure 21: Proportion of imported gas used for small-scale activities at LNG terminals in the EU (2018)[165,166]



[163] Wingrove, Martyn, "Exclusive interview: Elengy CCO Giuseppe Spotti," Riviera, 21 June 2019.
[164] GIE New LNG Services Inventory database, 2019.
[165] Amount of gas diverted to truck loading or to ship loading activities (in m3 of LNG) relative to the amount of gas delivered to the terminal (in m3 of LNG), collectively over the course of 2018.
[166] GLE's New LNG Services Inventory, October 2019 and processed ALSI data on LNG inventory and send-out at terminals in 2018.

Case studies

The range of services at Gate, Barcelona, and Świnoujście terminals that cater to the small-scale LNG market is described below.

Activities of Gate, Barcelona and Świnoujście terminals focused on small-scale LNG markets

Gate

- One of the first terminals in Europe to invest in small-scale LNG facilities
- Completed construction work for its "LNG Break Bulk" initiative in 2016
- Offers facilities customised for reloading LNG into ships, containers and trucks
- Allows for LNG intake to be redistributed by inland tanker, by short sea tanker or by truck to areas that lack pipelines for importing natural gas
- Truck-loading capacity of 13.9 GWh/day

Barcelona

- Terminal redeveloped into a multimodal facility to support the integration of small-scale capabilities including:
  - Truck loading
  - A small scale jetty
  - Railroad loading (Under study)
- Considered a model for "big and small-scale infrastructure coexistence"
- Truck loading capacity up to 50 trucks per day or 15 GWh of LNG per day at three simultaneous loading bays
- Has dedicated LNG flexible hoses specifically designed to facilitate LNG bunkering to big and small ships.
- LNG bunkering utilised by tugboats in the Barcelona harbour.
- LNG bunkering truck-to-ship also available.

Świnoujście

- Truck loading facilities operational since 2016
- Truck loading capacity of 4.5 GWh/day
- Terminal expansion plans, for which it received EU funding, include the construction of a new jetty for bunkering
- Specifically accounted for increasing demand in the small-scale LNG market in its expansion strategy and has plans to develop facilities for reloading small scale LNG vessels and rail loading

Sources: "LNG Break Bulk project," Gate terminal, 2019; "Small scale LNG map 2018," Gas Infrastructure of Europe; Jose Enrique Murcia, "Small Scale LNG: on the road to success," Gas Assets Management General Division, Enagas, 2017.

Stakeholder views

The availability of small-scale services is generally not considered to have a high impact on terminal competitiveness by stakeholders. When compared to other factors like tariff levels and the general range of services offered, small-scale products don't really influence shippers' decisions to use a specific terminal. Rather, the availability of these services is still only a minor determinant of terminal selection, though most shippers do acknowledge that the availability of these services does increase terminal attractiveness, all other factors being equal.[167]

It's possible that stakeholder views regarding small scale services will evolve as the market develops and demand for small-scale products rises in the transport and industrial sectors.

Of course, truck loading and small-scale ship loading capacity are the most important features of terminals for small-scale LNG companies. These small-scale players consider it advantageous for terminals to have low commodity prices facilitated by the presence of multiple LNG providers. They also appreciate flexibility at terminals and features that

[167] Responses to the stakeholder consultation on the EU regulatory framework for LNG, September 2019

reduce the complexity of their operations. Stakeholders in the small-scale industry indicated that it would be useful to standardise the booking processes for truck-loading and small-scale ship-loading slots across European terminals. This would facilitate their operations greatly and enable them to better project new market opportunities. Stakeholders in small-scale markets also indicate that it would be helpful to have transparent pricing signals – both with respect to tariffs for truck loading services and to prices for LNG itself.

Potential barriers

Based on this analysis, the possible barriers to competition related to small-scale LNG market development are summarised in the next table.

Table 16 : Potential barriers to LNG entry into the EU gas market – Small-scale LNG market development

Intra-terminal competition	• Terminals with only one active shipper offering LNG supply are less attractive to small-scale LNG players, compared to terminals where large shippers compete to supply LNG to small-scale operators
Inter-terminal competition	• Limited range of services at some LNG terminals might hinder supply of LNG to small-scale LNG market and affect competition • Variation and complexity in terminal processes for booking truck-loading and small-scale ship-loading slots can dissuade new entrants from joining the small-scale LNG provision market • Lack of transparency on tariff setting for terminal services • Lack of clear pricing signals on LNG can limit interest in small-scale LNG opportunities

ASSESSMENT AND RANKING OF IDENTIFIED SHORTCOMINGS

Shortcomings in the EU LNG market that are discussed in this chapter are collated and compared in Table 17. The table summarises the impact of each issue on inter- or intra- terminal competition; the scale of each issue's market impact; and the stakeholders who are disadvantaged – and in certain cases, advantaged – by each market issue.

According to the same ID's assigned in Table 17, the shortcomings are then ranked in Table 18 according to their scale and the urgency with which they must be addressed.

Table 17: The impacts of identified shortcomings in the EU LNG market

Category	Barrier	Impact on inter- or intra-terminal competition	Scale of market impact	Disadvantaged players	Advantaged players
A. Market access and liquidity	1. Several gas hubs in Europe are still developing or have not yet reached maturity or liquidity, limiting trade opportunities for users of LNG terminals in the concerned markets	Inter-terminal	Medium	LSOs of terminals in regions without well-developed gas trading hubs	End-users (less competition)
	2. Lack of connection pipeline infrastructure limits downstream market opportunities for gas imported at more isolated terminals	Inter-terminal	High	LSOs of terminals without access to cross-border gas networks	-
B. Capacity allocation	3. Short-term third-party access to terminals can only be secured by registered users at several terminals in secondary markets, where most primary capacity is booked by one or a few users engaged in long-term contracts	Intra-terminal	Medium	Smaller shippers or new entrants to the market who find it difficult to become registered users at terminals	Primary capacity holders
	4. Not all capacity allocation mechanisms are market-based, which can obscure market signals	Inter-terminal	Medium	Suppliers of LNG	-
	5. Some LNG terminal operators seem not properly incentivised to maximise the capacity made available to market parties and to optimise its use (via adequate UIOLI/UIOSI mechanisms)	Intra-terminal Inter-terminal	Medium	End-users of gas who ultimately pay more for their gas (less competition, lower cost efficiency)	LSOs and primary capacity holders
	6. The existence of long-term bookings with ship-or-pay clauses can prevent interested shippers other than the primary capacity holders from accessing terminals, even when slots become available	Inter-terminal	Medium	Smaller shippers and new entrants into the LNG supply market	Established shippers with primary access right to LNG terminals
C. Tariff structures and levels	7. A lack of harmonised tariff principles and structures, as well as a lack of transparency regarding tariff calculation methodologies and relevant input data at terminals, could obscure competition distortions amongst terminal users and especially might impact small-scale shippers	Intra-terminal Inter-terminal	High	Smaller shippers and new entrants into the LNG supply market	Larger, established shippers who have existing relationships and strong negotiating positions with LSOs

Category	Barrier	Impact on inter- or intra-terminal competition	Scale of market impact	Disadvantaged players	Advantaged players
	8. Cross-subsidisation through regulator-approved discounts, state-backed loss coverage, and discounts at entry points from LNG terminals may lead to competition distortion with terminals in neighbouring MSs where these indirect subsidies are not present	Inter-terminal	Medium	LSOs who do not receive any direct funding or indirect financial support	LSOs who receive direct or indirect subsidies
D. Information provision & transparency	9. Lack of adequate, user-friendly, and particularly non-discriminatory information provision on tariffs, capacity availability, services offered and contractual terms at some terminals (in particular exempted) leads to an unfair playing field between existing and potential users, especially smaller scale shippers and new entrants to a market	Intra-terminal	High	Smaller shippers and new entrants into the LNG supply market	Larger shippers with existing relationships with LSOs
E. Exemption from regulated TPA provisions	10. Exempted terminals are not required to charge the same rates to all their users, such that shippers at the same terminal cannot compete on a level playing field	Intra-terminal	Medium	Smaller LNG shippers without existing relationships or strong negotiating positions with LSOs	Larger LNG shippers who have existing relationships and strong negotiating positions with LSOs
	11. Exempted terminals have more autonomy to select their terminal users, and face less scrutiny in allocating their primary and secondary capacity	Intra-terminal	Low	LSOs of regulated terminals	LSOs of exempted terminals
	12. Regulated terminals in several countries benefit from state-guaranteed revenue coverage factors that reduce potential losses in times of lower terminal utilisation, but their exempted counterparts in the same countries do not receive this coverage	Inter-terminal	Medium	LSOs of exempted terminals	LSOs of regulated terminals
	13. There is unequal access to commercial information between terminals, as exempted terminals are not required to publish their tariff levels but can access the tariff levels of their regulated competitors*	Inter-terminal	Medium	LSOs of regulated terminals	LSOs of exempted terminals
F. Gas quality standards	14. Non-standardised national gas quality specifications can complicate LNG's import into and trade within the EU	Inter-terminal	Medium	LSOs of terminals in Member States with strict gas quality specifications	End-users (less competition, higher compliance costs)
G. Services offered at terminals	15. Provision of a limited range of services or only bundled services might reduce market demand for a specific LNG terminal, reducing the competitive range of shippers interested in using that terminal	Intra-terminal	Low	End-procurers of gas	Large shippers with singular access to terminals
	16. Development of new services in a timely, flexible and efficient way can be hindered due to required	Inter-terminal	Medium	LSOs without access to sufficient funding Suppliers/end-users	-

Category	Barrier	Impact on inter- or intra-terminal competition	Scale of market impact	Disadvantaged players	Advantaged players
	upfront investment in infrastructure without enough certainty regarding its use				
	17. Development of new services can be hindered by strict or inflexible regulatory oversight	Inter-terminal	Medium	LSOs & market players	-
	18. Lack of adequate external infrastructure (e.g. rail- or waterway connection) can render the development of specific new services infeasible and limit LNG entry into new markets	Inter-terminal	Low	LSOs lacking external infrastructural connections Potential users of these services	-
H. Small-scale LNG services	19. Terminals with only one active shipper offering LNG are less attractive to small-scale LNG players, compared to terminals where large shippers compete to supply LNG to small-scale operators	Intra-terminal	Low	Small-scale LNG companies	Large shippers with singular access to terminals
	20. Limited range of services at some LNG terminals might hinder supply of LNG to small-scale market and affect competition	Inter-terminal	Low	Small-scale LNG companies	-
	21. Variation and complexity in terminal processes for booking truck-loading and ship-loading slots can dissuade new entrants from joining the small-scale LNG provision market	Inter-terminal	Low	Small-scale LNG companies	-
	22. Lack of transparency on tariff setting mechanisms for terminal services catered to the small-scale market prevents players from developing long-term business cases	Inter-terminal	Low	Small-scale LNG companies	-
	23. Lack of clear pricing signals on LNG can limit interest in small-scale LNG opportunities	Inter-terminal	Low	Small-scale LNG companies	-

**Note that this shortcoming is also discussed in the sections on information provision and tariff structures and levels.*

These shortcomings are analysed in the following table according to the scale of their market impact; the scale and relevance of the market players they affect; the urgency with which they must be addressed; and the appropriate level for required regulatory intervention.

Those with higher market impacts and higher urgency and which can be addressed at the EU level are ranked highest in terms of their need and positioning for regulatory mitigation. The shortcomings are color-coded according to their ranking; those which most require regulatory intervention, and where EU-level intervention is considered to have the highest potential effectiveness, are highlighted in red, while those which do not require strong intervention or would not be mitigated by further regulation are highlighted in orange, yellow and green as they decrease in urgency. These ratings were determined according to stakeholder input (into the survey and through bilateral interviews) and in line with market analysis.

Table 18: Ranking identified shortcomings in the EU LNG market

Rank	Barrier	Scale of market impact	Scale and relevance of impacted market players	Urgency of addressing shortcoming	Appropriate level(s) for intervention
1	A2. Lack of connection pipeline infrastructure limits downstream market opportunities for gas imported at more isolated terminals	Medium	Medium	High	National EU
1	C7. Lack of harmonised tariff principles and structures and lack of transparency regarding tariff calculation methodologies and relevant input data at terminals might obscure competition distortions amongst terminal users, and especially might impact small-scale shippers	High	Medium	High	EU
1	D9. Lack of adequate, user-friendly, and particularly non-discriminatory information provision on tariffs, capacity availability, services offered and contractual terms at some terminals (in particular exempted) leads to an unfair playing field between existing and potential users, especially smaller scale shippers and new entrants to the market	High	Medium	High	EU or National
4	A1. Several gas hubs in Europe are still developing or have not yet reached maturity or liquidity, limiting trade opportunities for users of LNG terminals in the concerned markets	Medium	High	Medium	National and EU
4	B4. Not all capacity allocation mechanisms are market-based, which can obscure market signals	Medium	High	Medium	National and EU
4	E13. There is unequal access to commercial information between terminals, as exempted terminals are not required to publish their tariff levels but can access the tariff levels of their regulated competitors	Medium	High	Medium	EU and National
7	B3. Short-term third-party access to terminals can only be secured by registered users at several terminals in secondary markets, where most primary capacity is booked by one or two users engaged in long-term contracts	Medium	Medium	Medium	National and EU
7	B5. Some LNG terminal operators seem not properly incentivised to maximise the capacity made available to market parties and to optimise its use via adequate UIOLI/UIOSI mechanisms)	Medium	Medium	Medium	EU and National
7	E10. Exempted terminals are not required to charge the same rates to all their users, such that shippers at the same terminal cannot compete on a level playing field	Medium	Medium	Medium	EU and National
7	F14. Strict national gas quality specifications can hinder LNG imports. Variations in national gas quality standards can restrict free flow across EU Member State borders, hindering supra-national trade of gas imported via LNG terminals	Medium	Medium	Low	National and EU
7	G16. Development of new services in a timely, flexible and efficient way can be hindered due to required upfront investment in infrastructure without enough certainty regarding its use	Medium	Medium	Medium	Terminal, National, and EU
12	B6. The existence of long-term bookings with ship-or-pay clauses can prevent interested shippers other than the primary capacity holders from accessing terminals, even when slots become available	Medium	Medium	Low	EU

12	C8. Cross-subsidisation through regulator-approved discounts, state-backed loss coverage, and discounts at entry points from LNG terminals may lead to competition distortion with terminals in neighbouring MSs where these indirect subsidies are not present	Medium	Medium	Low	National and EU
12	G17. Development of new services can be hindered by strict or inflexible regulatory oversight	Medium	Medium	Medium	National
15	E12. Regulated terminals in several countries benefit from state-sponsored revenue coverage factors that reduce potential losses in times of lower terminal utilisation, but their exempted counterparts in the same market area do not receive this coverage	Medium	Low	Low	EU and National
15	H21. Variation and complexity in terminal processes for booking truck-loading and ship-loading slots can dissuade new entrants from joining the small-scale LNG provision market	Low	Low	Medium	Terminal and EU
15	H22. Lack of transparency on tariff setting mechanisms for terminal services catered to the small-scale market prevents players from developing long-term business cases	Low	Low	Medium	Terminal and EU
18	E11. Exempted terminals have more autonomy to select their terminal users, and face less scrutiny in allocating their primary and secondary capacity	Low	Low	Low	EU and National
18	G18. Lack of adequate external infrastructure (e.g. rail- or waterway connection) can render the development of specific new services infeasible and limit LNG entry into new markets	Low	Medium	Low	Terminal and National
18	H19. Terminals with only one active shipper offering LNG are less attractive to small-scale LNG players, compared to terminals where large shippers compete to supply LNG to small-scale operators	Low	Low	Medium	Terminal and National
18	H20. Limited range of services at some LNG terminals might hinder supply of LNG to small-scale market and affect competition	Low	Low	Medium	Terminal and National
22	G15. Provision of a limited range of services or only bundled services might reduce market demand for a specific LNG terminal, reducing the competitive range of shippers interested in using that terminal	Low	Low	Low	Terminal and National
22	H23. Lack of clear pricing signals on LNG can limit interest in small-scale LNG opportunities	Low	Low	Low	National/Regional/EU

CHAPTER 3. POTENTIAL MEASURES TO ADDRESS SHORTCOMINGS IN THE EU'S LNG MARKET

In this chapter we propose and qualitatively evaluate possible measures that could be implemented to mitigate the shortcomings in the EU LNG market identified and analysed in Chapter 2. Subsequently, some selected proposed measures are quantitatively evaluated in Chapter 4.

When considering the need for new policy measures, stakeholders – and regulators in particular – strongly emphasise the need for national or regional specificities and assert that there are few one-size-fits-all solutions to shortcomings in the EU LNG market.[168] They stress that in general regulation primarily should enable agile NRAs to allow LSOs to quickly and flexibly respond to changing market needs.

As discussed in Chapters 1 and 2, in some Member States terminals compete at national level (e.g. ES, FR, IT, UK), while in strongly interconnected markets terminals also increasingly compete at supra-national level (e.g. ES-PT, FR-BE-NL-UK, ES-FR). It would hence be appropriate to ensure a level playing field and more harmonised regulatory practices (e.g. tariff principles, entry/exit fee) in these interconnected regional markets to avoid competition distortion and to maximise overall gas system efficiency.

Below, specific measures are proposed and discussed, categorised according to the same topics as specified in Chapter 2. The proposed measures are then collectively evaluated and ranked according to their potential effectiveness, impact on LNG terminal competitiveness, efficiency and proportionality, and feasibility.

A. MARKET ACCESS AND MARKET LIQUIDITY

Large investments in additional cross-border pipelines and in reverse flow capabilities have substantially improved the interconnectivity of the gas system across the EU, with increased levels of security of supply, market integration and competition. At present, the lack of adequate interconnection capacity hinders downstream market opportunities for LNG imported only at a few isolated terminals and is in general not considered a barrier to LNG entry and competition by stakeholders, except in those regions (i.e., Poland-Eastern Europe-Baltics).

However, as several gas markets in Europe are still developing hub-based trading or have not yet reached maturity or sufficient liquidity, trading opportunities for users of LNG terminals in these concerned markets remain limited. Stakeholders do consider access to liquid gas markets one of most important determinants of terminal competitiveness and reflect the need for more liquid hubs particularly in Southern and Eastern Europe. Market participants affirm the importance of robust spot and forward market prices for allocating LNG cargos. LNG terminals in the Netherlands and UK are considered to have competitive advantages due to their link to TTF and NBP respectively.

To address identified shortcomings related to market access and liquidity (and accounting for stakeholder views), the following potential measures could be considered:

- In gas markets with limited competition and liquidity, consider the possibility of requiring terminal users with a dominant share in the overall contracted primary

[168] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019.

regasification capacity to offer a minimum quantity of their imported LNG in local gas markets and at regulated prices. This measure should specifically focus on gas markets with a high concentration level at the supply side, low residual supply import capacities, and insufficient liquidity levels at the traded gas market as defined in ACER/CEER's Market Monitoring Report on Gas Wholesale Markets. However, in order to be non-discriminating, effective and not distortive, such a measure should not be implemented in isolation for an LNG market only, but should preferably apply to the whole respective gas markets as such. Any measure addressing commodity release or market making obligations in LNG markets should be discussed in the context of and be consistent with the wider framework of measures proposed in this study.

B. CAPACITY ALLOCATION MECHANISMS AND TERMINAL LIQUIDITY

Although all LNG terminals are in principle relying on non-discriminatory mechanisms to allocate their primary capacity, some LSOs have in practice allocated all available capacity via long term contracts to a single terminal user (e.g. BE, PL); this outcome might negatively affect market liquidity and competition. Additionally, at several terminals short-term bookings can only be secured in secondary markets accessible for registered terminal users only, and as most primary capacity is typically booked by a limited number of users engaged in long-term contracts at terminals, this limits opportunities for a wider group of market parties to use the terminal. All terminals do use an open procedure (accessible to all market parties) to allocate primary capacity, but improvements in terms of market reflectiveness, market transparency and contractual flexibility could still be achieved. Especially in times of healthy LNG supplies and depressed (Asian) demand, when cargoes are directed towards Europe where market liquidity allows for a relatively easy market access, access to shorter-term regasification capacity would allow to attract additional LNG supplies along with additional market participants. As long as a relatively small group of primary long-term capacity holders can extract congestion rents, market liquidity will not benefit.

Operators of regulated terminals seem at present not systematically incentivized to maximise the capacity that they make available and to optimise its use, as their allowed revenues, which serve as a basis for tariff-setting, are not or only to a limited extent influenced by qualitative indicators, but are in general determined based on efficiently incurred operational expenditures and allowed capital remuneration.

Most stakeholders are in favour of the enforcement of the UIOLI-principle at all terminals. Whereas almost all LNG terminals have rules in place to make unused primary capacity available to interested market parties , there is no common EU rule to require UIOLI at LNG terminals, and subsequently there is a degree of discretion for NRAs regarding CAM, UIOLI procedures, and tariffs. For exempted terminals details are down to the specific exemption decision, for regulated terminals they are down to national legislation. However, in order for any such arrangements to be effective details matter. Particularly, the procedures would have to provide sufficient time to enable market participants to make the necessary arrangements to effectively utilise the capacity made available.
Some stakeholders favour standardising capacity allocation mechanisms across terminals, assuming this would reduce learning curves for shippers and facilitate access for smaller players to different European terminals and markets. Others consider that harmonisation would be difficult and affirm that LSOs and national regulators would be best suited to determine the optimal allocation procedures in their respective markets. These stakeholders agree that standardisation of products would to a certain extent also be

beneficial, but there should be sufficient flexibility to account for local specificities, in particular technical characteristics of the terminal (berthing and storage capacity) and absorption capacity of the market.

To address identified shortcomings related to capacity allocation (and accounting for stakeholder views), the following potential measures should be considered:

- Assess the opportunity and feasibility for setting quantitative and qualitative performance indicators in LSO revenue regulations that would incentivize LSOs to maximise the terminal capacity made available and to optimise capacity use based on market demand;
- Develop a standard set of products to be offered by all terminals, making it easy to compare tariffs and contractual terms, thereby increasing market liquidity and terminal usage;
- Standardise details for UIOLI/UIOSI rules, e.g. lead times, allocation mechanisms, minimum prices (if any), at all LNG terminals and facilitate secondary trading of capacity products across Europe, preferably through a single transactional platform;
- Continue to monitor terminals where secondary capacity allocation can be improved to ensure UIOLI/UIOSI is properly implemented by all terminals;
- Develop mechanisms for constant re-calculation and re-allocation of regasification slots (sometimes referred to as "dynamic slot allocation") to ensure terminals' responsiveness to global market conditions.

The largest impact on removing market entry barriers and facilitating LNG imports would be expected from implementing more harmonised and market based primary capacity allocation mechanisms for LNG terminals. The very nature of the LNG business including maritime transport of often weeks of sailing, will certainly require a tailor-made approach to allocate products that might differ to the allocation of gas pipeline or storage products. But, as this might be true for some products, it is not for all. For example, the range for products with or without berthing rights or "slots" included might be different, e.g. the shortest available product for LNG storage or regasification capacity could or rather should be a daily product, whereas the demand for the respective slot product might at some terminals not exist for anything less than month ahead. In essence though, the principles developed and applied in NC CAM should prevail.

A potential framework could include:

- Standardisation of products (and their contractual terms and conditions): e.g. years, quarters, months, days[169]
- Reservation of a minimum share of shorter-term products (i.e. lead times between allocation and time of use between 1 month and <1 year): e.g. 10%
- Default use of auctions on a single platform (at least) per market area for all standard products following a pre-defined auction calendar:
    1. Yearly auctions of multi-annual (e.g. 15 years ahead) yearly capacity products with a maximum allocation of e.g. 80% of total available capacity per terminal/ per market area.
    2. Yearly auction for all individual quarters in y+1
    3. Yearly auction for all individual months in y+1
    4. Quarterly auctions for individual months in q+1
    5. Monthly auctions for individual months in m+1
    6. Daily auctions for d+1 OR
       First-Committed-First-Served for all other newly available or un-allocated capacity after 5.

[169] Numbers, quotas, terms and frequency of auctions mentioned in this list are to be considered as indicative and subject to a consultation of stakeholders

Tariffs resulting from auctions (with prices determined as cleared) would better reflect the market values of terminals than pre-set tariffs charged to first-come first-served users.

The 10% reserved short-term capacity could be allocated to different products to ensure a minimum access on even the shortest lead time, e.g. month ahead (m+1) for a terminal access product ("slot" or bundled products including "slots"). Alternatively, auctions after the yearly auction for individual quarters (2.) could be provided with only those capacity products which could not be allocated in the respective previous auction.

In a scenario of standard auction procedures, the risk of over- or under-recovery of regulated costs of terminal operation would need to be addressed by either a regulated auction reserve price above zero (e.g. at least covering the variable cost of the individual terminal operation), which would mean that only the auction premium would be derived from the auction, or by multi-annual regulatory accounts, or both. If auctions result in congestion rents for LSOs, these revenues could be transferred to a regulatory account and/or used to finance investments. If auctions would lead to a structural under-recovery of regulated costs for specific terminals, socialisation of at least parts of the fixed costs via a surcharge on the grid tariffs of the national TSOs could be considered, if maintaining this terminal capacity offers an overall net consumer surplus on the basis of its effective contribution to enhanced security of supply and/or competition. This issue is quantitatively analysed and further discussed in Chapter 4.

While an open season procedure is considered an adequate approach to assess the market interests for long-term primary capacity that requires investments, auctions are considered the most adequate procedure to allocate existing capacity. The above-mentioned proposed allocation system complements the relevant capacity allocation mechanism for pipeline capacity provided for by EU NC CAM. The need for this is obvious when it comes to regasification capacity requiring respective network access capacity; it is less obvious for berthing rights or LNG storage.

As mentioned above, the characteristics of the global LNG market, particularly the different lead times necessary to operate inter-continental maritime transport, but also the nature of back-to-back supply and purchase agreements required for ensuring the bankability of upstream projects, might require adjustments. And for this the lessons learned from the current regulatory reforms in Spain and Italy should be considered. However, the same principle that guided the reforms of pipeline capacity allocation should manifest itself in the LNG market: shorter product terms represent less commercial risk which in turn facilitate market entry and increase competition.

C. TARIFF LEVELS AND TERMINAL FINANCING

The large diversity in tariff principles and structures across the EU makes any comparison amongst LNG terminals cumbersome and may hinder inter-terminal competition. Moreover, the lack of transparency regarding tariff calculation methodologies and relevant input data at exempted terminals makes it hard to detect competition distortions between users of the same terminal (where one shipper might be paying more than another for the same services).

Article 7(c) of the NC TAR requires the Reference Price Methodology for TSO tariffs to ensure non-discrimination and prevent undue cross-subsidisation. In practice, cross-subsidisation of LNG users can result from LNG infrastructure costs partly being recovered via network tariffs, state-backed loss coverage, or discounts at transmission system entry

points from LNG terminals. Such cross-subsidisation may lead to competition distortion with terminals in neighbouring Member States where LSO costs are recovered through terminal tariffs only. For example, in 2017, the costs recovered via terminal tariffs for using the LNG terminals in Spain covered only 63% of the overall costs (283 M€ vs. 447 M€ respectively)[170]. The El Musel LNG terminal, that has been mothballed at the end of its construction in 2012, receives for instance an annual remuneration of about 23 M€[171] financed via the "gas system".

Aggregated tariff levels (LSO tariffs + TSO tariffs) are considered the most important determinant of terminal competitiveness among terminal users. Some stakeholders point out that effective subsidies unfairly benefit terminals in markets where tariff levels are discounted, but the vast majority of stakeholders believe that cross-subsidisation of tariffs – especially when justified by LNG's contribution to security of supply and competition – is appropriate and necessary in specific situations.

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With respect to possibly reviewing or standardising the discount rate applied at transmission system entry points from LNG terminals across the EU, most stakeholders were not in favour of harmonisation due to regional market differences. Whereas only a few recommended removing the provision for a discount entirely, some suggested adding limits to potential discount levels.

To address identified shortcomings related to tariffs and financial issues (and accounting for stakeholder views), the following potential measures should be considered and assessed:

With respect to terminal financing and tariffs

- Consider introducing more harmonised tariff principles and structures for LNG terminal services similar to the governance structure proposed for setting TSO tariffs in Commission Regulation (EU) 2017/460 of 16 March 2017, which established a network code on harmonised transmission tariff structures for gas
- Consider progressively shifting from ex-ante set tariffs based on allowed costs towards more market-based tariff-setting mechanisms that reflect demand for terminal services (e.g. via primary capacity auctions where tariffs are set based on marginal bids), keeping in mind commercial and regional differences between terminals
- Stimulate cost benchmarking at European level to incentivise efficient operations
- Monitor ACER's opinions on potential cases of direct or indirect subsidisation, establish clear conditions for awarding any subsidies that, if met, will likely lead to increased competition (e.g. market-based allocation and CMP mechanisms, market making obligations, etc.), and intervene where not justified by security and diversity of supply, or enhanced competition in gas markets

[170] CNMC (2018). Documento de consulta pública, Expediente: INFDE/122/18 (pages 4-5).
[171] CNMC (2018). Orden TEC/1367/2018 (article 4).

With respect to TSO tariffs

- Consider reviewing Article 9 of the TAR NC in EU legislation regarding discounts for the transmission system entry fee for gas from LNG terminals, in order to properly reflect the effective benefits of LNG, not only to reduce the isolation of the concerned gas system/market (as referred to in the current legal provision), but also to enhance competition, taking into account the potential impact of additional gas sources on market prices. Based on these considerations, a reallocation of LNG related costs and their partial recovery via TSO tariffs can be justified. The impact of an adapted discount level is evaluated in the modelling exercise (see chapter 4).
- Ensure that TSO tariffs are cost-reflective and take into account the effective transport cost levels for LNG compared to pipeline gas (see decision of the French NRA in December 2019 to apply a 10% discount reflecting the lower entry cost of LNG compared to pipeline gas[172]).
- Ensure that any cross-subsidisation of LNG via TSO tariffs is justified by its effective benefits to security of supply and competition and prepare to end cross-subsidisation if markets mature or LNG becomes more competitive on its own.

D. INFORMATION PROVISION & TRANSPARENCY LEVELS AT TERMINALS

While actual terminal users can easily obtain commercial information from LNG terminals (including from exempted terminals), it is acknowledged by stakeholders in the survey that market relevant terminal information is less accessible for prospective users who want to enter the LNG market. Information particularly on available capacity, but also on tariff structures and discounts is less readily available to those market parties and the public. Precedents in the pipeline market show that this can represent a serious market entry barrier.

And even if information would be available and easily accessible for every terminal, an overview of available capacities, access terms etc. at regional – or EU – levels is missing.

Still, a majority of stakeholders consider terminal transparency greatly improved and LSOs sufficiently transparent. Some criticize that that not all relevant information (including regulation, contract details) is published online also in English, and that terminal terms and conditions should be better structured and subject to review by NRAs (including those of TPA-exempted terminals if permissible under their exemption decision).

To address identified shortcomings related to information transparency (and accounting for stakeholder views), the following potential measures can be considered:

- Mandate system operators to develop and implement a centralised transparency platform similar to (or as an extension of) ENTSO-G's transparency platform regarding gas pipeline capacity[173], where all relevant data regarding booked and available primary and secondary capacity at terminals across the EU is made publicly accessible in a downloadable format. The primary aim of this platform is to increase transparency by offering information in a standardised and centralised way; it would however be appropriate to also assess the potential use of this tool for capacity booking transactions;
- Mandate system operators to add all relevant information regarding services offered, contractual terms and tariffs to this transparency platform, and require that all

[172] CRE (2019). "Délibération de la CRE du 12 décembre 2019 portant projet de décision sur le tarif d'utilisation des réseaux de transport de gaz naturel de GRTgaz et Teréga," https://www.cre.fr/Documents/Deliberations/Decision/projet-de-decision-sur-le-tarif-d-utilisation-des-reseaux-de-transport-de-gaz-naturel-de-grtgaz-et-terega

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

terminals provide a counterfactual price calculation for a single standard service offering (i.e., the tariff of a standard unloading + storage + regasification package), to facilitate the comparison of LSO tariffs across EU markets. Additionally, tariff calculators can be proposed on a voluntary basis.
- Making data available on LNG capacities, send-out and inventory volumes and planned or unplanned un-availabilities for each LNG facility and with daily granularity, will imply additional efforts only with respect to agreeing on a standard format, as LSOs are already required to provide this data to regulators according to Article 9.3 of EU Regulation 1348/2014.
- Specific information regarding availability of LNG storage capacity should also be published in a standardised format on the above-mentioned joint operators' platform, in line with Article 19.4 of EU Regulation 715/2009.

E. TERMINAL EXEMPTIONS FROM REGULATED TPA AND TARIFF APPROVAL REQUIREMENTS

Terminals exempted from specific legal TPA provisions and tariff regulation are not required to charge the same tariff rates to all their users; shippers using such terminals may hence not be able to compete on a level playing field. This impacts intra-terminal competition.

There is also unequal access to commercially sensitive information between terminals, as exempted terminals are not required to publish their tariff levels but can access the tariff information of their regulated 'competitors'.

Stakeholders are split between support for and opposition to maintaining exemption regimes. Some stakeholders believe exemptions from regulated TPA prevent realisation of a level playing field, especially between regulated and exempted terminals in the same market area, where they believe regulated terminals are disadvantaged due to lower flexibility. Other stakeholders, however, believe that exempted terminals are disadvantaged, as they cannot be reimbursed for potential losses via state- or network user backed support mechanisms.

Some stakeholders mention the possibility of shifting from regulated to negotiated third-party access regimes, so that terminals could operate more flexibly. Overall, stakeholders tend to agree there is no need for a substantial review of the current regulatory framework, but suggest that provisions for granting exemptions be re-evaluated and potentially adjusted.

To address identified shortcomings related to regulated TPA and tariff regulation exemptions (and accounting for stakeholder views), the following potential measures can be considered:
- For the sake of clarity and to provide a truly level playing field, ensure that the regulatory regime eventually applied to currently exempted terminals at the expiry of their terms will allow them to compete equally and effectively within their regional markets, by imposing on them the same requirements as on currently regulated terminals;
- Further assess the legal feasibility to change – during the exemption term – specific requirements that apply for exempted terminals (if permissible under their exemption regimes), with the aims to enhance transparency (e.g. participation in centralized transparency platform) and to improve capacity allocation practices, both for primary and secondary capacity.

- Review the requirements/criteria for granting new exemptions and adjust as necessary, to also include minimum transparency requirements regarding tariffs, capacity availability and contractual terms, as well as requirements regarding primary and secondary capacity allocation, and to properly take into account the exemption's impacts on inter-terminal competition at the supra-national level.

F. GAS QUALITY RESTRICTIONS

LNG imported from certain geographical regions requires technical adjustments to comply with national quality standards in the EU (primarily Wobbe Index constraints). And sudden gas quality variations downstream an LNG terminal due to regasification of LNG from different sources may represent a challenge to some end-user appliances. Moreover, differences in national gas quality standards can restrict the free flow of gas across EU Member State borders, hindering intra-community trade of gas imported via LNG terminals.

These gas quality restrictions may hinder LNG imports and limit the free flow of trade, according to stakeholders. They generally acknowledge that while standardisation would be beneficial, it would be very difficult to implement fully harmonised requirements across the EU, also taken into account different technical characteristics of grid infrastructure and end-user appliances.

To address identified shortcomings related to gas quality (and accounting for stakeholder views), the following potential measures can be considered:

- Ensure terminals are transparent about gas quality restrictions in their domestic markets (this information is particularly important for non-EU market parties);
- Continue to support the current activities of CEN in view of gas quality standards at EU level, and insist that the standardisation committee properly takes into account the impact of any new standard on the potential for the EU to import LNG from a wide variety of sources on the one hand and on the safety and well-functioning of end-user appliances across the EU on the other hand;
- Anticipate the transition to a low-carbon energy supply by exploring the technical feasibility of using LNG terminals and related infrastructure in the medium- and long-term for importing and reloading renewable and low-carbon gaseous or liquid fuels, particularly hydrogen ("H2 readiness").

G. PRIMARY SERVICES OFFERED AT TERMINALS AND FLEXIBILITY TO ADAPT THEM TO MARKET NEEDS

The range and flexibility of services offered in some terminals seems not yet fully adapted to market needs, possibly due to insufficient incentives for LSOs and/or reluctance of NRAs to approve plans for investments to enable new service offerings. Additionally, terminal owners experience difficulties to finance the (considerable) upfront investments necessary to offer (additional) services, and therefore try to ensure the bankability of an investment via long term bookings for standard bundled services, while the market would appreciate the possibility of shorter term bookings and the option to access unbundled services, particularly storage. The availability of adequate products adapted to market needs (both bundled and unbundled products, firm and interruptible capacity) requires further consideration.

According to stakeholders, the range of services offered by a terminal is neither the most important determinant of terminal selection, nor the least important.[174] Market players consider terminals that provide additional unbundled storage and send-out products more attractive. And LSOs appreciate the timeliness and agility of national regulators in approving their plans for developing additional service offerings. Several market players proposed that terminals which only offer bundled products should be incentivized to also offer unbundled services for part of their capacity, in order to enable (smaller) shippers to develop operational niches, to increase infrastructure utilisation, enhance competition and help terminal users to better respond to market needs and price signals.[175]

To address identified shortcomings related to terminal services (and accounting for stakeholder views), the following potential measures should be considered:

- Encourage NRAs to incentivise LSOs to ensure a larger availability of different types of capacity products (next to bundled products also specific unbundled services, different contract durations, firm and interruptible capacity) in response to market requests by developing and monitoring performance indicators;
- Review and adapt where necessary the specific storage regulation in order to allow and facilitate LSOs to offer additional unbundled or bundled storage capacity, for which there seems to be a demand from market parties (according to the survey). This service is usually offered on the basis of capacity available in storage tanks on the terminal sites, but it could also be covered by using available underground storage capacity, via specific agreements with TSOs and SSOs. For example, the Lithuanian LSO has developed a bundled service offering for LNG unloading, gas storage, and gas transmission through the Baltics in conjunction with a Latvian underground storage operator and both countries' TSOs.

H. SMALL-SCALE LNG SERVICES OFFERED AT TERMINALS

According to feedback from market parties, terminals with only one active importing terminal user supplying LNG to small-scale market operators offer LNG at less competitive prices compared to terminals where several importers are able to supply this market segment. Variation and complexity in terminal processes regarding the booking of truck- and ship-loading slots can dissuade new entrants from entering the small-scale LNG market, as can non-transparent tariff-setting for terminal services. Finally, a lack of transparent price signals for imported and stored LNG can limit interest in small-scale LNG market opportunities.

Most LNG market participants do not yet consider the small-scale LNG market attractive enough to significantly impact the competitiveness of terminals – i.e., they do not consider the availability of small-scale services to be a primary reason to select terminals. However, businesses active on the small-scale LNG market consider the expansion of truck-and ship-loading capacities at terminals vital to ensure continued growth in this market segment. They report some logistical difficulties in booking slots at different terminals and would prefer a standardised booking platform for truck- or ship-loading services implemented across relevant terminals. Small-scale players also affirm that they would like tariff-setting mechanisms for terminal services to be more transparent.

The lack of harmonised national regulatory provisions for LNG road transport (e.g. safety requirements, maximum load for trucks, licence requirements, technical features, etc.) also hampers competition and development of this market segment. And an EU-wide or

[174] Response to the stakeholder consultation on the EU regulatory framework for LNG, September 2019
[175] Shell Energy Europe, Position on the proposed CNMC Reform of the Spanish LNG market, March 2019

regional reference small-scale LNG prices in Euros (LNG for trucks, for barges, for bunkering, etc.), would facilitate trade and also enable suppliers in the small-scale market segment to make long-term business projections and use this reference in their contracts with end-users. The Argus LNG daily price reporting platform, for example, has been referenced by small-scale players since it started reporting on truck-loading small-scale LNG prices since 2016.[176]

To address identified shortcomings related to the small-scale LNG market (and accounting for stakeholder views), the following potential measures should be considered:

- Mandate enhanced transparency for factors relevant to small-scale LNG by requiring the concerned LSOs to provide clear information on tariffs, available capacities and conditions for transhipment, truck-loading, rail-loading services. This information should preferably be made available via the same centralised transparency platform, that also provides information on large-scale services (see above in D);
- Ensure EU wide regulatory approval for LSOs to offer virtual conversion services, i.e. swapping LNG in tank with hub-sourced gas to respond to regasification requests/requirements and subsequently supplying LNG to small-scale market participants. This would enable participants in the small-scale LNG market to virtually source gas from liquid hubs and thereby to benefit from higher levels of competition and market-based prices;
- Suggest that NRAs and CEER assess the pros and cons of regulating specific services that only serve small-scale markets, considering that they compete with services and products (mainly oil) that are not regulated and using the conclusions of this assessment to inform regulatory measures related to broader terminal service offerings (see previous section). Request that this assessment be developed into guidelines and best practices on regulating the specific terminal services related to the small-scale LNG market.

[176] ARGUS LNG Daily, accessible via https://www.argusmedia.com/en/natural-gas-lng/argus-lng-daily?utm_medium=ppc&utm_source=google&utm_campaign=GA-GLO-NAT-Natural-Gas-DSA-NV&gclid=CjwKCAiA35rxBRAWEiwADqB375uMawObOiH1quekbJkLMt9W10_k-GeYBp7AzYuYP4EcvmG5QUO2LRoCTr4QAvD_BwE.

ASSESSMENT AND RANKING OF PROPOSED MEASURES

The proposed measures discussed in this chapter are collated and directly linked to the identified shortcomings they are designed to address in Table 19. The table provides details per measure on the type of action; intervention level required; and the terminals/Member States impacted by the potential measures.

The measures are then assessed in the subsequent Table 20, which evaluates proposed measures in terms of their potential effectiveness at mitigating barriers in the market; their feasibility; their potential impact on LNG competitiveness; and their proportionality. The assessment of the barriers is based on principles from the European Commission Decision best practice guidelines on impact assessments.[177]

Table 19: Assessing the features of proposed measures

Category	Measure	Barrier(s) addressed	Type of measure	Intervention level	Terminals/Member States impacted
A. Market access and market liquidity	1. In gas markets with limited competition and liquidity, consider possibility of requiring terminal users with dominant market share to offer minimum quantity of their imported LNG in local traded gas markets and at regulated prices	A1. Several gas hubs in Europe are still developing or have not yet reached maturity or liquidity, limiting trade opportunities for users of LNG terminals in concerned markets	Structural; Strategic	EU	Świnoujście (PL) Klaipeda (LT) Revithoussa (EL)
	2. Further improve, where necessary and justified via ex-ante cost-benefit assessments, gas market interconnectivity by adequate investments in interconnectors and enhance market integration by removing remaining barriers to cross border trade	A2. Lack of available interconnection capacity limits downstream market opportunities for gas imported at more isolated terminals	Financial support; Strategic	EU	Świnoujście (PL) Klaipeda (LT) Revithoussa (EL)
B. Capacity allocation mechanisms	3. Assess feasibility for setting quantitative and qualitative indicators in LSO revenue regulation that incentivize LSOs to maximise terminal capacity made available and to optimise capacity use based on market needs	B5. LSOs may at present not be properly incentivised to maximise capacity made available and its use	Structural; Potentially adjusted revenue cap regulation	EU	All regulated terminals
	4. Implement more harmonised and market based primary capacity allocation mechanisms by standardising product offerings, reserving minimum share of capacity for shorter-term products, and recommending default use of capacity auctions through single platforms per market area	B4. Not all capacity allocation mechanisms are market-based, which can obscure market signals	Advisory; Structural	EU	All terminals
	5. Develop standard set of products to be offered by all terminals, making it easy to	B3. Short-term third-party access to terminals can only be secured by	Advisory; Structural;	EU	All terminals

[177] European Commission, "Guidelines on Impact Assessment," accessible via https://ec.europa.eu/info/sites/info/files/better-regulation-guidelines-impact-assessment.pdf

Category	Measure	Barrier(s) addressed	Type of measure	Intervention level	Terminals/Member States impacted
	compare tariffs and contractual terms, thereby increasing market liquidity and terminal usage	registered users at several terminals in secondary markets, where most primary capacity is booked by one or two users engaged in long-term contracts B6. Existence of long-term bookings with ship-or-pay clauses can prevent interested shippers other than primary capacity holders from accessing terminals, even when slots become available	Communicative		
	6. Mandate UIOLI/UIOSI at all terminals and facilitate secondary trading of capacity rights across Europe, ideally through single platform		Advisory	EU	All terminals
	7. Develop mechanisms for constant re-calculation and re-allocation of regasification slots to ensure terminals' responsiveness to global market conditions		Advisory; Structural	EU Terminal	All terminals
	8. Continue to monitor terminals where secondary capacity allocation can be improved to ensure UIOLI/UIOSI is properly implemented by all terminals		Monitory; Advisory	EU	Świnoujście (PL)
C. Tariff levels and terminal financials	9. Consider introducing harmonised tariff principles and structures for LNG terminal services similar to governance for setting TSO tariffs in Commission Regulation (EU) 2017/460	C7. Lack of transparency regarding tariff calculation methodologies and relevant input data at terminals might obscure competition distortions amongst users of the same terminal, and especially might impact small-scale shippers C8. Cross-subsidisation through regulator-approved discounts, state-backed loss coverage, and discounts at entry points from LNG terminals may lead to competition distortion with terminals in neighbouring MSs where these indirect subsidies are not present	Structural; Strategic	EU	All terminals
	10. Consider shifting from ex-ante set cost based tariffs to more market-based tariff-setting mechanisms that reflect demand for terminal services		Structural; Strategic	EU	All terminals subject to tariff-setting regulations
	11. Stimulate cost benchmarking at European level to incentivise efficient operations		Advisory; Structural	EU	All terminals subject to tariff-setting regulations
	12. Actively monitor direct or indirect subsidisation and intervene where not justified by security and diversity of supply, or enhanced competition in gas markets		Monitory	EU Member State	All terminals subject to tariff-setting regulations
	13. Review Article 9 of TAR NC to ensure discounts on transmission system entry fee for gas from LNG terminals are justified based on security of supply and competition benefits, or by the different transport cost levels for LNG compared to pipeline gas		Monitory	EU	All terminals
	14. Ensure that cross-subsidisation of LNG via TSO tariffs reflects effective benefits of LNG to security of supply and competition and prepare to end subsidisation if markets mature or LNG becomes more competitive on its own		Monitory	EU Member State	All terminals
D. Information	15. Mandate GLE to develop and implement centralised transparency platform	D9. Lack of adequate, user-friendly, and non-discriminatory information	Monitory; Advisory	EU	All terminals

Category	Measure	Barrier(s) addressed	Type of measure	Intervention level	Terminals/Member States impacted
provision & transparency	16. Mandate GLE to add harmonised metrics to transparency platform, e.g., require that all terminals provide tariff estimate for single standard service offering so LSO tariffs can be easily compared across EU markets	provision on tariffs, services and contractual obligations at some terminals (e.g. exempted) leads to an unfair playing field between existing and potential users, especially smaller scale shippers and new entrants to a market	Communicative	EU	Regulated terminals
	17. Provide legal basis obliging all TSOs to use this platform		Communicative	EU	All terminals
E. TPA exemption regimes	18. Ensure that the regulatory regime eventually applied to currently exempted terminals imposes on them the same requirements as imposed on currently regulated terminals	E10. Exempted terminals are not required to charge the same rates to all their users, such that shippers at the same terminal cannot compete on a level playing field E11. Exempted terminals have more autonomy to select their terminal users, and face less scrutiny in allocating their primary and secondary capacity E12. Regulated terminals in several countries benefit from state-guaranteed revenue coverage factors that reduce potential losses in times of lower terminal utilisation, but their exempted counterparts in the same countries do not receive this coverage E13. There is unequal access to commercial information between terminals, as exempted terminals are not required to publish their tariff levels but can access the tariff levels of their regulated competitors	Structural	EU	Dunkerque (FR) Porto Levante (IT) Gate (NL) South Hook (UK) Isle of Grain (UK) Dragon (UK)
	19. Assess the legal feasibility of changing during exemption terms the transparency and capacity allocation requirements applied to exempted terminals, As the number of exempted terminals is very limited, this assessment could be undertaken on an ad-hoc basis.		Strategic; Structural	EU	Dunkerque (FR) Porto Levante (IT) Gate (NL) South Hook (UK) Isle of Grain (UK) Dragon (UK)
	20. Review the requirements/criteria for granting new exemptions and adjust as necessary, to also include minimum transparency requirements regarding tariffs, capacity allocation and contractual terms, and to properly take into account the exemption's impacts on competition at supra-national level		Structural; Communicative	EU	New terminals which apply for exempted status
F. Gas quality standards	21. Ensure terminals are transparent about gas quality restrictions in their domestic markets	F14. Strict national specifications can hinder LNG imports. Variations in national gas quality standards can restrict LNG flow across EU Member State borders, hindering supra-national trade of gas imported via terminals	Advisory; Communicative	EU	All terminals
	22. Support activities of CEN in view of further harmonising gas quality standards at EU level		Structural	EU	All terminals
	23. Anticipate transition to low-carbon energy supplies by exploring technical feasibility of		Advisory	EU	All terminals

Category	Measure	Barrier(s) addressed	Type of measure	Intervention level	Terminals/Member States impacted
	using LNG infrastructure in medium- and long-term for other gaseous fuels, e.g. hydrogen-based fuels (ensure "H2 readiness")				
G. Services offered at LNG terminals	24. Incentivize LSOs to ensure availability of different types of capacity products (bundled and unbundled products, different contract duration, firm and interruptible capacity) in response to market requests	G15. Provision of a limited range of services or only bundled services might reduce market demand for terminal services G16. Development of new services can be hindered due to required upfront investment in infrastructure without enough certainty regarding its use	Advisory	EU Member State	All terminals
	25. Review and adapt where necessary the specific storage regulation in order to allow and facilitate LSOs to offer additional unbundled or bundled storage capacity		Structural	EU	All terminals
H. Small-scale LNG services	26. Mandate enhanced transparency re: small-scale LNG services by requiring terminals to provide via centralised transparency platform adequate tariff info on services focussing on small-scale market	H19. Terminals with only one active shipper offering LNG are less attractive to small-scale LNG players, compared to terminals where large shippers compete to supply LNG to small-scale operators H22. Lack of transparency on tariff setting mechanisms for terminal services catered to the small-scale market prevents players from developing long-term business cases H21. Variation and complexity in terminal processes for booking truck-loading and ship-loading slots can dissuade new entrants from joining the small-scale LNG provision market	Communicative	EU	All terminals
	27. Allow LSOs to offer virtual conversion services, enabling LNG retailers to source LNG on gas hub and hence benefit from higher levels of competition and market-based prices		Structural; Strategic	EU	All terminals
	28. Develop and implement EU-wide platform for small-scale LNG bookings, whereby slots at all terminals that offer truck loading, ship loading, etc. can be booked in standardised way		Structural; Communicative	EU	All terminals
	29. Assess the pros/cons of regulating terminal services that compete with oil market services and products and potentially adjust their regulatory regime	-	Structural	EU	All terminals

The collected measures are analysed in the subsequent table, based on the following factors:

- Urgency – the importance of implementing a measure as quickly as possible, to mitigate its corresponding shortcomings
- Effectiveness – a measure's probable effectiveness at addressing each shortcoming and removing barriers to competition in the EU LNG market
- Impact on LNG competitiveness – a measure's potential to increase the attractiveness of European markets for LNG trade
- Feasibility – the likelihood that a measure can be easily implemented by a relevant authority
- Efficiency and proportionality – the scale of a measure's potential impact given the required amount of effort needed for implementation
- Consistency – the degree to which the content of a measure corresponds with existing systems
    - Low consistency with the current market structure would, for example, indicate that implementing the measure would substantially change market dynamics
    - High consistency with the current regulatory regime would, for example, indicate that implementing the measure would not require significant restructuring in the regulatory framework as it stands
- Modelling capacity – the extent to which the impacts of a measure can be modelled using REKK's EGMM, taking into account technical constraints

Each measure is scored from low ("+") to high ("+++") across these categories. This analysis was developed in line with the EC's best practice guidelines on impact assessments to determine which polices are most positive.[178] Positive measures are highlighted in green to indicate areas where implementation is likely feasible and could create the most impact, and where potential effects could be modelled using REKK's EGMM. These measures were singled out for modelling analysis and their projected impacts are further detailed in Chapter 4.

Table 20: Quick-scan ranking of proposed measures

Proposed measures	Urgency	Effectiveness	Impact on EU terminals' competitiveness	Feasibility	Efficiency and Proportionality	Consistency	Modelling capacity
1. Further improve, where necessary and justified via ex-ante cost-benefit assessments, gas market interconnectivity by adequate investments in interconnectors and enhance market integration by removing remaining barriers to cross border trade	++	+++	++	++	++	+++	✓
2. In gas markets with limited competition and liquidity, consider possibility of requiring terminal users with dominant market share to offer minimum quantity of their imported LNG in local traded gas markets and at regulated prices	++	+++	++	+	++	++	✓
3. Assess feasibility for setting quantitative and qualitative indicators in LSO revenue regulation that incentivize LSOs to maximise terminal	+	++	+	++	++	++	

[178] European Commission, "Guidelines on Impact Assessment," accessible via https://ec.europa.eu/info/sites/info/files/better-regulation-guidelines-impact-assessment.pdf

Proposed measures	Urgency	Effectiveness	Impact on EU terminals' competitiveness	Feasibility	Efficiency and Proportionality	Consistency	Modelling capacity
capacity made available and to optimise capacity use based on market needs							
4. Implement more harmonised and market based primary capacity allocation mechanisms by standardising product offerings, reserving minimum share of capacity for shorter-term products, and recommending default use of capacity auctions through single platforms per market area	+	+++	+++	+	++	++	✓
5. Develop standard set of products to be offered by all terminals, making it easy to compare tariffs and contractual terms, thereby increasing market liquidity and terminal usage	++	+++	+	+	++	+++	
6. Mandate UIOLI/UIOSI at all terminals and facilitate secondary trading of capacity rights across Europe, ideally through single platform	+++	+++	++	+	++	++	
7. Develop mechanisms for constant re-calculation and re-allocation of regasification slots to ensure terminals' responsiveness to global market conditions	+	++	++	+	+	+	
8. Continue to monitor terminals where secondary capacity allocation can be improved to ensure UIOLI/UIOSI is properly implemented by all terminals	+	+++	+	+++	++	+++	
9. Consider introducing harmonised tariff principles and structures for LNG terminal services similar to governance for setting TSO tariffs in Commission Regulation (EU) 2017/460	++	++	+++	++	++	+++	✓
10. Consider shifting from ex-ante set cost based tariffs to more market-based tariff-setting mechanisms that reflect demand for terminal services	++	+++	+++	++	++	++	✓
11. Stimulate cost benchmarking at European level to incentivise efficient operations	++	++	++	+++	+++	++	
12. Actively monitor direct or indirect subsidisation and intervene where not justified by security and diversity of supply, or enhanced competition in gas markets	+	++	+	+++	++	+++	
13. Review Article 9 of TAR NC to ensure discounts on transmission system entry fee for gas from LNG terminals are justified based on security of supply and competition benefits, or by	++	++	Condition dependent	++	++	++	✓

Proposed measures	Urgency	Effectiveness	Impact on EU terminals' competitiveness	Feasibility	Efficiency and Proportionality	Consistency	Modelling capacity
the different transport cost levels for LNG compared to pipeline gas							
14. Ensure that cross-subsidisation of LNG via TSO tariffs reflects effective benefits of LNG to security of supply and competition and prepare to end subsidisation if markets mature or LNG becomes more competitive on its own	+	++	+	++	++	++	
15. Mandate GLE to develop and implement centralised transparency platform	+++	++	+	+++	++	+++	
16. Mandate GLE to add harmonised metrics to transparency platform, e.g., require that all terminals provide tariff estimate for single standard service offering so LSO tariffs can be easily compared across EU markets	++	+++	++	++	+++	+++	
17. Provide legal basis obliging all TSOs to use this platform	+++	++	++	++	++	+	
18. Ensure that the regulatory regime eventually applied to currently exempted terminals imposes on them the same requirements as imposed on currently regulated terminals	++	+++	+++	+	++	++	✓
19. Assess the legal feasibility of changing during exemption terms the transparency and capacity allocation requirements applied to exempted terminals, As the number of exempted terminals is very limited, this assessment could be undertaken on an ad-hoc basis.	+	++	+	++	++	++	
20. Review the requirements/criteria for granting new exemptions and adjust as necessary, to also include minimum transparency requirements regarding tariffs, capacity allocation and contractual terms, and to properly take into account the exemption's impacts on competition at supra-national level	+	++	++	+++	++	+++	
21. Ensure terminals are transparent about gas quality restrictions in their domestic markets	+++	++	++	++	++	++	
22. Support activities of CEN in view of further harmonising gas quality standards at EU level	++	+++	+	+++	+++	+++	
23. Anticipate transition to low-carbon energy supplies by exploring technical feasibility of using LNG infrastructure in medium- and long-term for	++	++	++	++	++	++	

Proposed measures	Urgency	Effectiveness	Impact on EU terminals' competitiveness	Feasibility	Efficiency and Proportionality	Consistency	Modelling capacity
other gaseous fuels, e.g. hydrogen-based fuels (ensure "H2 readiness")							
24. Incentivize LSOs to ensure availability of different types of capacity products (bundled and unbundled products, different contract duration, firm and interruptible capacity) in response to market requests	+	++	N/A	++	++	++	
25. Review and adapt where necessary the specific storage regulation in order to allow and facilitate LSOs to offer additional unbundled or bundled storage capacity	+	++	+++	++	++	++	
26. Mandate enhanced transparency re: small-scale LNG services by requiring terminals to provide via centralised transparency platform adequate tariff info on services focussing on small-scale market	++	++	+	++	++	+	
27. Allow LSOs to offer virtual conversion services, enabling LNG retailers to source LNG on gas hub and hence benefit from higher levels of competition and market-based prices	++	+++	++	++	+++	+	
28. Develop and implement EU-wide platform for small-scale LNG bookings, whereby slots at all terminals that offer truck loading, ship loading, etc. can be booked in standardised way	++	++	++	++	++	+++	
29. Assess the pros/cons of regulating terminal services that compete with oil market services and products and potentially adjust their regulatory regime	+	+++	++	+	++	+	

CHAPTER 4. MODELLING AND QUANTIFICATION OF THE SELECTED MEASURES

The modelling presented in this chapter was carried out by REKK using the European Gas Market Model (EGMM)[179] (a model description is included in the Annex).

MODELLED RESULTS OF EGMM

In this chapter, we first present the a without measures scenario to which all selected measures will subsequently be compared. The without measures scenario was set up using publicly available data and assumptions provided by DG Energy. Detailed documentation of the inputs can be found in the Annexes.

Table 21: Primary data sources

Category	Data Unit	Source	Note
Consumption	Annual Quantity Monthly distribution (% of annual quantity)	Commission (EUCO 3232.5), Eurostat, 2019	
Production	Minimum and maximum production	Commission (EUCO 3232.5) 2019	
Pipeline infrastructures	Daily maximum flow	ENTSO-G TYNDP 2018	
Storage infrastructures	Injection, withdrawal, working gas capacity	GSE, ENTSO-G TYNDP 2018	
LNG infrastructures	Capacity	GIE 2019, GIIGNL Annual Report 2019	Only FID added
LTC contracts	Yearly minimum maximum quantity, Seasonal minimum and maximum quantity	Gazprom, National Regulators Annual reports, Platts, Cedigaz (2019)	
Storage and transmission tariffs	€/MWh	TSO, SSO webpages (2019)	
LNG tariffs	€/MWh	CEER 2017	Cross-checked with terminal websites in 2019

Main drivers of gas markets are demand, supply and underlying infrastructure setup.

Demand and supply assumptions were based on EUCO 3232.5 scenario. This assumes an increase in gas demand to 2025, then a decline to 2030. Infrastructure assumptions were based on ENTSOG TYNDP 2018 Low infrastructure setup scenario. This scenario includes all projects under construction and any additional pipelines, storages and LNG terminals which reached an FID according to the ENTSOG TYNDP 2018. Modelling was performed for a two scenarios: one including Nord Stream 2 and re-routing all long-term contracts which transited via Ukraine to Nord Stream 2; and another infrastructure setup as well, which represents the network infrastructure and contractual arrangements in 2019. The assessment showed similar results for the measures in both infrastructure setups, so the main findings are not affected by the commissioning of Nord Stream 2. For reference, both infrastructure setups are shown in this chapter.

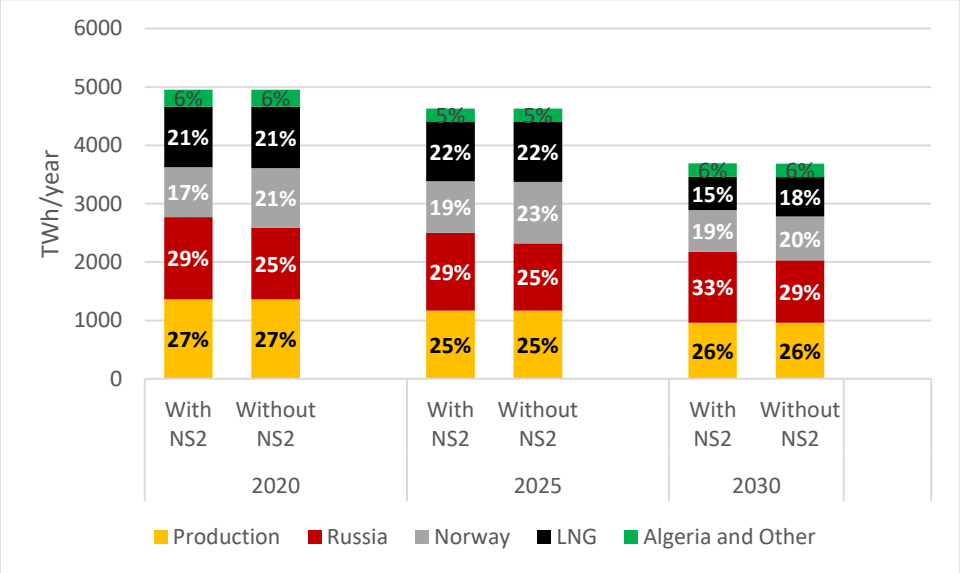
[179] Detailed model description can be found in András Kiss, Adrienn Selei, Borbála Takácsné Tóth (2016): A Top-Down Approach to Evaluating Cross-Border Natural Gas Infrastructure Projects in Europe. The Energy Journal, Vol. 37, SI3. A mathematical appendix listing model equations can be accessed from https://andraskiss.com/wp-content/uploads/egmm.pdf

Using these parameters, a modelling of the European gas markets was performed. The main outputs of the modelling are gas prices, flows on infrastructure and consumption. Using these primary outputs, a detailed welfare assessment was also done, which highlights the effects of measures on gas market stakeholders (consumers, producers, traders and infrastructure operators).

These different setups result in different modelled supply structures for the EU28. Main sources of supply are the indigenous European production (Production), pipeline imports from Russia, Norway, Algeria and other sources (most notably TAP), and LNG imports (LNG). Comparing the three modelled years 2020, 2025 and 2030, the most apparent change is in the level of overall consumption and the available domestic European supply. European gas consumption and production are assumptions based on EUCO3232.5 scenario. The import needs and the different sources of supply are determined by the EGMM model endogenously. The model maximises the total welfare of consumers, producers and traders on the gas market. It is apparent that European import is dominated by Russian and Norwegian pipeline gas. In the scenario when Nord Stream 2 is assumed as commissioned and contracts are re-routed to bypass Ukraine, the import share of Russian gas in Europe is 4 percentage points higher, crowding out LNG and Norwegian supplies.

Modelling was performed in late 2019, before the conclusion of the transit deal stipulating Russian ship-or pay transit volumes via Ukraine 65 bcm/year for 2020 and 40 bcm for the years 2021-2024. This transit volume was not considered for the modelling.

Figure 22: EU28 supply structure in the two scenarios, with and without Nord Stream 2



Total LNG imports to EU28 are higher in the scenario when Nord Stream 2 is not commissioned, as Russian pipeline gas has then less opportunities to reach European markets (despite the availability of existing pipeline capacities including via Ukraine). LNG imports to Europe are at the same level by 2025, as EU28 gas consumption decreases slower than indigenous gas production, creating a higher import need in 2025 as compared to 2020. For 2030, the gas consumption in the EU28 falls below 4000 TWh/year. As pipeline gas tends to be more competitive and the incumbent players (Russia, Norway) are able to cut their prices to keep up their market share, lower LNG volumes are envisaged to reach the European markets.

Table 22: Total modelled LNG inflow to the EU28, TWh/year

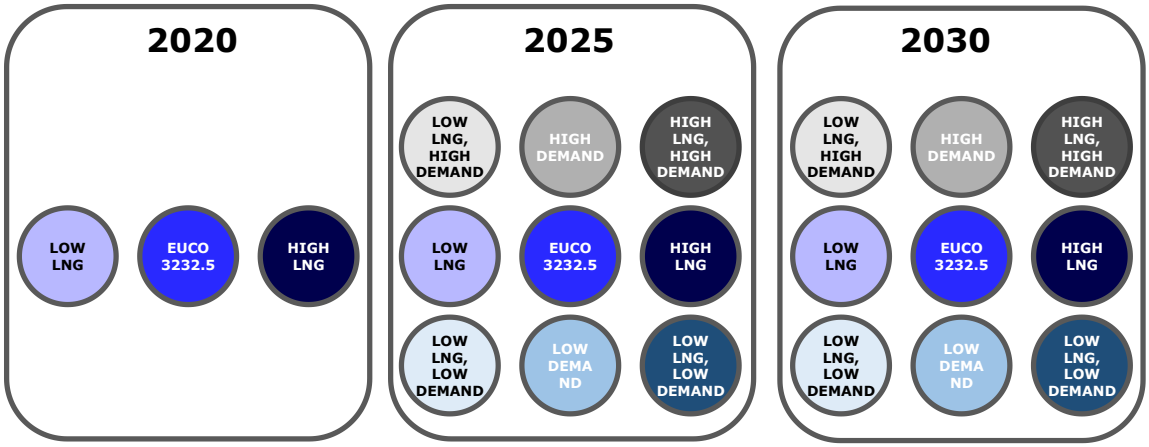
Total LNG inflow, TWh/year						
	2020		2025		2030	
	With NS2	Without NS2	With NS2	Without NS2	With NS2	Without NS2
BE	17	22	21	66	37	20
CY	7	7	10	9	5	7
ES	185	185	92	92	77	77
FR	109	125	118	147	23	104
GR	84	84	84	84	70	75
HR	20	20	31	19	7	18
IE	0	0	31	31	28	28
IT	166	113	174	116	113	116
LT	35	35	45	45	42	45
MT	4	4	4	4	3	3
NL*	0	0	0	0	0	0
PL	33	33	51	61	32	54
PT	21	21	21	21	0	0
UK	355	401	334	334	130	130
Total	1036	1052	1015	1028	567	676

**As the NL LNG regasification terminal has no published tariff, an average tariff of 1€/MWh was assumed. This tariff is too high to attract LNG flows to the NL. A detailed assessment of the impact of terminal tariffs is shown in the section on "Measure 2".*

SENSITIVITY SCENARIOS ON NATURAL GAS DEMAND AND LNG SUPPLY

There are two main uncertainties that have huge impact on LNG terminal utilization: one is the European gas demand, the other is the natural gas demand in Asia, that directly impacts the availability of global LNG supply for Europe. As the modelled years are further in the future the uncertainty in the forecasted input data increases. Therefore nine different scenarios were designed along these two main drivers to test the robustness of the modelled results in 2025 and 2030. (For 2020, the central assumption of EUCO 3232.5 was not altered, as a substantial demand shift cannot be expected in such a short term). A 20% higher and a 20% lower demand was plotted for 2025 and 2030. It must be stressed that these demand scenarios are not based on any kind of modelling or policy, they only serve as an extreme modelling case to test the robustness of the results. For LNG inflow, two additional sensitivity scenarios were drafted, one showing a stronger LNG glut, another a more scarce global market (similar to the years 2012-2018 for European LNG importers). Altogether, 21 scenarios were modelled.

Figure 23: Modelled scenarios



These different setups result in different modelled supply structures for the EU28. Main sources of supply are the indigenous European production (Production), pipeline imports from Russia, Norway, Algeria and other sources (most notably TAP), and LNG imports (LNG). There are some differences between the with Nord Stream 2 and without Nord Stream 2 scenarios: when Nord Stream 2 is present, Russian market share is higher and less LNG is imported into the European markets.

Figure 24: Modelled supply structure of EU28 for 2020, TWh/year

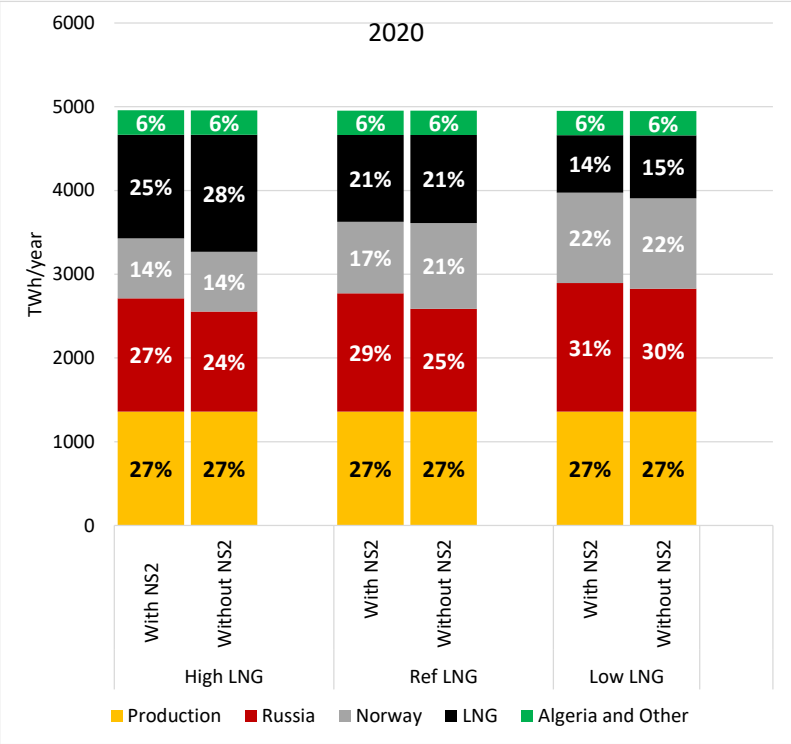


Figure 25: Modelled supply structure of EU28 for 2025, TWh/year

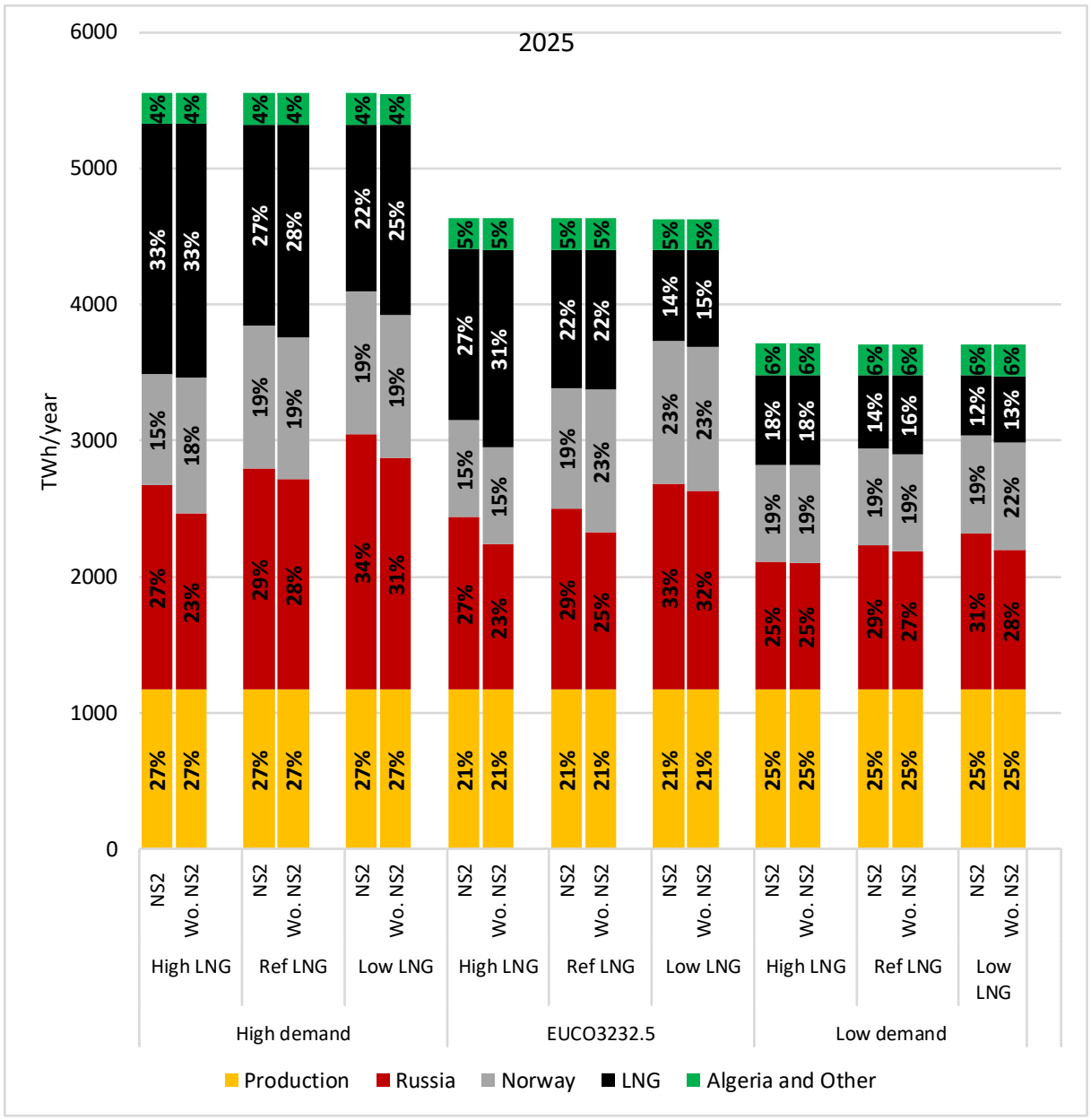
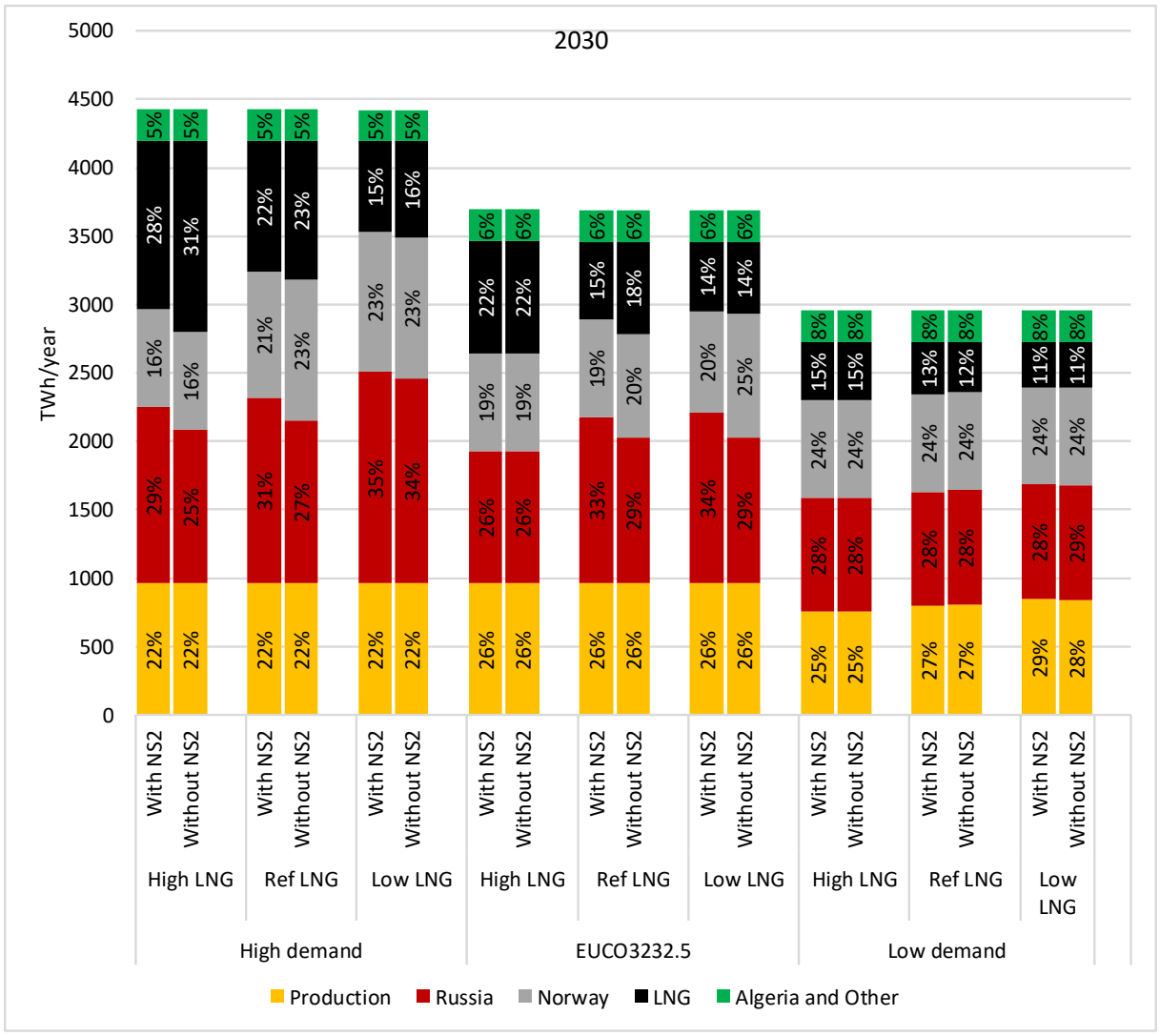


Figure 26: Modelled supply structure of EU28 for 2030, TWh/year



ASSESSMENT OF SELECTED MEASURES WITH MODELLING

Based on the survey results, bilateral contacts with stakeholders, our own analysis and the discussions at the stakeholder workshop, a list of possible measures has been identified. The goal of the measures is to further enhance the operation of LNG markets in Europe, to deliver competitive and secure alternative supply of gas and to reap the benefits of a potential LNG glut.

The measures to be modelled are a sub-set of the proposed list, due to the fact that not all measures have easily quantifiable effects. The modelling tool used for this exercise (EGMM) is able to assess measures which have direct effects on (i) effective use of regasification send-out capacity (ii) regasification tariffs (iii) TSO entry tariffs from the LNG terminal to the transmission system (iii) long-term contracts related to LNG terminals. Therefore the following measures were modelled:

Table 23: Modelled measures based on the list of proposed measures

Modelled measure	Proposed measure
Measure 1a-c: Auction, without reserve price and with reserve price 0.5/1 €/MWh	B4. Implement more harmonised and market based primary capacity allocation mechanisms for LNG terminals, by standardising product offerings, reserving a minimum share of capacity for shorter-term products, and suggesting the default use of capacity auctions through single platforms per market area
Measure 2: Decrease TSO entry tariff	C13. Review the stipulations of Article 9 of the TAR NC in EU legislation and consider harmonising discounts for the transmission system entry fee for gas from LNG terminals, in order to properly reflect the effective benefits of LNG to security of supply and competition, and possibly also the different transport cost levels for LNG compared to pipeline gas
Measure 3: Regasification tariff decrease	C9. Introduce harmonised tariff principles and structures for LNG terminal services similar to the governance structure proposed for setting TSO tariffs in Commission Regulation (EU) 2017/460 of 16 March 2017, which established a network code on harmonised transmission tariff structures for gas C10. Progress towards requiring more market-based tariff-setting mechanisms that reflect demand for terminal services (e.g. via primary capacity auctions where tariffs are set based on marginal bids), keeping in mind commercial and regional differences between terminals
Measure 4: Contract release / market making obligations	A2. In gas markets with limited competition and liquidity, consider the possibility of requiring terminal users with a dominant share of the overall contracted primary regasification capacity to offer a minimum quantity of their imported LNG in local traded gas markets and at regulated prices
Measure 5: identification of investments which may facilitate LNG market access and liquidity of gas markets	A1. Further improve, where necessary and justified on the basis of thorough cost-benefit assessments, physical gas market interconnectivity by adequate investments in interconnectors (including reverse flows), and enhance market integration, by removing remaining barriers to cross border trade and ensuring the full implementation of EU legislation (3rd Package).
Measure 6: Regulation of exempted TPA terminals	E18. Ensure that the regulatory regime eventually applied to currently exempted terminals at the expiry of their terms will allow them to compete equally and effectively within their regional markets, by imposing on them the same requirements as imposed on currently regulated terminals

The evaluation of the measures is based on a pairwise comparison to a without measures case, as described in the previous section. Sensitivity analyses for higher/lower gas

demand and higher/lower LNG supply to Europe were performed for the three considered years (2020, 2025 and 2030).

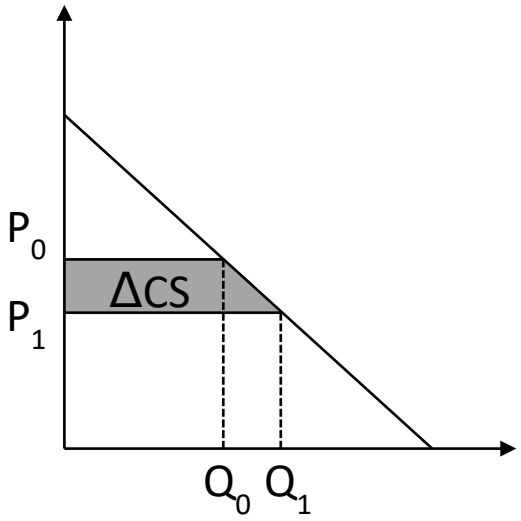
For all measures, a number of KPIs were assessed, these included:

(i) EU28 weighted average price: calculated as the volume-weighted average of the EU28 Member States, indicative of one yearly price.

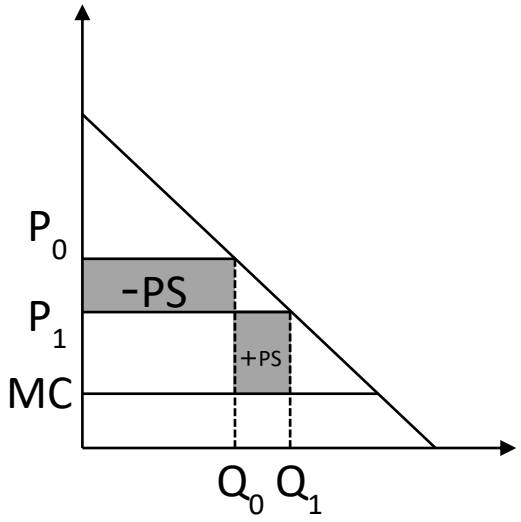
(ii) Total LNG import to EU28: calculated as total LNG imported in regasification terminals in one year.

(iii) Total welfare change in EU28 compared to the without measures case. Total welfare consists of the welfare of different stakeholders defined as follows (welfare of the six categories of stakeholders is equally weighted):

a. Consumer surplus (ΔCS) change: the difference between what consumers are willing to pay for natural gas, and what they actually pay on wholesale gas markets. Graphically, if a measure would result in a price decrease (from equilibrium price P_0 to equilibrium price P_1), the change in consumer surplus is equal to the area shaded in the figure below.



b. Producer surplus (ΔPS) change: defined as a short-run margin excluding fix costs; the difference between what European natural gas producers receive for natural gas in revenues and what it costs them to extract the gas in the short run (total revenues - variable costs).



c. Margin of LTC holders (ΔLTC) change: on long-term take-or-pay (TOP) contracts is the difference between the wholesale market price (at which importers sell the gas), and the contract price set for the gas, multiplied by the delivered quantity.
d. LSO operational margin and congestion rent change (ΔLSO): operational margins equal the difference between revenues based on the regasification tariff and regasification variable costs, multiplied by the shipped quantity. Congestion rents are gained when an infrastructure is used up to capacity Traders compete with each other, and are willing to bid in a capacity auction to gain access to the interconnector capacity. Congestion rent of LNG operators equals to the profit of traders earned by selling cheaper LNG on more expensive markets.
e. SSO operational profit and inter-temporal arbitrage (ΔSSO): storage operational margin is the difference between the storage revenues and variable costs, multiplied by the amount of gas stored. Inter-temporal arbitrage grasps the value of summer-winter spreads. If there are price differences that are higher than the storage fees, then traders will utilize underground gas storages to benefit from these price spreads. This inter-temporal arbitrage is indicated at the SSOs.
f. TSO operational margin and congestion rent (ΔTSO): Operational margin is the difference between transmission tariff and average variable costs, multiplied by the transported quantity. Congestion revenue is paid to the TSO when an infrastructure is used up to capacity between two neighbouring markets, cross-border trading might not eliminate all price differences in excess of transmission fees. Normally, traders buying in the cheaper market and selling into the more expensive one would reap the price difference minus the transmission fee as margin. On the other hand, traders also compete with each other for this margin, and hence are willing to bid in a capacity auction up to the same amount to gain access to the interconnector capacity. In the end, this congestion rent is collected by the TSOs operating the cross-border pipeline.

(iv) Change in the utilisation of LNG terminals: calculated as total LNG regasified and fed into the European system divided by the annual capacity of the LNG regasification terminal.
(v) Change in the average wholesale price on MS level.

MEASURE 1: ALLOCATION OF TERMINAL CAPACITY BY AUCTIONS

- Three capacity auction types were simulated:
  (i) auction with a reserve price covering only variable costs
  (ii) auction with a reserve price of 0.5 €/MWh
  (iii) auction with a reserve price of 1 €/MWh
- By implementing auction-based allocation in all LNG terminals, more LNG would enter the European markets.
- European consumers are the winners of this measure, as increased LNG imports would push down gas prices.
- LSOs would earn less revenues than in the without measures case.
- Introducing a high(er) reserve price alleviates this lower revenue effect for LSOs, but also reduces the overall positive effects of the measure
- The measure has the strongest effect on the well-interconnected Western European markets, followed by the Mediterranean market
- The overall welfare effect of the measure (taking into account the changes in producer, trader, infrastructure operator and consumer positions) is net negative, but the consumer welfare effects are positive and outweigh the negative effects on the infrastructure operators.

Currently, most regulated terminals are allocating their capacity rights based on a FCFS basis, using a predetermined tariff for terminal's access, approved by the respective NRA. Exempted terminals organise open seasons or auctions and allocate capacity rights accordingly to those market players who value the right the most.

We assess whether capacity allocation using auctions with a reserve price that only covers the variable costs, or auctions with a pre-determined reserve price of 0.5 €/MWh or 1 €/MWh affects market outcomes and terminal utilisation. The measures are presented for six different regions:

Table 24: Regions defined for the auction allocation measure

Code	Region	Terminals
ALL	All EU28 terminals	Zeebrugge, Montoir de Bretagne, Dunkerque, Rotterdam, Barcelona, Cartagena, Huelva, Sagunto, Mugardos, Bilbao,Fos Cavou, Fos Tonkin, Revythoussa, Krk,OLT Toscana, Panigaglia, Porto Levante, Sines, Malta LNG, Cyprus LNG, South Hook, Dragon LNG, Milford Haven, Grain LNG, Shannon, Świnoujście, Klaipedos
BAL	Baltic	Świnoujście, Klaipedos
CWE	Central Western Europe	Zeebrugge, Montoir de Bretagne, Dunkerque, Rotterdam
CWE_NATL	Central Western Europe and North Atlantic	Zeebrugge, Montoir de Bretagne, Dunkerque, Rotterdam, South Hook, Dragon LNG, Milford Haven, Grain LNG, Shannon
MED	South Atlantic and Mediterranean	Barcelona, Cartagena, Huelva, Sagunto, Mugardos, Bilbao,Fos Cavou, Fos Tonkin, Revythoussa, Krk,OLT Toscana, Panigaglia, Porto Levante, Sines, Malta LNG, Cyprus LNG
NATL	North Atlantic	South Hook, Dragon LNG, Milford Haven, Grain LNG, Shannon

Measure 1a: Auction with reserve price covering only variable costs

In this scenario, we assume that all capacities are allocated in an auction and LNG terminal operators only charge, next to the possible congestion rent, a low fee which covers their variable costs of operation. Modelling results are presented by region, starting with the situation where the measure is applied for all terminals in the EU: *All terminals (ALL).*

Total LNG flows increase considerably, and the measure has an overall positive effect on EU28 prices. The reason for this is that the traders on the market get access to cheaper gas, as they have to pay no additional fee for terminal usage, only the congestion rent for the terminal operator, if there is congestion on a specific terminal. Prices in the EU28 decrease by 2-3% in 2020, up to 6% in 2025 and up to 7% in 2030. Total LNG flows increase up to 24% in 2020, 25% in 2025 and in 2030. The measure has an overall positive effect in all scenarios on LNG flows and EU28 weighted average price.

Figure 27: Effects of auction allocation without reserve price in all EU-28 terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2020

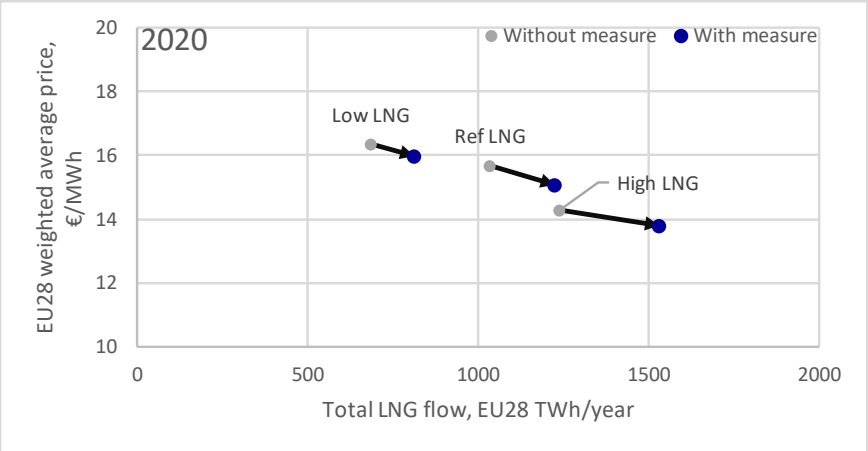


Figure 28: Effects of auction allocation without reserve price in all EU-28 terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2025

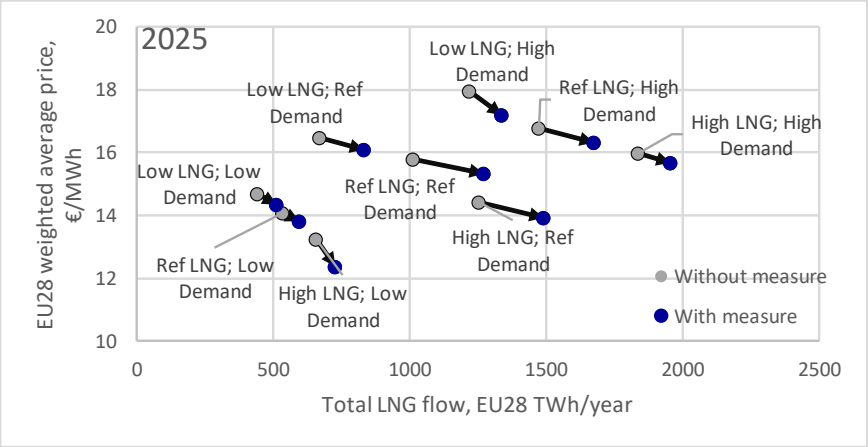
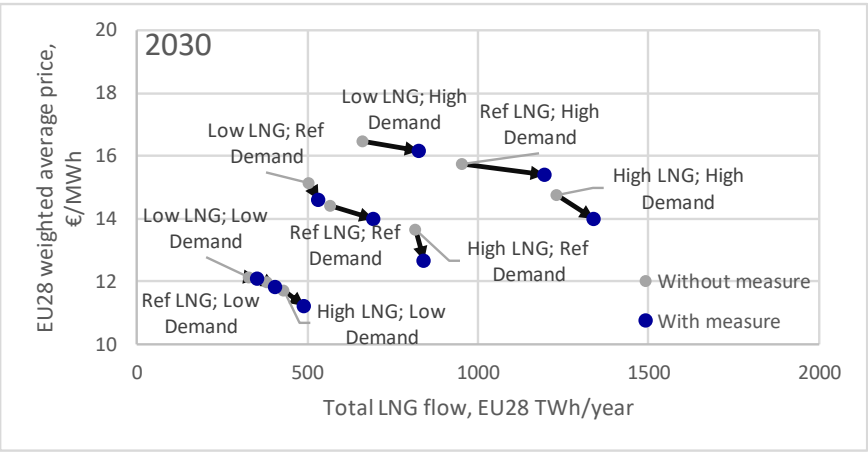


Figure 29: Effects of auction allocation without reserve price in all EU-28 terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2030



LSOs have two kinds of revenues: (i) operational revenues related to pre-determined tariffs or reserve prices (ii) congestion rents, which are paid by traders to LSOs in case of congestion. The most apparent effect of the auction is that LSOs' operational revenues (i.e. tariff-related income or income related to the reserve price on an auction) drop to the level

of variable costs in all cases, hence LSOs' operational profits equal zero. Nevertheless, competition between traders for the regasification capacities intensifies and in turn congestion revenues increase considerably. Still, LSOs on the EU28 level lose 42% of their revenues compared to the EUCO3232.5 demand case in 2020, 35-40% in 2025 and 53-67% in 2030. If variable fees do not cover the long-term operational costs of the terminals, such change in the structure of the LSOs may require additional support (e.g. recovery of their fixed costs via a surcharge on the TSO grid tariffs) to keep up the long-term operation of the infrastructure, or possibly the introduction of a reserve price floor.

Figure 30: LSO operational profit and congestion rent, auction allocation without reserve price, M€/year 2020

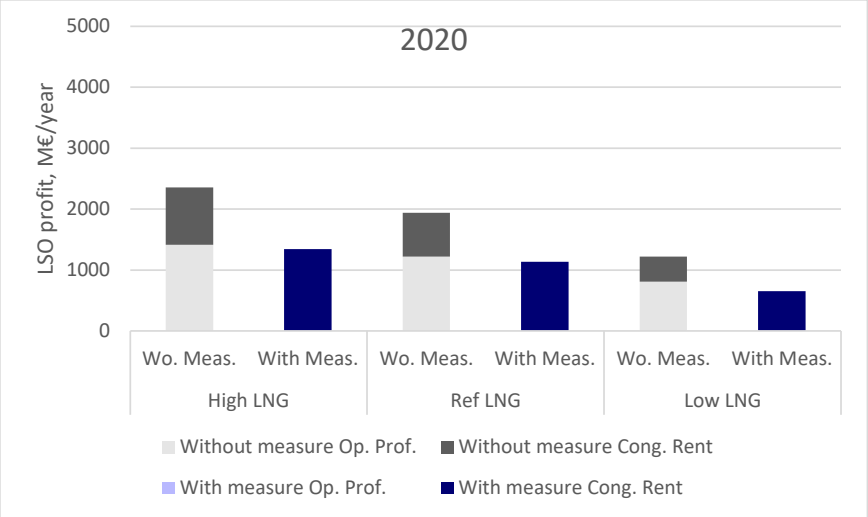


Figure 31: LSO operational profit and congestion rent, auction allocation without reserve price, M€/year 2025

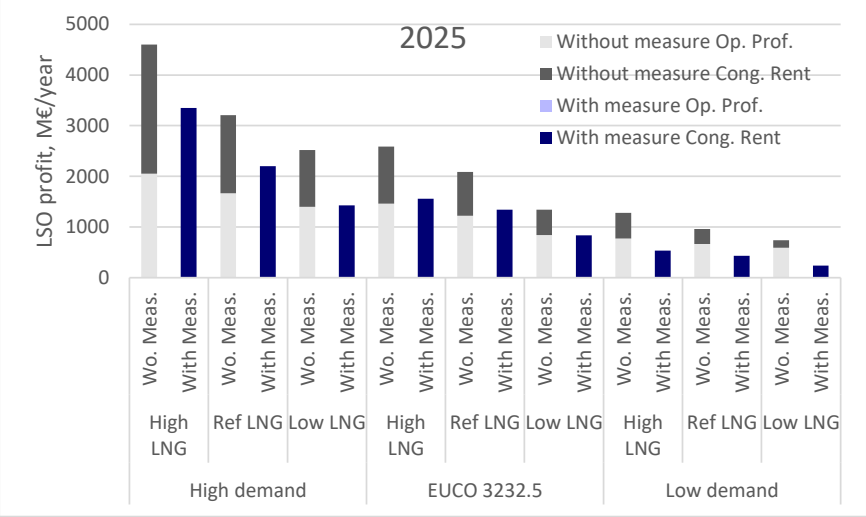
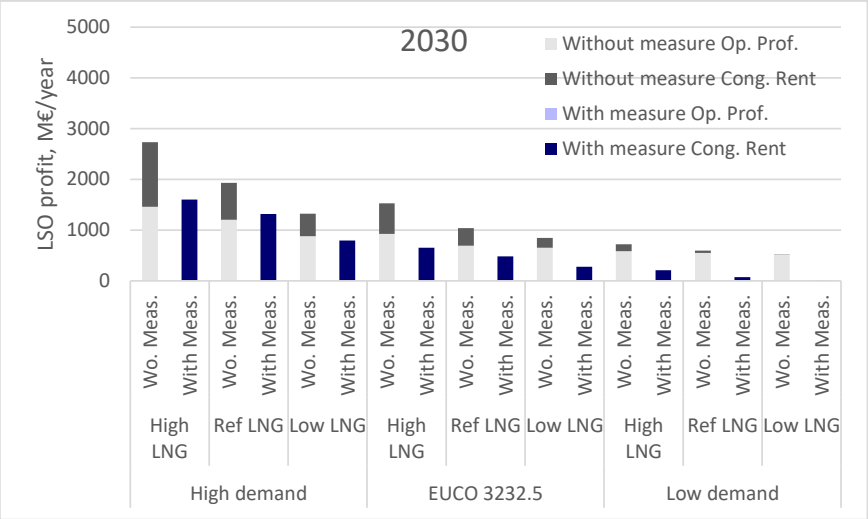


Figure 32: LSO operational profits and congestion rent, auction allocation without reserve price, M€/year 2030



Welfare effects are in line with the price developments and the design of the measure:

- Consumer surplus increases due to the general price decrease
- Producer surplus and LTC holder profit decrease due to the generally price decrease
- LSO operating profit decreases due to the fact that tariff revenues drop, and these are not counter-balanced by the increasing congestion rents
- SSO profit changes slightly, the effect is not significant
- TSO profits are generally lower
- Net total effect of the measure is negative in all scenarios, mainly driven by the decrease of LTC holder profit and the LSO profit, which cannot be counter-balanced by the increase of consumer surplus.

Modelling results show that the LSO costs could be recovered via e.g. a surcharge on TSO tariff as consumer surplus increase is *higher than cumulative negative impact on regulated operators LSO, TSO and SSO*. Such cross-subsidisation is justified by the positive impact of LNG on security of supply and competition.

Table 25: Welfare effects of auction allocation without reserve price on EU28, M€/year

AUCTION ALL, M€/YEAR CHANGE									
Year	**Demand**	**LNG**	**Δ CS**	**Δ PS**	**Δ LTC**	**Δ LSO**	**Δ SSO**	**Δ TSO**	**Δ Total**
2020	**EUCO 3232.5**	High	2405	-515	-1174	-1010	-42	56	-280
		Ref	**2875**	**-793**	**-1664**	**-804**	**3**	**-69**	**-451**
		Low	1750	-472	-1088	-569	-23	-262	-663
2025	High	High	1571	-272	-782	-1255	21	274	-443
		Ref	2475	-514	-1424	-1007	32	-110	-548
		Low	4088	-827	-2745	-1088	-7	-148	-728
	EUCO 3232.5	High	2322	-524	-1213	-1030	-23	50	-419
		Ref	**2086**	**-495**	**-1111**	**-741**	**12**	**-154**	**-403**
		Low	1732	-454	-1099	-503	-6	-305	-637
	Low	High	3156	-914	-2002	-743	4	6	-493
		Ref	1033	-198	-705	-530	4	-75	-470
		Low	1187	-353	-741	-499	14	-188	-580

AUCTION ALL, M€/YEAR CHANGE									
Year	**Demand**	**LNG**	**Δ CS**	**Δ PS**	**Δ LTC**	**Δ LSO**	**Δ SSO**	**Δ TSO**	**Δ Total**
2030	High	High	3376	-659	-2056	-1131	1	-44	-513
		Ref	1519	-290	-871	-617	8	-182	-433
		Low	1350	-250	-845	-526	-5	-432	-709
	EUCO 3232.5	High	3560	-870	-2237	-876	15	-133	-540
		Ref	**1504**	**-315**	**-955**	**-557**	**-2**	**-198**	**-524**
		Low	2013	-462	-1499	-566	-9	-65	-588
	Low	High	1399	-232	-1178	-511	-8	-10	-541
		Ref	451	-87	-354	-522	1	-22	-534
		Low	90	-30	-39	-506	-4	-42	-531

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other non-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)

Utilisation pattern of European terminals somewhat changes compared to the without measures case. Importing terminals with high regasification tariffs turn out to be much higher utilised when the access tariff is reduced to the variable cost (e.g. BE, FR, HR, PL, IT, UK). Comparing the modelling years it is apparent that 2025 utilisation is the highest on general, when the total supply-demand gap and import need to the EU28 is the greatest. In 2030, utilisation is much lower, as the decreasing EU28 demand can be supplied with pipeline gas at a lower cost. The effects of the measure are the greatest in the 2025 scenarios.

Table 26: Utilisation of LNG terminals on country level, %/year 2020

Year	**2020**					
Demand	**EUCO 3232.5**					
LNG	**High**		**Ref**		**Low**	
	Without measure	**With Measure**	**Without measure**	**With Measure**	**Without measure**	**With Measure**
BE	24%	75%	10%	12%	10%	10%
CY	64%	64%	64%	64%	64%	64%
ES	26%	26%	26%	26%	26%	26%
FR	48%	82%	24%	47%	4%	10%
GR	100%	100%	100%	100%	99%	100%
HR	100%	100%	66%	89%	42%	42%
IT	93%	100%	88%	100%	60%	100%
LT	79%	79%	79%	79%	78%	78%
MT	50%	50%	50%	50%	50%	50%
NL	0%	8%	0%	0%	0%	0%
PL	56%	100%	57%	57%	57%	57%
PT	17%	17%	17%	17%	17%	17%
UK	73%	73%	63%	72%	28%	32%
Total	47%	56%	40%	45%	27%	31%

Green colour means less congestion on the infrastructure; red colour means more congestion on the infrastructure

Table 27: Utilisation of LNG terminals on country level, %/year 2025

Year	2025																	
Demand	High						EUCO3232.5						Low					
LNG	High		Ref		Low		High		Ref		Low		High		Ref		Low	
	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure
BE	91%	100%	61%	75%	51%	38%	59%	87%	13%	34%	10%	10%	10%	10%	10%	10%	10%	10%
CY	100%	100%	100%	100%	100%	100%	100%	100%	92%	100%	67%	83%	34%	0%	8%	0%	0%	0%
ES	26%	29%	20%	21%	19%	20%	13%	14%	13%	13%	14%	14%	11%	11%	11%	11%	11%	11%
FR	85%	89%	54%	80%	36%	44%	53%	77%	26%	61%	5%	13%	13%	11%	6%	9%	1%	1%
GR	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	58%	83%	51%	36%	26%
HR	79%	79%	79%	79%	48%	51%	69%	69%	53%	68%	22%	22%	16%	20%	12%	12%	12%	12%
IE	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	91%	91%
IT	100%	100%	93%	100%	92%	100%	93%	100%	93%	100%	71%	100%	61%	100%	61%	100%	60%	93%
LT	100%	100%	100%	100%	100%	100%	100%	100%	100%	96%	93%	88%	95%	53%	92%	53%	74%	53%
MT	56%	56%	56%	56%	56%	56%	47%	47%	47%	47%	47%	47%	38%	38%	38%	38%	38%	38%
NL	67%	100%	8%	17%	0%	7%	0%	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL	100%	100%	91%	100%	54%	98%	88%	100%	57%	100%	49%	98%	36%	94%	36%	67%	36%	54%
PT	24%	24%	24%	24%	24%	24%	17%	17%	17%	17%	17%	17%	10%	10%	10%	10%	0%	8%
UK	86%	90%	83%	86%	67%	73%	59%	59%	59%	59%	27%	32%	31%	32%	17%	17%	17%	17%
Total	66%	70%	52%	58%	43%	46%	44%	52%	36%	44%	25%	29%	24%	26%	20%	22%	16%	18%

Green colour means less congestion on the infrastructure; red colour means more congestion on the infrastructure

Table 28: Utilisation of LNG terminals on country level, %/year 2030

Year	2030																	
Demand	High						EUCO3232.5						Low					
LNG	High		Ref		Low		High		Ref		Low		High		Ref		Low	
	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure	Without measure	With Measure
BE	87%	87%	37%	75%	19%	17%	70%	36%	23%	20%	10%	10%	10%	10%	10%	10%	10%	10%
CY	83%	100%	67%	83%	67%	83%	67%	19%	41%	8%	0%	0%	0%	6%	0%	0%	0%	0%
ES	12%	12%	12%	12%	14%	12%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
FR	61%	67%	31%	61%	7%	11%	31%	32%	5%	12%	1%	1%	1%	1%	1%	1%	1%	1%
GR	100%	100%	97%	100%	90%	97%	98%	83%	83%	67%	67%	39%	6%	4%	1%	1%	1%	1%
HR	65%	65%	57%	61%	26%	48%	26%	27%	11%	15%	11%	11%	9%	14%	4%	4%	0%	1%
IE	99%	99%	99%	97%	99%	99%	90%	90%	90%	90%	85%	90%	71%	71%	58%	69%	0%	50%
IT	95%	100%	95%	100%	82%	100%	63%	100%	60%	100%	60%	95%	60%	78%	55%	63%	44%	44%
LT	100%	100%	100%	99%	97%	92%	100%	76%	93%	68%	87%	68%	76%	29%	63%	29%	38%	29%
MT	47%	47%	47%	47%	47%	47%	39%	39%	39%	39%	39%	39%	31%	31%	31%	31%	31%	31%
NL	16%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL	97%	100%	73%	100%	49%	98%	61%	100%	36%	91%	49%	56%	36%	73%	36%	60%	36%	48%
PT	2%	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
UK	40%	40%	40%	40%	22%	33%	23%	23%	23%	23%	21%	18%	20%	23%	17%	17%	17%	17%
Total	41%	45%	32%	40%	22%	27%	28%	29%	19%	23%	16%	17%	16%	18%	12%	13%	11%	11%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 29: Price effect of auction allocation in ALL terminals, % compared to without measures case

	2020			2025									2030								
	EUCO3232.5			High			EUCO3232.5			Low			High			EUCO3232.5			Low		
	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low
AT	-1%	-3%	-1%	0%	-2%	-4%	-3%	-2%	-1%	-4%	-1%	-5%	-6%	-3%	-2%	-6%	-2%	-6%	-4%	-1%	0%
BE	-4%	-4%	-3%	-1%	-3%	-4%	-2%	-2%	-3%	-6%	-1%	-2%	-5%	-2%	-2%	-6%	-1%	-3%	0%	0%	0%
BG	-1%	-3%	-1%	0%	-1%	-3%	-3%	-2%	-1%	-4%	0%	1%	-4%	-1%	-1%	-6%	-3%	-6%	-1%	0%	0%
CZ	-1%	-3%	-1%	0%	-2%	-4%	-1%	-2%	-1%	-5%	0%	-1%	-4%	-1%	-2%	-6%	-1%	-3%	-4%	-1%	0%
CY	-7%	-5%	-4%	0%	-1%	-3%	-3%	-1%	-1%	-11%	-7%	-5%	0%	2%	0%	-8%	-7%	-6%	-4%	-3%	0%
DE	-1%	-4%	-2%	-1%	-2%	-5%	-2%	-2%	-2%	-6%	0%	0%	-5%	-1%	-2%	-6%	-1%	-3%	-4%	-1%	0%
DK	-1%	-3%	-1%	-1%	-2%	-4%	-1%	-2%	-2%	-5%	0%	0%	-4%	-1%	-2%	-5%	-1%	-3%	-4%	-1%	0%
EE	0%	0%	1%	0%	0%	0%	0%	0%	0%	-4%	1%	0%	-2%	-1%	0%	-9%	-2%	0%	0%	0%	-1%
ES	-7%	-5%	-6%	-7%	-6%	-5%	-7%	-5%	-5%	-6%	-2%	-2%	-8%	-4%	-3%	-8%	-2%	-4%	-5%	-1%	0%
FI	0%	0%	1%	0%	0%	0%	0%	0%	0%	-4%	1%	0%	-2%	-1%	0%	-9%	-2%	0%	0%	0%	-1%
FR	-5%	-4%	-3%	-6%	-4%	-5%	-5%	-4%	-3%	-6%	-2%	-1%	-7%	-3%	-3%	-7%	-3%	-4%	-4%	-1%	0%
GR	-4%	-3%	-2%	0%	-1%	-3%	-3%	-1%	-1%	-10%	-7%	-5%	0%	2%	0%	-8%	-7%	-6%	-6%	-3%	0%
HR	-1%	-4%	-4%	-6%	-5%	-5%	-6%	-4%	-3%	-5%	-2%	-4%	-6%	-3%	-4%	-6%	-4%	-4%	-5%	-6%	-1%
HU	-1%	-3%	-1%	0%	-2%	-4%	-3%	-2%	-1%	-4%	-1%	-4%	-4%	-1%	-1%	-5%	-2%	-5%	-3%	-1%	0%
IE	-6%	-4%	-2%	-4%	-4%	-4%	-6%	-4%	-3%	-6%	-2%	-2%	-5%	-3%	-2%	-7%	-3%	-4%	-4%	-3%	-1%
IT	-4%	-3%	-2%	0%	-2%	-4%	-3%	-2%	-2%	-10%	-7%	-5%	-6%	-3%	-2%	-9%	-7%	-5%	-7%	-4%	0%
LT	1%	0%	1%	0%	-2%	-4%	-3%	-3%	0%	-4%	1%	0%	-3%	-1%	0%	-10%	-2%	0%	0%	1%	0%
LU	-3%	-4%	-2%	-1%	-3%	-4%	-2%	-2%	-3%	-6%	-1%	-2%	-5%	-1%	-2%	-6%	-1%	-3%	0%	0%	0%
LV	0%	0%	1%	0%	0%	-1%	-3%	-2%	0%	-4%	1%	-1%	-3%	-1%	-1%	-9%	-2%	0%	0%	0%	-1%
MT	-6%	-4%	-4%	-6%	-5%	-5%	-6%	-4%	-3%	-5%	-2%	-5%	-6%	-3%	-3%	-5%	-4%	-5%	-6%	-6%	-6%
NL	-2%	-4%	-3%	-1%	-3%	-4%	-2%	-2%	-3%	-6%	-1%	-2%	-5%	-2%	-1%	-6%	-1%	-3%	0%	0%	0%
PL	-1%	-7%	-1%	0%	-2%	-5%	-3%	-3%	-2%	-7%	-2%	-3%	-4%	-1%	-2%	-10%	-4%	-3%	-6%	-3%	-2%
PT	-7%	-5%	-6%	-7%	-6%	-5%	-8%	-6%	-5%	-8%	-2%	-2%	-8%	-5%	-2%	-8%	-2%	-5%	-5%	-1%	0%
RO	-1%	-3%	-1%	0%	-1%	-3%	-3%	-2%	-1%	-4%	-1%	-3%	-4%	-1%	-1%	-6%	-2%	-4%	-1%	0%	0%
SE	-1%	-3%	-1%	-1%	-2%	-4%	-1%	-2%	-2%	-5%	0%	0%	-4%	-1%	-1%	-5%	-1%	-3%	-3%	-1%	0%
SI	-1%	-3%	-1%	0%	-2%	-4%	-3%	-2%	-1%	-4%	-1%	-5%	-6%	-3%	-2%	-5%	-2%	-5%	-4%	-1%	0%
SK	-1%	-3%	-1%	0%	-2%	-4%	-1%	-2%	-1%	-5%	0%	-1%	-4%	-1%	-1%	-6%	-1%	-3%	-4%	-1%	0%
UK	-7%	-4%	-3%	-4%	-4%	-5%	-7%	-5%	-3%	-7%	-1%	-2%	-6%	-5%	-2%	-7%	-2%	-3%	-4%	0%	0%
EU28	-3%	-4%	-2%	-2%	-3%	-4%	-4%	-3%	-2%	-7%	-2%	-2%	-5%	-2%	-2%	-7%	-3%	-4%	-4%	-1%	0%

To sum up, the introduction of an auction mechanism and the distribution of capacity rights without any reserve price highly increases the utilisation of LNG terminals in the EU28, depending on the scenario with 2-9 percentage points on EU28 level. The higher utilisation has an overall positive effect on the average price in the EU28. However, lower access tariffs lead to lower profits for LSOs, even with increased congestion rent on the infrastructure. Potential losses of the LSO compared to the without measures case may be compensated, or a reserve price may be set up to cover for this lost revenue.

The impact of the auction mechanism has been estimated for a set of other regions as well, as listed in the Appendix. Due to the high number of cases, only a summary of these results and the main take-aways are presented.

Baltic (BAL)
In this scenario, the auction mechanism was implemented for the Polish and Lithuanian terminals. Effects on the EU-28 level are therefore negligible but can be found on the Polish and Baltic markets. In the without measures case, the Klaipeda LNG terminal has the lowest regasification tariff (0.4 €/MWh), while the Polish terminal has one of the highest (2.2 €/MWh). This results in a high utilisation for the Lithuanian terminal and lower for the Polish, as they are geographically close to each other. If tariffs are only recovering variable costs in these two terminals, the Polish terminal will significantly increase its utilisation, while the Lithuanian terminal will see lower flows – LNG terminal access tariff being the same in Poland and Lithuania with the measure, but the Polish terminal being closer to all liquefaction terminals, and hence having lower sea transport costs. This effect can be seen in scenarios 2025 low demand and 2030 without measures demand and low demand (see Figure 34 and Figure 35).

Figure 33: Effects of auction allocation without reserve price in BAL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2020

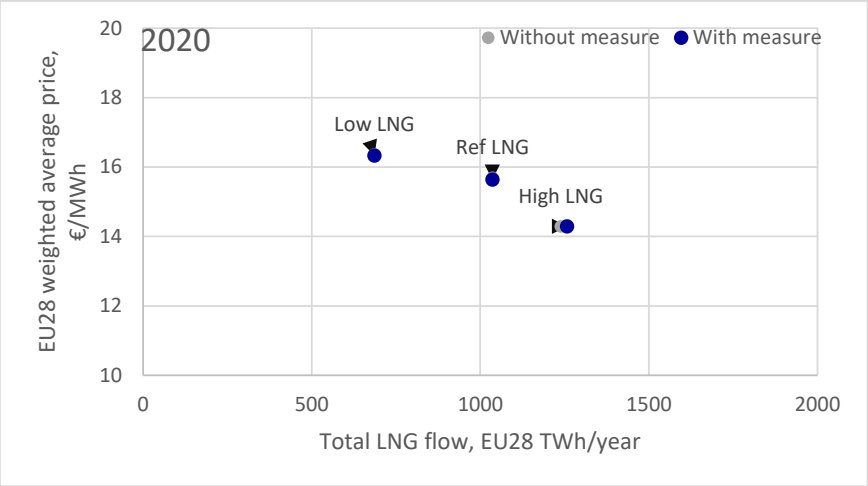


Figure 34: Effects of auction allocation without reserve price in BAL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2025

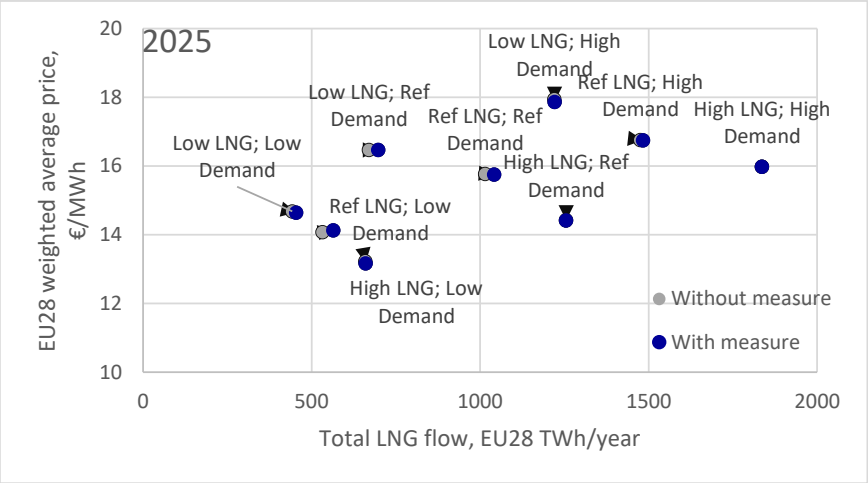


Figure 35: Effects of auction allocation without reserve price in BAL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2030

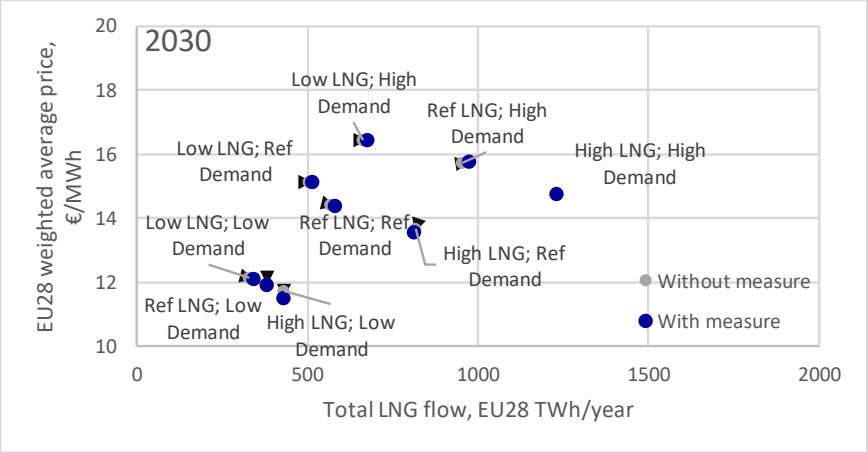


Table 30: Effect of capacity allocation with auction on Świnoujście LNG terminal

Year	Demand	LNG	PL_Swi					
			Without Measure	With Measure	Effect	Without Measure	With Measure	Effect
			%	%	%	TWh/yr	TWh/yr	TWh/yr
2020	EUCO 3232.5	High	56%	100%	44%	32	58	25
		Ref	57%	66%	10%	33	38	6
		Low	57%	57%	0%	33	33	0
2025	High	High	100%	100%	0%	90	90	0
		Ref	91%	100%	9%	82	90	8
		Low	54%	100%	46%	49	90	41
	EUCO 3232.5	High	88%	100%	12%	79	90	11
		Ref	57%	100%	43%	51	90	39
		Low	49%	100%	51%	44	90	46
	Low	High	36%	100%	64%	32	90	57
		Ref	36%	100%	64%	32	90	57
		Low	36%	61%	25%	32	55	22
2030	High	High	97%	100%	3%	88	90	2
		Ref	73%	100%	27%	66	90	24
		Low	49%	100%	51%	44	90	46

Year	Demand	LNG	PL_Swi					
			Without Measure	With Measure	Effect	Without Measure	With Measure	Effect
			%	%	%	TWh/yr	TWh/yr	TWh/yr
	EUCO 3232.5	High	61%	100%	39%	54	90	35
		Ref	36%	100%	64%	32	90	57
		Low	49%	81%	32%	44	73	29
	Low	High	36%	84%	48%	32	75	43
		Ref	36%	73%	37%	32	66	33
		Low	36%	57%	21%	32	51	19

Table 31: Effect of capacity allocation with auction on Klaipeda LNG terminal

Year	Demand	LNG	LT_Kla					
			Without Measure	With Measure	Effect	Without Measure	With Measure	Effect
			%	%	%	TWh/yr	TWh/yr	TWh/yr
2020	EUCO 3232.5	High	79%	79%	0%	35	35	0
		Ref	79%	79%	0%	35	35	0
		Low	78%	78%	0%	35	35	0
2025	High	High	100%	100%	0%	45	45	0
		Ref	100%	100%	0%	45	45	0
		Low	100%	100%	0%	45	45	0
	EUCO 3232.5	High	100%	100%	0%	45	45	0
		Ref	100%	100%	0%	45	45	0
		Low	93%	90%	-3%	42	40	-1
	Low	High	95%	92%	-4%	43	41	-2
		Ref	92%	64%	-27%	41	29	-12
		Low	74%	53%	-22%	33	24	-10
2030	High	High	100%	100%	0%	45	45	0
		Ref	100%	100%	0%	45	45	0
		Low	97%	92%	-5%	43	41	-2
	EUCO 3232.5	High	100%	100%	0%	45	44	0
		Ref	93%	74%	-19%	42	33	-9
		Low	87%	68%	-19%	39	30	-8
	Low	High	76%	29%	-47%	34	13	-21
		Ref	63%	29%	-34%	28	13	-15
		Low	38%	29%	-10%	17	13	-4

Similarly, the measure has price effects in Poland, Lithuania and in some neighbouring countries (Estonia, Latvia, Finland). In some scenarios, the measure may decrease wholesale prices with 0.6-0.8 €/MWh for these countries (2030 EUCO3232.5 demand and High LNG assumptions or 2020 EUCO3232.5 demand and reference LNG). However, price effects in other markets are well below 1%. Overall, this measure has generally positive effects on the utilisation of the Polish LNG terminal and no or negative effects on the Lithuanian one. This is because some deliveries originally targeting Lithuania are rerouted to Poland due to the relatively higher tariff decrease.

Table 32: Price effects of the capacity allocation with auction measure on the Baltic terminals, change compared to without measures case, %

Year	2020			2025									2030								
Demand	EUCO3232.5			High			EUCO3232.5			Low			High			EUCO3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low
AT	0%	0%	0%	0%	0%	-1%	0%	0%	0%	-1%	0%	0%	0%	1%	0%	0%	0%	0%	-3%	-1%	0%
BE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BG	0%	0%	0%	0%	0%	-1%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%
CZ	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-3%	-1%	0%
CY	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%
DE	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-3%	-1%	0%
DK	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-3%	0%	0%
EE	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-2%	-2%	0%	0%	0%	0%	-6%	-4%	0%	1%	0%	-1%
ES	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	2%	0%	-3%	-1%	0%
FI	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-2%	-2%	0%	0%	0%	0%	-5%	-4%	0%	1%	-1%	-1%
FR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	1%	0%	-3%	-1%	0%
GR	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%
HR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%
HU	0%	0%	0%	0%	0%	-1%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	-2%	0%	0%
IE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%	0%	2%	1%	0%	1%	0%
IT	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	-1%	0%	0%
LT	0%	-2%	-2%	0%	0%	-1%	-1%	-2%	0%	-3%	-2%	0%	0%	0%	0%	-6%	-4%	0%	1%	0%	-1%
LU	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
LV	0%	-2%	-2%	0%	0%	-1%	-1%	-2%	0%	-2%	-2%	0%	0%	0%	0%	-6%	-4%	0%	1%	0%	-1%
MT	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%
NL	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL	0%	-8%	-4%	0%	0%	-1%	-1%	-2%	0%	-3%	-3%	-3%	0%	0%	-1%	-5%	-4%	-2%	-5%	-3%	-3%
PT	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	2%	0%	2%	0%	-4%	-1%	0%
RO	0%	0%	0%	0%	0%	-1%	0%	0%	0%	-1%	0%	-3%	0%	0%	0%	0%	0%	0%	-1%	0%	0%
SE	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-2%	0%	0%
SI	0%	0%	0%	0%	0%	-1%	0%	0%	0%	-1%	0%	0%	0%	1%	0%	0%	0%	0%	-3%	0%	0%
SK	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-3%	-1%	0%
UK	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
EU28	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-2%	-1%	0%

Green colour means price decrease compared to the without measures case; red colour means price increase compared to the without measures case

Consumer surplus effects are small but positive in most scenarios compared to the without measures case. Total welfare effects including impacts on other market actors are negative.

Table 33: Welfare effects of the capacity allocation with auction measure on the Baltic terminals, change compared to without measures case, M€/year

AUCTION BAL									
Year	**Demand**	**LNG**	**ΔCS**	**ΔPS**	**ΔLTC**	**ΔLSO**	**ΔSSO**	**ΔTSO**	**ΔTotal**
2020	EUCO 3232.5	High	-15	0	20	-33	-2	-11	-42
		Ref	253	-69	-204	-78	0	18	-80
		Low	139	-33	-106	-77	0	3	-74
2025	High	High	0	0	11	-69	0	-12	-69
		Ref	31	-7	19	-57	2	-73	-85
		Low	458	-92	-314	-133	6	-24	-99
	EUCO 3232.5	High	70	-18	-20	-76	7	-28	-65
		Ref	75	-24	-18	-36	3	-72	-72
		Low	4	-3	11	-78	4	-44	-105
	Low	High	213	-75	-106	-84	0	-41	-93
		Ref	-197	89	125	-39	-4	-40	-65
		Low	118	-76	-10	-61	-3	-70	-102
2030	High	High	-3	0	25	-66	0	-27	-70
		Ref	-131	8	78	-14	-2	-20	-82
		Low	-15	-20	87	-65	-10	-80	-104
	EUCO 3232.5	High	317	-96	-114	-104	-3	-87	-87
		Ref	37	-11	66	-68	-5	-88	-70
		Low	101	-34	-47	-79	-2	-24	-85
	Low	High	611	-101	-550	-74	-2	26	-90
		Ref	176	-49	-116	-76	1	12	-53
		Low	80	-33	-24	-66	-3	-27	-73

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

Central Western Europe (CWE)

In this measure, four terminals (Rotterdam, Zeebrugge, Montoir de Bretagne and Dunkerque) have the option to allocate capacities in an auction, while other terminals remain as in the without measures case. Since the measure relates only to some LNG terminals, EU28-wide effects are limited. However, total LNG flows increase significantly in High LNG supply scenarios, as these terminals are located at the interconnected western European markets which may easily absorb higher volumes.

Figure 36: Effects of auction allocation of CWE terminals on EU28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2020

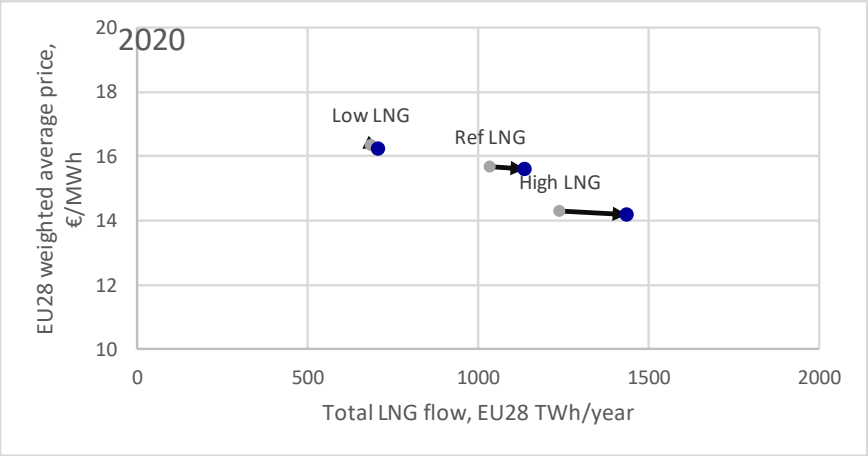


Figure 37: Effects of auction allocation of CWE terminals on EU28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2025

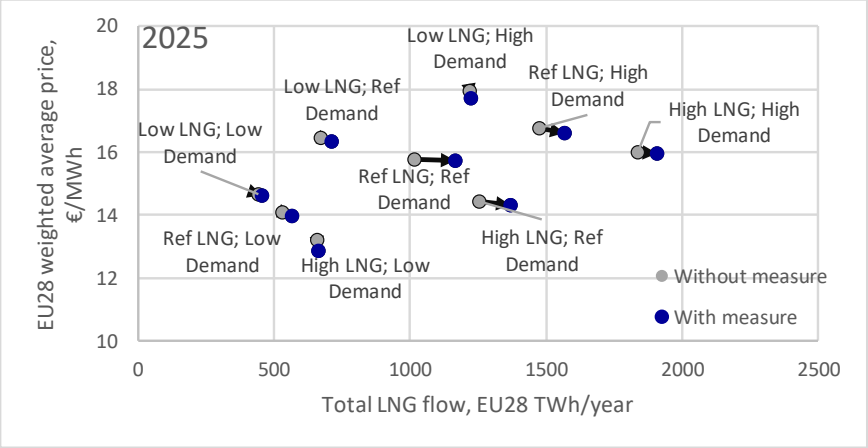


Figure 38: Effects of auction allocation of CWE terminals on EU28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2030

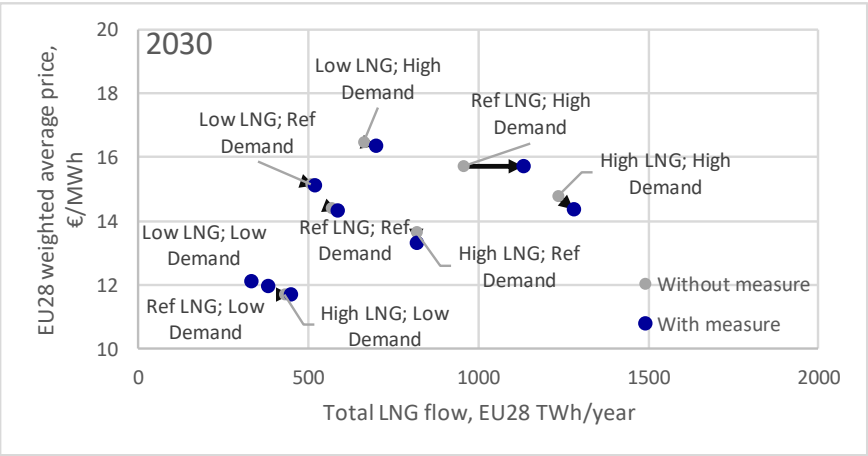


Table 34: Effect of capacity allocation with auction on Zeebrugge LNG terminal

Year	Demand	LNG	BE_ZEE					
			Without Measure	With Measure	Effect	Without Measure	With Measure	Effect
			%	%	%	TWh/yr	TWh/yr	TWh/yr
2020	EUCO 3232.5	High	24%	84%	61%	38	137	98
		Reference	10%	65%	54%	17	105	88
		Low	10%	12%	1%	17	19	2
2025	High	High	91%	100%	9%	148	162	15
		Reference	61%	80%	19%	99	130	31
		Low	51%	69%	17%	84	111	28
	EUCO 3232.5	High	59%	87%	28%	96	141	46
		Reference	13%	75%	62%	21	121	100
		Low	10%	15%	4%	17	24	7
	Low	High	10%	20%	9%	17	32	15
		Reference	10%	10%	0%	17	17	0
		Low	10%	10%	0%	17	17	0
2030	High	High	87%	87%	0%	141	141	0
		Reference	37%	75%	38%	60	121	61
		Low	19%	34%	15%	32	56	24
	EUCO 3232.5	High	70%	75%	5%	113	121	8
		Reference	23%	45%	22%	37	73	36
		Low	10%	19%	8%	17	31	14
	Low	High	10%	35%	24%	17	57	40
		Reference	10%	10%	0%	17	17	0
		Low	10%	10%	0%	17	17	0

Utilisation of LNG terminals increases significantly in High LNG supply scenarios.

Table 35: Effect of auction allocation without reserve price in CWE terminals, change in utilisation compared to without measures case, percentage points

Year	Demand	LNG	BE_Zee	NL_Rot	FR_Dun	FRMon
2020	EUCO 3232.5	High	61%	35%	32%	11%
		Reference	54%	0%	59%	27%
		Low	1%	0%	18%	17%
2025	High	High	9%	33%	17%	0%
		Reference	19%	39%	25%	0%
		Low	17%	16%	37%	0%
	EUCO 3232.5	High	28%	52%	24%	9%
		Reference	62%	2%	57%	24%
		Low	4%	0%	16%	40%
	Low	High	9%	0%	31%	57%
		Reference	0%	0%	2%	52%
		Low	0%	0%	0%	11%
2030	High	High	0%	50%	16%	0%
		Reference	38%	18%	60%	20%
		Low	15%	0%	8%	42%
	EUCO 3232.5	High	5%	0%	39%	9%
		Reference	22%	0%	0%	31%
		Low	8%	0%	0%	10%
	Low	High	24%	0%	0%	5%
		Reference	0%	0%	0%	0%
		Low	0%	0%	0%	0%

Green colour means increase in LNG terminal utilisation; red colour means decrease in utilisation

Price effects of the measure can be observed in the French, Dutch and Belgian markets, resulting in a 2% price decrease in most scenarios and 4-5% in high LNG supply scenarios. Neighbouring major markets are not affected (e.g. UK, DE, ES). On the other hand, in some scenarios Baltic markets experience some negative effects: some LNG deliveries into Lithuania are rerouted to Western-European terminals resulting in lower utilization of Klaipeda terminal and higher prices on Baltic markets.

Figure 39: Price effect of auction allocation in CWE terminals, % compared to without measures case

Year	2020			2025									2030								
Demand	EUCO 3232.5			High			EUCO 3232.5			Low			High			EUCO 3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low
AT	0%	-1%	0%	0%	0%	-1%	-1%	0%	0%	-3%	0%	0%	-1%	0%	0%	-2%	0%	0%	0%	0%	0%
BE	-2%	-1%	-2%	0%	-2%	-3%	-1%	-1%	-2%	-3%	-1%	-1%	-5%	-1%	-2%	-4%	-2%	0%	0%	0%	0%
BG	0%	-1%	0%	0%	0%	-1%	-1%	0%	0%	-3%	0%	0%	-1%	0%	0%	-3%	0%	0%	0%	0%	0%
CZ	0%	-1%	0%	0%	0%	-1%	-1%	0%	0%	-3%	0%	0%	-4%	0%	0%	-3%	0%	0%	0%	0%	0%
CY	0%	0%	0%	0%	0%	-1%	-1%	0%	0%	-2%	-1%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
DE	-1%	-1%	-1%	0%	-2%	-1%	-1%	-1%	0%	-3%	0%	0%	-4%	0%	0%	-4%	0%	0%	-1%	0%	0%
DK	-1%	-1%	0%	0%	0%	-1%	-1%	-1%	0%	-3%	0%	0%	-4%	0%	0%	-3%	0%	0%	0%	0%	0%
EE	0%	0%	3%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-2%	0%	-1%	-3%	0%	0%	3%	0%	0%
ES	0%	0%	0%	0%	0%	0%	0%	0%	-2%	-3%	-2%	0%	-1%	0%	-2%	-6%	-1%	-2%	-1%	0%	0%
FI	0%	0%	3%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-2%	0%	0%	-2%	0%	0%	3%	0%	0%
FR	-2%	-2%	-2%	-1%	-2%	-4%	-2%	-2%	-2%	-4%	-2%	0%	-4%	-1%	-2%	-5%	-2%	-2%	-1%	0%	0%
GR	-1%	0%	0%	0%	0%	-1%	0%	0%	0%	-2%	-1%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
HR	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%	-1%	0%	1%	-1%	1%	0%	0%	0%	0%
HU	0%	-1%	0%	0%	0%	-1%	-1%	0%	0%	-2%	0%	0%	-2%	0%	0%	-2%	0%	0%	0%	0%	0%
IE	0%	0%	-2%	0%	-1%	-1%	0%	1%	-1%	-1%	0%	0%	0%	1%	0%	0%	2%	1%	2%	0%	0%
IT	-1%	0%	0%	0%	0%	-1%	0%	0%	0%	-2%	-1%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%
LT	3%	3%	3%	0%	0%	-1%	0%	0%	0%	-2%	0%	0%	-3%	0%	0%	-3%	0%	0%	3%	0%	0%
LU	-1%	-1%	-2%	0%	-2%	-2%	-1%	-1%	-1%	-3%	-1%	-1%	-5%	-1%	-1%	-4%	-2%	0%	0%	0%	0%
LV	3%	3%	3%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-3%	0%	-1%	-3%	0%	0%	3%	0%	0%
MT	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%	-1%	0%	1%	0%	2%	0%	0%	0%	0%
NL	-1%	-1%	-2%	0%	-2%	-3%	-1%	-1%	-1%	-3%	-1%	-1%	-5%	-1%	-2%	-4%	-2%	0%	0%	0%	0%
PL	0%	-1%	0%	0%	0%	-1%	0%	0%	0%	-3%	0%	0%	-3%	0%	0%	-3%	0%	0%	0%	0%	0%
PT	0%	1%	0%	0%	0%	0%	0%	1%	1%	-2%	-1%	0%	0%	1%	1%	-6%	-1%	-2%	-1%	0%	0%
RO	0%	-1%	0%	0%	0%	-1%	-1%	0%	0%	-3%	0%	0%	-2%	0%	0%	-3%	0%	0%	0%	0%	0%
SE	-1%	-1%	0%	0%	0%	-1%	-1%	-1%	0%	-3%	0%	0%	-4%	0%	0%	-3%	0%	0%	0%	0%	0%
SI	0%	-1%	0%	0%	0%	-1%	0%	0%	0%	-2%	0%	0%	-1%	0%	0%	-2%	0%	0%	0%	0%	0%
SK	0%	-1%	0%	0%	0%	-1%	-1%	0%	0%	-3%	0%	0%	-4%	0%	0%	-3%	0%	0%	0%	0%	0%
UK	0%	0%	-2%	0%	-1%	-1%	0%	1%	-1%	-2%	-1%	-1%	0%	1%	0%	0%	1%	0%	0%	0%	0%
EU28	-1%	-1%	-1%	0%	-1%	-1%	-1%	0%	-1%	-3%	-1%	0%	-3%	0%	-1%	-3%	-1%	0%	0%	0%	0%

Green colour means price decrease compared to the without measures case; red colour means price increase compared to the without measures case

Table 36: Welfare effect of auction allocation in CWE terminals, M€/year

AUCTION CWE									
Year	**Demand**	**LNG**	**ΔCS**	**ΔPS**	**ΔLTC**	**ΔLSO**	**ΔSSO**	**ΔTSO**	**ΔTotal**
2020	EUCO 3232.5	High	448	-95	-274	-72	-24	74	58
		Ref	430	-104	-298	-136	-11	94	-25
		Low	660	-270	-375	-20	7	-42	-40
2025	High	High	122	-10	-53	-69	8	-3	-7
		Ref	839	-213	-542	-174	27	31	-32
		Low	1196	-306	-760	-307	24	63	-89
	EUCO 3232.5	High	467	-113	-304	-172	-2	110	-13
		Ref	253	-40	-193	-58	3	39	5
		Low	563	-161	-376	-64	26	-23	-35
	Low	High	1276	-397	-830	-176	-11	44	-93
		Ref	331	-78	-224	-28	-9	-2	-11
		Low	140	-59	-87	-9	10	-4	-9
2030	High	High	1706	-370	-1054	-411	1	33	-95
		Ref	132	-35	-99	-38	-13	59	6
		Low	467	-108	-330	-128	-4	-6	-109
	EUCO 3232.5	High	1315	-296	-935	-271	-2	66	-122
		Ref	260	-79	-183	-34	0	12	-24
		Low	130	-7	-140	-7	-3	7	-20
	Low	High	68	-13	-75	-9	-4	15	-17
		Ref	0	0	0	-12	0	0	-12
		Low	0	0	0	-12	0	0	-12

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

Overall, this measure has a high effect on terminal utilisation and flows and price effect in the markets where the terminals are located. On EU28 level, price effects are less stronger but still detectable, as the terminals affected are close to the large gas consuming markets in the EU. Overall welfare effect is negative.

Central Western Europe and North Atlantic (CWE + NATL)
In this scenario, auction allocation is imposed to all CWE and NATL terminals. A general price decrease is noticed in all scenarios, albeit to a different extent: with higher global LNG supply or higher demand, the price effect and changes in LNG inflow are generally stronger.

Figure 40: Effects of auction allocation without reserve price in CWE and NATL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2020

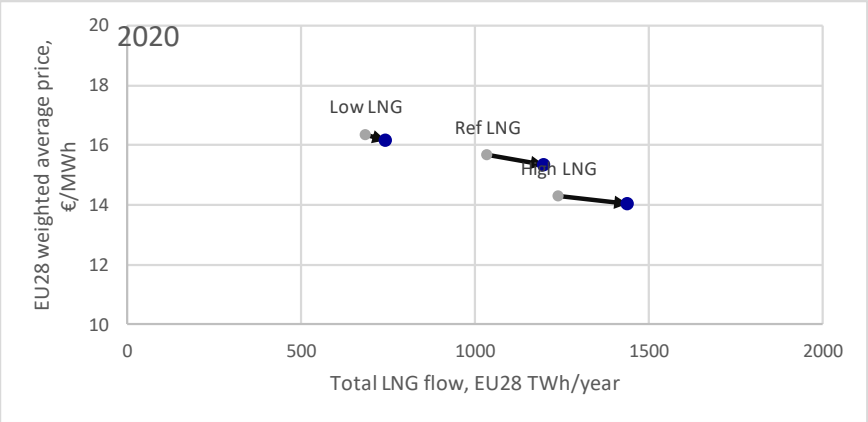


Figure 41: Effects of auction allocation without reserve price in CWE and NATL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2025

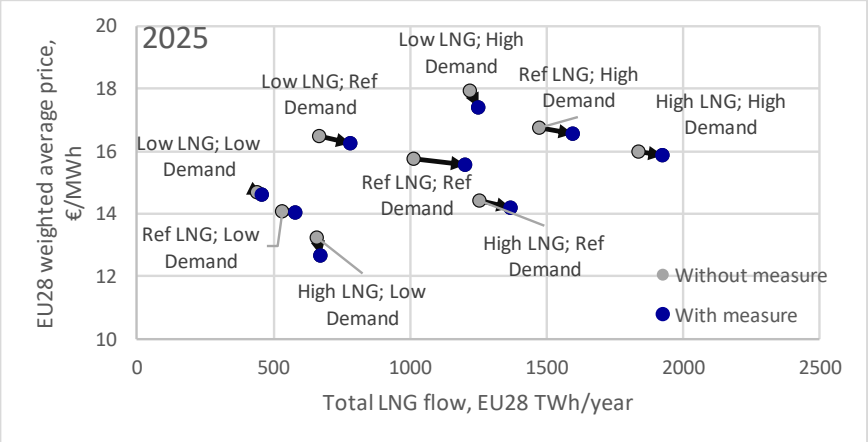


Figure 42: Effects of auction allocation without reserve price in CWE and NATL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2030

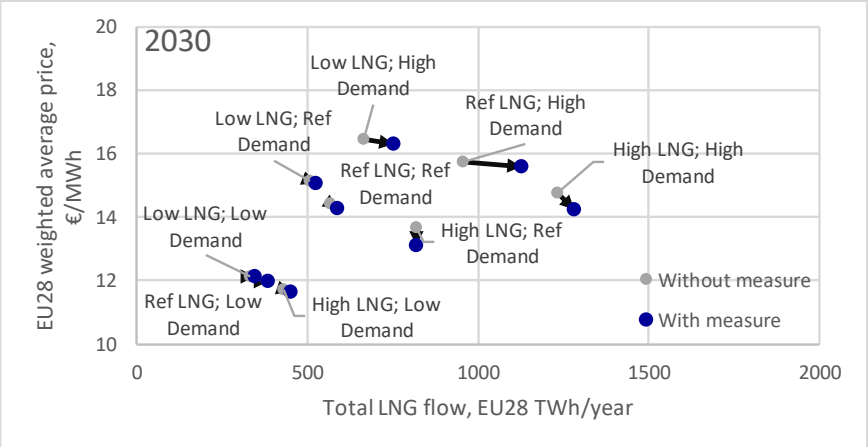


Table 37: Price effect of auction allocation in CWE and NATL terminals, % compared to without measures case

	2020			2025									2030								
	EUCO 3232.5			High			EUCO 3232.5			Low			High			EUCO 3232.5			Low		
	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low
AT	0%	-1%	-1%	0%	0%	-2%	-1%	0%	-1%	-3%	0%	0%	-1%	0%	-1%	-3%	0%	0%	0%	0%	0%
BE	-2%	-3%	-3%	0%	-2%	-4%	-1%	-1%	-2%	-5%	-1%	-1%	-5%	-1%	-1%	-5%	-2%	0%	0%	0%	0%
BG	0%	-1%	-1%	0%	0%	-2%	-1%	-1%	0%	-4%	0%	0%	-1%	0%	0%	-3%	0%	0%	0%	0%	0%
CZ	0%	-2%	-1%	0%	0%	-2%	-1%	-1%	-1%	-4%	0%	0%	-4%	0%	-1%	-4%	0%	0%	0%	0%	0%
CY	0%	0%	0%	0%	0%	-2%	-1%	0%	0%	-2%	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%
DE	-1%	-3%	-1%	0%	-2%	-4%	-1%	-1%	-1%	-4%	0%	0%	-4%	0%	-1%	-4%	0%	0%	0%	0%	0%
DK	-1%	-2%	-1%	0%	0%	-2%	-1%	-1%	-1%	-4%	0%	0%	-4%	0%	-1%	-4%	0%	0%	0%	0%	0%
EE	0%	0%	3%	0%	0%	0%	0%	0%	0%	-2%	0%	0%	-2%	0%	-1%	-3%	0%	0%	3%	1%	0%
ES	0%	1%	0%	-1%	0%	0%	0%	1%	-2%	-5%	-1%	-1%	-1%	0%	-1%	-6%	-1%	-1%	0%	0%	0%
FI	0%	0%	2%	0%	0%	0%	0%	0%	0%	-2%	0%	0%	-2%	0%	0%	-3%	0%	0%	4%	1%	0%
FR	-2%	-2%	-2%	-1%	-2%	-4%	-2%	-2%	-2%	-5%	-1%	0%	-4%	-1%	-1%	-5%	-2%	-1%	0%	0%	0%
GR	-1%	-1%	-1%	0%	0%	-2%	0%	0%	0%	-2%	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%
HR	0%	0%	0%	0%	0%	-1%	0%	1%	1%	0%	3%	0%	-1%	0%	1%	-1%	1%	1%	0%	0%	0%
HU	0%	-1%	0%	0%	0%	-2%	-1%	0%	0%	-3%	0%	0%	-2%	0%	0%	-3%	0%	0%	0%	0%	0%
IE	-6%	-4%	-2%	-3%	-4%	-4%	-6%	-4%	-2%	-6%	-2%	-2%	-6%	-4%	-3%	-6%	-4%	-4%	-5%	-5%	-2%
IT	-1%	-1%	-1%	0%	0%	-2%	0%	0%	-1%	-2%	0%	0%	-1%	0%	-1%	-1%	0%	0%	0%	0%	0%
LT	3%	2%	3%	0%	0%	-2%	0%	-1%	0%	-3%	0%	0%	-3%	0%	-1%	-3%	0%	0%	3%	1%	1%
LU	-1%	-3%	-2%	0%	-2%	-4%	-1%	-1%	-2%	-5%	-1%	-1%	-5%	-1%	-1%	-5%	-2%	0%	0%	0%	0%
LV	3%	2%	3%	0%	0%	-1%	0%	-1%	0%	-2%	0%	0%	-3%	0%	-1%	-3%	0%	0%	3%	1%	0%
MT	0%	0%	0%	0%	0%	-1%	0%	1%	0%	0%	3%	0%	-1%	0%	1%	0%	2%	1%	1%	0%	0%
NL	-1%	-3%	-3%	0%	-2%	-4%	-1%	-1%	-3%	-5%	-1%	-1%	-5%	-1%	-1%	-4%	-2%	0%	0%	0%	0%
PL	0%	-2%	0%	0%	0%	-2%	0%	-1%	0%	-4%	0%	0%	-3%	0%	-1%	-3%	0%	0%	0%	0%	0%
PT	0%	1%	0%	0%	0%	0%	0%	2%	1%	-3%	0%	-1%	0%	1%	1%	-6%	-1%	-1%	0%	0%	0%
RO	0%	-1%	0%	0%	0%	-2%	-1%	0%	0%	-3%	0%	0%	-2%	0%	0%	-3%	0%	0%	0%	0%	0%
SE	-1%	-2%	-1%	0%	0%	-2%	-1%	-1%	-1%	-4%	0%	0%	-4%	0%	-1%	-4%	0%	0%	0%	0%	0%
SI	0%	-1%	-1%	0%	0%	-2%	0%	0%	0%	-3%	0%	0%	-1%	0%	0%	-3%	0%	0%	0%	0%	0%
SK	0%	-2%	-1%	0%	0%	-2%	-1%	-1%	-1%	-4%	0%	0%	-4%	0%	-1%	-4%	0%	0%	0%	0%	0%
UK	-7%	-4%	-2%	-3%	-4%	-4%	-7%	-4%	-3%	-7%	-1%	-1%	-7%	-5%	-2%	-7%	-3%	-3%	-5%	0%	0%
EU28	-2%	-2%	-1%	-1%	-1%	-3%	-2%	-1%	-1%	-4%	0%	0%	-3%	-1%	-1%	-4%	-1%	-1%	-1%	0%	0%

Green colour means price decrease compared to the without measures case; red colour means price increase compared to the without measures case

Table 38: Welfare effect of auction allocation in CWE and NATL terminals, M€/year

AUCTION CWE NATL									
Year	**Demand**	**LNG**	**ΔCS**	**ΔPS**	**ΔLTC**	**ΔLSO**	**ΔSSO**	**ΔTSO**	**ΔTotal**
2020	EUCO 3232.5	High	1206	-393	-434	-426	-24	47	-23
		Ref	1607	-543	-876	-351	-8	70	-102
		Low	1035	-385	-626	-127	-6	-79	-188
2025	High	High	554	-151	-169	-340	20	24	-61
		Ref	1200	-339	-654	-378	44	6	-120
		Low	3067	-715	-2189	-677	0	226	-289
	EUCO 3232.5	High	1155	-368	-505	-493	-2	118	-94
		Ref	932	-297	-390	-318	2	-1	-72
		Low	1047	-322	-664	-197	26	-97	-206
	Low	High	2056	-697	-1252	-305	-7	28	-177
		Ref	223	-94	-126	-90	-8	-12	-108
		Low	193	-85	-114	-96	13	-10	-98
2030	High	High	2223	-546	-1250	-632	1	32	-174
		Ref	639	-207	-292	-259	-12	56	-75
		Low	704	-152	-477	-251	12	-94	-258
	EUCO 3232.5	High	1967	-538	-1265	-422	1	46	-212
		Ref	536	-192	-297	-138	-1	-9	-101
		Low	335	-98	-220	-117	-6	-9	-114
	Low	High	184	-61	-97	-104	-8	-16	-102
		Ref	-16	3	27	-102	1	-7	-94
		Low	-7	3	6	-92	-3	-26	-119

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

Overall, the price effect of the combined CWE and NATL scenario is the combination of these two scenarios. Price effects are confined to the countries implementing the measure. The price decrease benefits the consumers and has negative effects on the supply side (Producers, LTC holders). LSOs have lower revenues compared to the without measures case, as congestion rents are not sufficient to cover the tariff-related losses. Other infrastructure operators are virtually unaffected. The total welfare effect is net negative, but small.

South Atlantic and Mediterranean (MED)

This measure affects all terminals in the Mediterranean and the South Atlantic Spanish and Portuguese terminals. On EU28 level, the price decrease effect is small (1-2% in most scenarios). The price effects are considerable in the countries affected by the measure, e.g. 5-7% price decrease is noticed in Spanish terminals. Due to the limited interconnectivity of Spanish markets to France, this price effect is limited to the Iberian Peninsula. Similarly, the price decrease in Italy, Greece, Croatia does not affect the wholesale price in neighbouring countries.

Figure 43: Effects of auction allocation without reserve price in MED terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2020

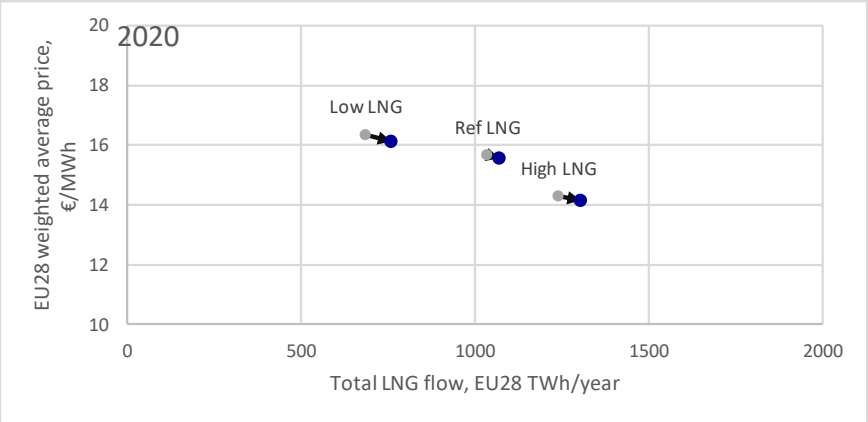


Figure 44: Effects of auction allocation without reserve price in MED terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2025

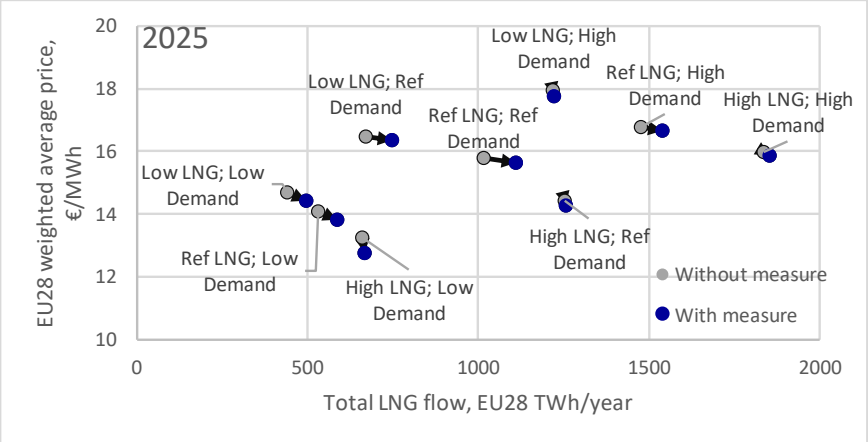
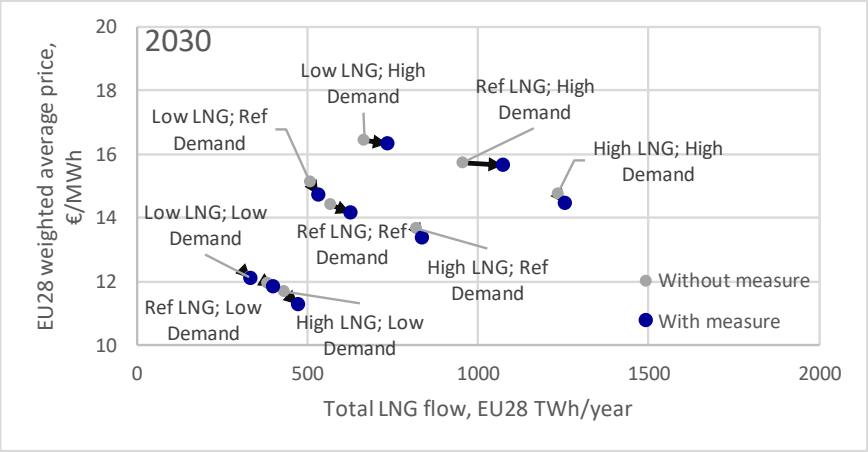


Figure 45: Effects of auction allocation without reserve price in MED terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2030



The utilisation greatly increases in the French and Italian terminals.

Table 39: Effect of auction allocation without reserve price in MED terminals, change in utilisation compared to without measures case, percentage points

Year	Demand	LNG	ES_Bar	ES_Car	ES_Hue	ES_Sag	ES_Mug	ES_Bil	FR_Cav	FR_Ton	GR_Rev	HR_Krk	IT_Olt	IT_Pan	IT_Lev	PT_Sin	MT_Del	CY_Vas
2020	EUCO 3232.5	High	0%	1%	2%	0%	56%	0%	91%	61%	0%	0%	0%	0%	16%	0%	0%	0%
		Ref	-9%	6%	5%	0%	25%	0%	82%	78%	0%	34%	13%	0%	16%	0%	0%	0%
		Low	0%	-29%	24%	0%	17%	0%	20%	31%	1%	3%	100%	0%	16%	0%	0%	0%
2025	High	High	0%	18%	0%	1%	25%	0%	29%	9%	0%	0%	0%	0%	0%	-2%	0%	0%
		Ref	-9%	14%	31%	0%	10%	0%	77%	50%	0%	0%	0%	0%	16%	-1%	0%	0%
		Low	0%	4%	18%	0%	0%	0%	73%	60%	0%	30%	2%	0%	16%	-2%	0%	0%
	EUCO 3232.5	High	0%	1%	53%	0%	0%	0%	81%	52%	0%	0%	0%	0%	16%	0%	0%	0%
		Ref	-6%	0%	35%	0%	0%	0%	81%	78%	0%	16%	0%	0%	16%	0%	0%	8%
		Low	0%	0%	9%	0%	0%	0%	35%	39%	0%	12%	66%	0%	16%	-9%	0%	16%
	Low	High	0%	0%	0%	0%	0%	0%	81%	-4%	-39%	10%	98%	0%	16%	-10%	0%	-34%
		Ref	0%	0%	0%	0%	0%	0%	33%	11%	-34%	3%	98%	0%	16%	-10%	0%	-8%
		Low	0%	0%	0%	0%	0%	0%	2%	15%	-10%	0%	83%	-5%	16%	0%	0%	0%
2030	High	High	0%	0%	56%	0%	0%	0%	72%	17%	0%	0%	0%	0%	10%	0%	0%	17%
		Ref	-1%	-2%	45%	0%	0%	0%	74%	16%	3%	8%	0%	0%	12%	0%	0%	16%
		Low	-2%	0%	0%	0%	0%	0%	37%	13%	7%	22%	33%	0%	16%	-2%	0%	16%
	EUCO 3232.5	High	0%	0%	9%	0%	0%	0%	65%	-4%	-3%	24%	92%	0%	16%	0%	0%	-45%
		Ref	0%	0%	0%	0%	0%	0%	37%	-3%	-16%	4%	100%	0%	16%	0%	0%	-33%
		Low	0%	0%	0%	0%	0%	0%	7%	8%	-22%	0%	93%	-5%	16%	0%	0%	0%
	Low	High	0%	0%	0%	0%	0%	0%	0%	0%	-2%	22%	83%	-3%	-18%	0%	0%	6%
		Ref	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	48%	-27%	0%	0%	0%	0%
		Low	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%

Green colour means increase in LNG terminal utilisation; red colour means decrease in utilisation

Table 40: Price effect of auction allocation in MED terminals, % compared to without measures case

	2020			2025									2030								
	EUCO 3232.5			High			EUCO 3232.5			Low			High			EUCO 3232.5			Low		
	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low
AT	0%	-1%	-1%	0%	-1%	-1%	-1%	-1%	0%	-3%	0%	-5%	-3%	-1%	-1%	-1%	-2%	-5%	-4%	0%	0%
BE	0%	-1%	-1%	0%	0%	0%	0%	0%	-2%	-2%	-1%	-1%	-2%	0%	0%	-1%	0%	-1%	0%	0%	0%
BG	0%	-1%	-1%	0%	0%	-1%	-1%	-1%	0%	-2%	0%	1%	0%	0%	-1%	-1%	-2%	-6%	-1%	0%	0%
CZ	0%	0%	-1%	0%	-1%	-1%	-1%	-1%	0%	-2%	0%	-1%	-1%	0%	0%	-1%	0%	-1%	-4%	0%	0%
CY	-6%	-5%	-4%	0%	0%	-1%	-2%	-1%	0%	-9%	-7%	-5%	0%	1%	0%	-5%	-8%	-6%	-4%	-3%	0%
DE	0%	-1%	-1%	0%	-1%	-1%	-1%	-1%	0%	-2%	0%	0%	-1%	0%	0%	-1%	0%	-1%	-4%	0%	0%
DK	0%	0%	-1%	0%	-1%	-1%	0%	-1%	0%	-2%	0%	0%	-1%	0%	0%	-1%	0%	-1%	-4%	0%	0%
EE	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	-1%	-1%	0%	0%
ES	-6%	-5%	-6%	-7%	-5%	-6%	-7%	-6%	-2%	-3%	-2%	-1%	-7%	-5%	-2%	-3%	-2%	-4%	-4%	0%	0%
FI	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	-1%	-1%	0%	0%
FR	-1%	-1%	-1%	-4%	-1%	-2%	-2%	-2%	-2%	-3%	-2%	-1%	-3%	-1%	-2%	-2%	-2%	-4%	-4%	0%	0%
GR	-1%	-1%	-2%	0%	0%	-1%	-2%	-1%	0%	-9%	-7%	-5%	0%	1%	0%	-5%	-7%	-6%	-7%	-3%	0%
HR	0%	-1%	-4%	-6%	-5%	-5%	-6%	-5%	-2%	-4%	-2%	-4%	-6%	-3%	-3%	-3%	-4%	-4%	-5%	-6%	-1%
HU	0%	-1%	-1%	0%	-1%	-1%	-1%	-1%	0%	-2%	0%	-3%	-1%	0%	-1%	-1%	-2%	-5%	-3%	0%	0%
IE	0%	0%	-1%	0%	0%	-1%	0%	1%	-1%	-1%	0%	-1%	1%	1%	0%	1%	2%	0%	0%	0%	0%
IT	-1%	-1%	-2%	0%	-1%	-1%	-2%	-1%	0%	-9%	-7%	-5%	-3%	-1%	-2%	-7%	-7%	-5%	-8%	-4%	0%
LT	-1%	-1%	-1%	0%	0%	-1%	0%	-1%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	-1%	-1%	0%	0%
LU	0%	-1%	-1%	0%	0%	-1%	0%	0%	-1%	-2%	-1%	-1%	-1%	0%	0%	-1%	0%	-1%	0%	0%	0%
LV	-1%	-1%	-1%	0%	0%	0%	0%	-1%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	-1%	-1%	0%	0%
MT	-5%	-4%	-4%	-6%	-5%	-5%	-6%	-5%	-2%	-4%	-2%	-5%	-5%	-3%	-3%	-3%	-4%	-5%	-7%	-6%	-6%
NL	0%	-1%	-1%	0%	0%	0%	0%	-1%	-2%	-2%	-1%	-1%	-2%	0%	0%	-1%	0%	-1%	0%	0%	0%
PL	0%	0%	0%	0%	0%	-1%	0%	-1%	0%	-2%	0%	0%	-1%	0%	0%	-1%	0%	-1%	-3%	0%	0%
PT	1%	1%	0%	0%	0%	-1%	1%	0%	1%	-1%	-1%	-1%	0%	1%	0%	-3%	-2%	-4%	-5%	0%	0%
RO	0%	-1%	-1%	0%	0%	-1%	-1%	-1%	0%	-3%	0%	-3%	-1%	0%	-1%	-1%	-2%	-3%	-1%	0%	0%
SE	0%	0%	-1%	0%	-1%	-1%	0%	-1%	0%	-2%	0%	0%	-1%	0%	0%	-1%	0%	-1%	-3%	0%	0%
SI	0%	-1%	-1%	0%	-1%	-1%	-1%	-1%	0%	-3%	0%	-4%	-3%	-1%	-1%	-1%	-2%	-5%	-4%	0%	0%
SK	0%	0%	-1%	0%	-1%	-1%	-1%	-1%	0%	-2%	0%	-1%	-1%	0%	0%	-1%	-1%	-1%	-4%	0%	0%
UK	0%	0%	-1%	0%	0%	-1%	0%	1%	-1%	-2%	-1%	-1%	0%	0%	0%	0%	3%	-1%	0%	0%	0%
EU28	-1%	-1%	-2%	-1%	-1%	-1%	-1%	-1%	-1%	-4%	-2%	-2%	-2%	-1%	-1%	-2%	-2%	-3%	-3%	-1%	0%

Green colour means price decrease compared to the without measures case; red colour means price increase compared to the without measures case

Table 41: Welfare effect of auction allocation in MED terminals, M€/year

AUCTION MED									
Year	**Demand**	**LNG**	**ΔCS**	**ΔPS**	**ΔLTC**	**ΔLSO**	**ΔSSO**	**ΔTSO**	**ΔTotal**
2020	EUCO 3232.5	High	640	-56	-398	-473	1	21	-264
		Ref	693	-106	-456	-434	26	-22	-299
		Low	1253	-272	-807	-380	-1	-214	-422
2025	High	High	649	-30	-385	-752	-4	191	-333
		Ref	626	-58	-434	-440	13	-31	-324
		Low	1088	-123	-796	-588	8	9	-402
	EUCO 3232.5	High	721	-94	-492	-555	14	95	-312
		Ref	684	-90	-474	-365	11	-58	-291
		Low	590	-178	-392	-257	30	-128	-334
	Low	High	1693	-406	-1137	-512	-6	-16	-383
		Ref	931	-167	-658	-371	4	-48	-309
		Low	909	-236	-613	-335	9	-144	-410
2030	High	High	1228	-164	-826	-581	12	51	-280
		Ref	361	1	-311	-330	10	17	-253
		Low	608	-75	-397	-314	-4	-215	-398
	EUCO 3232.5	High	964	-130	-696	-441	17	-16	-303
		Ref	913	-74	-710	-376	1	-89	-335
		Low	1470	-281	-1122	-391	-12	-68	-404
	Low	High	1158	-149	-1060	-346	-5	25	-376
		Ref	290	-49	-241	-358	1	-3	-360
		Low	24	-4	-18	-349	0	-2	-350

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

The measure has an overall net negative welfare effect. Consumers do gain in all scenario setups, thanks to lower wholesale prices, but the supply side (producers, traders importing gas) is worse off compared to the without measures case. LSOs realise a loss due to the decreased operational revenues, notwithstanding the somewhat higher income from congestion rents. Overall positive gains on the consumer side are offset by the losses on infrastructure operation and at supply side. Overall welfare effects are slightly negative. This means that if any such measure is to be introduced, regulators should be aware that any gains on the consumer side are coming at the expense of other stakeholders.

Total consumer surplus gains are higher than the losses of infrastructure operators: this means that potential losses of LSOs, TSOs and SSOs may be compensated via a surcharge on TSO exits.

North Atlantic (NATL)
This measure affects all UK terminals and the to-be-commissioned Irish terminal. The price and welfare effects are limited to the UK and Ireland, and do not affect other countries in the EU. Utilisation of UK terminals increases in most scenarios.

Figure 46: Effects of auction allocation without reserve price in NATL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2020

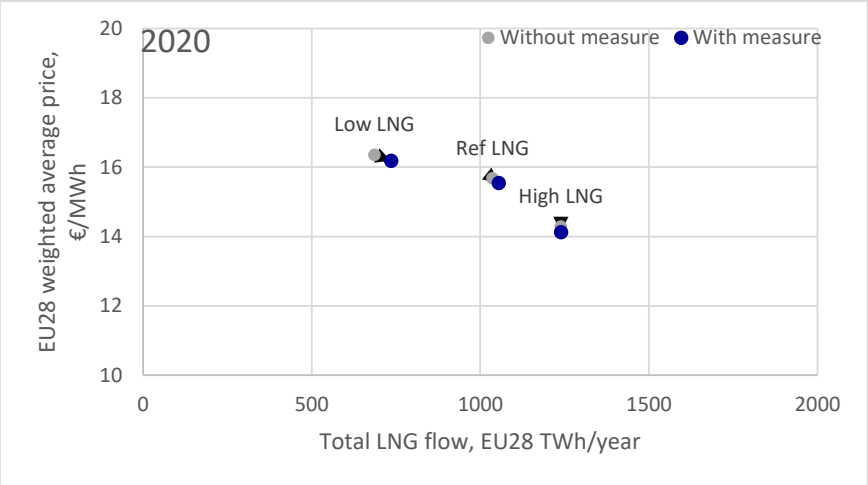


Figure 47: Effects of auction allocation without reserve price in NATL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2025

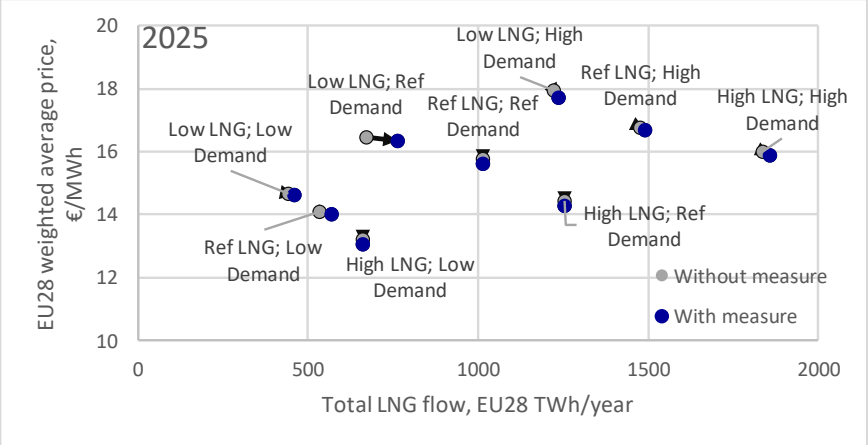


Figure 48: Effects of auction allocation without reserve price in NATL terminals on weighted average EU28 price (vertical axis) and total LNG flows (horizontal axis), 2030

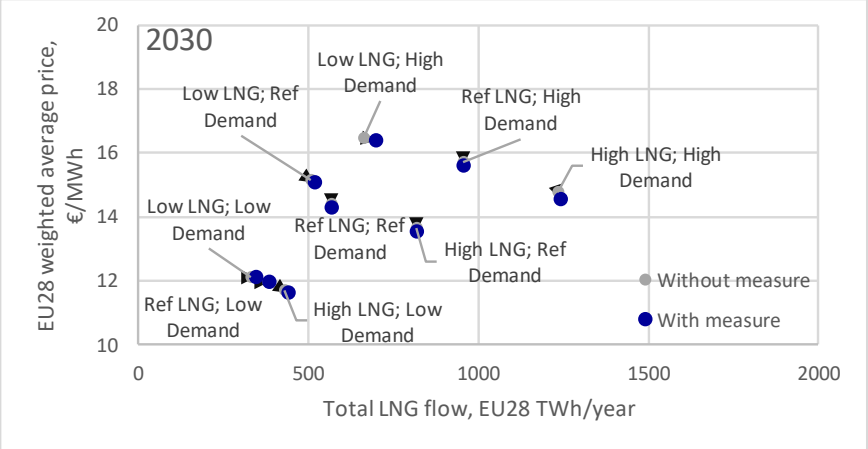


Table 42: Effect of capacity allocation with auction on Isle of Grain LNG terminal

Year	Demand	LNG	UK_Gra					
			Without measure	With Measure	Effect	Without measure	With Measure	Effect
			%	%	%	TWh/yr	TWh/yr	TWh/yr
2020	EUCO 3232.5	High	64%	67%	2%	151	156	5
		Ref	56%	67%	10%	132	156	24
		Low	8%	17%	9%	19	39	21
2025	High	High	81%	83%	2%	191	195	4
		Ref	72%	76%	4%	169	178	10
		Low	64%	74%	10%	150	173	24
	EUCO 3232.5	High	56%	57%	1%	131	135	3
		Ref	54%	56%	2%	127	132	5
		Low	8%	28%	20%	19	66	47
	Low	High	11%	12%	1%	26	28	2
		Ref	1%	15%	14%	3	35	32
		Low	0%	3%	3%	0	8	8
2030	High	High	17%	45%	29%	39	106	67
		Ref	31%	26%	-4%	73	62	-11
		Low	0%	23%	23%	0	55	55
	EUCO 3232.5	High	3%	9%	6%	8	21	13
		Ref	1%	9%	8%	3	22	19
		Low	3%	2%	-1%	8	5	-3
	Low	High	3%	6%	3%	7	15	8
		Ref	0%	0%	0%	0	0	0
		Low	0%	0%	0%	0	0	0

Table 43: Effect of auction allocation without reserve price in NATL terminals, change in utilisation compared to without measures case, percentage points

Year	Demand	LNG	UK Hoo	UK_Dra	UK_Gra	IE_Sha
2020	EUCO 3232.5	High	0%	-6%	2%	0%
		Ref	8%	10%	10%	0%
		Low	12%	11%	9%	0%
2025	High	High	1%	16%	2%	0%
		Ref	1%	7%	4%	0%
		Low	24%	12%	10%	0%
	EUCO 3232.5	High	3%	-12%	1%	0%
		Ref	-5%	8%	2%	0%
		Low	19%	26%	20%	0%
	Low	High	1%	0%	1%	0%
		Ref	6%	39%	14%	0%
		Low	2%	7%	3%	7%
2030	High	High	2%	0%	29%	0%
		Ref	-3%	19%	-4%	0%
		Low	7%	29%	23%	0%
	EUCO 3232.5	High	-9%	8%	6%	0%
		Ref	-11%	9%	8%	0%
		Low	-2%	23%	-1%	5%
	Low	High	0%	6%	3%	2%
		Ref	1%	0%	0%	11%
		Low	0%	0%	0%	50%

Green colour means increase in LNG terminal utilisation; red colour means decrease in utilisation

Table 44: Price effect of auction allocation in NATL terminals, % compared to without measures case

	2020			2025									2030								
	EUCO 3232.5			High			EUCO 3232.5			Low			High			EUCO 3232.5			Low		
	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low	High	Ref	Low
AT	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BE	0%	0%	-2%	0%	0%	-1%	0%	0%	0%	0%	-1%	-1%	-4%	0%	0%	0%	0%	0%	0%	0%	0%
BG	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CZ	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
CY	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
DE	0%	0%	-1%	0%	0%	-2%	0%	0%	-1%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
DK	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
EE	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	-1%	0%	0%	0%	2%	1%	0%
ES	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	2%	0%	0%	0%	0%	0%	0%
FI	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	2%	1%	0%
FR	0%	0%	-2%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	1%	0%	0%	0%	0%	0%	0%
GR	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
HR	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%
HU	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
IE	-6%	-4%	-2%	-3%	-3%	-3%	-6%	-5%	-2%	-6%	-2%	-2%	-6%	-5%	-3%	-6%	-6%	-4%	-6%	-5%	-2%
IT	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
LT	0%	1%	3%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	2%	1%	1%
LU	0%	0%	-2%	0%	0%	-2%	0%	0%	0%	0%	-1%	-1%	-2%	0%	0%	0%	0%	0%	0%	0%	0%
LV	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	-1%	0%	0%	0%	2%	1%	0%
MT	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
NL	0%	0%	-2%	0%	0%	-1%	0%	0%	0%	0%	-1%	-1%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
PL	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
PT	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	-1%	0%	0%	3%	0%	0%	0%	0%	0%	0%
RO	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
SE	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
SI	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SK	0%	0%	-1%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
UK	-7%	-4%	-2%	-3%	-3%	-3%	-7%	-6%	-2%	-7%	-1%	-1%	-7%	-6%	-3%	-7%	-6%	-3%	-5%	0%	0%
EU28	-1%	-1%	-1%	0%	0%	-1%	-1%	-1%	-1%	-1%	0%	0%	-1%	-1%	0%	-1%	-1%	0%	-1%	0%	0%

Green colour means price decrease compared to the without measures case; red colour means price increase compared to the without measures case

Table 45: Welfare effect of auction allocation in NATL terminals, M€/year

AUCTION NATL									
Year	**Demand**	**LNG**	**ΔCS**	**ΔPS**	**ΔLTC**	**ΔLSO**	**ΔSSO**	**ΔTSO**	**ΔTotal**
2020	EUCO 3232.5	High	762	-299	-199	-355	0	10	-81
		Ref	685	-261	-228	-277	6	-9	-83
		Low	856	-336	-505	-123	11	-80	-176
2025	High	High	416	-134	-102	-269	12	15	-62
		Ref	429	-151	-138	-236	13	-9	-93
		Low	1265	-311	-907	-329	3	130	-150
	EUCO 3232.5	High	690	-256	-175	-323	0	-18	-81
		Ref	685	-254	-190	-319	0	-2	-81
		Low	486	-155	-250	-164	15	-98	-165
	Low	High	589	-270	-217	-184	-1	-2	-86
		Ref	199	-88	-96	-81	-13	-29	-107
		Low	193	-85	-103	-84	13	-20	-87
2030	High	High	953	-260	-446	-372	7	46	-72
		Ref	502	-173	-201	-222	-1	13	-82
		Low	284	-113	-76	-233	-19	-20	-178
	EUCO 3232.5	High	430	-176	-196	-139	0	0	-83
		Ref	411	-173	-178	-138	0	-3	-81
		Low	241	-97	-122	-108	-10	0	-97
	Low	High	227	-70	-123	-102	-1	-13	-82
		Ref	-16	3	27	-90	1	-7	-82
		Low	-7	3	6	-80	-3	-26	-107

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

Overall welfare effects are small but negative. Consumers in the UK and Ireland gain compared to the without measures case, producers, LTC holders and LSOs are worse off.

Measure 1b: Auction with reserve price 0.5 €/MWh

In this measure, a "reserve price" of 0.5 €/MWh is assumed next to the congestion rents for LSOs. Introducing such a reserve price affects the general level of flows and prices. As a general comment, all effects measured in the scenario auction allocation without reserve price are replicated, but the effects are weaker.

The most important difference is in the level of profit change of LSOs. As opposed to the auction without reserve price case, due to the 0.5 €/MWh reserve price, negative impacts on revenues of LSOs are lower. Still, compared to the without measures case, profits of the LSO are considerably lower. This effect is shown for the ALL terminals scenario, all further scenarios can be found in the Annex. Apart from these results, all takeaways and findings are identical with the without reserve price case, the difference is that price effects and LNG inflow effects are lower than in the without reserve price case.

All terminals (ALL)

Figure 49: LSO operational profits and congestion rent, auction allocation with 0.5 €/MWh reserve price, M€/year 2020

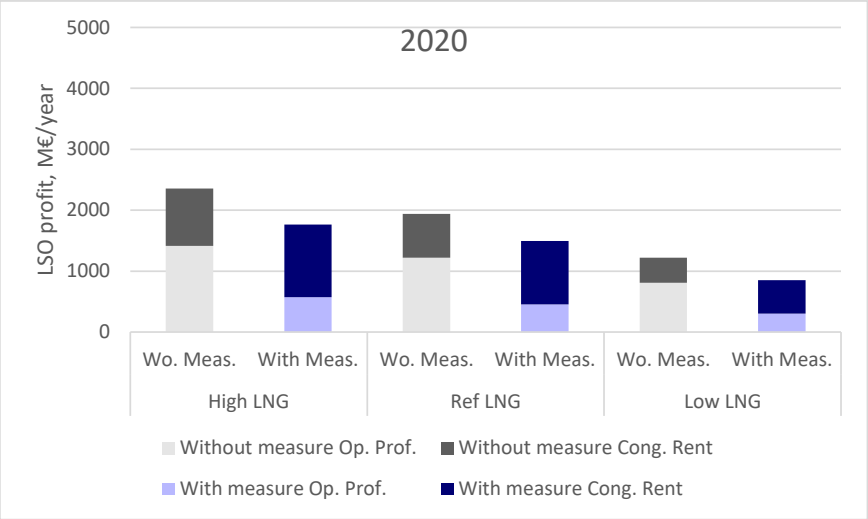


Figure 50: LSO operational profits and congestion rent, auction allocation with 0.5 €/MWh reserve price, M€/year 2025

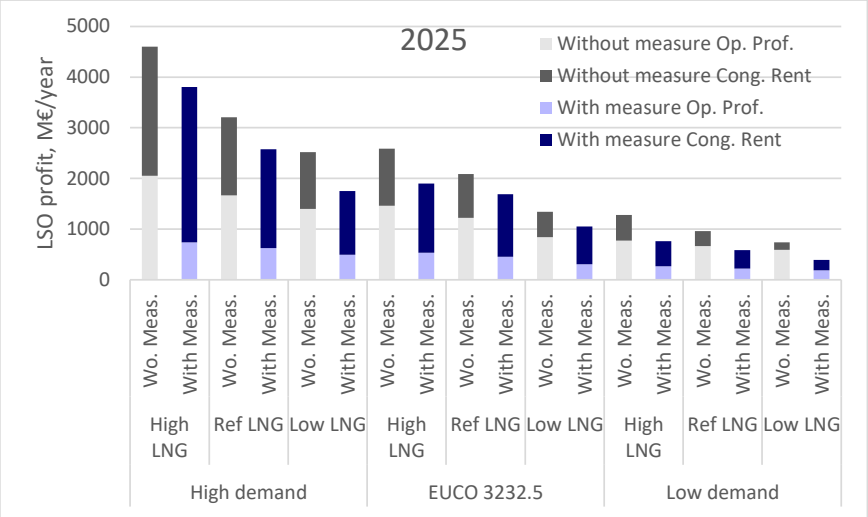
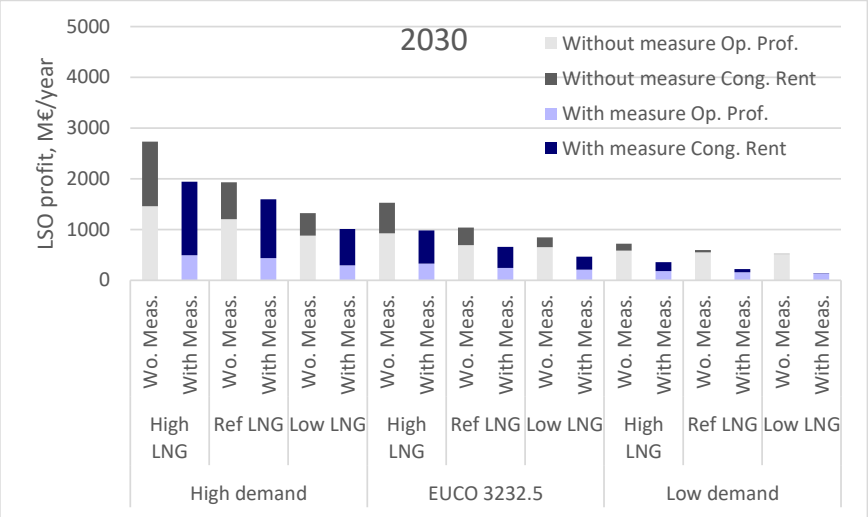


Figure 51: LSO operational profits and congestion rent, auction allocation with 0.5 €/MWh reserve price, M€/year 2030



Measure 1c: Auction with reserve price of 1 €/MWh

All terminals (ALL)

Revenues of the LSO are somewhat lower compared to the without measures case, but in turn the effects of the measure are not significant in any of the scenarios. This means that setting a too high reserve price changes little in market outcomes. The measure only has effect in markets where the access tariff in the without measures case is over 1 €/MWh.

Figure 52: LSO operational profits and congestion rent, auction allocation with 1 €/MWh reserve price, M€/year 2020

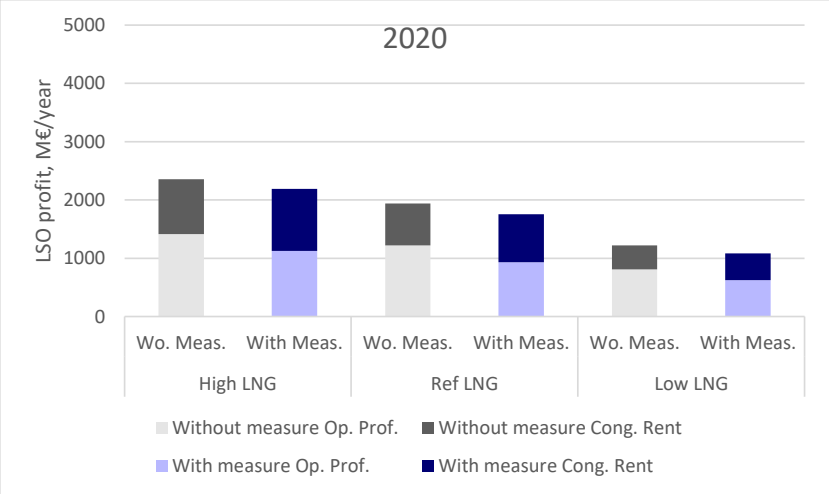


Figure 53: LSO operational profits and congestion rent, auction allocation with 1 €/MWh reserve price, M€/year 2025

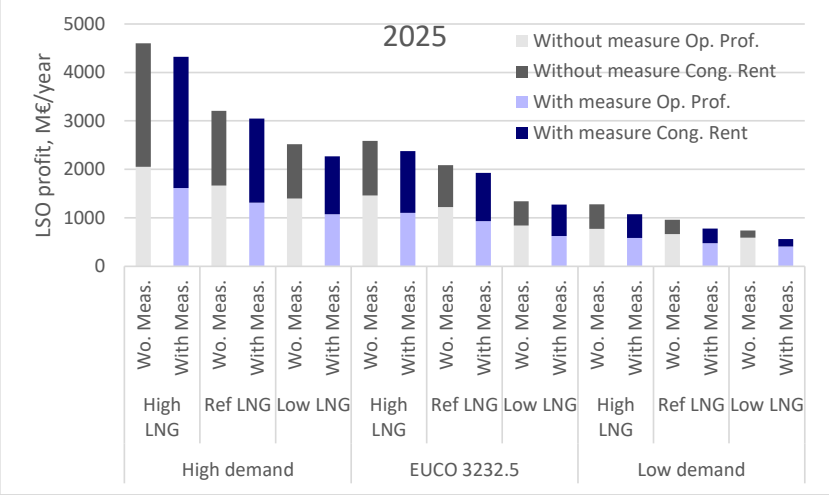
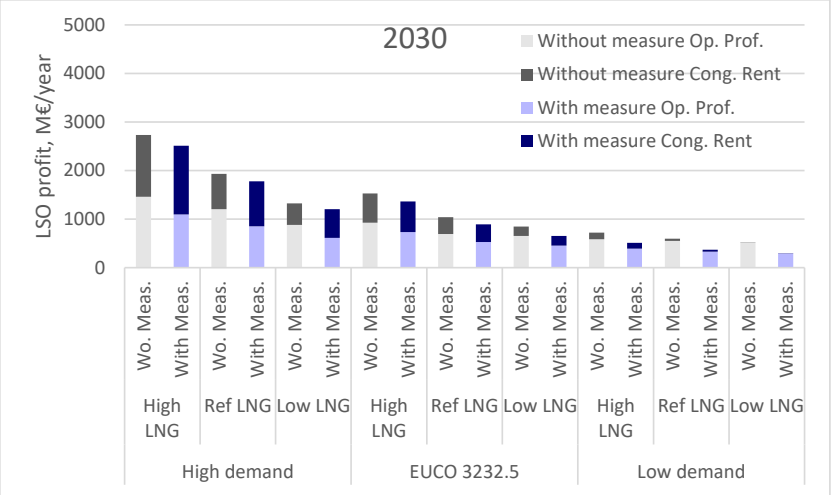


Figure 54: LSO operational profits and congestion rent, auction allocation with 1 €/MWh reserve price, M€/year 2030



MEASURE 2: DECREASE OF THE TSO ENTRY TARIFF

- Decreasing the TSO entry tariffs to the variable cost level would have no major effect for most terminals.
- In some markets however, where the tariff for entry from LNG terminals to the TSO system is high (HR, IT, PL), the measure has considerable effect.
- Consumers and LSOs are benefiting from this measure, and the benefits of these stakeholders compensate the negative impact on TSOs.
- The overall welfare effect of the measure is negative.
- On the basis of this analysis, we do not advise a general decrease of the TSO entry tariff, but discounts may be introduced on a market-by-market basis, either for security of supply and competition reasons (isolated markets) or to reflect the lower entry cost of LNG compared to pipeline gas.

TAR NC allows for discounts to transmission tariffs at entry points from LNG terminals, if the discount facilitates new LNG sources' entry into the market and increases security of supply. In order to analyse the potential positive effects of this measure on LNG flows and European gas markets, we assumed for the modelling that TSO entry fees for all European LNG terminals are uniformly decreased to 0.1 €/MWh (to the variable cost level). Tariffs in the base case are presented in the Annexes.

Overall effects of the measure are summarized in the figures below. Grey dots represent the without measures case, and blue dots the with measure case.

For 2020, LNG inflow to the EU28 increases by 2% in the without measures case, 5% in high LNG supply assumptions and 1% in low LNG supply assumptions.

In 2025, effects are similar but somewhat higher in the without measures case, ranging from 3% to 6% on EU28 level.

Figure 55: Effects of the TSO entry tariff decrease on EU28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2020

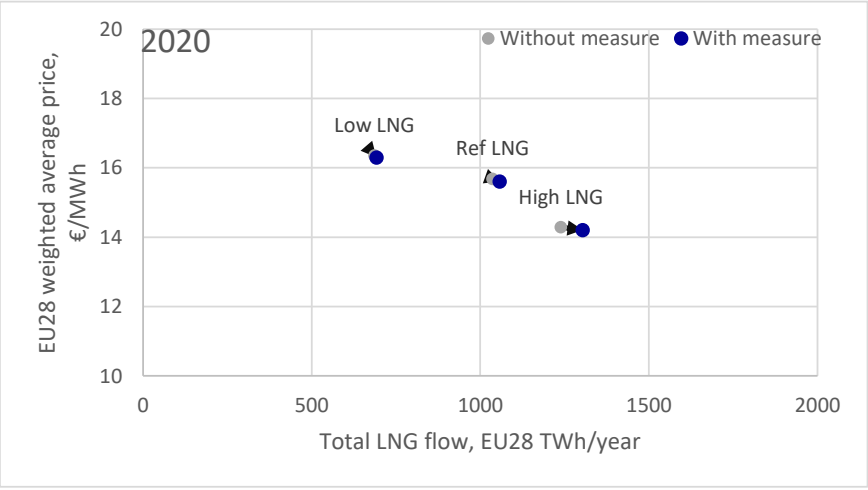


Figure 56: Effects of the TSO entry tariff decrease on EU28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2025

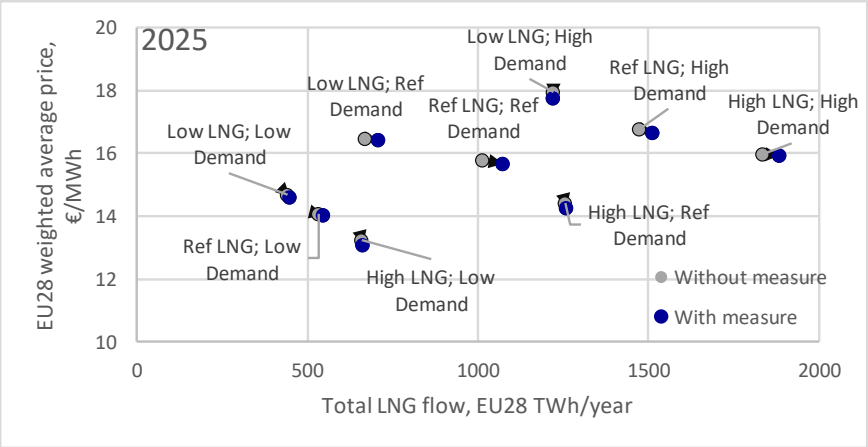
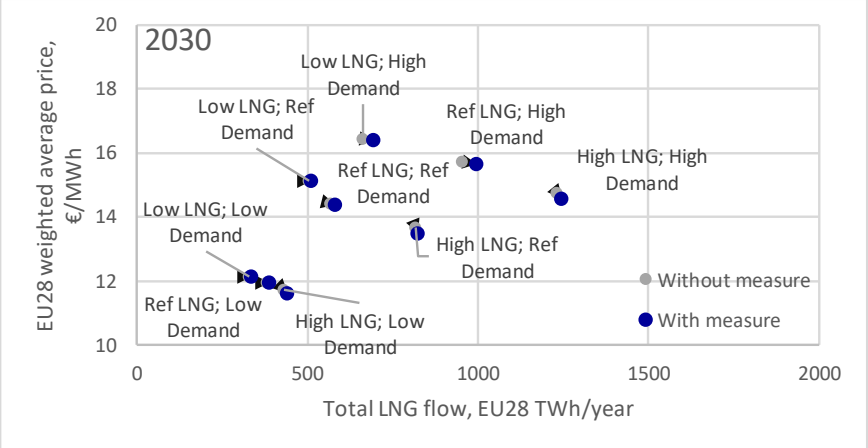


Figure 57: Effects of the TSO entry tariff decrease on EU-28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2030



Figures above show that decreasing the TSO entry tariffs to the marginal cost level does not have significant effects neither on LNG inflow nor on EU28 average price level. The change of total LNG import due to this measure varies between 1 and 65 TWh/year which is a change between 0.1 and 5.7%. Weighted average price change is maximum -0.2 €/MWh, which is around 1.5% at most. This is not only an average effect, but the same can be seen at country level as well: price decrease remains below 0.5 €/MWh in all modelled countries and in all scenarios.

Table 46.: Welfare effect of the TSO entry tariff decrease, M€/year

TSO ENTRY									
Year	Demand	LNG	CS	PS	LTC	LSO	SSO	TSO	Total
2020	EUCO 3232.5	High	387	-63	-211	131	-3	-254	-12
		Ref	383	-89	-242	116	9	-233	-56
		Low	287	-88	-151	44	4	-185	-90
2025	High	High	290	-24	-149	169	-2	-329	-45
		Ref	453	-74	-260	165	-10	-372	-99
		Low	1089	-210	-718	13	-3	-298	-127
	EUCO 3232.5	High	678	-153	-393	64	1	-297	-99
		Ref	401	-77	-223	172	9	-359	-77
		Low	174	-46	-100	148	4	-244	-64
	Low	High	590	-175	-371	14	4	-158	-95
		Ref	225	-62	-142	39	1	-139	-78
		Low	207	-66	-134	21	6	-120	-86
2030	High	High	803	-133	-499	76	6	-323	-69
		Ref	268	-67	-152	166	-1	-292	-77
		Low	170	-30	-114	110	0	-244	-108
	EUCO 3232.5	High	696	-170	-407	31	1	-238	-87
		Ref	161	-31	-112	55	-1	-153	-82
		Low	41	-12	-32	29	-3	-120	-96
	Low	High	290	-41	-271	23	0	-97	-96
		Ref	99	-18	-75	11	-1	-104	-89
		Low	-3	0	5	6	-2	-98	-92

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

The limited effect on European market prices reflects also in the quite low increase in consumer surplus. The effect on total welfare is also negligible. Pipeline TSOs suffer noticeable revenue losses: total TSO revenue decrease is 2.3%-6%. If TSOs were allowed to increase their other tariffs in order to compensate their revenue loss, the slight positive impacts on the market would almost disappear.

The measure has a distribution effect between the LSOs and TSOs affected. Slightly higher LNG inflow increase the revenue of LNG terminals, while revenue losses are incurred at the TSO due to lower entry fees compared to the without measures case. Revenue decreases incurred by the TSOs are on total higher than the revenue increases at the LSOs' side.

Table 47: Change of TSO and LSO revenues due to decrease in TSO tariff in the modelled scenarios, M€/year

Year	Demand	LNG	TSO total profit, M€/year				Total LNG terminal profit, M€/year			
			Without Measure	With Measure	Change absolute	Change relative	Without Measure	With Measure	Change absolute	Change relative
2020	EUCO 3232.5	High LNG	6128	5875	-254	-4,1%	2355	2486	131	5,6%
		Ref LNG	6145	5911	-233	-3,8%	1939	2055	116	6,0%
		Low LNG	6654	6469	-185	-2,8%	1221	1265	44	3,6%
2025	High	High LNG	7955	7627	-329	-4,1%	4601	4771	169	3,7%
		Ref LNG	8002	7629	-372	-4,7%	3208	3374	165	5,2%
		Low LNG	8284	7985	-298	-3,6%	2517	2531	13	0,5%
	EUCO 3232.5	High LNG	5949	5651	-297	-5,0%	2589	2653	64	2,5%
		Ref LNG	6025	5666	-359	-6,0%	2084	2256	172	8,2%
		Low LNG	6547	6303	-244	-3,7%	1340	1488	148	11,0%
	Low	High LNG	4804	4646	-158	-3,3%	1277	1292	14	1,1%
		Ref LNG	4839	4700	-139	-2,9%	962	1002	39	4,1%
		Low LNG	5018	4898	-120	-2,4%	739	760	21	2,9%
2030	High	High LNG	5786	5463	-323	-5,6%	2734	2810	76	2,8%
		Ref LNG	5825	5534	-292	-5,0%	1932	2099	166	8,6%
		Low LNG	6227	5983	-244	-3,9%	1321	1431	110	8,3%
	EUCO 3232.5	High LNG	4776	4538	-238	-5,0%	1529	1559	31	2,0%
		Ref LNG	4805	4652	-153	-3,2%	1039	1094	55	5,3%
		Low LNG	4821	4701	-120	-2,5%	842	872	29	3,5%
	Low	High LNG	4131	4034	-97	-2,3%	721	744	23	3,2%
		Ref LNG	4136	4032	-104	-2,5%	595	605	11	1,8%
		Low LNG	4212	4115	-98	-2,3%	516	521	6	1,1%

For the 2020 modelling year, the discount on the entry fee has a generally positive effect on all LNG importing countries only in the high LNG supply case. With reference LNG and low LNG supply, UK terminals realise somewhat lower flows, as other destinations turn out to be more beneficial due to the relatively higher tariff decrease in other countries. Still, effects of the measure are in 2020 negligible on most markets.

Table 48: Change in LNG inflow due to decrease in TSO tariffs compared to without measures (TWh/year), 2020

Demand	EUCO 3232.5		
LNG	High	Ref	Low
BE	10	0	0
CY	0	0	0
ES	0	0	0
FR	50	23	14
GR	0	0	1
HR	0	10	0
IE	0	0	0
IT	0	8	5
LT	0	0	0
MT	0	0	0
NL	0	0	0
PL	4	0	0
PT	0	0	0
UK	0	-19	-13
Total	65	22	6

In 2025, effects of the measure are similar to the 2020 modelling year. Main difference compared to 2020 is the widening gap between EU28 local gas production and local gas demand, resulting in higher import share compared to 2020.

Table 49: Change in LNG inflow due to decrease in TSO tariffs compared to without measures (TWh/year), 2025

Demand	High			EUCO 3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BE	14	3	-16	-20	-2	0	0	0	0
CY	0	0	0	0	-1	1	-2	-1	0
ES	10	0	0	0	0	0	0	0	0
FR	0	17	0	17	21	8	29	15	1
GR	0	0	0	0	0	0	1	0	1
HR	0	0	4	0	5	2	5	2	0
IE	0	0	0	0	0	0	0	0	0
IT	0	7	0	0	0	23	0	0	0
LT	0	0	0	0	0	0	-2	-2	0
MT	0	0	0	0	0	0	0	0	0
NL	24	0	10	0	0	0	0	0	0
PL	0	7	28	8	34	4	6	3	0
PT	0	0	0	0	0	0	0	0	4
UK	0	4	-25	0	0	0	-33	-3	0
Total	48	37	1	5	58	38	4	14	6

In 2030, the generally lower demand and closing gap between the EU28 gas demand and local gas production make less room for LNG, which cannot always compete with pipeline gas. Therefore, the effects of this measure are less pronounced as compared to 2020 or 2025 effects.

Table 50: Change in LNG inflow due to decrease in TSO tariffs compared to without measures (TWh/year), 2030

Demand	High			EUCO 3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BE	0	4	-6	-34	0	0	0	0	0
CY	0	-1	0	0	-1	0	0	0	0
ES	0	0	0	0	0	0	0	0	0
FR	6	15	9	12	0	5	0	0	0
GR	0	0	1	0	-1	0	0	0	0
HR	0	0	5	15	5	0	6	0	0
IE	0	0	0	0	0	1	0	3	6
IT	4	1	10	4	2	0	1	4	0
LT	0	0	-1	0	0	0	0	-1	0
MT	0	0	0	0	0	0	0	0	0
NL	1	0	0	0	0	0	0	0	0
PL	2	22	8	11	9	2	0	0	0
PT	0	0	0	0	0	0	0	0	0
UK	0	0	5	0	0	-1	5	0	0
Total	14	41	31	7	14	7	12	7	6

However, overall the total LNG inflow into Europe slightly increases, some realignment can be seen between different terminals. The measure has the largest positive impact in those countries where the entry to TSO system tariff is relatively high in the without measures case (where the relative tariff decrease is more significant): Poland, Croatia, Italy. LNG inflow also increases into terminals in France in most of the scenarios, due to of lower entry tariffs. In case of terminals with lower entry tariff in the without measures scenarios (e.g. Belgium and UK) LNG inflow decreases due to this measure because LNG is rather delivered to the terminals where the tariff decrease is relatively larger.

To sum up, the measure has a small but positive effect on an EU28 level, and most countries with high TSO entry tariffs benefit from the regulatory change. The costs of such regulatory action are the revenue losses incurred by the TSOs. These missing revenues however may be recovered via increased regulated grid tariffs. Consumers and operators of LNG terminals are the winners in most scenarios. However, at lower LNG supply or lower demand scenarios not all LNG importers are the winners of this measure, as flows are re-distributed between destinations. Modelling suggests that an EU-wide regulation on tariffs discounts is not appropriate as the overall effects are negligible, however NRAs could assess the applicability of discounts on specific LNG entry points and take into account regional specifics, rather than opting for a one-size-fits-all measure.

We can hence add in conclusions that we do not recommend review of article 9 of TAR NC: "At entry points from LNG facilities, and at entry points from and exit points to infrastructure developed with the purpose of ending the isolation of Member States in respect of their gas transmission systems, a discount may be applied to the respective capacity-based transmission tariffs for the purposes of increasing security of supply."

MEASURE 3: REGASIFICATION TARIFF DECREASE

- With this measure, all LNG regasification tariffs are reduced by 50% of current levels.
- European consumers are the winners of this measure, as increased LNG imports would push down gas prices.
- More LNG enters the European markets, enhancing the utilisation of terminals.
- Compared to the without measure case, the revenues of the LSOs would be lower.
- The overall welfare effect of the measure is negative, but the consumer welfare effects are positive and outweigh the negative effects on infrastructure operators.

In this section we analyse the effect of a 50% uniform regasification tariff decrease for all European LNG terminals.

Overall effects of the measure are summarized in the figures below. Grey dots represent the without measures case, and blue dots the with measure case.

For 2020, LNG inflow to the EU28 increases by 11% in the case without measures, 17% in high LNG supply assumptions and 10% in low LNG supply assumptions.

In 2025 and 2030, effects are similar, LNG inflow increases ranging from 2% to 18% on EU28 level.

Figure 58: Effects of the 50% regasification tariff decrease on EU-28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2020

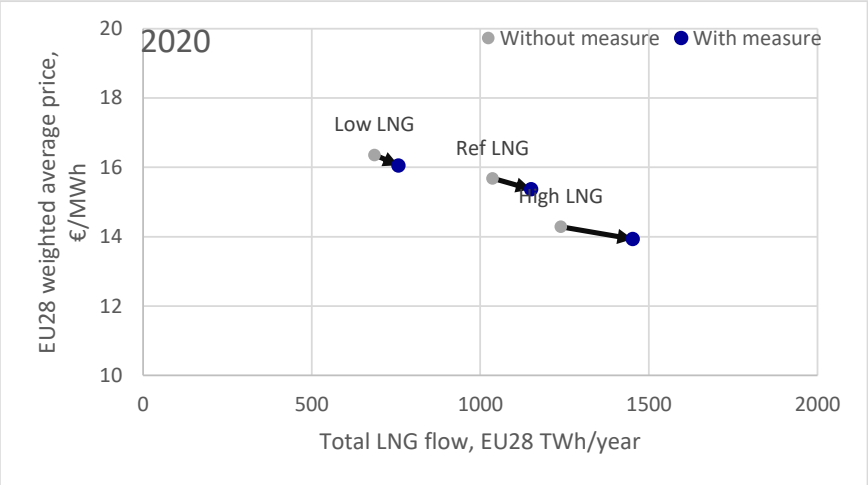


Figure 59: Effects of the 50% regasification tariff decrease on EU-28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2025

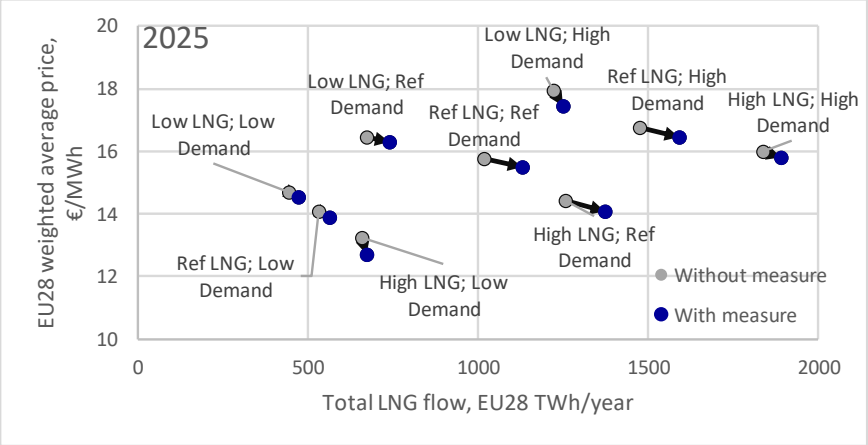
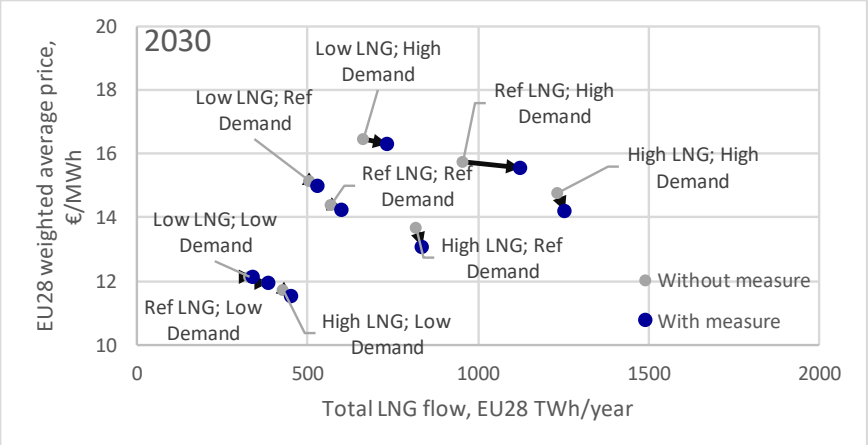


Figure 60: Effects of the 50% regasification tariff decrease on EU-28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2030



The price effect of this significant regasification tariff decrease is quite modest, ranging between -0.1% and -4.2%, the maximum value of average European price effect being -0.6 €/MWh.

The decrease of the regasification tariff affects differently the flows to the LNG terminals. The most significant effects concentrate in only a few terminals, mainly in those with the highest regasification tariff in the without measures case (for detailed tariffs used for all terminals in the modelling see the Annexes): French terminals Fos Cavou and Fos Tonkin, Italian terminals OLT Toscana and Porto Levante and Polish terminal Świnoujście realize the highest additional flows in most of the scenarios. Several terminals remain unaffected because they are already congested in the without measures scenario (e.g. Revythoussa, Klaipedos, Panigaglia, Shannon) or because 50% decrease of regasification tariff is not enough to attract additional flows. The revenues of LNG operators would be highly affected by this tariff decrease, in particular if the total LNG inflow to the terminal would change. Several terminals would in some scenarios incur substantial revenue losses due to tariff decrease. These results suggest that almost the same LNG inflow could be reached even if regasification tariff decrease was carried out in case of only a few terminals. It must be noted however, that this selected tariff decrease would result in a very modest price and welfare effect.

Table 51: Change in utilization of LNG terminals due to 50% regasification tariff decrease compared to without measures (%), 2020

Year	2020					
Demand	EUCO 3232.5					
LNG	High		Ref		Low	
	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure
BE_Zee	24%	74%	10%	12%	10%	10%
ES_Bar	39%	39%	48%	45%	48%	48%
ES_Car	12%	6%	3%	7%	33%	16%
ES_Hue	67%	67%	62%	62%	31%	49%
ES_Sag	0%	0%	0%	0%	0%	1%
ES_Mug	0%	20%	0%	0%	4%	0%
ES_Bil	0%	0%	0%	0%	0%	0%
FR_Cav	8%	45%	6%	19%	6%	6%
FR_Ton	22%	84%	5%	20%	0%	0%
FR_Mon	83%	83%	67%	67%	8%	8%
FR_Dun	53%	71%	10%	22%	0%	1%
GR_Rev	100%	100%	100%	100%	99%	100%
HR_Krk	100%	100%	66%	74%	42%	42%
IT_Olt	100%	100%	87%	100%	0%	100%
IT_Pan	100%	100%	100%	100%	100%	100%
IT_Lev	84%	100%	84%	100%	84%	84%
LT_Kla	79%	79%	79%	79%	78%	78%
NL_Rot	0%	0%	0%	0%	0%	0%
PL_Swi	56%	90%	57%	56%	57%	57%
PT_Sin	17%	17%	17%	17%	17%	17%
TR_Mar	0%	0%	0%	0%	0%	0%
TR_Ali	75%	57%	65%	63%	57%	55%
TR_Dor	18%	5%	19%	9%	2%	4%
TR_Etk	56%	84%	66%	64%	54%	56%
UK_Hoo	83%	83%	74%	79%	54%	56%
UK_Dra	67%	67%	51%	61%	11%	16%
UK_Gra	64%	64%	56%	67%	8%	8%
MT_Del	50%	50%	50%	50%	50%	50%
CY_Vas	64%	64%	64%	64%	64%	64%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 52: Change in utilization of LNG terminals due to 50% regasification tariff decrease compared to without measures (%), 2025

Year	2025																	
Demand	High						EUCO 3232.5						Low					
LNG	High		Ref		Low		High		Ref		Low		High		Ref		Low	
	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure
BE_Zee	91%	100%	61%	68%	51%	41%	59%	77%	13%	16%	10%	10%	10%	10%	10%	10%	10%	10%
ES_Bar	39%	39%	48%	45%	48%	48%	39%	39%	45%	39%	48%	48%	39%	39%	39%	39%	39%	39%
ES_Car	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Hue	67%	67%	36%	40%	31%	31%	11%	11%	1%	11%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Sag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Mug	41%	34%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Bil	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
FR_Cav	71%	84%	18%	54%	13%	23%	12%	55%	6%	21%	6%	6%	6%	17%	6%	10%	6%	6%
FR_Ton	91%	91%	41%	78%	24%	51%	48%	82%	9%	61%	14%	8%	74%	73%	31%	63%	0%	0%
FR_Mon	100%	100%	83%	83%	75%	67%	83%	83%	68%	67%	9%	17%	22%	8%	10%	0%	0%	0%
FR_Dun	83%	83%	58%	65%	25%	20%	59%	62%	13%	25%	1%	0%	0%	0%	0%	0%	0%	0%
GR_Rev	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	80%	83%	74%	36%	38%
HR_Krk	79%	79%	79%	79%	48%	40%	69%	69%	53%	55%	22%	22%	16%	12%	12%	12%	12%	12%
IT_Olt	100%	100%	100%	100%	98%	100%	100%	100%	100%	100%	34%	100%	2%	55%	2%	52%	0%	32%
IT_Pan	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
IT_Lev	100%	100%	84%	100%	84%	100%	84%	100%	84%	100%	84%	95%	84%	84%	84%	84%	84%	84%
LT_Kla	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	93%	93%	95%	87%	92%	87%	74%	77%
NL_Rot	67%	83%	8%	8%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL_Swi	100%	100%	91%	99%	54%	93%	88%	97%	57%	96%	49%	58%	36%	48%	36%	45%	36%	36%
PT_Sin	24%	24%	24%	24%	24%	24%	17%	17%	17%	17%	17%	17%	10%	10%	10%	10%	0%	6%
UK_Hoo	98%	98%	98%	99%	74%	80%	65%	65%	64%	62%	54%	54%	50%	59%	39%	40%	39%	39%
UK_Dra	67%	75%	71%	78%	58%	53%	53%	55%	58%	49%	8%	8%	30%	28%	0%	1%	0%	0%
UK_Gra	81%	79%	72%	76%	64%	58%	56%	56%	54%	60%	8%	10%	11%	3%	1%	0%	0%	0%
MT_Del	56%	56%	56%	56%	56%	56%	47%	47%	47%	47%	47%	47%	38%	38%	38%	38%	38%	38%
IE_Sha	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	91%	91%
CY_Vas	100%	100%	100%	100%	100%	100%	100%	100%	92%	100%	67%	83%	34%	0%	8%	0%	0%	0%
Total	66%	69%	52%	56%	43%	44%	44%	48%	36%	40%	25%	27%	24%	24%	20%	21%	16%	17%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 53: Change in utilization of LNG terminals due to 50% regasification tariff decrease compared to without measures (%), 2030

Year	2030																	
Demand	High						EUCO 3232.5						Low					
LNG	High		Ref		Low		High		Ref		Low		High		Ref		Low	
	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure
BE_Zee	87%	87%	37%	70%	19%	15%	70%	56%	23%	13%	10%	10%	10%	10%	10%	10%	10%	10%
ES_Bar	39%	39%	40%	39%	48%	48%	39%	39%	39%	39%	39%	39%	39%	39%	39%	39%	39%	39%
ES_Car	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Hue	3%	3%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Sag	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Mug	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ES_Bil	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
FR_Cav	20%	45%	13%	28%	6%	8%	23%	13%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
FR_Ton	83%	79%	67%	83%	53%	54%	83%	83%	48%	29%	0%	0%	0%	0%	0%	0%	0%	0%
FR_Mon	84%	83%	67%	67%	5%	3%	71%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
FR_Dun	67%	60%	11%	43%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
GR_Rev	100%	100%	97%	97%	90%	91%	98%	95%	83%	78%	67%	67%	6%	12%	1%	1%	1%	1%
HR_Krk	65%	63%	57%	56%	26%	33%	26%	24%	11%	15%	11%	11%	9%	15%	4%	4%	0%	0%
IT_Olt	100%	100%	100%	100%	67%	100%	8%	83%	0%	76%	0%	41%	0%	0%	0%	0%	0%	0%
IT_Pan	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	97%	100%	76%	80%	29%	29%
IT_Lev	90%	100%	88%	100%	84%	99%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%
LT_Kla	100%	100%	100%	100%	97%	93%	100%	97%	93%	93%	87%	85%	76%	74%	63%	61%	38%	42%
NL_Rot	16%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL_Swi	97%	100%	73%	98%	49%	64%	61%	78%	36%	48%	49%	52%	36%	37%	36%	36%	36%	36%
PT_Sin	2%	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
UK_Hoo	59%	50%	56%	53%	53%	55%	48%	43%	51%	43%	44%	43%	41%	48%	39%	39%	39%	39%
UK_Dra	50%	34%	19%	33%	0%	4%	8%	5%	6%	18%	3%	6%	10%	11%	0%	0%	0%	0%
UK_Gra	17%	32%	31%	28%	0%	9%	3%	10%	1%	5%	3%	1%	3%	2%	0%	0%	0%	0%
MT_Del	47%	47%	47%	47%	47%	47%	39%	39%	39%	39%	39%	39%	31%	31%	31%	31%	31%	31%
IE_Sha	99%	99%	99%	99%	99%	99%	90%	90%	90%	90%	85%	90%	71%	71%	58%	69%	0%	25%
CY_Vas	83%	83%	67%	65%	67%	50%	67%	34%	41%	49%	0%	0%	0%	0%	0%	0%	0%	0%
Total	41%	43%	32%	37%	22%	25%	28%	29%	19%	20%	16%	17%	16%	17%	12%	13%	11%	11%

Green colour means less congestion; red colour means more congestion on the infrastructure

LNG operators suffer from a significant reduction of their gross margin (overall 13-47%) due to the 50% regasification fee decrease. The reason of this is that the decrease of operational margin (calculated as the LNG inflow multiplied with the regasification fee minus variable cost) (42.5%-53.1%) is only partly compensated by the larger auction revenues resulting from congestion fees in case of fully utilized terminals.

Table 54: Change of LNG terminal operators' profit due to 50% regasification tariff decrease

Year	Demand	LNG	LNG terminal operation profit (M€/year)		LNG terminal auction profit (M€/year)		Total LNG terminal profit (M€/year)	
			Change absolute	Change relative	Change absolute	Change relative	Change absolute	Change relative
2020	**EUCO 3232.5**	High LNG	-650	-45,9%	95	10,1%	-555	-23,6%
		Ref LNG	**-585**	**-47,8%**	**186**	**25,9%**	**-399**	**-20,6%**
		Low LNG	-345	-42,5%	66	16,2%	-279	-22,8%
2025	High	High LNG	-1095	-53,3%	343	13,5%	-751	-16,3%
		Ref LNG	-826	-49,6%	285	18,5%	-541	-16,9%
		Low LNG	-701	-50,1%	50	4,5%	-651	-25,9%
	EUCO 3232.5	High LNG	-713	-48,8%	151	13,4%	-562	-21,7%
		Ref LNG	**-572**	**-46,7%**	**190**	**22,2%**	**-382**	**-18,3%**
		Low LNG	-364	-43,3%	139	27,9%	-225	-16,8%
	Low	High LNG	-367	-47,4%	-43	-8,5%	-410	-32,1%
		Ref LNG	-305	-45,9%	37	12,4%	-268	-27,8%
		Low LNG	-284	-48,1%	22	15,0%	-262	-35,5%
2030	High	High LNG	-762	-52,2%	66	5,2%	-696	-25,5%
		Ref LNG	-554	-46,2%	295	40,4%	-259	-13,4%
		Low LNG	-392	-44,7%	123	27,6%	-269	-20,3%
	EUCO 3232.5	High LNG	-435	-47,0%	-32	-5,3%	-467	-30,6%
		Ref LNG	**-302**	**-43,8%**	**58**	**16,7%**	**-244**	**-23,5%**
		Low LNG	-313	-47,9%	30	15,6%	-283	-33,7%
	Low	High LNG	-302	-51,9%	25	17,9%	-278	-38,5%
		Ref LNG	-291	-53,1%	13	26,6%	-278	-46,8%
		Low LNG	-271	-52,5%	1	519%	-270	-52,3%

To sum up, a significant (50%) decrease of the regasification tariff levels results in a 2-18% increase of LNG inflow in the different scenarios. In parallel, the price effect is hardly

noticeable (ranges between -0.1% and -4.2%), which yields a moderate increase of consumers surplus compared or measure 1, auction allocation without reserve price. The flow effects concentrate in only a few terminals, mainly in those with the highest regasification tariff in the without measures scenario: French terminals Fos Cavou and Fos Tonkin, Italian terminals OLT Toscana and Porto Levante and Polish terminal Świnoujście realize the highest benefits in most of the scenarios. It must be noted that since several terminals remain unaffected almost the same market effects could be reached if such a regasification tariff decrease was carried out for only a few terminals.

Table 55: Welfare effects of 50% regasification tariff decrease (50%) on EU28, M€/year

50% LSO									
Year	**Demand**	**LNG**	**Δ CS**	**Δ PS**	**Δ LTC**	**Δ LSO**	**Δ SSO**	**Δ TSO**	**Δ Total**
2020	EUCO 3232.5	High	1703	-339	-874	-555	-34	-2	-101
		Ref	1525	-375	-913	-399	-2	-67	-231
		Low	1454	-409	-930	-279	-20	-177	-361
2025	High	High	925	-148	-400	-751	-6	59	-322
		Ref	1563	-316	-880	-541	-7	-145	-326
		Low	2713	-557	-1829	-651	3	-68	-389
	EUCO 3232.5	High	1521	-348	-793	-562	-10	-26	-218
		Ref	1177	-270	-646	-382	12	-133	-240
		Low	759	-195	-462	-225	3	-183	-303
	Low	High	1960	-567	-1253	-410	-5	-41	-316
		Ref	636	-132	-429	-268	0	-59	-252
		Low	501	-130	-341	-262	9	-74	-297
2030	High	High	2331	-455	-1414	-696	12	-83	-305
		Ref	684	-158	-366	-259	-3	-109	-211
		Low	648	-101	-375	-269	-18	-217	-332
	EUCO 3232.5	High	2083	-495	-1291	-467	8	-121	-284
		Ref	643	-118	-451	-244	-9	-96	-275
		Low	527	-75	-410	-283	-8	-42	-292
	Low	High	528	-90	-454	-278	-2	5	-291
		Ref	80	-16	-60	-278	0	-4	-279
		Low	23	-7	-7	-270	-3	-18	-281

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

MEASURE 4: COMMODITY IMPORT CONTRACT RELEASE /MARKET MAKING OBLIGATION

- This measure could contribute to reducing gas market concentration and enhancing market liquidity. Gas contract release obligations may in particular be justified, if
  (i) capacities are allocated long-term
  (ii) there is no effective secondary market
  (iii) there is limited competition on the wholesale market
- The analysis shows that this measure would not affect the overall utilisation of terminals, as long-term contracted LNG supply would be substituted with spot LNG flows, without leading to additional LNG import volumes.
- The proposed measure (in chapter 3) consists of obliging dominant shippers/importers to offer part of their imported volumes **at regulated prices** via the local gas hub or exchange.
- The impact of this measure has in the modelling however been estimated without taking into account such accompanying price regulation.
- Without imposing regulated prices for the volumes offered at the hub/exchange, the measure would cause a price increase and would hence have a negative impact on consumers.
- If price regulation would be implemented for the released volumes, a positive impact on competition and hence lower end-user prices can be assumed.

This measure relates to the possibility of obliging dominant market parties to release previously booked capacities to third parties, and/or to sell part of their imported gas volumes via the gas hub (as liquidity provider). Current modelling refers to long-term bookings only, the effects of moving towards bookings from a long term towards shorter (2-4 weeks) booking period were not part of the assessment.

In theory, if capacity rights are owned by a single player and no efficient use-it-or lose it mechanisms or secondary markets exist, it can happen that the owner of the capacity does not make use of the previously booked volumes, but does not let other market players make use of it either. For this market failure to occur, multiple criteria need to apply at the same time:

(i) capacities need to be allocated on a long term,
(ii) no effective secondary market
(iii) limited competition on the wholesale market (including pipeline supply)

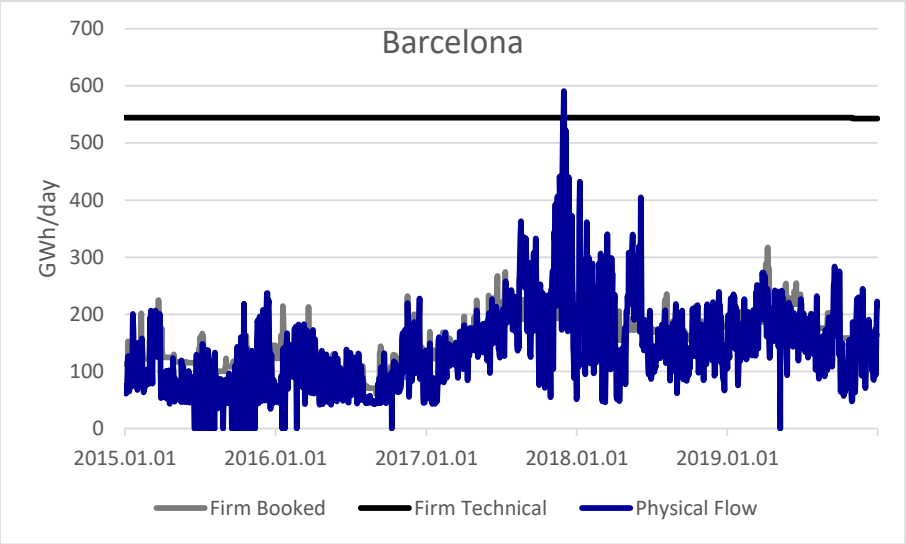
This means that this measure should mainly focus on Greece, Poland and Lithuania, as gas markets in other MSs with LNG terminals are rather liquid and competitive (See Section A in Chapter 3).

Capacity allocation in European terminals based on historical bookings

Historical capacity bookings on TSO entry points were consulted from ENTSOG Transparency platform. This is not related to the capacity booking at the LNG terminal itself, but the booking of capacities on the entry point – historical bookings were not found on LSO websites, and as an indication the linked entry capacity booking is shown. Two distinctive patterns were observed:

(i) Short-term booking of capacities, indicated by close correlation of firm bookings and physical flows. This is typical for all Spanish terminals, the Portuguese terminal, the Greek terminal

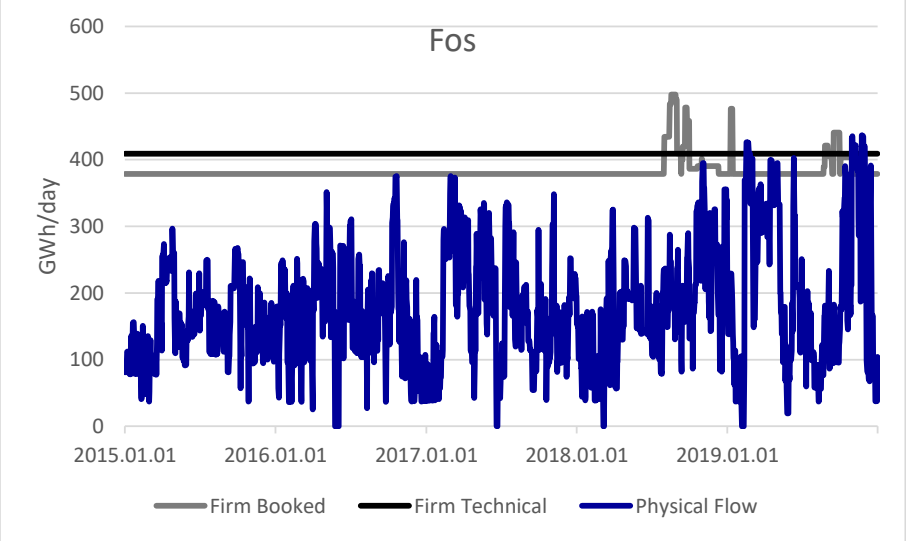
Figure 61: Historical booking of capacities, physical flow and firm technical capacity for Barcelona entry point, GWh/day 2015-2019



Source: ENTSOG Transparency platform

(ii) Long-term booking of capacities and no full utilisation of booked primary firm capacity. This pattern is typical for French terminals, UK terminals, Italian terminals. If secondary markets are well-functioning, the primarily booked capacity may be re-allocated to other market players – so a higher booking with lower realised physical flows is not an indication of not well functioning markets per se, it may reflect normal market functioning.

Figure 62: Historical booking of capacities, physical flow and firm technical capacity for Fos Tonkin and Fos Cavou entry point, GWh/day 2015-2019



Source: ENTSOG Transparency platform

No effective secondary market

Chapter 2B assessed the existence of secondary markets in LNG terminals. It is apparent that in nearly all terminals a bulletin board or a more organised secondary market exists, except for the Polish terminal. No information was found for Dunkerque, Toscana and OLT terminals.

Market liquidity
Based on Chapter 2A, markets were ranked in Established/Advanced/Illiquid categories.

If all the above listed criteria suggest that there may be an issue, it is marked in the last column of the table below. This way the only terminal where this issue may be a problem (but not necessarily) is the Polish one.

Table 56: Firm booking patterns on LNG terminal entry points to transmission system

Terminal	Country	Firm bookings pattern 2015-2019	Secondary market*	Liquidity**	Potential need for gas release
Barcelona	ES	Short-term	Existing	Advanced	No
Cartagena	ES	Short-term	Existing	Advanced	No
Huelva	ES	Short-term	Existing	Advanced	No
Sagunto	ES	Short-term	Existing	Advanced	No
Bilbao	ES	Short-term	Existing	Advanced	No
Mugardos	ES	Short-term	Existing	Advanced	No
Zeebrugge	BE	No data / Long term	Existing	Advanced	No
Dunkerque	FR	Long-term	No information	Advanced	No
Fos	FR	Long-term	Existing	Advanced	No
Montoir	FR	Long-term	Existing	Advanced	No
Revythoussa	GR	Short-term	Existing	Illiquid	No
Toscana	IT	Long-term	No information	Advanced	No
Porto levante	IT	Long-term	Existing	Advanced	No
Panigaglia	IT	Short-term	Existing	Advanced	No
Klaipeda	LT	Short-term	Existing	Illiquid	No
GATE Rotterdam	NL	Long-term	Existing	Established	No
Sines	PT	Short-term	No information	?	No
Świnoujście	PL	Long-term	Not existing	Illiquid	Yes
Dragon + South hook	UK	Long-term	Existing	Established	No
Isle of grain	UK	Long-term	Existing	Established	No

Source: REKK data collection based on ENTSOG Transparency platform,
**Based on Chapter 2A;*
***Based on Figure 7*

From modelling point of view, all capacities are allocated efficiently, and all previously booked capacities are utilised (i.e. we assume perfect foresight / efficiently working secondary markets). However, we assume that LNG long-term contracts are to be shipped due to TOP obligations. Releasing these obligations can simulate the capacity/commodity release measure. To do so, the TOP obligation was abolished in these scenarios, making all LNG cargoes compete on a price basis. TOP obligations stipulate a high penalty for volumes not shipped, therefore the minimum annual contracted quantity is always shipped. Abolishing this obligation may result in non-delivery of TOP LNG volumes. These volumes are either substituted by pipeline gas, or LNG from other suppliers. Long-term LNG contracts are listed below in Table 57.

Table 57: LNG long-term contracts in the model without measures case with TOP obligation

	Contract price €/MWh	2020 TWh/y	2025 TWh/y	2030 TWh/y
DZ-ES-LNG	16.8	10	10	10
DZ-FR-LNG	19.7	8	8	8
DZ-GR-LNG	16.8	1	1	1
DZ-IT-LNG	18.9	15	15	15
NG-ES-LNG	14.4	20	20	20
NO-ES-LNG	15.1	20	20	20
NO-LT-LNG	16.9	5	5	5
QA-BE-LNG	15.8	20	20	20
QA-ES-LNG	14.2	41	41	41
QA-IT-LNG	11.8	61	61	61
QA-PL-LNG	15.8	38	38	38
QA-UK-LNG	14.8	110	110	110

Source: REKK based on EUROSTAT COMEXT

The effects of the measure are presented for three distinctive years and multiple sensitivity cases.

Overall effects of the measure are summarized in the figure below. Grey dots represent the without measures case, and blue dots the with measure case. Effects of the measure on the EU-28 volume-weighted average price and total LNG inflow are negligible in most modelling cases, resulting in lower LNG inflow and somewhat higher prices. This means that the LNG contracts are not substituted completely with spot gas, or some spot LNG cargoes turn out to be somewhat more expensive. Still, the effects are 1%-3% of total LNG inflow volumes in 2020 modelling case. Results are similar in 2025 and 2030 likewise, with one major difference: in low demand scenarios (when EU28 gas demand was assumed to be 20% below the EUCO3232.5 scenario) the TOP quantities were virtually "free" for market participants (they are sunk cost), and leaving out this cheap source from the mix would result in lower LNG inflow and higher prices.

Figure 63: Effects of the contract release on EU-28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2020

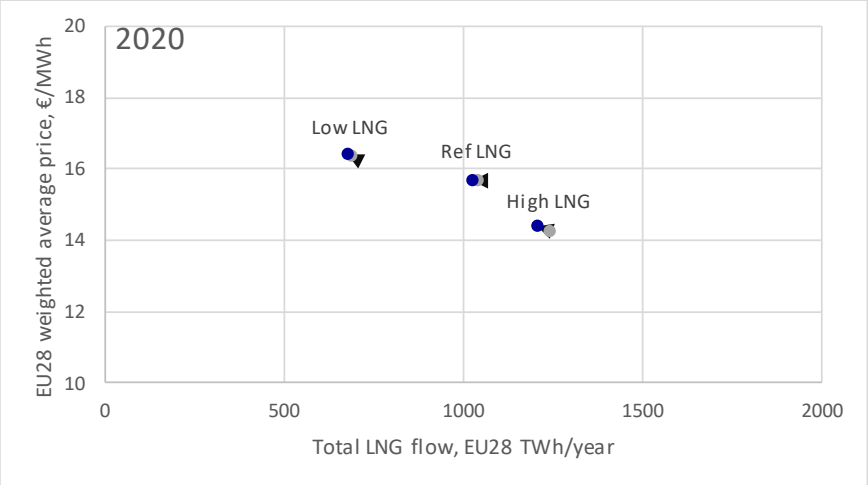


Figure 64: Effects of the contract release on EU-28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2025

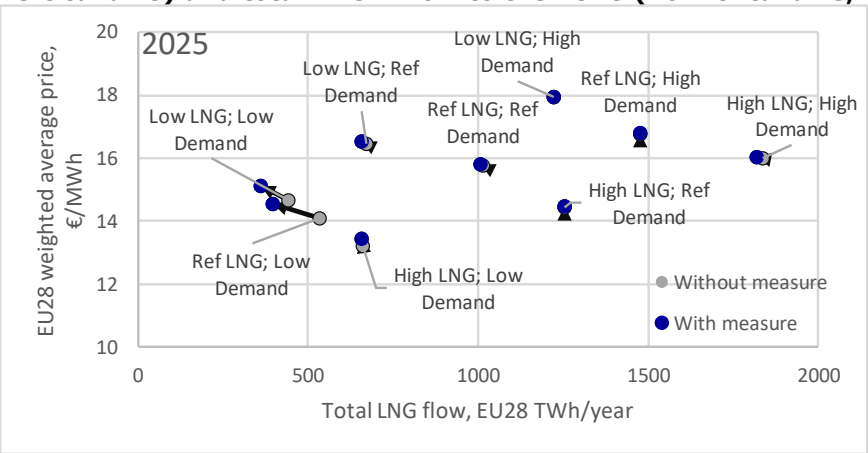
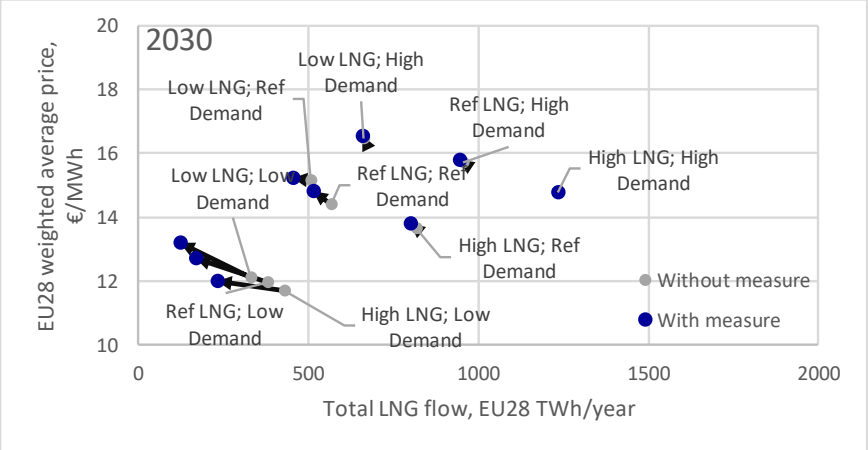


Figure 65: Effects of the contract release on EU-28 weighted average price (€/MWh, vertical axis) and total LNG inflow to the EU28 (horizontal axis, TWh/year), 2025



Generally, this measure replaces the long-term contracted flows with spot volumes. On EU28 level, no major changes in total volumes can be seen, but the structure of LTC and spot flows shifts.

Figure 66: Spot and long-term contracted LNG flows to EU28 terminals, TWh/year for 2020

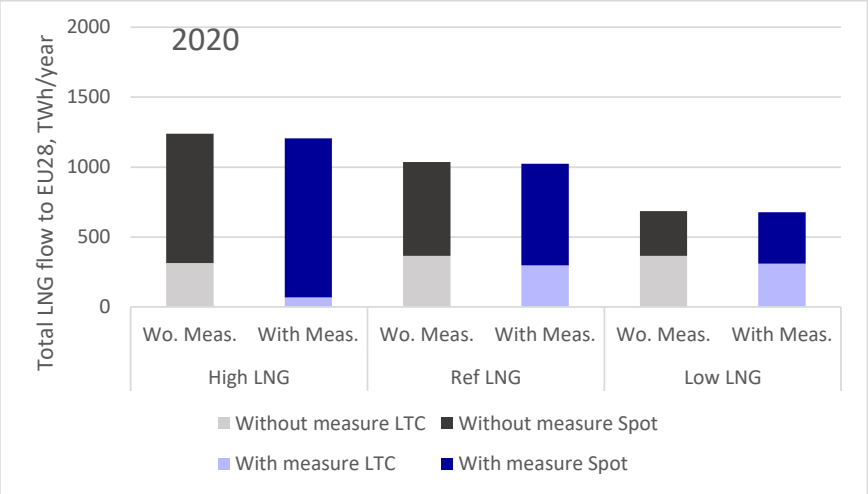


Figure 67: Spot and long-term contracted LNG flows to EU28 terminals, TWh/year for 2025

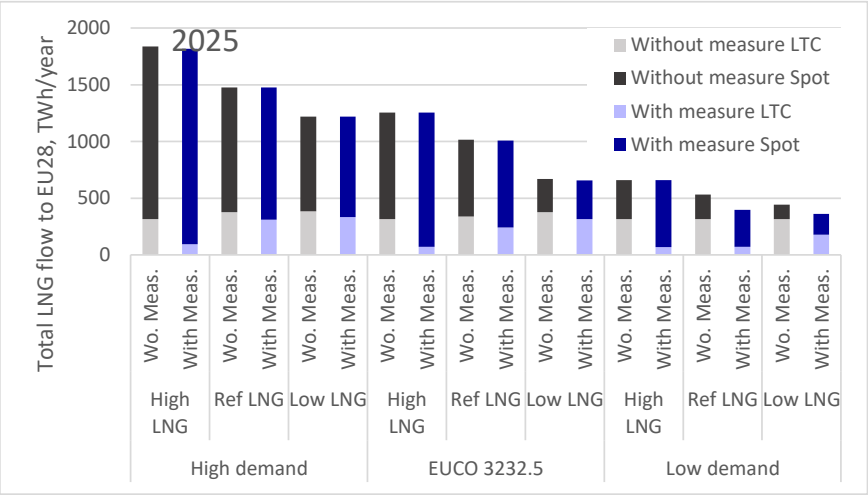
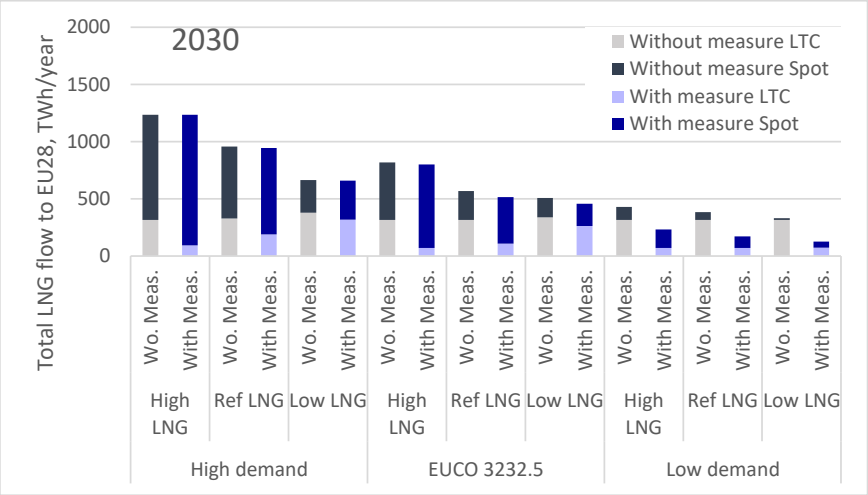


Figure 68: Spot and long-term contracted LNG flows to EU28 terminals, TWh/year for 2030



The change in structure of the volumes to more spot deliveries affects the revenue structure of the LNG terminal operators as well. In all modelled years and scenarios, operational revenues remain at the same level or drop a few percent compared to the without measures case (due to nearly identical utilisation of the infrastructure), but congestion rent paid by market players to LSOs for the use of terminal capacities increases considerably. In 2020, 26-28% higher congestion revenues are realised by the LSOs compared to the without measures case.

Figure 69: Total revenues (operational and congestion rent) of LNG terminal operators, M€/year, 2020

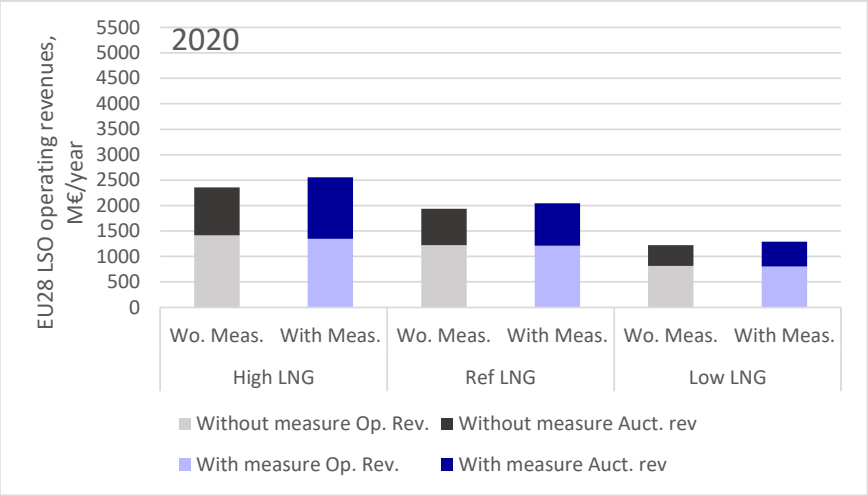


Figure 70: Total revenues (operational and congestion rent) of LNG terminal operators, M€/year, 2025

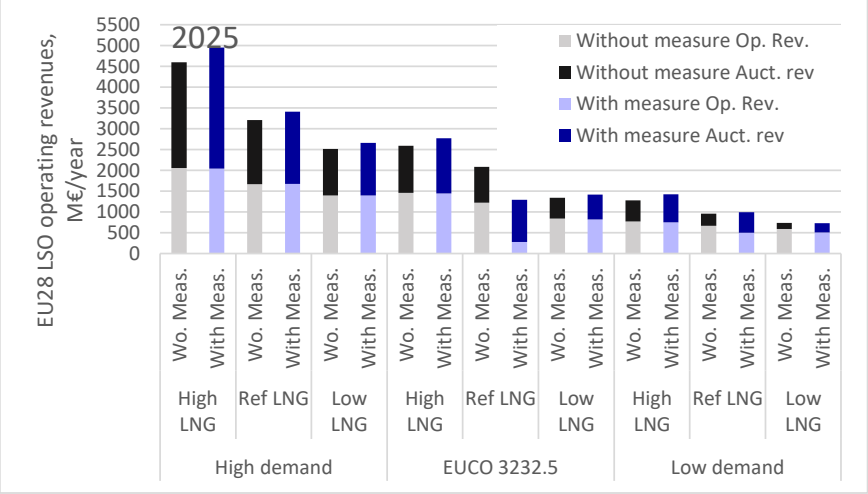
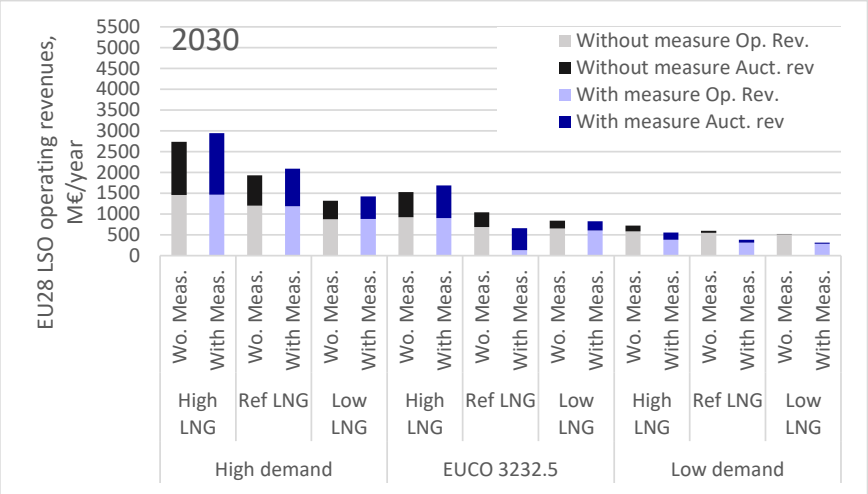


Figure 71: Total revenues (operational and congestion rent) of LNG terminal operators, M€/year, 2030



Utilisation of terminals overall remains at the same level. In some terminals and scenarios, utilisation drops when other sources of gas are more favourable than the long-term contracts in the without measures case – e.g. in 2020 High LNG supply scenario the Polish terminal utilisation shrinks to 0. Still, the effects of the measure are not considerable on EU28 level.

Table 58: Yearly average LNG terminal utilisation in the without measures case and due to the capacity/commodity release measure, 2020

Year	2020					
Demand	EUCO 3232.5					
LNG	High		Ref		Low	
	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure
BE	24%	20%	10%	1%	10%	2%
CY	64%	64%	64%	64%	64%	64%
ES	26%	26%	26%	26%	26%	26%
FR	48%	50%	24%	25%	4%	4%
GR	100%	100%	100%	100%	99%	100%
HR	100%	100%	66%	80%	42%	42%
IT	93%	93%	88%	87%	60%	60%
LT	79%	79%	79%	79%	78%	78%
MT	50%	50%	50%	50%	50%	50%
NL	0%	0%	0%	0%	0%	0%
PL	56%	0%	57%	56%	57%	57%
PT	17%	17%	17%	17%	17%	17%
UK	73%	72%	63%	63%	28%	29%
Total	47%	46%	40%	39%	27%	27%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 59: Yearly average LNG terminal utilisation in the without measures case and due to the capacity/commodity release measure, 2025

Year	2025																	
Demand	High						EUCO3232.5						Low					
LNG	High		Ref		Low		High		Ref		Low		High		Ref		Low	
	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure	Without Measure	With Measure
BE	91%	87%	61%	55%	51%	48%	59%	62%	13%	5%	10%	2%	10%	0%	10%	0%	10%	0%
CY	100%	100%	100%	100%	100%	100%	100%	100%	92%	92%	67%	67%	34%	31%	8%	0%	0%	0%
ES	26%	23%	20%	20%	19%	19%	13%	13%	13%	13%	14%	13%	11%	6%	11%	6%	11%	6%
FR	85%	88%	54%	54%	36%	36%	53%	55%	26%	24%	5%	6%	13%	25%	6%	5%	1%	1%
GR	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	100%	83%	83%	36%	50%
HR	79%	79%	79%	79%	48%	49%	69%	69%	53%	52%	22%	22%	16%	16%	12%	12%	12%	12%
IE	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	99%	99%	91%	99%
IT	100%	100%	93%	93%	92%	93%	93%	93%	93%	93%	71%	70%	61%	61%	61%	60%	60%	60%
LT	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	93%	100%	95%	100%	92%	100%	74%	92%
MT	56%	56%	56%	56%	56%	56%	47%	47%	47%	47%	47%	47%	38%	38%	38%	38%	38%	38%
NL	67%	67%	8%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL	100%	100%	91%	94%	54%	54%	88%	74%	57%	70%	49%	49%	36%	22%	36%	1%	36%	32%
PT	24%	24%	24%	24%	24%	24%	17%	17%	17%	17%	17%	17%	10%	10%	10%	10%	0%	10%
UK	86%	86%	83%	84%	67%	68%	59%	59%	59%	59%	27%	27%	31%	32%	17%	9%	17%	6%
Total	66%	65%	52%	52%	43%	43%	44%	44%	36%	36%	25%	24%	24%	24%	20%	15%	16%	14%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 60: Yearly average LNG terminal utilisation in the without measures case and due to the capacity/commodity release measure, 2030

Year	2030																	
Demand	High						EUCO3232.5						Low					
LNG	High		Ref		Low		High		Ref		Low		High		Ref		Low	
	Without Measure	With Measure	Without Measure	Without Measure	With Measure	Without Measure	Without Measure	With Measure	Without Measure	Without Measure	With Measure	Without Measure	Without Measure	With Measure	Without Measure	Without Measure	With Measure	Without Measure
BE	87%	83%	37%	37%	19%	15%	70%	66%	23%	1%	10%	0%	10%	0%	10%	0%	10%	0%
CY	83%	83%	67%	67%	67%	67%	67%	67%	41%	58%	0%	0%	0%	0%	0%	0%	0%	0%
ES	12%	12%	12%	12%	14%	12%	11%	6%	11%	6%	11%	6%	11%	0%	11%	0%	11%	0%
FR	61%	62%	31%	28%	7%	8%	31%	36%	5%	7%	1%	1%	1%	1%	1%	0%	1%	0%
GR	100%	100%	97%	97%	90%	90%	98%	100%	83%	81%	67%	67%	6%	10%	1%	0%	1%	0%
HR	65%	65%	57%	57%	26%	26%	26%	29%	11%	15%	11%	11%	9%	12%	4%	4%	0%	0%
IE	99%	99%	99%	99%	99%	99%	90%	90%	90%	90%	85%	90%	71%	71%	58%	71%	0%	45%
IT	95%	96%	95%	95%	82%	85%	63%	63%	60%	60%	60%	60%	60%	60%	55%	56%	44%	40%
LT	100%	100%	100%	100%	97%	100%	100%	100%	93%	100%	87%	97%	76%	76%	63%	76%	38%	67%
MT	47%	47%	47%	47%	47%	47%	39%	39%	39%	39%	39%	39%	31%	31%	31%	31%	31%	31%
NL	16%	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL	97%	100%	73%	77%	49%	49%	61%	60%	36%	38%	49%	49%	36%	14%	36%	1%	36%	0%
PT	2%	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
UK	40%	40%	40%	40%	22%	23%	23%	23%	23%	23%	21%	20%	20%	4%	17%	0%	17%	0%
Total	41%	41%	32%	32%	22%	22%	28%	28%	19%	17%	16%	15%	16%	10%	12%	6%	11%	4%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 61: Welfare effects of contract release on EU28, M€/year

CONTRACT RELEASE									
Year	**Demand**	**LNG**	**Δ CS**	**Δ PS**	**Δ LTC**	**Δ LSO**	**Δ SSO**	**Δ TSO**	**Δ Total**
2020	EUCO 3232.5	High	-448	150	587	202	-7	3	487
		Ref	-15	-1	109	104	-5	8	200
		Low	-220	65	184	71	1	13	113
2025	High	High	-259	59	336	349	-5	-55	425
		Ref	-135	52	117	205	6	-22	223
		Low	-41	14	-10	145	11	-5	115
	EUCO 3232.5	High	-248	52	544	184	-10	18	540
		Ref	-88	17	148	-794	-4	-9	-730
		Low	-289	57	251	78	4	22	124
	Low	High	-809	206	1127	144	-15	3	656
		Ref	-1763	654	1261	33	8	137	331
		Low	-1577	529	1280	-13	1	-3	218
2030	High	High	-152	34	466	208	6	-1	561
		Ref	-287	45	288	158	2	19	225
		Low	-347	37	364	101	-14	-16	125
	EUCO 3232.5	High	-542	97	922	162	-3	-35	601
		Ref	-1492	342	1325	-377	4	0	-199
		Low	-246	21	379	-16	-3	-33	102
	Low	High	-893	147	1740	-168	23	-17	831
		Ref	-2212	572	2630	-209	8	-64	724
		Low	-3108	782	3322	-205	-4	-184	602

Δ CS: Consumer surplus change;
Δ PS: Producer surplus change, related to European indigenous gas producers;
Δ LTC: profit change of long-term contract holders, related to traders importing gas from Russia, Norway and other extra-EU countries;
Δ LSO: profit change of LNG terminal operators (change in congestion rents and change in tariff revenues)
Δ SSO: profit change of storage operators (change in yearly storage arbitrage/summer-winter spread and change in tariff revenues)
Δ TSO: profit change of transmission system operators (change in congestion rents and change in tariff revenues)
Δ Total: sum of all stakeholder profit changes (CS+PS+LTC+LSO+SSO+TSO)
Green colour means increase compared to without measures case, red colour means decrease compared to without measures case

To sum up, the combined capacity-commodity release measure aims to solving an issue which may occur when unused primary capacity rights are not re-allocated with UIOLI or effectively working secondary markets. We could not identify this issue in either the historical capacity bookings pattern, nor with modelling the measure in any of the scenarios. Overall, the measure would not alter significantly the market outcomes and would not bring any benefits to neither LSOs, nor traders or consumers. For this reason it is concluded that if the secondary markets are working efficiently and the primary capacity rights are subject to UIOLI, this measure should not be implemented. However, if the secondary markets are not efficient or UIOLI is not in place, these problems should be assessed.

MEASURE 5: IDENTIFICATION OF NEW INVESTMENTS WHICH MAY FACILITATE LNG MARKET ACCESS AND LIQUIDITY OF GAS MARKETS

- The analysis shows that there are no missing interconnectors or capacity barriers in the Western European gas markets which hinder the inflow of LNG.
- In some isolated markets, further capacity improvements will positively affect the terminal utilization and consumers' welfare (e.g. HR, LT).
- This implies that in general, apart from some fringe markets, European gas markets are sufficiently interconnected and integrated.
- There is for most gas markets no strong argument for commissioning new pipelines to facilitate LNG trade.

In this section we summarize the modelled utilization of different interconnectors in the various scenarios in order to analyse whether the actual physical interconnection capacity is high enough to assure strong inter-terminal competition, as shippers can choose to use different terminals to serve the same markets. Or, on the other hand were there missing capacities which can prevent LNG from reaching neighbouring markets. In practice, we are looking whether additional interconnectors are needed to facilitate gas market integration in the EU.

First, we listed all interconnectors leading from LNG importing countries to neighbouring countries and assessed their utilisation in all modelled scenarios without measures. This meant 21 modelling scenarios altogether, 3 scenarios for 2020, and 9 scenarios for 2025 and 2030 each. If we find no congestion on an interconnector, there are no physical barriers to market integration. The assessment shows that:

1) In Western Europe, no physical congestion can be found on the major interconnectors. This means that infrastructure included in the without measures case (existing pipelines + FID projects + selected PCI projects, for detailed description see the Infrastructure section of the Annex) is sufficient to serve market needs and no additional pipeline investment is needed. Congestion was however identified in three modelling scenarios for the ES-FR interconnector (2030 low demand cases, see Table 64).
2) In the Baltic markets, congestion was noticed in 9 modelled scenarios for the LT-LV interconnector, with utilisation level over 85%.
3) The PL-UA interconnector was congested in 6 scenarios (all scenarios in 2020 and low demand scenarios in 2030).
4) The HR-HU interconnector was found to be congested in 3 cases in 2025 and one case in 2030. With High demand, the HR-HU interconnector was congested and the utilisation of the HR LNG terminal could be improved if there was ample evacuation possibilities for gas from Croatia.

Congestion issues can be handled by either enhancing the interconnection capacities (i.e. commissioning physical infrastructure or reducing contractual congestion), or by implementing market rules to allow for market mergers. Modelling results suggest that the mature and interconnected Western, Southern and Central European markets do not need any additional investment in pipelines. In the Baltics and Croatia additional capacity may be needed in some scenarios. However, with the current decarbonisation targets, there is no strong case to build additional gas interconnectors, also taken into account that studies suggest that as of 2030, natural gas demand would in the EU gradually decline.

Table 62: Yearly utilisation of selected interconnectors from LNG importing countries to neighbouring countries, 2020

Year	2020		
Demand	EUCO 3232.5		
LNG	High	Ref	Low
BE-UK	0%	0%	0%
BE-NL	0%	0%	0%
BE-DE	0%	0%	0%
BE-LU	68%	68%	68%
BE-FR	11%	19%	45%
ES-PT	44%	44%	44%
ES-FR	0%	0%	0%
FR-CH	35%	38%	29%
FR-ES	26%	26%	26%
GR-BG	16%	16%	16%
HR-HU	62%	25%	0%
IT-AT	0%	0%	0%
IT-SI	0%	0%	0%
LT-LV	90%	90%	89%
NL-BE	35%	31%	49%
NL-DE	22%	12%	0%
NL-UK	0%	29%	31%
PL-DE	0%	0%	1%
PL-UA	100%	100%	100%
PT-ES	0%	0%	0%
UK-BE	0%	0%	0%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 63: Yearly utilisation of selected interconnectors from LNG importing countries to neighbouring countries, 2025

Year	2025								
Demand	High			EUCO 3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BE-UK	0%	0%	0%	0%	0%	0%	0%	0%	0%
BE-NL	0%	0%	0%	0%	0%	0%	0%	0%	0%
BE-DE	0%	0%	0%	0%	0%	0%	0%	0%	0%
BE-LU	81%	81%	81%	73%	73%	73%	62%	62%	62%
BE-FR	4%	5%	5%	5%	5%	19%	5%	9%	7%
ES-PT	29%	29%	29%	29%	29%	29%	29%	29%	45%
ES-FR	60%	8%	0%	0%	0%	5%	39%	39%	25%
FR-CH	69%	69%	25%	57%	49%	25%	8%	19%	25%
FR-ES	26%	26%	26%	26%	26%	26%	26%	26%	26%
GR-BG	16%	16%	16%	16%	16%	16%	16%	16%	16%
HR-HU	100%	100%	35%	100%	67%	0%	8%	0%	0%
IT-AT	0%	0%	0%	0%	0%	0%	0%	0%	0%
IT-SI	0%	0%	0%	0%	0%	0%	0%	0%	0%
LT-LV	100%	100%	98%	99%	89%	89%	54%	54%	54%
NL-BE	6%	8%	13%	23%	19%	35%	34%	38%	36%
NL-DE	24%	1%	0%	10%	12%	0%	19%	0%	0%

Year	2025								
Demand	High			EUCO 3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
NL-UK	3%	13%	0%	0%	0%	6%	3%	45%	48%
PL-DE	4%	27%	71%	0%	0%	14%	0%	0%	0%
PL-UA	0%	50%	42%	0%	0%	34%	8%	8%	8%
PT-ES	0%	0%	0%	0%	0%	0%	0%	0%	0%
UK-BE	0%	0%	0%	0%	0%	0%	0%	0%	0%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 64: Yearly utilisation of selected interconnectors from LNG importing countries to neighbouring countries, 2030

Year	2030								
Demand	High			EUCO 3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BE-UK	0%	0%	0%	0%	0%	0%	0%	0%	0%
BE-NL	0%	0%	0%	0%	0%	0%	0%	0%	0%
BE-DE	0%	0%	0%	0%	0%	0%	0%	0%	0%
BE-LU	77%	77%	46%	68%	68%	22%	56%	56%	56%
BE-FR	2%	4%	2%	3%	2%	5%	2%	3%	4%
ES-PT	29%	29%	29%	29%	29%	29%	29%	29%	29%
ES-FR	0%	0%	17%	41%	41%	42%	91%	91%	91%
FR-CH	60%	59%	31%	19%	20%	20%	2%	0%	20%
FR-ES	26%	26%	26%	26%	26%	26%	26%	26%	26%
GR-BG	16%	16%	16%	16%	16%	16%	16%	16%	16%
HR-HU	100%	83%	16%	32%	0%	0%	0%	0%	0%
IT-AT	0%	0%	0%	0%	0%	0%	0%	0%	0%
IT-SI	0%	0%	0%	0%	0%	0%	0%	3%	0%
LT-LV	72%	62%	62%	38%	38%	38%	4%	0%	0%
NL-BE	7%	8%	8%	4%	29%	24%	22%	23%	25%
NL-DE	5%	0%	0%	15%	0%	0%	0%	0%	5%
NL-UK	0%	0%	0%	0%	0%	8%	5%	6%	2%
PL-DE	0%	0%	18%	0%	0%	0%	0%	0%	0%
PL-UA	0%	0%	0%	0%	0%	0%	100%	100%	92%
PT-ES	0%	0%	0%	3%	3%	3%	10%	10%	10%
UK-BE	0%	0%	0%	0%	0%	0%	0%	0%	0%

Green colour means less congestion; red colour means more congestion on the infrastructure

Second, where there is missing interconnection capacity to reach neighbouring countries, but no interconnector exists, it may make investment worthwhile. However, since the GIPL pipeline and the Baltic pipe were included as PCI projects in the without measures case, this way no country was isolated from a major neighbouring market.

Third, the new interconnectors which are not in place in 2020 but will be commissioned in the coming years may solve such problems. For this reason, we listed the utilisation of the new pipelines. On yearly level in the EUCO 3232.5 scenario, there was no congestion in any of these interconnectors. With 20% higher European demand, the SK-PL pipeline was congested, but this congestion is not related to the LNG market. Assuming 20% lower demand, the LT-PL interconnector was congested, and in the very same scenario the

utilisation of the Klaipeda LNG terminal was below the usually modelled utilisation of that terminal. This means that in one extreme case, when European demand for gas was 20% lower than the EUCO 3232.5 scenario, but global LNG markets are oversupplied, further expanding the GIPL interconnector would allow for more flows on the Klaipeda terminal.

Table 65: Utilisation of new interconnectors in 2025, %/year

Year	2025								
Demand	High			EUCO3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BG-RS	66%	48%	48%	43%	48%	46%	52%	46%	39%
CY-GR	22%	22%	22%	23%	22%	20%	18%	16%	15%
DK-PL	19%	7%	24%	2%	0%	0%	0%	0%	0%
ES-PT	29%	29%	29%	29%	29%	29%	29%	29%	45%
LT-PL	1%	1%	1%	19%	30%	16%	89%	82%	45%
PL-DK	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL-LT	9%	9%	7%	0%	0%	0%	0%	0%	0%
PL-SK	0%	0%	0%	0%	0%	0%	0%	0%	0%
PT-ES	0%	0%	0%	0%	0%	0%	0%	0%	0%
RS-BG	0%	0%	0%	0%	0%	0%	0%	0%	0%
SK-PL	34%	81%	100%	4%	47%	71%	0%	0%	4%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 66: Utilisation of new interconnectors in 2030, %/year

Year	2030								
Demand	High			EUCO3232.5			Low		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BG-RS	56%	50%	45%	49%	44%	42%	46%	40%	40%
CY-GR	30%	28%	28%	29%	27%	23%	16%	24%	24%
DK-PL	1%	1%	11%	0%	0%	0%	0%	0%	0%
ES-PT	29%	29%	29%	29%	29%	29%	29%	29%	29%
LT-PL	5%	17%	10%	75%	60%	48%	100%	71%	20%
PL-DK	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL-LT	0%	0%	0%	0%	0%	0%	0%	0%	0%
PL-SK	0%	0%	0%	0%	0%	0%	0%	0%	0%
PT-ES	0%	0%	0%	3%	3%	3%	10%	10%	10%
RS-BG	0%	0%	0%	0%	0%	0%	0%	0%	0%
SK-PL	51%	81%	100%	7%	46%	32%	0%	0%	0%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 67: LNG terminal utilisation, %/year 2025

Year	2025								
Demand	High			EUCO3232.5			High		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BE	91%	61%	51%	59%	13%	10%	10%	10%	10%
CY	100%	100%	100%	100%	92%	67%	34%	8%	0%
ES	26%	20%	19%	13%	13%	14%	11%	11%	11%
FR	85%	54%	36%	53%	26%	5%	13%	6%	1%
GR	100%	100%	100%	100%	100%	100%	99%	83%	36%
HR	79%	79%	48%	69%	53%	22%	16%	12%	12%
IE	100%	100%	100%	100%	100%	100%	99%	99%	91%
IT	100%	93%	92%	93%	93%	71%	61%	61%	60%
LT	100%	100%	100%	100%	100%	93%	95%	92%	74%
MT	56%	56%	56%	47%	47%	47%	38%	38%	38%
NL	67%	8%	0%	0%	0%	0%	0%	0%	0%
PL	100%	91%	54%	88%	57%	49%	36%	36%	36%
PT	24%	24%	24%	17%	17%	17%	10%	10%	0%
UK	86%	83%	67%	59%	59%	27%	31%	17%	17%
Total	66%	52%	43%	44%	36%	25%	24%	20%	16%

Green colour means less congestion; red colour means more congestion on the infrastructure

Table 68: LNG terminal utilisation in the without measures case, %/year 2030

Year	2030								
Demand	High			EUCO3232.5			High		
LNG	High	Ref	Low	High	Ref	Low	High	Ref	Low
BE	87%	37%	19%	70%	23%	10%	10%	10%	10%
CY	83%	67%	67%	67%	41%	0%	0%	0%	0%
ES	12%	12%	14%	11%	11%	11%	11%	11%	11%
FR	61%	31%	7%	31%	5%	1%	1%	1%	1%
GR	100%	97%	90%	98%	83%	67%	6%	1%	1%
HR	65%	57%	26%	26%	11%	11%	9%	4%	0%
IE	99%	99%	99%	90%	90%	85%	71%	58%	0%
IT	95%	95%	82%	63%	60%	60%	60%	55%	44%
LT	100%	100%	97%	100%	93%	87%	76%	63%	38%
MT	47%	47%	47%	39%	39%	39%	31%	31%	31%
NL	16%	0%	0%	0%	0%	0%	0%	0%	0%
PL	97%	73%	49%	61%	36%	49%	36%	36%	36%
PT	2%	2%	2%	0%	0%	0%	0%	0%	0%
UK	40%	40%	22%	23%	23%	21%	20%	17%	17%
Total	41%	32%	22%	28%	19%	16%	16%	12%	11%

Green colour means less congestion; red colour means more congestion on the infrastructure

MEASURE 6: TARIFF REGULATION FOR EXEMPTED TERMINALS

- Exempted terminals have the option to negotiate their capacity allocation and tariffs, which allows them to maximise their revenues
- Modelling shows that the "optimal" tariff level differs for each exempted terminal, which means that if tariff regulation is introduced at the end of their exemption terms, the optimal tariff should be determined on a case-by-case basis

In this section we analyse how a potential tariff regulation for exempted terminals (moving them to a regulated tariff regime) would affect the European gas markets. As a first step, for each of these terminals we estimated the level of regasification tariffs which maximizes the profit of the LNG operators of these terminals. We determined these tariffs for each exempted terminal separately, and considered these profit-maximizing tariff scenarios as without measures case. Then, as a second step we compared these market situations to a hypothetical scenario where we assume that after expiry of exemption, the tariff would be regulated based on efficient costs (assumed to be 0.4 €/MWh). This comparison allows us to analyse the expected market effects of a potential regulation.
Table 69 summarizes the profit-maximizing regasification tariffs and the resulting revenue levels compared to the hypothetical regulated scenario. The average variable regasification cost of the terminals is assumed to be 0.1 €/MWh.

Table 69: Profit maximizing level of regasification tariff and maximum revenue levels compared to potential regulated tariffs

	Without measure (Regas tariff at profit maximising level)					With measure (Regas tariff are regulated)				
	Regas tariff (€/MWh)	LNG flow (TWh)	LNG opera-tion profit (m€/yr)	LNG auction profit (m€/yr)	Total LNG profit (m€/yr)	Regas tariff (€/MWh)	LNG flow (TWh)	LNG operation profit (m€/yr)	LNG auction profit (m€/yr)	Total LNG profit (m€/yr)
FR_Dun	0,5	129,2	52	46	97	0,4	129,2	38,8	54	93
IT_Olt	3	60,8	176	52	228	0,4	60,8	18,2	128	147
NL_Rot	0,1	17,5	0	50	50	0,4	0,0	0,0	0	0
UK termi-nals	1	355,3	312	86	398	0,4	396,6	119,0	96	215

Modelling results show that the profit-maximizing level of regas tariffs is very much different between the exempted terminals. For the UK terminals, the profit-maximizing tariff equals to the average of regulated tariffs (1 €/MWh), while for the Dunkerque and Rotterdam terminals, tariffs which maximize the profit of these terminals are significantly lower. In the former case it is 0.5 €/MWh, while in the latter case interestingly, the sum of operation profit and congestion rent of LNG operator reaches its highest level when regas tariff equals to the regas average variable cost. This leads to a zero LNG operation profit, which is compensated by larger auction revenues due to increased flows. For the OLT Italian LNG terminal the current level of regas fee (3.1 €/MWh) is very close to its profit-maximizing level (3.0 €/MWh). Only a slight tariff decrease results in a 100% utilization and further tariff decrease leads to lower profit.

Table 70 illustrates the expected market effects of a potential regulation which sets the regas tariff of exempted terminals at a level of 0.4 €/MWh.

Table 70: Market effects if tariffs for exempted terminals are

	Price in hosting country			Welfare change (MEUR)	
	Without measure	With measure	Change	Consumer surplus Change	Total welfare change
FR_Dun	15,17	15,15	-0,02	11	21
IT_Olt	17,69	17,69	0,00	0	0
NL_Rot	14,21	14,23	0,02	-7	-5
UK terminals	15,14	15,02	-0,12	97	-30

It can be seen that compared to the significant profit loss of LNG terminals (except for the Dunkerque where the profit-maximising level of regas tariff is very close to the regulated level), the market effects are negligible both in terms of price and total welfare.

These results show that the profit-maximizing tariff level of exempted terminals is highly different, hence the same regulation would result in different – however not significant - market effects. This suggests that a mandatory tariff regulation of the currently TPA exempted terminals would not be necessary, on the contrary, modelling shows that very different regulatory solutions would lead to the efficient use of the terminals. Hence, it is probably better to leave the national regulator to decide on a case by case basis.

ROBUSTNESS CHECK OF RESULTS ON AN ALTERNATIVE INFRASTRUCTURE SCENARIO

Measures were also modelled in an infrastructure setup where Nord Stream 2 is not in place. This infrastructure and contractual arrangement setup is indicative of the 2019 status. Russian long-term contracted gas deliveries are using the Ukrainian system to a much higher degree compared to the setup where Nord Stream 2 and TurkStream are operational.

The absolute levels of the results of the measures are indeed slightly different from the Nord Stream case, but the direction of the changes due to measures compared to the without measures case is the same, apart from a few cases. This implies that no matter if Nord Stream 2 is in place or not, the measures act the same way in the two different infrastructure setups and the conclusions and takeaways are hence similar. In Table 71, the green cells indicate where both infrastructure setups result in similar effects, so for instance introducing the measure would increase welfare in both setups. Red cells indicate that the effect of the measure is different in the two infrastructure setups.

Table 71: Scenarios where the direction of total welfare effect changes. Green - same direction Red – opposite direction

			TOTAL WELFARE CHANGE																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE + NATL	MED	NATL			
2020	EUCO 3232.5	High LNG																					
		Ref LNG																					
		Low LNG																					
2025	High demand	High LNG																					
		Ref LNG																					
		Low LNG																					
	EUCO 3232.5	High LNG																					
		Ref LNG																					
		Low LNG																					
	Low demand	High LNG																					
		Ref LNG																					
		Low LNG																					
2030	High demand	High LNG																					
		Ref LNG																					
		Low LNG																					
	EUCO 3232.5	High LNG																					
		Ref LNG																					
		Low LNG																					
	Low demand	High LNG																					
		Ref LNG																					
		Low LNG																					

SUMMARY AND COMPARISON OF MODELLING RESULTS FOR THE CONSIDERED MEASURES

This section summarizes the main findings and takeaways of the modelling chapter. A concise comparison of the measures is presented, by showing combined tables for measures 1-4. Adding indicators for measures 5-6 was not possible, but the relevant findings are included.
In all summary tables, the effects of the measures are shown for the modelled years 2020, 2025 and 2030. For each modelled year,

(i) a high LNG supply to Europe (about 1200 TWh, indicative of a stronger LNG glut),
(ii) a low LNG supply (about 600 TWh/year, indicative of 2018 flows) and a
(iii) reference LNG supply (about 1000 TWh, indicative of 2019 flows) was modelled.

Additionally, for 2025 and 2030, results for 20% higher and 20% lower European demand are shown. The overview tables indicate the changes compared to the without measures case, for the key indicators we selected. To evaluate each measure, the results for EUCO3232.5 demand and Reference LNG supply should be consulted in the first place. All other demand and LNG supply scenarios serve as a sensitivity. Sensitivity helps to test the effects of the measure under different global circumstances as well.

Generally, effects of the measures are the strongest in 2025, as the import need of Europe is the highest in that year, as defined in the EUCO3232.5 scenario. The 2020 year represents the current status. In 2030, a strong decline in European gas demand is envisaged by EUCO3232.5 scenario, therefore the proposed measures will have less impact.

Comparing the measures, the highest impact is shown by the measure "auction allocation of capacities with a reserve price covering the variable costs only". A somewhat lower effect is indicated, if the reserve price is set at 0.5 €/MWh and the measure has nearly no effect, if the reserve price is set at 1 €/MWh. Obviously, introducing the measures for all terminals has the greatest effect. The regional effects are the highest for the CWE terminals, followed by the MED terminals – as these terminals are connected to the most liquid, largest and best interconnected markets, and as they have high tariffs. The TSO tariff decrease measure has a minor impact, as TSO entry tariffs are no barriers to entry in the current market. The second strongest effect was modelled by the 50% cut of LNG regasification tariffs. The contract release measure would change the shares of the different sources of supply to Europe, but in 2020 and 2025 it would only replace long-term contracted flows with spot cargoes.
Terminal utilisation and market competition are enhanced by introducing new measures, but the effect is substantially influenced by global LNG market conditions (e.g. global gas supply available for Europe) and European gas demand level. This means that measures which can be realised in the short term should be prioritized as (i) current global market conditions and European demand trends are favourable, and (ii) market conditions are expected to remain favourable (given an increasing LNG glut and a rise in EU28 gas demand).

Additional LNG inflow to the EU28 resulting from the measures is presented in Table 72. In 2020, LNG inflow would increase by 189 TWh/year due to the measures (from 1036 TWh/year). By 2025, this effect is stronger due to somewhat increased European demand and import need, increasing by 258 TWh/year (from 1015 TWh/year). By 2030, the diminishing European demand would reduce the effect of the measures to only 127

TWh/year (from 567 TWh/year). TSO tariff decrease scenario has a minor impact on LNG inflow, as TSO entry tariffs are no barriers to entry in the current market. The second strongest effect on LNG inflow was modelled by the 50% cut of LNG regasification tariffs, increasing LNG inflows by 113-115 TWh/year in 2020-2025. The contract release measure would redefine the sources of supply to Europe.

In some scenarios, LNG inflow to EU28 may decrease. This is observed in extreme cases, for example when the reference price in the auction allocation is set higher than the current reference price / regasification fee on certain terminals. Another example is when inflexible LTC contracts with take-or-pay clauses are released in contract release programmes, but global circumstances do not support spot LNG flows to European markets. These modelling results suggest that before introducing measures, a thorough assessment of the market and effects on all stakeholders must be conducted.
The utilisation level of all EU28 terminals is depicted in Table 73. For example, assuming EUCO 3232.5 demand and reference LNG supply to Europe in 2025, introducing the measure capacity allocation by auction with reserve price equal to variable cost in all European terminals would lead to 7.4% higher utilisation (i.e. from 36.5% to 43.9%).

Table 72: Change in total LNG flow to EU28, TWh/year

			Δ TOTAL LNG FLOW, TWh																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE + NATL	MED	NATL			
2020	**EUCO 3232.5**	High LNG	293	19	200	200	65	1	224	19	128	128	46	0	43	19	-5	-5	25	0	65	213	-33
		Ref LNG	**189**	**0**	**102**	**163**	**35**	**18**	**126**	**0**	**22**	**74**	**29**	**18**	**22**	**0**	**0**	**0**	**23**	**0**	**22**	**115**	**-12**
		Low LNG	126	0	22	57	72	49	85	0	1	16	65	4	27	-2	0	0	30	0	6	71	-9
2025	High demand	High LNG	121	0	70	90	18	20	56	0	45	49	14	4	0	0	-6	-6	6	0	48	53	-20
		Ref LNG	199	8	94	121	65	15	123	8	55	67	45	15	18	12	-11	-11	16	0	37	116	1
		Low LNG	115	1	1	29	1	17	49	1	1	14	1	12	1	1	0	0	0	0	1	27	0
	EUCO 3232.5	High LNG	235	0	115	116	3	0	118	0	18	18	3	0	2	0	0	0	2	0	5	115	0
		Ref LNG	**258**	**26**	**150**	**189**	**96**	**1**	**156**	**26**	**77**	**72**	**60**	**0**	**44**	**27**	**-2**	**-2**	**34**	**0**	**58**	**113**	**-8**
		Low LNG	162	27	39	111	76	94	112	27	-3	25	63	12	42	4	-1	-1	43	0	38	70	-14
	Low demand	High LNG	67	1	5	14	8	2	18	2	4	4	4	2	4	0	-1	-1	4	0	4	11	-1
		Ref LNG	66	32	35	48	54	37	34	23	20	26	34	26	14	4	0	0	14	0	14	29	-135
		Low LNG	69	12	12	18	56	18	46	9	4	5	37	5	26	1	0	0	26	0	6	29	-81
2030	High demand	High LNG	110	0	47	49	21	9	23	0	19	20	21	4	9	0	0	0	10	0	14	21	0
		Ref LNG	240	20	177	170	116	-1	159	20	109	109	76	0	11	22	-13	-13	8	0	41	169	-11
		Low LNG	163	16	34	91	71	35	88	16	20	46	42	24	31	13	-3	-3	26	0	31	70	-3
	EUCO 3232.5	High LNG	25	-2	2	2	20	0	20	1	1	1	19	0	12	1	-29	-29	19	0	7	20	-17
		Ref LNG	**127**	**13**	**19**	**19**	**57**	**0**	**57**	**12**	**11**	**11**	**41**	**0**	**28**	**10**	**-12**	**-12**	**20**	**0**	**14**	**33**	**-54**
		Low LNG	27	9	13	20	27	13	26	11	4	12	26	12	9	3	0	0	7	0	7	23	-51
	Low demand	High LNG	62	2	19	23	44	13	36	0	1	12	26	12	14	-2	0	0	15	0	12	24	-197
		Ref LNG	25	0	0	3	17	3	14	2	0	3	7	3	-10	0	0	0	-10	0	7	4	-212
		Low LNG	22	14	0	15	1	15	10	6	0	7	0	7	-4	-4	0	0	0	0	6	10	-206

Table 73: Change in utilisation of EU28 LNG terminals resulting from the measures, %points

			Δ TOTAL LNG FLOW, % change to without measures case																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE + NATL	MED	NATL			
2020	**EUCO 3232.5**	High LNG	8.9%	0.6%	6.7%	6.7%	1.8%	0.0%	6.9%	0.6%	4.3%	4.3%	1.2%	0.0%	1.1%	0.6%	-0.2%	-0.2%	0.5%	n.a.	2.2%	6.9%	-1.1%
		Ref LNG	5.3%	0.0%	3.0%	4.9%	0.6%	0.4%	3.5%	0.0%	0.4%	2.0%	0.4%	0.4%	0.3%	0.0%	0.0%	0.0%	0.4%	n.a.	0.4%	3.5%	-0.4%
		Low LNG	4.3%	0.0%	0.7%	1.9%	2.4%	1.7%	2.9%	0.0%	0.0%	0.6%	2.2%	0.1%	0.9%	-0.1%	0.0%	0.0%	1.0%	n.a.	0.2%	2.4%	-0.3%
2025	High demand	High LNG	3.9%	0.0%	2.3%	2.9%	0.6%	0.7%	1.8%	0.0%	1.5%	1.6%	0.5%	0.1%	0.0%	0.0%	-0.2%	-0.2%	0.2%	n.a.	1.6%	2.9%	-0.6%
		Ref LNG	6.4%	0.3%	3.0%	3.9%	2.1%	0.5%	4.0%	0.3%	1.8%	2.1%	1.4%	0.5%	0.5%	0.4%	-0.4%	-0.4%	0.5%	n.a.	1.2%	4.1%	0.0%
		Low LNG	2.8%	0.0%	0.0%	0.9%	0.0%	0.5%	0.9%	0.0%	0.0%	0.5%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	n.a.	0.0%	0.9%	0.0%
	EUCO 3232.5	High LNG	7.2%	0.0%	3.8%	3.8%	0.0%	0.0%	3.7%	0.0%	0.6%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	n.a.	0.2%	3.8%	0.0%
		Ref LNG	7.4%	0.9%	4.9%	6.1%	2.7%	0.0%	4.3%	0.9%	2.5%	2.3%	1.8%	0.0%	1.4%	0.9%	-0.1%	-0.1%	1.1%	n.a.	1.9%	3.6%	-0.2%
		Low LNG	4.5%	0.7%	0.8%	3.2%	1.9%	2.6%	3.1%	0.6%	0.0%	0.8%	1.5%	0.4%	0.8%	0.1%	0.0%	0.0%	0.8%	n.a.	0.8%	2.1%	-0.5%
	Low demand	High LNG	1.9%	0.0%	0.2%	0.4%	0.2%	0.1%	0.6%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	n.a.	0.1%	0.5%	0.0%
		Ref LNG	1.8%	1.0%	1.0%	1.5%	1.4%	1.1%	1.0%	0.8%	0.6%	0.9%	1.0%	0.9%	0.4%	0.1%	0.0%	0.0%	0.3%	n.a.	0.5%	0.9%	-4.5%
		Low LNG	2.2%	0.4%	0.4%	0.6%	1.8%	0.6%	1.5%	0.3%	0.1%	0.2%	1.2%	0.2%	0.8%	0.0%	0.0%	0.0%	0.9%	n.a.	0.2%	1.0%	-2.6%
2030	High demand	High LNG	3.2%	0.0%	2.0%	2.1%	0.3%	0.4%	0.4%	0.0%	0.9%	0.9%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	n.a.	0.2%	1.2%	0.0%
		Ref LNG	7.6%	0.6%	5.7%	5.5%	3.6%	0.0%	5.0%	0.6%	3.6%	3.6%	2.3%	0.0%	0.4%	0.7%	-0.4%	-0.4%	0.3%	n.a.	1.3%	5.5%	-0.4%
		Low LNG	5.0%	0.5%	1.1%	3.0%	2.1%	1.1%	2.8%	0.5%	0.7%	1.5%	1.3%	0.8%	1.1%	0.4%	-0.1%	-0.1%	1.0%	n.a.	1.0%	2.4%	-0.1%
	EUCO 3232.5	High LNG	0.3%	0.0%	0.1%	0.2%	0.1%	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%	0.0%	-0.1%	0.0%	-1.0%	-1.0%	0.1%	n.a.	0.1%	0.7%	-0.7%
		Ref LNG	4.1%	0.4%	0.6%	0.6%	1.8%	0.0%	1.8%	0.4%	0.4%	0.4%	1.3%	0.0%	0.9%	0.3%	-0.4%	-0.4%	0.6%	n.a.	0.5%	1.1%	-1.2%
		Low LNG	0.9%	0.3%	0.4%	0.7%	0.9%	0.4%	0.9%	0.4%	0.1%	0.4%	0.9%	0.4%	0.3%	0.1%	0.0%	0.0%	0.2%	n.a.	0.2%	0.8%	-1.7%
	Low demand	High LNG	2.0%	0.1%	0.6%	0.8%	1.4%	0.4%	1.1%	0.0%	0.0%	0.4%	0.8%	0.4%	0.4%	-0.1%	0.0%	0.0%	0.5%	n.a.	0.4%	1.0%	-6.4%
		Ref LNG	0.8%	0.0%	0.0%	0.1%	0.6%	0.1%	0.5%	0.1%	0.0%	0.1%	0.2%	0.1%	-0.3%	0.0%	0.0%	0.0%	-0.3%	n.a.	0.2%	0.4%	-6.9%
		Low LNG	0.7%	0.5%	0.0%	0.5%	0.0%	0.5%	0.3%	0.2%	0.0%	0.2%	0.0%	0.2%	-0.1%	-0.1%	0.0%	0.0%	0.0%	n.a.	0.2%	0.3%	-6.7%

Green colour means increase in LNG terminal utilisation; red colour means decrease in utilisation

Increased LNG flows do have price decreasing effects in LNG importing countries and consequently in Europe. To indicate this effect, we show the price change in the EU28 volume-weighted average price (i.e. price change in all EU28 countries weighted with the gas consumption in each market) resulting from all measures.

The price effect of the measures is proportional to the volume of additional LNG inflow. The largest impact is modelled in the auction without reserve price scenario, followed by the 50% regasification tariff decrease scenario. Still, price effects of the measures are well below 1 €/MWh (0.59 €/MWh in 2020, 0.46 €/MWh in 2025 and 0.42 €/MWh in 2030). The price effect is not negligible, as it affects the weighted average price of the entire European gas market. The measures have limited effect in regional markets and seldom affect neighbouring countries.

To show the effect on market integration, an indicator on change of price dispersion was calculated in Table 74. The weighted average price dispersion was calculated as:

$$WSD = \sqrt{\frac{\sum_{i=1}^{28} Cons_i (p_i - \overline{p_w})^2}{\frac{27}{28}\sum_{i=1}^{28} Cons_i}}$$

Where

WSD is the weighted standard deviation, €/MWh
$Cons_i$ is the yearly consumption in country i, TWh/year
p_i is the yearly average price in country i, €/MWh
$\overline{p_w}$ is the consumption-weighted average EU28 average price, calculated as $\overline{p_w} = \frac{\sum_{i=1}^{28} Cons_i p_i}{\sum_{i=1}^{28} Cons_i}$

The price dispersion change was below 1 €/MWh in all cases. In most measures, the price dispersion indicator decreased slightly, either meaning that the measure had effect in a country where the price was over the weighted average price, or the price effect was not constrained in one country. If the indicator increased, the effects of the measure were positive in the LNG importing countries, but this effect could not spread to neighbouring countries. Still, price dispersion in the without measures case was low, meaning that price convergence is currently strong in Europe apart from some fringe markets.

Table 74: Price effect of the modelled measures, weighted average price in the EU28, in €/MWh

			PRICE CHANGE, €/MWh																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL			
2020	**EUCO 3232.5**	High LNG	-0.50	0.00	-0.09	-0.25	-0.13	-0.16	-0.31	0.01	-0.05	-0.14	-0.12	-0.09	-0.06	0.01	0.00	0.00	-0.08	0.00	-0.08	-0.35	0.09
		Ref LNG	**-0.59**	**-0.05**	**-0.09**	**-0.33**	**-0.14**	**-0.14**	**-0.31**	**-0.04**	**-0.08**	**-0.15**	**-0.09**	**-0.07**	**-0.07**	**-0.02**	**0.00**	**0.00**	**-0.06**	0.00	**-0.08**	**-0.32**	**0.00**
		Low LNG	-0.36	-0.03	-0.14	-0.21	-0.26	-0.18	-0.30	-0.01	-0.06	-0.08	-0.16	-0.06	-0.06	0.01	0.00	0.00	-0.08	0.00	-0.06	-0.30	0.05
2025	High demand	High LNG	-0.29	0.00	-0.02	-0.10	-0.12	-0.08	-0.14	0.00	-0.02	-0.07	-0.08	-0.05	-0.01	0.00	0.00	0.00	-0.02	0.00	-0.05	-0.17	0.05
		Ref LNG	-0.46	-0.01	-0.15	-0.22	-0.12	-0.08	-0.30	-0.01	-0.06	-0.09	-0.08	-0.03	0.01	-0.01	0.04	0.04	-0.03	0.00	-0.08	-0.29	0.03
		Low LNG	-0.75	-0.08	-0.22	-0.57	-0.20	-0.23	-0.52	-0.08	-0.15	-0.33	-0.13	-0.12	-0.07	-0.08	0.00	0.00	-0.06	0.00	-0.20	-0.50	0.01
	EUCO 3232.5	High LNG	-0.51	-0.02	-0.10	-0.26	-0.16	-0.15	-0.36	-0.01	-0.09	-0.17	-0.11	-0.08	0.00	-0.01	0.08	0.08	-0.05	0.00	-0.15	-0.34	0.05
		Ref LNG	**-0.46**	**-0.02**	**-0.06**	**-0.21**	**-0.15**	**-0.15**	**-0.22**	**-0.02**	**-0.05**	**-0.13**	**-0.10**	**-0.08**	**-0.03**	**-0.01**	**0.01**	**0.01**	**-0.03**	0.00	**-0.09**	**-0.26**	**0.02**
		Low LNG	-0.38	0.00	-0.12	-0.23	-0.13	-0.11	-0.18	0.00	-0.06	-0.11	-0.06	-0.04	0.00	0.02	0.01	0.01	-0.01	0.00	-0.04	-0.17	0.06
	Low demand	High LNG	-0.87	-0.06	-0.35	-0.57	-0.47	-0.16	-0.58	-0.05	-0.10	-0.29	-0.23	-0.09	-0.11	-0.01	0.11	0.11	-0.12	0.00	-0.16	-0.54	0.22
		Ref LNG	-0.29	0.05	-0.09	-0.06	-0.26	-0.06	-0.22	0.03	-0.05	-0.06	-0.22	-0.05	-0.12	0.00	0.02	0.02	-0.10	0.00	-0.06	-0.18	0.49
		Low LNG	-0.33	-0.03	-0.04	-0.05	-0.25	-0.05	-0.21	-0.03	-0.03	-0.03	-0.18	-0.03	-0.12	0.00	0.00	0.00	-0.13	0.00	-0.06	-0.14	0.44
2030	High demand	High LNG	-0.78	0.00	-0.39	-0.51	-0.28	-0.22	-0.57	0.00	-0.23	-0.30	-0.22	-0.11	-0.08	0.00	0.00	0.00	-0.10	0.00	-0.19	-0.54	0.04
		Ref LNG	-0.35	0.03	-0.03	-0.15	-0.08	-0.12	-0.17	0.03	-0.01	-0.07	-0.05	-0.06	0.00	0.01	0.03	0.03	-0.02	0.00	-0.06	-0.16	0.07
		Low LNG	-0.31	0.00	-0.11	-0.16	-0.14	-0.07	-0.13	0.01	-0.01	-0.06	-0.10	-0.01	-0.01	0.01	0.01	0.01	-0.02	0.00	-0.04	-0.15	0.08
	EUCO 3232.5	High LNG	-0.99	-0.09	-0.36	-0.55	-0.27	-0.12	-0.58	-0.08	-0.19	-0.26	-0.20	-0.07	-0.11	-0.08	0.07	0.07	-0.12	0.00	-0.19	-0.58	0.15
		Ref LNG	**-0.42**	**-0.01**	**-0.07**	**-0.15**	**-0.25**	**-0.11**	**-0.28**	**0.00**	**-0.04**	**-0.11**	**-0.22**	**-0.06**	**-0.12**	**0.00**	**0.00**	**0.00**	**-0.14**	0.00	**-0.04**	**-0.18**	**0.41**
		Low LNG	-0.56	-0.03	-0.04	-0.09	-0.41	-0.07	-0.27	-0.01	-0.02	-0.02	-0.22	-0.02	-0.11	0.00	0.00	0.00	-0.12	0.00	-0.01	-0.15	0.07
	Low demand	High LNG	-0.48	-0.21	-0.02	-0.06	-0.40	-0.08	-0.34	-0.17	0.00	-0.03	-0.30	-0.03	-0.23	-0.12	0.00	0.00	-0.22	0.00	-0.10	-0.18	0.31
		Ref LNG	-0.16	-0.06	0.00	0.01	-0.10	0.01	-0.04	0.00	0.00	0.00	-0.04	0.00	0.04	0.01	0.00	0.00	0.03	0.00	-0.03	-0.03	0.77
		Low LNG	-0.03	-0.03	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	-0.01	1.08

Table 75: Price dispersion effect of the modelled measures, weighted standard deviation of prices in the EU28, in €/MWh

			CHANGE OF AVERAGE WEIGHTED EU28 PRICE'S STANDARD DEVIATION, in €/MWh																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL			
2020	EUCO 3232.5	High NG	0.29	0.00	0.00	0.17	0.09	0.17	0.15	0.00	-0.02	0.06	-0.01	0.08	-0.07	0.00	0.00	0.00	-0.06	0.00	0.03	-0.10	-0.04
		Ref LNG	**0.18**	**0.02**	**0.01**	**0.13**	**0.03**	**0.08**	**0.06**	**0.01**	**-0.01**	**0.04**	**0.01**	**0.02**	**-0.05**	**0.00**	**0.00**	**0.00**	**-0.04**	**0.00**	**0.00**	**-0.01**	**-0.01**
		Low LNG	-0.11	0.00	-0.02	-0.04	-0.13	-0.03	-0.11	0.00	0.00	-0.01	-0.14	0.00	-0.09	0.01	0.00	0.00	-0.10	0.00	-0.01	-0.11	0.02
2025	High demand	High NG	-0.04	0.00	0.00	-0.01	-0.02	-0.01	-0.03	0.00	0.00	-0.01	-0.03	-0.01	-0.03	0.00	0.00	0.00	-0.02	0.00	0.00	0.17	-0.01
		Ref LNG	-0.06	0.00	-0.01	-0.01	-0.05	0.00	-0.06	0.00	-0.01	-0.01	-0.03	0.00	-0.02	0.00	0.00	0.00	-0.01	0.00	-0.01	0.09	0.00
		Low LNG	-0.33	-0.06	-0.10	-0.23	-0.10	-0.10	-0.26	-0.06	-0.07	-0.16	-0.07	-0.05	-0.05	-0.06	0.00	0.00	-0.04	0.00	-0.11	-0.24	0.00
	EUCO 3232.5	High LNG	-0.10	-0.02	-0.04	0.02	-0.10	0.06	-0.14	-0.02	-0.05	-0.03	-0.06	0.02	-0.05	-0.02	0.03	0.03	-0.04	0.00	-0.07	0.07	0.01
		Ref LNG	**-0.09**	**-0.03**	**-0.07**	**-0.03**	**-0.09**	**0.05**	**-0.13**	**-0.03**	**-0.06**	**-0.05**	**-0.11**	**0.02**	**-0.07**	**-0.02**	**0.00**	**0.00**	**-0.05**	**0.00**	**-0.08**	**0.01**	0.00
		Low LNG	-0.09	0.00	-0.01	-0.03	-0.02	-0.03	-0.06	0.00	0.00	-0.01	-0.02	-0.01	-0.01	0.01	0.00	0.00	-0.01	0.00	-0.01	-0.08	0.02
	Low demand	High NG	-0.25	-0.10	-0.11	-0.09	-0.35	-0.01	-0.34	-0.08	-0.07	-0.10	-0.33	-0.03	-0.19	-0.02	0.03	0.03	-0.17	0.00	-0.10	-0.20	-0.02
		Ref LNG	-0.20	-0.05	-0.03	0.00	-0.18	-0.01	-0.22	-0.03	-0.02	-0.02	-0.21	-0.02	-0.15	0.00	0.01	0.01	-0.13	0.00	-0.03	-0.09	-0.06
		Low LNG	0.20	0.01	0.04	0.06	0.14	0.06	0.10	0.01	0.03	0.03	0.08	0.03	0.06	0.01	0.00	0.00	0.06	0.00	0.02	-0.23	-0.28
2030	High demand	High NG	-0.53	0.00	-0.23	-0.23	-0.23	-0.05	-0.45	0.00	-0.13	-0.14	-0.20	-0.03	-0.18	0.00	0.00	0.00	-0.18	0.00	-0.16	-0.38	0.00
		Ref LNG	-0.54	0.05	0.03	-0.02	-0.26	-0.03	-0.37	0.05	0.04	0.02	-0.24	-0.02	-0.23	0.02	0.01	0.01	-0.23	0.00	-0.12	-0.09	0.00
		Low LNG	-0.25	-0.03	-0.04	-0.08	-0.19	-0.04	-0.14	-0.02	-0.02	-0.04	-0.13	-0.03	-0.07	-0.02	0.00	0.00	-0.04	0.00	-0.03	0.16	0.02
	EUCO 3232.5	High NG	-0.72	-0.15	-0.17	-0.20	-0.53	-0.01	-0.56	-0.12	-0.11	-0.13	-0.36	-0.01	-0.22	-0.11	0.02	0.02	-0.16	0.00	-0.19	-0.25	0.02
		Ref LNG	**-0.09**	**-0.06**	**0.00**	**-0.03**	**0.08**	**-0.01**	**0.03**	**-0.04**	**0.00**	**-0.02**	**0.11**	**-0.02**	**0.15**	**-0.03**	**0.00**	**0.00**	**0.13**	**0.00**	**0.01**	**0.15**	**0.19**
		Low LNG	0.08	-0.02	0.02	0.00	0.13	-0.01	0.07	0.01	0.01	0.00	0.07	0.00	0.07	0.01	0.00	0.00	0.05	0.00	-0.01	0.06	-0.03
	Low demand	High NG	0.23	0.10	0.02	0.05	0.19	0.06	0.12	0.06	0.00	0.01	0.12	0.01	0.07	0.03	0.00	0.00	0.08	0.00	0.04	-0.08	-0.17
		Ref LNG	0.06	0.03	0.00	-0.01	0.03	-0.01	0.00	0.00	0.00	0.00	0.01	0.00	-0.02	-0.01	0.00	0.00	-0.01	0.00	0.01	-0.02	-0.58
		Low LNG	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.49

Primary results of modelling are prices and flows on infrastructure. Using these primary results, the effects on stakeholders were also quantified. The following tables will reflect the changes in consumer surplus, operating profits (calculated as the difference of operating revenues and variable costs of operation) and congestion rents related to infrastructure.

The modelling shows that consumer welfare increases in all scenarios where the price is lower. This is in line with the expectations and the goal of the measure – which is to bring diverse and cheaper sources to European consumers.

Table 76: Consumer surplus change in all modelled measures, M€/year

			CONSUMER SURPLUS CHANGE, M€/year																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE + NATL	MED	NATL			
2020	**EUCO 3232.5**	High LNG	2405	-15	448	1206	640	762	1485	-30	263	685	558	424	276	-49	-21	-21	379	0	387	1703	-448
		Ref LNG	**2875**	**253**	**430**	**1607**	**693**	**685**	**1502**	**200**	**372**	**726**	**448**	**343**	**331**	**76**	**2**	**2**	**302**	**0**	**383**	**1525**	**-15**
		Low LNG	1750	139	660	1035	1253	856	1467	27	289	402	798	301	309	-46	0	0	369	0	287	1454	-220
2025	High demand	High LNG	1571	0	122	554	649	416	770	0	103	403	407	296	70	0	-2	-2	89	0	290	925	-259
		Ref LNG	2475	31	839	1200	626	429	1631	31	312	479	419	185	-51	50	-209	-209	184	0	453	1563	-135
		Low LNG	4088	458	1196	3067	1088	1265	2837	458	825	1780	724	665	369	457	-19	-19	318	0	1089	2713	-41
	EUCO 3232.5	High LNG	2322	70	467	1155	721	690	1614	67	402	785	497	384	8	67	-366	-366	226	0	678	1521	-248
		Ref LNG	**2086**	**75**	**253**	**932**	**684**	**685**	**1002**	**75**	**204**	**571**	**451**	**381**	**137**	**44**	**-40**	**-40**	**133**	**0**	**401**	**1177**	**-88**
		Low LNG	1732	4	563	1047	590	486	799	0	251	516	249	182	3	-78	-43	-43	40	0	174	759	-289
	Low demand	High LNG	3156	213	1276	2056	1693	589	2100	188	362	1042	828	342	386	49	-394	-394	428	0	590	1960	-809
		Ref LNG	1033	-197	331	223	931	199	792	-114	170	209	791	178	447	-16	-54	-54	379	0	225	636	-1763
		Low LNG	1187	118	140	193	909	193	770	118	105	112	656	112	441	-9	0	0	464	0	207	501	-1577
2030	High demand	High LNG	3376	-3	1706	2223	1228	953	2475	-3	1012	1301	956	488	360	-3	0	0	447	0	803	2331	-152
		Ref LNG	1519	-131	132	639	361	502	723	-131	48	312	232	276	18	-42	-145	-145	103	0	268	684	-287
		Low LNG	1350	-15	467	704	608	284	567	-22	59	238	439	60	26	-44	-59	-59	93	0	170	648	-347
	EUCO 3232.5	High LNG	3560	317	1315	1967	964	430	2110	299	681	922	719	238	391	295	-245	-245	445	0	696	2083	-542
		Ref LNG	**1504**	**37**	**260**	**536**	**913**	**411**	**1023**	**-6**	**152**	**382**	**796**	**230**	**437**	**-11**	**-12**	**-12**	**503**	**0**	**161**	**643**	**-1492**
		Low LNG	2013	101	130	335	1470	241	961	40	70	69	794	69	400	-3	0	0	434	0	41	527	-246
	Low demand	High LNG	1399	611	68	184	1158	227	983	479	1	77	875	77	676	344	0	0	642	0	290	528	-893
		Ref LNG	451	176	0	-16	290	-16	118	-6	0	8	119	8	-106	-25	0	0	-82	0	99	80	-2212
		Low LNG	90	80	0	-7	24	-7	8	14	0	-7	1	-7	-56	-56	0	0	0	0	-3	23	-3108

The measures modelled affected the regasification tariff in most scenarios. Consequently, the profit of LNG terminal operators will be lower compared to the without measures case. In the auction allocation without reference price measure, operational profits of the LSOs decrease the most, but in turn they do earn additional congestion rent – however, this does not cover all their "missing money" compared to the without measures case. The decrease in profits resulting from the modelling does not necessarily imply that they do not recover their costs: in all modelling scenarios, variable costs of operation are recovered. Fixed costs are to be recovered from modelled operational profits and congestion rents. We have no information on the level of fixed costs. However, if we see a revenue loss for LSOs in all measures, it may still be socially justified to re-distribute (part of) the benefits to the consumers. The level of recoverable fixed cost and return on capital is to be determined by NRAs on a case by-case basis. This is an important issue to be looked at more in depth on national level before introducing any regulatory change.

LSOs do not benefit equally from the measures, for example introducing auctions without reserve price in the Baltics market would have a beneficial impact in Poland and the Baltics, but adverse effects in CWE markets, due to redistribution of spot cargoes. These effects are described in more detail in Table 77.

Table 77: LSO profit change in all modelled measures, M€/year

			LSO PROFIT CHANGE, M€/year																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)								
			ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
2020	**EUCO 3232.5**	High LNG	-1010	-33	-72	-426	-473	-355	-592	-9	4	-193	-337	-198	-162	24	6	6	-206	0	131	-555	202
		Ref LNG	**-804**	**-78**	**-136**	**-351**	**-434**	**-277**	**-443**	**-51**	**-81**	**-131**	**-291**	**-118**	**-185**	**-18**	**9**	**9**	**-169**	**0**	**116**	**-399**	**104**
		Low LNG	-569	-77	-20	-127	-380	-123	-371	-51	-7	-57	-257	-57	-138	-21	3	3	-117	0	44	-279	71
2025	High demand	High LNG	-1255	-69	-69	-340	-752	-269	-798	-54	-64	-240	-530	-177	-278	-36	-1	-1	-249	0	169	-751	349
		Ref LNG	-1007	-57	-174	-378	-440	-236	-630	-42	-32	-115	-301	-91	-160	-35	49	49	-179	0	165	-541	205
		Low LNG	-1088	-133	-307	-677	-588	-329	-768	-114	-170	-382	-413	-161	-248	-88	12	12	-221	0	13	-651	145
	EUCO 3232.5	High LNG	-1030	-76	-172	-493	-555	-323	-688	-61	-125	-304	-366	-179	-211	-39	59	59	-211	0	64	-562	184
		Ref LNG	**-741**	**-36**	**-58**	**-318**	**-365**	**-319**	**-395**	**-22**	**6**	**-180**	**-266**	**-178**	**-154**	**10**	**12**	**12**	**-157**	**0**	**172**	**-382**	**-794**
		Low LNG	-503	-78	-64	-197	-257	-164	-287	-56	-57	-98	-143	-87	-68	-31	1	1	-49	0	148	-225	78
	Low demand	High LNG	-743	-84	-176	-305	-512	-184	-513	-56	-66	-166	-348	-102	-203	-19	36	36	-195	0	14	-410	144
		Ref LNG	-530	-39	-28	-90	-371	-81	-376	-20	-18	-56	-288	-49	-184	-13	8	8	-158	0	39	-268	33
		Low LNG	-499	-61	-9	-96	-335	-84	-348	-47	-4	-52	-248	-47	-175	-21	3	3	-155	0	21	-262	-13
2030	High demand	High LNG	-1131	-66	-411	-632	-581	-372	-791	-51	-218	-344	-403	-167	-225	-33	4	4	-214	0	76	-696	208
		Ref LNG	-617	-14	-38	-259	-330	-222	-336	-1	14	-107	-218	-122	-156	18	4	4	-159	0	166	-259	158
		Low LNG	-526	-65	-128	-251	-314	-233	-314	-44	-18	-77	-227	-75	-119	-17	16	16	-110	0	110	-269	101
	EUCO 3232.5	High LNG	-876	-104	-271	-422	-441	-139	-549	-84	-135	-213	-302	-78	-166	-65	18	18	-145	0	31	-467	162
		Ref LNG	**-557**	**-68**	**-34**	**-138**	**-376**	**-138**	**-384**	**-38**	**-8**	**-85**	**-289**	**-77**	**-150**	**-8**	**-8**	**-8**	**-155**	**0**	**55**	**-244**	**-377**
		Low LNG	-566	-79	-7	-117	-391	-108	-380	-48	-6	-54	-264	-49	-191	-29	3	3	-168	0	29	-283	-16
	Low demand	High LNG	-511	-74	-9	-104	-346	-102	-367	-50	-7	-48	-268	-43	-211	-30	3	3	-188	0	23	-278	-168
		Ref LNG	-522	-76	-12	-102	-358	-90	-378	-42	-5	-57	-285	-52	-227	-25	3	3	-206	0	11	-278	-209
		Low LNG	-506	-66	-12	-92	-349	-80	-380	-48	-5	-47	-283	-42	-229	-32	3	3	-200	0	6	-270	-205

TSOs and SSOs' operational profits, congestion rents and inter-temporal arbitrage are nearly unaffected by the measures. TSOs' profits are most affected in the decrease of the TSO entry tariff measure. Losses of infrastructure operators can in theory be compensated by the increased consumer surplus. In the next table, the total profit changes of LSOs, TSOs and SSOs are presented against the changes in consumer surplus. We must note that the equilibrium outcome of modelling is also affected by the welfare of domestic European gas producers and traders with long-term contracts (LTC holders).

Adding up these stakeholder categories, all measures seem to have overall positive effects: this means that from the consumer surplus gains, infrastructure operators may be compensated in the three main auction measures. In the Baltic markets, which are isolated and small, they tend to re-direct flows from other markets. The auction without reserve price measure has the strongest effect, but hurts LSOs profits the most. Introducing a reserve price may alleviate these losses. However, it also results in lower LNG flows and lower consumer surplus change. Moreover, setting a too high reserve price can result in no change in LNG flows whatsoever.

Table 78: Change in Consumer surplus and profit of infrastructure operators

			ΔCS+ΔLSO+ΔSSO+ΔTSO, M€/year																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL			
2020	**EUCO 3232.5**	High LNG	1431	-61	429	806	189	417	886	-58	272	480	204	226	90	-42	-27	-17	162	0	263	1125	-247
		Ref LNG	**2010**	**193**	**382**	**1323**	**244**	**406**	**1010**	**145**	**329**	**614**	**119**	**232**	**110**	**41**	**3**	**-8**	**110**	**0**	**267**	**1064**	**98**
		Low LNG	905	65	597	822	659	656	849	-23	278	289	308	231	54	-58	2	3	110	0	147	989	-134
2025	High demand	High LNG	592	-80	50	240	88	163	79	-39	60	187	-3	123	-207	-37	11	11	-154	0	131	218	29
		Ref LNG	1381	-97	707	847	168	185	859	-70	240	328	50	75	-312	-21	-176	-166	-55	0	250	884	51
		Low LNG	2846	307	954	2611	514	1085	1981	289	679	1475	288	612	53	325	-13	-13	62	0	807	1996	102
	EUCO 3232.5	High LNG	1333	-29	405	780	276	350	898	3	317	530	170	196	-261	2	-300	-324	-4	0	448	935	-55
		Ref LNG	**1206**	**-31**	**243**	**618**	**269**	**363**	**490**	**-7**	**169**	**371**	**98**	**210**	**-123**	**-24**	**-34**	**-34**	**-104**	**0**	**219**	**672**	**-893**
		Low LNG	928	-114	483	764	223	238	240	-98	221	387	-22	95	-206	-138	-41	-42	-133	0	83	362	-186
	Low demand	High LNG	2424	88	1142	1776	1174	402	1525	88	318	874	468	238	99	-3	-363	-363	190	0	451	1505	-667
		Ref LNG	435	-279	304	115	520	78	339	-176	156	140	448	101	188	-50	-40	-43	171	0	126	311	-1576
		Low LNG	497	-15	131	92	431	93	275	4	87	36	289	53	162	-58	-8	13	201	0	108	165	-1590
2030	High demand	High LNG	2203	-95	1332	1625	710	633	1597	-80	795	964	562	310	72	-55	-12	-3	185	0	563	1564	60
		Ref LNG	727	-168	143	426	47	293	231	-158	84	212	-48	157	-229	-74	-116	-116	-114	0	137	305	-108
		Low LNG	394	-156	329	362	81	28	-36	-128	5	71	55	-69	-280	-105	-41	-41	-140	0	36	164	-259
	EUCO 3232.5	High LNG	2564	122	1108	1588	524	290	1433	131	573	737	392	159	92	158	-224	-224	235	0	489	1501	-418
		Ref LNG	**748**	**-121**	**238**	**389**	**450**	**270**	**463**	**-129**	**131**	**288**	**407**	**150**	**154**	**-74**	**-22**	**-17**	**237**	**0**	**62**	**296**	**-1862**
		Low LNG	1368	-4	124	200	999	124	507	-35	60	-1	458	11	148	-42	-4	3	213	0	-52	188	-293
	Low demand	High LNG	869	563	71	56	834	110	602	436	-4	14	633	19	450	308	4	4	460	0	216	253	-1058
		Ref LNG	-93	113	-12	-124	-69	-112	-269	-51	-5	-56	-162	-51	-318	-58	3	3	-263	0	6	-202	-2479
		Low LNG	-461	-17	-12	-127	-327	-115	-397	-37	-5	-73	-282	-67	-285	-88	3	3	-200	0	-98	-267	-3498

The supply side of the gas market including indigenous European gas producers and traders owning long-term contracts with countries exporting gas via pipeline or LNG, is always adversely affected by any kind of price decrease.

Traders owning long-term contracts may also have less profits if wholesale gas prices in the EU decrease. However, they have the possibility to re-negotiate with the exporting countries the price and contractual terms.

Overall, adding up all stakeholder effects modelled were small and no win-win measure could be shown for all gas market stakeholders. Any major regulatory changes must be taken with due consideration.

Regarding infrastructure investments, we could not identify infrastructure bottlenecks which would hamper the utilisation of LNG terminals. However, the current FID projects are important in reaching this outcome.
The results are in general robust independently of the scenario assumptions on Nord Stream 2 commissioning.

Table 79: Total welfare change in all modelled measures

			TOTAL WELFARE CHANGE, M€/year																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE + NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL	ALL	BAL	CWE	CWE +NATL	MED	NATL			
2020	**EUCO 3232.5**	High LNG	-280	-42	58	-23	-264	-81	-195	-30	61	16	-188	-45	-124	-12	-1	-1	-113	0	-12	-101	487
		Ref LNG	**-451**	**-80**	**-25**	**-102**	**-299**	**-83**	**-314**	**-63**	**-4**	**-34**	**-232**	**-48**	**-176**	**-41**	**3**	**3**	**-135**	**0**	**-56**	**-231**	**200**
		Low LNG	-663	-74	-40	-188	-422	-176	-489	-57	-3	-89	-334	-71	-214	-39	3	3	-182	0	-90	-361	113
2025	High demand	High LNG	-443	-69	-7	-61	-333	-62	-363	-55	-12	-55	-264	-43	-236	-37	-2	-2	-199	0	-45	-322	425
		Ref LNG	-548	-85	-32	-120	-324	-93	-427	-71	-1	-56	-265	-57	-226	-42	10	10	-184	0	-99	-326	223
		Low LNG	-728	-99	-89	-289	-402	-150	-474	-81	-51	-158	-317	-78	-241	-57	6	6	-198	0	-127	-389	115
	EUCO 3232.5	High LNG	-419	-65	-13	-94	-312	-81	-333	-51	-33	-78	-249	-45	-193	-32	22	22	-179	0	-99	-218	540
		Ref LNG	**-403**	**-72**	**5**	**-72**	**-291**	**-81**	**-281**	**-58**	**23**	**-32**	**-260**	**-45**	**-207**	**-35**	**3**	**3**	**-171**	**0**	**-77**	**-240**	**-730**
		Low LNG	-637	-105	-35	-206	-334	-165	-440	-82	-12	-92	-239	-73	-187	-54	2	2	-142	0	-64	-303	124
	Low demand	High LNG	-493	-93	-93	-177	-383	-86	-409	-69	-32	-111	-268	-50	-206	-33	21	21	-172	0	-95	-316	656
		Ref LNG	-470	-65	-11	-108	-309	-107	-353	-48	-4	-59	-257	-67	-196	-26	9	9	-166	0	-78	-252	331
		Low LNG	-580	-102	-9	-98	-410	-87	-418	-85	-5	-51	-311	-46	-248	-35	3	3	-216	0	-86	-297	218
2030	High demand	High LNG	-513	-70	-95	-174	-280	-72	-393	-56	-40	-85	-203	-48	-194	-38	4	4	-155	0	-69	-305	561
		Ref LNG	-433	-82	6	-75	-253	-82	-326	-67	24	-21	-230	-45	-236	-41	1	1	-188	0	-77	-211	225
		Low LNG	-709	-104	-109	-258	-398	-178	-475	-85	-33	-113	-300	-91	-240	-58	15	15	-189	0	-108	-332	125
	EUCO 3232.5	High LNG	-540	-87	-122	-212	-303	-83	-362	-64	-60	-106	-222	-46	-141	-39	6	6	-124	0	-87	-284	601
		Ref LNG	**-524**	**-70**	**-24**	**-101**	**-335**	**-81**	**-399**	**-53**	**-11**	**-56**	**-268**	**-45**	**-226**	**-22**	**0**	**0**	**-198**	**0**	**-82**	**-275**	**-199**
		Low LNG	-588	-85	-20	-114	-404	-97	-412	-74	-8	-66	-290	-60	-217	-44	3	3	-178	0	-96	-292	102
	Low demand	High LNG	-541	-90	-17	-102	-376	-82	-397	-69	-6	-51	-288	-46	-247	-49	3	3	-217	0	-96	-291	831
		Ref LNG	-534	-53	-12	-94	-360	-82	-386	-41	-5	-55	-282	-50	-209	-35	3	3	-177	0	-89	-279	724
		Low LNG	-531	-73	-12	-119	-350	-107	-397	-46	-5	-65	-282	-60	-238	-41	3	3	-200	0	-92	-281	602

Competition in LNG terminals may be indicated with the share of spot LNG as opposed to long-term contracted flows. The more spot LNG, the higher the competition between the various sources. Table 80 summarizes the change of spot LNG percentage in total LNG flow to EU28. In the without measures case, modelled share of spot LNG was 65% in 2020, 67% in 2025 and 45% in 2030.

As the table shows, in most of the cases the percentage of spot LNG is increased by the measures. This implies that the share of long-term contracted flows decrease. The highest positive changes are caused by the contract release scenarios (measure 4) in without measures scenarios 2025 (9.32%) and 2030 (38.14 %). In the without measures scenario 2020, allocation of capacities by auction in all regions (measure 1) produced the highest growth (9,67%). From all the measures none of them decreased the rate of LNG spot volume with more than -1,25%. In the without measures scenarios only auction allocation with 1 €/MWh reserve price in Central Western European terminals or in Central Western European and North Atlantic terminals caused decrease (between -0,01% and -1,22%) in every modelled year.

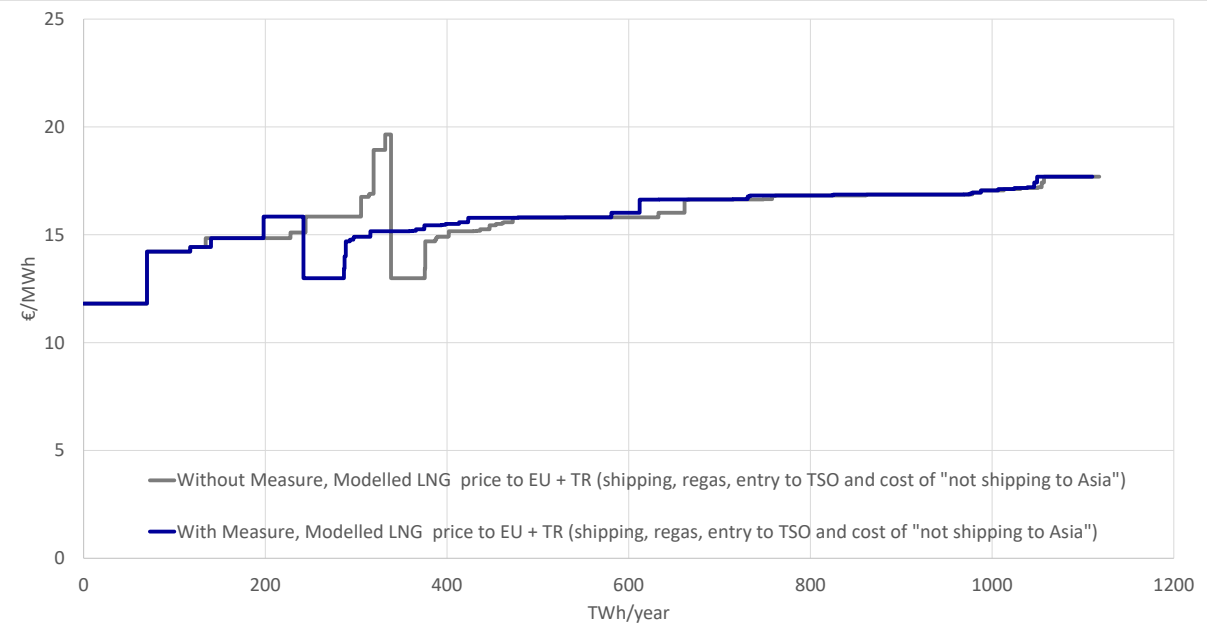
Table 80: Change in the ratio of spot LNG due to the measures, % compared to without measures case

			CHANGE OF SPOT LNG PERCENTAGE, M€/year																				
			AUCTION						AUCTION (0.5 €/MWh RP)						AUCTION (1 €/MWh RP)						TSO ENTRY	50% LSO TARIFF	CONTRACT RELEASE
			ALL	BAL	CWE	CWE+ NATL	MED	NATL	ALL	BAL	CWE	CWE+ NATL	MED	NATL	ALL	BAL	CWE	CWE+ NATL	MED	NATL			
2020	**EUCO3232.5**	High LNG	4.9%	0.4%	3.5%	3.5%	1.3%	0.0%	3.9%	0.4%	2.4%	2.4%	0.9%	0.0%	0.9%	0.4%	-0.1%	-0.1%	0.5%	0.0%	1.3%	3.7%	19.6%
		Ref LNG	**9.7%**	**0.0%**	**3.2%**	**7.6%**	**2.9%**	**3.8%**	**7.2%**	**0.0%**	**0.7%**	**5.3%**	**1.7%**	**3.8%**	**0.8%**	**0.0%**	**0.0%**	**0.0%**	**0.8%**	**0.0%**	**3.8%**	**6.9%**	**6.2%**
		Low LNG	8.3%	0.0%	1.7%	4.1%	5.1%	3.6%	5.9%	0.0%	0.1%	1.2%	4.6%	0.3%	2.0%	-0.2%	0.0%	0.0%	2.3%	0.0%	0.5%	5.0%	7.6%
2025	High demand	High LNG	1.1%	0.0%	0.6%	0.8%	0.2%	0.2%	0.5%	0.0%	0.4%	0.4%	0.1%	0.0%	0.0%	0.0%	-0.1%	-0.1%	0.1%	0.0%	0.4%	0.5%	11.9%
		Ref LNG	6.8%	0.9%	1.5%	4.0%	2.3%	2.5%	5.5%	0.9%	0.9%	3.2%	1.2%	2.5%	0.3%	0.2%	-0.2%	-0.2%	0.3%	0.0%	1.0%	4.3%	4.5%
		Low LNG	2.7%	0.0%	0.0%	0.7%	0.0%	0.4%	1.2%	0.0%	0.0%	0.4%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	4.0%
	EUCO3232.5	High LNG	4.0%	0.0%	2.1%	2.1%	0.1%	0.0%	2.2%	0.0%	0.3%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	2.1%	19.5%
		Ref LNG	**8.6%**	**1.9%**	**1.3%**	**5.2%**	**1.7%**	**0.0%**	**6.5%**	**1.9%**	**-0.4%**	**2.0%**	**1.3%**	**0.0%**	**1.4%**	**1.4%**	**-0.1%**	**-0.1%**	**1.1%**	**0.0%**	**2.4%**	**4.4%**	**9.3%**
		Low LNG	10.9%	2.2%	3.1%	8.0%	5.7%	6.9%	8.1%	2.2%	-0.2%	2.0%	4.9%	1.0%	3.3%	0.3%	-0.1%	-0.1%	3.4%	0.0%	3.0%	5.3%	8.4%
	Low demand	High LNG	4.4%	0.1%	0.3%	1.0%	0.6%	0.1%	1.3%	0.2%	0.3%	0.3%	0.3%	0.1%	0.3%	0.0%	0.0%	0.0%	0.3%	0.0%	0.3%	0.8%	37.1%
		Ref LNG	6.5%	3.3%	3.6%	4.9%	5.4%	3.9%	3.6%	2.5%	2.1%	2.8%	3.5%	2.8%	1.5%	0.5%	0.0%	0.0%	1.5%	0.0%	1.6%	3.0%	41.3%
		Low LNG	9.6%	1.9%	1.9%	2.8%	7.9%	2.8%	6.7%	1.4%	0.7%	0.8%	5.4%	0.8%	3.9%	0.2%	0.0%	0.0%	4.0%	0.0%	0.9%	4.4%	22.0%
2030	High demand	High LNG	2.1%	0.0%	0.9%	1.0%	0.4%	0.2%	0.5%	0.0%	0.4%	0.4%	0.4%	0.1%	0.2%	0.0%	0.0%	0.0%	0.2%	0.0%	0.3%	0.4%	18.0%
		Ref LNG	8.0%	1.9%	5.1%	5.0%	3.9%	0.0%	6.1%	1.9%	3.5%	3.5%	2.7%	0.0%	1.3%	2.0%	-0.5%	-0.5%	0.0%	0.0%	1.6%	5.3%	14.3%
		Low LNG	12.1%	1.3%	3.2%	7.3%	6.0%	2.9%	6.7%	1.3%	1.7%	3.7%	3.8%	2.0%	2.6%	1.1%	-0.2%	-0.2%	2.2%	0.0%	2.6%	5.5%	8.8%
	EUCO3232.5	High LNG	1.2%	-0.1%	0.1%	0.1%	0.9%	0.0%	0.9%	0.0%	0.1%	0.1%	0.9%	0.0%	0.6%	0.0%	-1.4%	-1.4%	0.9%	0.0%	0.3%	0.9%	29.8%
		Ref LNG	**10.1%**	**1.3%**	**1.8%**	**1.8%**	**5.1%**	**0.0%**	**5.1%**	**1.2%**	**1.1%**	**1.1%**	**3.7%**	**0.0%**	**2.6%**	**0.9%**	**-1.2%**	**-1.2%**	**1.9%**	**0.0%**	**1.4%**	**3.0%**	**34.5%**
		Low LNG	7.8%	3.2%	1.6%	4.8%	7.0%	4.0%	6.3%	1.2%	0.0%	3.9%	5.5%	3.9%	1.3%	-0.1%	0.0%	0.0%	0.9%	0.0%	1.3%	5.2%	9.2%
	Low demand	High LNG	13.0%	0.4%	3.0%	3.7%	10.7%	2.1%	9.6%	0.0%	0.2%	2.0%	8.2%	2.0%	6.4%	-0.4%	0.0%	0.0%	6.5%	0.0%	2.0%	3.8%	43.3%
		Ref LNG	5.1%	0.1%	0.0%	0.6%	3.6%	0.6%	3.0%	0.4%	0.0%	0.6%	1.4%	0.6%	-2.3%	0.0%	0.0%	0.0%	-2.3%	0.0%	1.4%	0.9%	41.2%
		Low LNG	6.1%	4.0%	0.0%	4.1%	0.2%	4.1%	2.7%	1.7%	0.0%	2.0%	0.0%	2.0%	-1.1%	-1.1%	0.0%	0.0%	0.0%	0.0%	1.6%	2.7%	38.1%

A reserve price curve for LNG supplies was also plotted. The figure is based on modelled LNG flows (output of the modelling) and assumed cost of (i) shipping, (ii) regasification, (iii) entry to TSO as well as the (iv) opportunity cost for not shipping this gas to Asian markets. The figure resembles a supply curve of LNG for Europe. The curve is made up of two distinctive parts: (i) take-or-pay of long-term contracted LNG volumes, which need to be delivered (otherwise the importer pays a high penalty) and (ii) spot deliveries based on costs. This means that the long-term contracted deliveries are ordered in a stepwise function, then the spot deliveries are also ordered in a stepwise function.

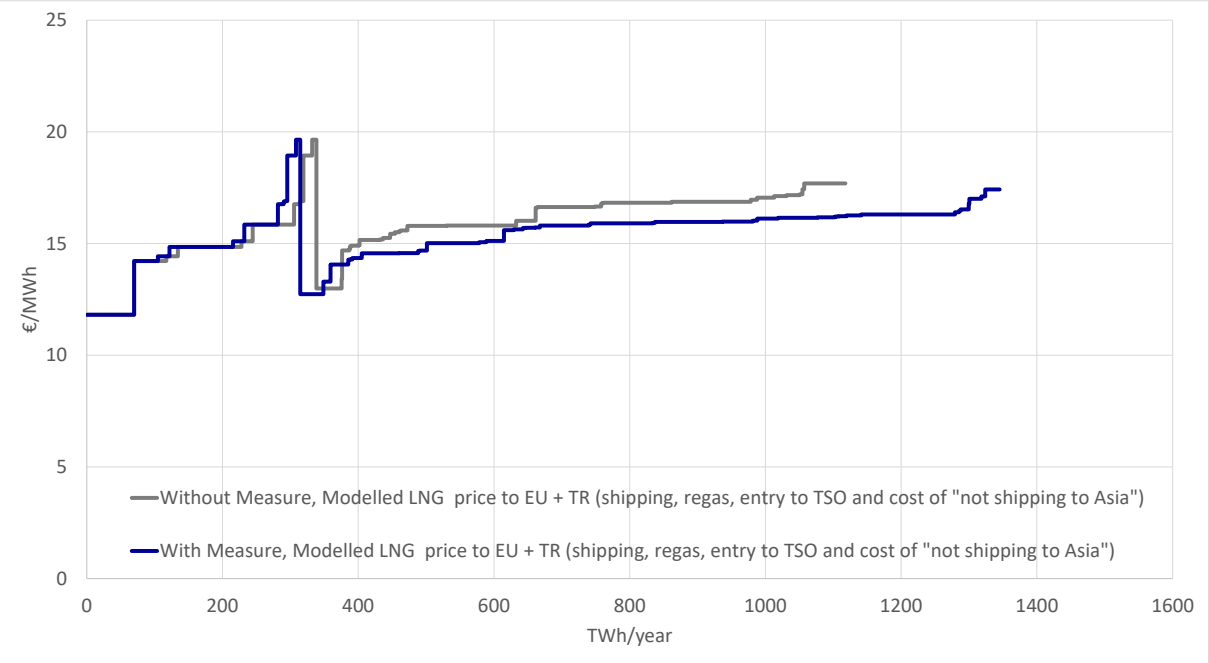
Figure 72 shows the effect of the contract release measure on the curve. The grey curve indicates the without measure case, the blue one the measure. It is apparent that some high-priced LNG contracts in the without measure case are delivered, as the TOP obligation stipulates. Once the obligation is lifted, only those contracts remain which are competitive with the spot trades – thus the blue curve flattens and more spot based deliveries occur. Overall, the level of LNG reaching Europe is nearly the same, but the spot share is considerably higher.

Figure 72: Effect of contract release on LNG deliveries (TWh/year) and reservation price paid (€/MWh), 2025 EUCO3232.5 demand and reference LNG supply scenario



For the auction allocation without reserve price measure, it is apparent that the curve is shifted to the right and downwards – i.e. more LNG is available at a lower price, as the regasification fees only cover variable cost. This additional supply has price decreasing effect on the EU28 weighted average price and consequently a positive effect on consumer surplus.

Figure 73: Effect of auction allocation without reserve price on LNG deliveries (TWh/year) and reservation price paid (€/MWh), 2025 EUCO3232.5 demand and reference LNG supply scenario



MODELLING RESULTS

The implementation of most considered measures would decrease the weighted average gas price for the EU-28. This price decrease would positively impact the EU's consumer surplus and negatively affect the EU's producers and companies importing gas to the EU. Implementing most measures would result in a net negative total welfare effect, redistributing money from the supply side (and from infrastructure operators) to consumers.

All measures have varying impacts on the different stakeholders of the market. None of the measures can improve the position of all stakeholders without negatively affecting the position of other stakeholders. Therefore any regulatory change will affect some players adversely compared to the status quo.

The modelling results indicate however that the negative impact of the considered measures on infrastructure operators could be partly or fully recovered through, e.g., a surcharge on TSO tariffs, because increases in consumer surplus exceed the cumulative negative impacts on regulated LSOs, TSOs and SSOs in all tested scenarios. Such cross-subsidisation could be justified on the grounds of LNG's contribution to security of supply and increased gas market competition.

Enforcing capacity allocation through auctioning with a low reserve price would generate the highest benefits for European consumers. Moving towards auction-based allocation regimes would enable more efficient utilisation of terminals. Fixed and variable costs of terminal operation could be considered to set the 'optimal' reserve price. The levying of additional congestion rents would indicate the need for capacity expansions and could act as a source for their funding. Setting excessive reserve prices would hinder terminal utilisation and render LNG less competitive than pipeline gas.

Decreasing TSO tariffs charged at entry points from LNG terminals has only a minor impact on market outcomes. **This implies that current entry tariffs to the transmission system are not a barrier to entry for LNG**.

Implementing a uniform 50% decrease in regasification tariffs would strongly impact LNG flows into EU markets, gas prices, and consumer surplus levels. However, this measure would affect some terminals more severely than others.

Implementing regulation that would impose on dominant LNG importers commodity contract release/market-making obligations would redefine the sources of gas supply for Europe, and would replace long-term contracted flows with spot cargoes.

Introducing the recommended measures positively impacts terminal utilisation rates and levels of market competition, but the effective size of the impacts is highly dependent on global LNG market conditions (e.g., the global gas supply available for Europe) and on European gas demand level. This indicates that implementing the proposed measures in the short term would lead to high benefits, as global market conditions and trends in European gas demand are currently favourable. But the measures would continue to generate benefits even if market conditions become less favourable (i.e., if the "LNG glut" disappears, and/or if EU28 gas demand stabilizes or declines).

All modelled scenarios assume perfect competition and efficient functioning of primary and secondary markets. Primary capacity is currently allocated based on first-committed-first-served principles at most terminals. Secondary markets are not in place for all terminals.

Transparent and efficient market operations are prerequisites to foster competitive LNG entry into European markets. **In this context, it is considered advisable to establish and operate a single platform for allocating secondary capacity rights.**

Transparency – particularly regarding information on historical bookings, available primary and secondary capacity slots at terminals, and access requirements for terminals – is vital to attract new users to EU terminals. All modelled scenarios assume perfect information transparency. While the GIE transparency template has increased market transparency in recent years, not all terminals provide data of the same quality and transparency remains far from perfect. **It is considered advisable to continue monitoring the use of the transparency template by LSOs and to require that all terminal operators publish data on historical and future capacity bookings, on access conditions, on tariff levels.**

Modelling results suggest that the mature and interconnected Western, Southern and Central European markets do not require any additional investment in pipelines. More isolated, less integrated markets, e.g. the Baltics and Croatia, would benefit from additional pipeline capacity in some scenarios.

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