Consultation on an EU Strategy for

Liquefied Natural Gas and Gas Storage

LNG in the EU today

Question 1: *Do you agree with the assessment for the above regions in terms of infrastructure development challenges and needs to allow potential access for all Member States, in particular the most vulnerable ones, to LNG supplies either directly or through neighbouring countries? Do you have any analysis or view on what an optimal level/share of LNG in a region or Member State would be from a diversification / security of supply perspective? Please answer by Member state / region.*

Höegh LNG agrees with the assessment; building new or expanding current pipeline systems throughout Europe will, through access to LNG supplies, make Member States in Europe less exposed to disruptions in supply from a single source. Access to the LNG world market also provides Member States with an option to buy natural gas from the most competitive source, which ensures a fair gas price.

However, new land-based LNG import terminals are both time- and capital intensive, and often end up being delayed. The land-based LNG import terminals on Krk in Croatia and Świnoujście in Poland were both initiated in 2006, and ten years later the terminal in Poland is nearing completion, while the terminal at Krk has yet to start construction.

Floating LNG import terminals (FSRUs) represent a faster, more cost effective and flexible solution and Höegh LNG's FSRU project in Egypt is an excellent example of a fast track project; Höegh LNG commenced operations five months after signing the lease contract. FSRUs can be relocated and used as an LNG transportation vessel.

The FSRU Independence in Klaipeda, Lithuania, which Höegh LNG designed, delivered, own and operate, demonstrates the benefits of floating LNG infrastructure and its ability to introduce LNG to new regions, such as the Baltics. The project was initiated in 2011 and commenced operations in 2014, at a substantially lower cost compared to land-based terminals. The FSRU has allowed Lithuania to diversify their gas supply source and thereby eliminates the threat of supply disruptions and the negative effects of monopoly pricing of natural gas. The coastline of the Black Sea, inside the Bosporus Strait, is perceived as a similar closed region, which would benefit greatly from an FSRU.

Question 2: *Do you have any analysis (cost/benefit) that helps identify the most cost-efficient options for demand reduction or infrastructure development and use, either through better interconnections to existing LNG terminals and/or new LNG infrastructure for the most vulnerable Member States? What, in your view, are reasons, circumstances to (dis)favour new LNG investments in new locations as opposed to pipeline investments to connect existing LNG terminals to those new markets?*

FSRUs is a fast track, cost effective and flexible solution, which may be used to interconnect and optimise current infrastructure and to directly access the demand centres that have a coastline, for instance in some of the vulnerable Member States. The typical cost of a land-based terminal with specifications comparable to FSRUs is EUR 600 mill, with some terminals reported as high as around EUR 1 billion. A typical FSRU lease rate for a 10 year contract would be in the region of USD 40-50 million per year, depending on technical specifications, equivalent to EUR 35-45 million per year. When accounting for the time value of money and discounting the future cash flow of the yearly lease payments, the net present value (NPV) should look very attractive from the client's perspective.

Question 3: *Do you think, in addition to the already existing TEN-E Regulation, any further EU action is needed in this regard? Do you think the use of LNG gas and existing LNG infrastructure could be improved e.g. by better storage possibilities, better network cooperation of TSOs or other measures? Please give examples.*

A potential EU action could be facilitation of FSRUs, in order to enable easy access for EU members to the most optimal cost solution. In terms of storage, FSRUs offer floating storage of natural gas in the form of LNG, which takes up 1/600 space compared to natural gas in gaseous state at atmospheric pressure, at a lower cost than storage at land-based LNG terminals. In addition, FSRUs can work as a break-bulk facility by re-loading LNG to small scale LNG carriers and thereby supplying commercial vessels using LNG as fuel (LNG bunkering). These features are already included in the FSRU design and would not represent additional costs, as it would for onshore terminal with additional jetty, cryogenic piping etc.

Question 4: *What in your view explains the low use rates in some regions? Given uncertainties over future gas demand, how would you assess the risk of stranded assets and lock-in effects (and the risk of diverting investments from low carbon technologies such as renewables and delaying a true change in energy systems) and weigh those against risks to gas security and resilience? What options exist in your view to reduce and/or address the risk of stranded assets?*

With economic growth in the Euro Zone, LNG volumes, in particular from the US Gulf, are expected to find their way to Europe, and as an effect increase utilisation of European terminals. The sale of LNG on a single cargo basis is becoming more common, some of the new importers (also using FSRUs), such as Egypt, Jordan and Pakistan, are purchasing LNG from the world market on a cargo basis. Having the opportunity to purchase LNG on a single cargo basis is an important flexibility for countries seeking to have a back-up to pipeline gas.

Given these developments and consequent uncertainties of future gas demand, the use of FSRUs offered by service providers represents a medium- to long-term solution, which may reduce or even eliminate the risk of constructing stranded or under-utilised assets, as for instance seen for land based LNG import terminals constructed in the US before domestic natural gas production from shale was a fact. FSRUs represent a flexible solution that can be re-located or serve as traditional LNG carriers in low demand seasons.

Question 5: *The Energy Union commits the EU to meeting ambitious targets on greenhouse gas emissions, renewable energy and energy efficiency, and also to reducing its dependency on imported fossil fuels and hence exposure to price spikes. Moderating energy demand and fuel-switching to low carbon sources such as renewables, particularly in the heating and cooling sector, can be highly cost-effective solutions to such challenges, and ones that Member States will wish to consider carefully alongside decisions on LNG infrastructure. In this context, do you have any evidence on the most cost-efficient balance between these different options in different areas, including over the long term (i.e. up to 2050)?*

Renewables like wind and photovoltaic require economically attractive back-up solutions with quick response times, to cope with changes in wind and sun conditions. In most cases, gas fired power generations are the preferred back-up solution. It is expected that natural gas in the form of LNG will be an important part of the energy mix in the power sector, also in the longer term.

Potential entry barriers for LNG

Question 6: *What in your view are the most critical regulatory barriers by Member State to the optimal use of and access to LNG, and what policy options do you see to overcome those barriers? Have you encountered or are you aware of any problems in accessing existing LNG terminal infrastructure, either because of regulatory provisions or as a result of company behaviour? Please describe in detail.*

Exemptions to third party access (TPA), as seen in the UK, are a critical barrier for optimal use of the terminals and for UK to access LNG world markets. By facilitating open third party access, additional players will have access to the terminals. This will allow the markets to work in the most efficient way, which may lead to increased utilisation in meeting demand at a competitive price, as large players will have less power in controlling the market and/or terminal capacity.

Question 7: *What do you think are the most critical commercial, including territorial restrictions and financial barriers at national and regional level to the optimal use and access to LNG?*

Access to financing is a critical barrier in terms of securing and constructing LNG import solutions. FSRUs are owned by ship owners and subsequently leased to clients, offering them access to LNG import capacity with low up-front capital costs. Although the EU provides subsidies for investments, these do not cover long-term leasing. As a result, the subsidies favour the substantially more costly and time consuming land based terminals.

Equal subsidies for land based LNG terminals and FSRUs would make it preferable to select FSRUs; the cheapest, fastest and most flexible solution.

Question 8: *More specifically, do you consider that ongoing EU policy initiatives and/or existing legislation can adequately tackle the outstanding issues, or there is more the EU should do?*

Commencing support programs that include long-term leasing contracts, such as FSRUs, would be a recommended initiative. EU could also engage further by opening the Bosporus Strait, to facilitate LNG developments in the Black Sea.

International LNG markets

Question 9: *How do you see worldwide LNG markets evolving over the next decade and what effects do you expect this to have on EU gas markets? Do you expect a shift away from oil-indexed LNG contracts, and if so under what conditions?*

Höegh LNG expects LNG markets to develop substantially the next five years. Approximately 140 million tons of LNG, representing a 50% increase from today's capacity, mainly from the US and Australia, will reach the market within the coming years. Furthermore, prices are already decreasing as a result of declining oil prices, as most LNG sales contracts are linked to oil in today's market.

The LNG market has turned into a buyers' market, which is very different from only a few years back. Today, the suppliers of LNG are looking for buyers of their excess volumes, and attractive commercial terms are expected to be achievable to buyers in the coming years (both for spot cargo purchases and medium to long term supply agreements).

Question 10: *What problems if any do you see with the functioning of the international LNG market, particularly at times of stress? Are there specific actions the EU should take, in dialogue with our international partners, including in trade negotiations, to improve its functioning and/or to make the EU market more attractive as a destination for LNG? Could voluntary demand aggregation be helpful in some way?*

Payment security and guarantees covering LNG buyer's obligations towards the suppliers could ease the situation, by securing sufficient supply of gas at attractive terms.

LNG technology issues including LNG use in transport

Question 11: *What technological developments do you anticipate over the medium term in the field of LNG and how do you see the market for LNG in transport developing? Is there a need for additional EU action in this area to reduce barriers to uptake, for example on technology or standards, including for quality and safety?*

LNG is expected to increasingly be used as fuel for vessels, especially in short-sea shipping within the EU, due to IMO Sulphur regulations in ECA. Furthermore, FSRUs are expected to take a significant market share of all new gas import projects, as they represent easy solutions to access the world gas market. This allows new countries to import LNG and offers redistribution and small-scale shipping within the EU, and IMO has already initiated several regulatory programs to reduce barriers for LNG imports and flows in Europe. However, an increasing focus on subsidies and support of construction of necessary LNG infrastructure could be a way of speeding up the development.

LNG sustainability issues

Question 12: *Do you think there are any sustainability issues specific to LNG that should be explored as part of this strategy? What would be the environmental costs and benefits of alternative solutions to LNG? Please provide evidence in support your views.*

Natural gas is a clean, available, and cost-effective fuel. Although considered a bridge fuel towards renewables by some, natural gas currently represents a necessary part of the fuel mix, which due to quick ramp up and ramp down times for thermal power plants work very well in the energy mix with low carbon fuel sources and renewables.

Storage

Internal market constraints and challenges for storage

Question 13: *What opportunities or challenges do the supply projections for different sources, in particular LNG and pipeline gas and low carbon indigenous sources, present for the use of gas storage / for gas storage operators?*

As LNG is cooled-down natural gas, boil-off of gas during storage represents a challenge. Although technological developments have been initiated, such as increased storage tank insolation and boil-off gas management systems, opportunities and new technology development are expected to be increasingly important, in order to minimise loss of product during storage.

Question 14: *Are, in your view, current market and regulatory conditions adequate to ensure that storages can fully play their role in addressing supply disruptions or other unforeseen events (e.g. extreme cold spells)?*

For LNG, the size of the storage facilities, access to LNG and sufficient regasification capacity will be critical to meet pipeline gas supply disruptions or other unforeseen events, such as extreme cold spells.

Question 15: *As an alternative to mandatory reserves, how could market based instruments ensure adequate minimum reserves?*

The question is not applicable to Höegh LNG.

Storage Infrastructure

Question 16: *Do you have any analysis or view on what an optimal level/share of storage in a Member State or region would be? What kind of initiatives, if any, do you consider necessary in terms of infrastructure development in relation to storage?*

Developing new LNG terminals would enable vulnerable Member States to import LNG quickly from the world market from various sources/suppliers, and as such increase security of supply. Moreover, gas can be stored in the form of LNG within the tanks of efficient FSRUs with boil-off gas management systems.

Question 17: *Do you think, in addition to the existing TEN-E Regulation, any further EU action is needed in this regard?*

Funding and permitting support would be beneficial. Furthermore, allowing LNG carriers to transit the Bosporus Strait could open up a potential LNG tie-in point in Ukraine, and allow import of LNG to feed Eastern Europe through the existing gas pipeline grid.

Question 18: *Given uncertainties over future gas demand, how would you assess the risk of stranded assets (and hence unnecessary costs), lock-in effects, the risk of diverting investments from low carbon technologies such as renewables, delaying a transition in energy systems and how would you and weigh those against risks to gas security and resilience? What options exist in your view to reduce the risk of stranded assets?*

FSRUs are typically financed, owned and operated by ship owners, and leased to clients (usually state- or gas owned entities), on a 5-20 year contract base. This significantly reduces the risk of investing in assets that could potentially become stranded in the case of market changes.

Regulatory framework and potential barriers for storage

Question 19: *What do you think are the most critical regulatory barriers to the optimal use of storage in a regional setting?*

Storage of LNG coupled with cross-border sales are expected to remain difficult and expensive, due to national fees, storage fees and subsequently transport fees. More terminals, offering direct import to the intended markets, could potentially be a cheaper, easier, and more flexible solution of solving the same challenge.

Question 20: *Do you think ongoing initiatives and existing legislation can tackle the remaining outstanding issues or is there more the EU could do? Do initiatives need to include additional issues further to the ones described here?*

As suggested, funding support and permitting would be beneficial, as well as allowing LNG carriers to transit the Bosporus Strait.

Question 21: *Do you consider EU-level rules necessary to define specific tariff regimes for storage only or should such assessment be made rather on a national level in view of available measures able to meet the objective of secure gas supply?*

The question is not applicable to Höegh LNG.

Question 22: *Have you ever encountered, or are you aware of, difficulties in accessing storage facilities? Has this concerned off-site or on-site storage facilities? Please describe the nature of the difficulties in detail.*

The question is not applicable to Höegh LNG.

Question 23: *Have you ever encountered, or are you aware of, difficulties related to feeding LNG gas from the storage site back into the gas network? If so please describe the nature of*

these difficulties (regulatory provisions, company behaviour, technical problems) in detail. Practical details on responding, consultation events etc.

The question is not applicable to Höegh LNG.