STUDY ON POTENTIAL ROLE AND BENEFITS OF LIQUIFIED NATURAL GAS IMPORT TERMINAL IN LATVIA

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Natural gas is relatively clean energy source, which emits less greenhouse gases (hereinafter – GHG), compared to other fossil fuels, such as hard and brown coal, and therefore it may be the most feasible resource to ensure smooth energy transition towards Europe’s climate neutrality by 2050. Traditional natural gas can be easily transported and used in liquefied (hereinafter – LNG) or compressed form. As for biomethane, in future it also can be used in liquefied (hereinafter – bioLNG) and compressed form, as well as transported by means of the current natural gas infrastructure. It can also significantly enhance regional and national energy security and independence, which has been challenging for the European Union (hereinafter – EU) over at least several decades.

Issue on energy independence, security of supply, alternative natural gas sources has been in a hotspot of the Baltic energy policy makers as well. Now, considering Russia’s invasion in Ukraine, since late February 2022, a problem of the EU natural gas dependency on the Russian Federation has escalated again and with force never before experienced. The European natural gas prices also hit records, as the natural gas prices in the Netherlands Title Transfer Facility reached 345 euros per megawatt-hour (hereinafter – EUR/MWh) in March 2022.

Therefore, LNG import terminal is the only viable option to reduce national dependency of the so-called pipe gas which in some cases, due to the insufficient interconnections, may be delivered from very limited number of sources. The European policy makers and relevant institutions are currently working towards radical EU natural gas supply diversification, where LNG deliveries coming from outside of Russia will certainly take a central stage.
In case of Latvia, the potential benefits of the LNG terminal development in Skulte were evaluated in order to reduce energy independence of the Russian natural gas deliveries in the Baltic region and to introduce new ways and sources of the natural gas flows to the Baltics. LNG terminal in Skulte could ensure significant capital investment cost reduction comparing to other projects proposed for Latvia in different periods, due to already existing natural gas transmission infrastructure and the relative closeness to the Incukalns underground gas storage (hereinafter – UGS). Various aspects, such as technical, political and economic ones, were analysed to assure that Skulte LNG terminal would be a real asset not only to customers of Latvia, but also to those of the whole Baltic region, where in future it would be possible to use biomethane for efficient utilisation of existing and developing natural gas infrastructure.

**Keywords:** Biomethane, energy independence, energy policy, energy security, gas storage, gas transmission, LNG, security of supply, SoS.

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**1. INTRODUCTION**

The European Green Deal is a set of the EU policy initiatives, which was approved in 2020, with the main goal to reach Europe’s carbon-neutrality by 2050. This requires major changes in energy sector as well, especially considering *Für-for-55* legislation package, which was published in July 2021, setting policy measures to reduce EU’s GHG emissions by 55% comparing to year 1990 [1].

Natural gas is also considered to be sustainable under the EU’s Taxonomy Regulation delegated act, published in February 2022, which classifies economic activities that are sustainable, to help investors and any other party better shift investments towards sustainable development. According to the European Commission (hereinafter – EC), the natural gas facilities have to comply with strict rules and, in case of fossil gas related activities, should switch to renewable gases (hereinafter – RG) by the end of 2035 [2]. In the future, where fossil natural gas might be fully substituted by the RG biomethane, potential biomethane supply could be arranged not only by using current natural gas transmission and distribution systems, but also by sea in a form of bioLNG [3].

Any LNG can be used in several crucial sectors of the national economy in order to provide reliable and clean energy: for example, it can help meet energy needs of freight and maritime transport sectors and provide environmentally sound and affordable fuel for electric energy and heat generation [4]. Especially, in regions where renewable energy sources are less available or cannot meet high energy demand in winter season [5]–[7].

**2. THE NATURAL GAS SUPPLY RISKS IN THE BALTIC REGION**

**2.1. Import and Supply Sources**

More than a decade ago, the Baltic States asked the EC to help find compromise on LNG terminal construction location in the Baltic region, but the initiative
failed to find a common ground on development and cost sharing [8]. The only one of the Baltic States, which actually developed its own national LNG import terminal project, was Lithuania, and the Klaipėda LNG terminal was commissioned in 2014. Its import capacity reaches 3.75 billion cubic meters (hereinafter – BCM; around 36.64 terawatt-hours (hereinafter –TWh)) per year. Unfortunately, 90% of the Europe’s natural gas is imported [9]. Share of each exporting country in the EU’s natural gas import is shown in Fig. 1.

In 2021, around 140 BCM (around 1367.72 TWh*) of natural gas were imported to the EU by pipelines, while 15 BCM (146.54 TWh*) were delivered as LNG [11]. The Baltic States and Finland still relied mostly on the natural gas supplies from Russia, while Lithuanian natural gas supplies were more diverse due to the ever-growing natural gas imports through Klaipėda LNG terminal [12].

Once again, a question on the natural gas supply and Europe’s dependency on Russian gas has escalated, considering Russia’s invasion in Ukraine, which started in February 2022. The European natural gas prices also hit records, as the natural gas prices in the Netherlands Title Transfer Facility reached 345 EUR/MWh in March 2022 [13].

In a short-term period, the EC plans to minimise Russian natural gas dependency by means of increasing the share of the LNG import from the USA and Qatar, while in a longer run, it is working towards additional alternatives, including locally produced RGs, such as biomethane or hydrogen. In March 2022, the International Energy Agency also revealed a plan to reduce the EU’s dependency on the Russian natural gas supplies, where one of the key suggestions was to replace Russian pipeline natural gas supplies with non-Russian LNG ones. In comparison to 2021, it would be possible to increase LNG import to the EU by 50–60 BCM per year, but since suppliers were more or less the same, it might result in higher LNG prices worldwide [11]. On 8 March 2022, the EC introduced communication on a new plan “REPowerEU: Joint European Action for more affordable, secure and sustainable energy” to become independent of Russia’s fossil fuel, which includes LNG import diversification, using a wider range of potential suppliers, includ-
ing but not limited to Qatar, the USA, Egypt and West Africa [10].

While diversifying the EU’s natural gas supplies in a form of LNG, the role of UGSs is tend to grow in foreseeable future. The Baltic region has only one such a storage – Incukalns UGS located in Latvia, which is also one of the most modern UGS facili-
ties of its type in Europe with a capacity of 2.3 BCM. It can ensure safe storage of the large amounts of natural gas that has been imported to Latvia and the whole Baltic region. Therefore, LNG terminal in Latvia could not only increase security of supply in our country, but also in the remaining Baltic countries and Finland.

2.2. Main Aspects of Analysis of the Baltic Natural Gas Supply Risks

At the end of 2021 and beginning of 2022, the EU natural gas market was under tension, where atypically high natural gas demand was observed. However, at that time it was translated as global economic recovery from the pandemic. While Russia’s war against Ukraine escalated, in March 2022 the natural gas flows from Russia via Yamal pipeline (via Belarus and Poland) to Germany declined sharply. Possible reason is that keeping Russia’s supplies low would highlight a need for additional routes, such as commissioning of currently banned the Nord Stream 2 pipeline project [14]–[16].

There was a hope that the natural gas supply risk plans that were developed under Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No. 994/2010 (hereinafter – Regulation 2017/1938) would not be used in real life, while ongoing war in Ukraine and the EU sanctions proved that scenarios from the preventive action plan and emergency plan could actually came true in foreseeable future [17].

In a preventive action plan, one of the scenarios simulates a situation where, due to the geopolitical crisis, the flow of natural gas from Russia stops completely within two weeks of peak demand and eight average winter weeks. The most significant risks identified in the preventive action plan are related to the natural gas supply disrup-
tions from Russia in March coupled with insufficient natural gas reserve in Incukalns UGS. Among others, it was concluded on the national level that the limiting factor of the natural gas transmission system is the cross-border interconnection capacity. The amount of active gas stored at the Incukalns UGS is the most important factor in guaranteeing both the Latvian and regional security of the natural gas supply. Lithuania’s support to Latvia in some crisis scenarios is limited by the potential volatility of the LNG cargos due to LNG logistics [18].

An important role in the Baltic natural gas supply is dedicated to the Polish–Lithuanian natural gas interconnector (hereinafter – GIPL), which will be commissioned in mid-2022, ending isolation of the Baltic States from central European natural gas transmission systems, but unfortunately no plan predicted limited natural gas supplies from Russia to the whole Europe at the same time, as it is happening now. With high geopolitical tensions in relations with Russia for at least midterm perspective, the only viable option for the natural gas supplies to the Baltic States and Finland is Klaipeda LNG terminal and GIPL. In accordance with early warning in the natural gas supply sector of Latvia that was announced on 9 March 2022, the natural gas deliveries from Klaipeda LNG and via GIPL are regarded as prioritising gas flows by the Latvian natural gas transmission system operator (hereinafter – TSO) Conexus.
Baltic Grid [19]. However, before finishing enhancement of the Latvia–Lithuania interconnection (ELLI project) in 2024, current interconnection capacities and operating pressures are limited between Lithuania and Latvia (known as the bottleneck effect), therefore making it challenging to provide absolutely sufficient natural gas supplies to Latvia, Estonia and Finland from the Lithuanian and Polish side [20], [21].

The necessary natural gas reserve of capacity in the region is provided by Incukalns UGS, which allows fully compensating for seasonal fluctuations (except for Finland, which has to adjust the demand for maximum hours to the capacity of Balticconnector). Nevertheless, the total amount of available capacity at the Klaipeda LNG and GIPL entry points per year may be lower than demand, depending on climate conditions and industrial demand. It addresses an important question of necessity to create at least one more LNG import terminal in the Baltic region in the shortest possible terms.

A number of traders may seek to diversify supply risks in the market as well. However, there is a significant market power, currently on the part of supplies from Russia, as well as on the part of the Baltic region industrial energy companies, which maintain a high level of concentration. Market power discourages investments by private investors, relying solely on expected demand for the natural gas import capacity. Also, high volatility of the energy prices with construction and development time delays discourages private investors. Markets with high levels of concentration and/or with signs of market power, show a significant increase in risk, which discourages private capital from making significant investments [22]. Therefore, the Baltics States and Finland, since having high market power from Russia’s gas, have low chances of fully-private investment in the natural gas supply diversification projects.

3. TECHNICAL ASPECTS OF LNG TERMINAL BUILDING PROJECT IN LATVIA

3.1. Site Selection Evaluation for Potential LNG Terminal in Latvia

Latvia, as all the Baltic countries and Finland, is located on the shores of the Baltic Sea, with the coast line more than 450 kilometres long. When planning LNG terminal construction, various aspect should be considered, such as closeness of the port cities, accessibility of the infrastructure (transmission pipelines) and distance to Incukalns UGS. Therefore, originally three potential locations of the LNG import terminal were reviewed in Latvia: Ventspils (with existing oil pipelines and port), Riga (port) and Skulte (port). The comparison of the three chosen locations is shown in Table 1.

In general, it is believed that Skulte is the best of the three possible locations with several significant benefits:

- geographical closeness to Incukalns UGS;
- easy access and safe maneuvering of the LNG vessels;
- adequate terminal and pipeline routing separation from the residential areas;
- lacking interference with the existing ship traffic;
- ice-free port for most of the year;
- no urgent need for LNG storage tanks (with regard to closeness of Incukalns UGS) [23].
Table 1. Comparison of Potential Locations of LNG Import Terminal in Latvia

| Location  | Ventspils                       | Riga                             | Skulte                           |
|-----------|---------------------------------|----------------------------------|-----------------------------------|
| Solution/costs | Port infrastructure is suitable only for onshore solution that has high CapEx | Port infrastructure is suitable only for onshore solution, which has high CapEx | Port location is suitable for FSU, which is the most effective cost solution |
| Consumption | Potential new consumption by port companies and city | Location close to the biggest end consumers in the country | Close location to Incukalns UGS that is the key infrastructure element in the region |
| Ice conditions | Ice free port | Port has the biggest ice coverage in Latvia | Port has average ice coverage in winter months |
| Grid connection | Investments are required to upgrade existing oil transportation pipeline (200 km) and connection to the grid | Residential area around the port makes the pipeline routing to grid (16 km) difficult. Distance to Incukalns UGS is 50km | Pipeline distance to Incukalns UGS is 30–35 km. The route is crossing rural areas |
| Vessel traffic | Terminal location is in the navigable area of the port that makes interference with the main traffic | Terminal location is in the navigable area of the port that makes interference with the main traffic | Terminal is located outside navigable area |
| Flexibility | Long distance to the Incukalns UGS makes the low flexibility in supplies | Absence of direct connection to UGS lowers flexibility of supplies. In winter period, it is possible to absorb the regasified gas in the natural gas distribution system | Very high flexibility because of direct connection to Incukalns UGS |
| Other | Process of land rent agreement allocation lacks transparency | Substantial support from port authorities |

3.2. Evaluation of Potential LNG Terminal Concepts

Various LNG terminal types were compared in order to find the most suitable LNG import terminal solution that could ensure both security of the natural gas supply for Latvia and the Baltic region, and provide relatively low operational costs of the terminal. The general estimate is shown in Table 2.

Table 2. Comparison of Potential LNG Import Terminal Concepts

| Criterion          | Onshore terminal                                      | Floating Storage Regasification Unit (FRSU)                                      | Floating Regasification Unit (FRU)                                      |
|--------------------|-------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Costs              | Highest CapEx because of extensive ground building (infrastructure and storage tanks) | Relatively high CapEx because of vessel use and storage tank placement on the vessel | Low CapEx because of simple technical solution – floating platform with regasification equipment |
| Operational costs  | High operational costs because of extensive onshore storage and infrastructure maintenance | Relatively high operational costs because of storage tank and vessel maintenance | Low operational costs because of simple technical solution. No costs on standby mode |
| Flexibility        | Low flexibility because of limited storage capacity   | Low flexibility because of limited storage capacity                               | High flexibility because of direct connection to Incukalns UGS            |
| Freight speed      | It takes 2–3 days to unload the LNG vessel            | It takes 2–3 days to unload LNG vessel                                             | It takes about 6–8 days to unload LNG at planned capacity (can be increased) |
| Timing             | The building of such a terminal takes 6 or more years  | The building of such a terminal takes 4 or more years                             | The project execution time is estimated to be less than 2 years after final investment decision |
Floating regasification unit (hereinafter – FRU) could ensure the lowest costs to the energy consumers, due to the low operational costs, relatively simple technology and no need to store the natural gas on site. FRU consists of a tubular structure where the columns contribute most to the buoyancy required. Due to the small and distributed water plane area the floater will have very stable sea keeping characteristics. Due to the tubular structure the displacement of the floater is low compared to the conventional ship shaped or barge solution and thus low steel weight; this has a direct positive impact on the construction and maintenance cost of the floater. Mooring of the floater at site could be conventional spread mooring. The visiting LNG carriers could be moored to the floater with conventional ship-to-ship mooring methods. These methods are in accordance with the tried and tested industry practices.

### 3.3. Technical Aspects of Potential LNG Terminal in Latvia

For the Skulte LNG import terminal, natural gas storage is considered to be at the Incukalns UGS. This, in principle, makes the requirement for on-site LNG storage redundant and thus brings down the project capital expenditures (hereinafter – CapEx) to as low as 1/3 to 1/4 of the other projects proposed in the Baltic Sea region.

Implementation of Skulte LNG import terminal, using FRU solution, will mean that LNG shall be pressurized, vaporized and sent-out to a medium pressure subsea gas pipeline and onshore gas pipeline to Incukalns UGS. The project also would include the subsea pipeline and the onshore pipeline carrying natural gas from the terminal to either existing gas transmission system or the UGS facility. The general technical information of Skulte LNG terminal is summarised in Table 3.

| Table 3. General Technical Information of Skulte LNG Terminal [23] |
|---------------------------------------------------------------|
| Terminal capacity | Up to 3 million tonnes/year |
| Regasification capacity | 600 million standard cubic feet of gas per day |
| Storage | Existing UGS at Incukalns Latvia with capacity of 2.3 BCM |
| Supply LNG carrier size | 40 000 m³ to 170 000 m³ |
| Carried offload time | 4 to 8 days at full capacity |

The key element of the Skulte LNG import terminal concept is direct pipeline to Incukalns UGS, whose technical parameters must be in line with terminal regasification capacity and gas transportation pressure in the grid. The preliminary technical parameters for pipeline are provided in Table 4.

| Table 4. Preliminary Technical Parameters for Pipeline Connecting Skulte LNG and Incukalns UGS |
|---------------------------------------------------------------|
| Transmission capacity | 15–20 million m³/day |
| Pressure | 55 bar |
| Diameter | 0.7 m |
4. SITUATION EVALUATION IN THE BALTIC REGION

4.1. The Overview of Natural Gas Market

In the Baltic region, the natural gas demand is historically dominated by power and heat generation and industrial consumption, thus creating sensitivity to price fluctuations. The natural gas consumption in the Baltics between 2015 and 2020 is shown in Fig. 2.

![Fig. 2. The natural gas consumption in the Baltic States (2015–2020) [24]. Source: Eurostat](image)

The largest natural gas consumers in the Baltic States are AB Achema (largest fertilizer producer in Baltic States, located in Lithuania), JSC Latvenergo (state-owned energy company that generates about 70% of the electric energy in Latvia), AB Lietuvos Elektrinės (the owner of the Elektrenai Power Plant in Lithuania), JSC Nitrofert (the only fertilizer producer in Estonia), JSC Rigas Siltums (the district heating company of Riga, Latvia), and other district heating companies. However, future trends of the natural gas consumption in the Baltics could be affected by increased LNG use. Namely, the usage of natural gas could increase and penetrate brand new sectors of the national economies. There is a large potential for LNG to be used as truck fuel – a cleaner alternative comparing to diesel [4].

It is not easy to assess the future position that natural gas will play in the energy mix of the Baltic States. The trends of natural gas consumption are influenced by the overall development of the national economy, building energy efficiency development, the use of modern and economical gas burning equipment and gradual replacement of the natural gas with RGs [25].
4.2. Evaluation of LNG Projects in the Baltic Region

According to various sources, at least ten potential LNG import terminal locations were considered throughout the Baltic region: Liepaja, Ventspils, Riga, Skulte/Lilaste (all in Latvia), Paldiski, Muuga, Sillamæe (all in Estonia), Inkoo and Turku (both in Finland). Five projects (Skulte, Paldiski, Talinn, Muuga and Inkoo) have reached a certain development maturity stage to foresee a possibility to be actually implemented [26].

Some projects are dependent on the EU funding, therefore, need to meet Projects of Common Interest criteria. From these potential projects, only Skulte LNG terminal has an immediate effect on the natural gas supply portfolio of the Baltic region, both in terms of security of supply and supply diversification. It is located in the middle of the Baltic region, and it can supply natural gas to its neighbouring countries immediately after its commissioning without major investments in the additional natural gas pipeline infrastructure.

In order to outline competitiveness of Skulte LNG terminal project, four existing and planned LNG terminal projects were compared in accordance with several criteria, summarised in Table 5. These terminals are: floating storage and regasification terminal in Klaipeda, onshore terminal with lowered storage capacity in Riga, floating regasification terminal in Skulte and onshore terminal with full storage capacity in Paldiski/Inkoo.

Since three different technologies are involved, for clarity purposes the following assumptions are made:

- an onshore storage tank costs are 1 million EUR per 1000 m$^3$ of storage capacity;
- regasification unit costs are 50 million EUR;
- mooring costs are 10 million EUR regardless of type of technology used;
- transmission network upgrades and connection to UGS are covered by system charges and EU financial instruments (with 50 % gap) and not by LNG terminal operator;
- unloading freight time is included in case of floating regasification unit technology;
- 20-year period is used for financial calculation, except for Klaipeda (10-year lease);
- 8 % annual return rate for investments is used for all terminals;
- 10-ship scenario is used as a base scenario for regasification cost comparison and 20–5 ship scenario is used to demonstrate flexibility cost of the terminal (penalty for low utilisation compared to high utilisation);
- Freight cost is assumed to be 60 000 EUR per day.

Based on assumptions explained before, Table 1 indicates that since Skulte LNG terminal would not need storage tank (since it is possible to efficiently use Incukalns UGS, if transmission interconnection is built), it would reach total costs of about EUR 60 million, while other projects would cost from EUR 260 to 430 million, making Skulte LNG significantly cheaper and more cost-effective than other LNG terminal projects under review in the Baltic region.
Table 5. Evaluation of LNG Projects in the Baltic Region

| Location, Annual regasification capacity (50% utilisation rate) | Technology | Storage tank | Unload costs | Supply agreements | Financial structure | Total gap | Total cost at 1 BCM scenario |
|---|---|---|---|---|---|---|---|
| Klaipėda, 2 BCM | FSRU | 170 000 | Indirect – shutdown of other terminals in the port | ToP agreements are crucial – no flexibility available for the terminal (additional storage capacities of flexible consumption) | 10-year financial lease with a mandatory market share | NA | Total cost: EUR 430 million; regasification cost: 46 EUR/1000m³ |
| Riga, 2 BCM | Onshore | 200 000 | No costs associated | To achieve reasonable capacities ToP agreements are needed for operation but partly it could be operated on the opportunistic basis | Not defined but considerable gap (75%) of financial resources should be covered by public funding | 195 million EUR | Total cost: EUR 260 million; regasification cost: 26.4 EUR/1000m³; Regasification cost with covered gap: EUR 11.85/1000m³ |
| Skulte, 2 BCM | FRU | N/A | Unloading freight costs | Opportunistic trade mainly, due to low cost of flexibility and ability to operate with irregular shipment schedule | Commercial offtake coverage with limited (33%) or favourably no market gap for optimal level of utilisation | 20 million EUR | Total cost: EUR 60 million; regasification cost: EUR 12.4/1000m³; Regasification cost with covered gap: EUR 10.6/1000m³ |
| Inkoo, 2 BCM | Onshore | 300 000 | No costs associated | ToP agreements mainly and limited amount of opportunistic trading | Not defined, but existing available market for power generation, industrial and transport sector; nevertheless, gap (33%) of financial resources should be covered by public funding | 120 million EUR | Total cost: EUR 360 million; regasification cost: EUR 35.4/1000m³; Regasification cost with covered gap: EUR 24.6/1000m³ |

5. POLITICAL AND REGULATORY PERSPECTIVES OF LNG DEVELOPMENT IN LATVIA

5.1. Energy Market Regulation

Most of energy market activities are regulated businesses in Latvia. Market operators in power, natural gas and district heating industries shall obtain license from the Public Utilities Commission. LNG terminal operation, the natural gas transmis-
sion and the natural gas trade are among licensed activities. Currently there are 28 natural gas traders in the Latvian natural gas market [27]. Framework of the natural gas market in Latvia is shown in Fig. 3.

![Framework of the natural gas market in Latvia](image)

**Fig. 3.** Framework of the natural gas market in Latvia [28].

*Source: JSC Conexus Baltic Grid*

If developed, Skulte LNG terminal will need to acquire LNG operation license and the natural gas transmission license to operate FRU and connector pipeline to Incukalns UGS. Since 2020, when the single natural gas market in the Baltics has been launched, it unites the natural gas TSOs of Finland, Latvia, and Estonia – Gasgrid Finland, Elering, and Conexus, confirming the cooperation capability of several neighbouring countries. The common natural gas market is characterised by unified entry-exit tariff area, and single Estonian–Latvian balancing zone, while continuously cooperating would ensure deeper integration with prospects of Lithuania joining the market as well [29].

### 5.2. Access to the Infrastructure

The Energy Law (hereinafter – EL) provides non-discriminatory, tariff-based third-party access to the natural gas infrastructure [30]. Capacity allocations, congestion management and different capacity reservation products are provided by the national transmission and storage network code. Selling capacity reservation products in secondary market is allowed. For the time being short-term capacity reservation products (up to one year) are the most popular in the market. However, long-term capacity reservation products can be designed by the TSO should there be interest from market participants.

Due to a high level of infrastructure integrity and importance of security of the natural gas supplies for the national economy, prices for the natural gas infrastructure services are regulated by tariffs in accordance with the Law On Public Utilities Regulators [31]. Tariff structures are changing from cost plus to revenue cap patterns with numerous variations.

The EL also provides an exemption from general third-party access regime for new infrastructure projects. Conditions for such an exemption are as follows:

- the investment must enhance competition in the natural gas supply and enhance security of supply;
• the level of risk attached to the investment must be such that the investment will not take place unless an exemption is granted;
• the infrastructure must be owned by a natural or legal entity that is separate at least in terms of its legal form from the system operators, in whose systems that infrastructure will be built;
• charges must be levied on users of that infrastructure;
• the exemption must not be detrimental to competition or the effective functioning of the internal market in natural gas, or the efficient functioning of the regulated system, to which the infrastructure is connected.

The national regulatory authority grants the exemption, if ex ante verification from the EC is received. Detailed procedure and evaluation criteria for the exemption are stipulated in 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 [32]. Skulte LNG Terminal operator may need to secure third-party access to the terminal and the natural gas transmission via a connector pipeline. Therefore, it is to be decided whether Skulte LNG terminal project operator will apply for derogation from third-party access or not.

5.3. LNG Project Characteristics and Risks

LNG projects possess characteristics and risks that tend to amplify the potential for high value disputes. Such projects are highly technically challenging (including floating LNG technology) and require a myriad of sub-contractors, often based across multiple jurisdictions. They are environmentally sensitive and subject to stringent regulatory requirements. LNG projects are often politically sensitive and subject to significant public scrutiny. LNG projects involve very significant upfront capital expenditure, with essentially no income generation prior to project commissioning [33]. Moreover, the overall viability of an LNG project, which may have an expected lifetime exceeding 30 years, will often depend upon the long-term stability and predictability of regulatory, political and economic environments [33], [34].

For liquefaction and regasification projects in particular, the risks associated with them include: project economics, environmental approvals and regulation, political risks, joint venture risks, technical engineering, procurement and construction challenges, feedstock challenges and end product marketing and contracting. All of the above risks can affect heavily an LNG project and lead to disputes. Successfully addressing project implementation challenges on all levels can be critical to prospects of every LNG import project [35].

5.4. Construction of the Infrastructure Objects

There are a number of stages (phases) to any LNG terminal project, which commonly include, but are not limited to:
• planning and regulatory approvals;
• front end engineering and design (FEED);
• construction;

• construction of related infrastructure (connecting pipelines);
• commissioning and handover;
• post-commissioning operations [35].

However, in many cases, they can be reduced to only two general phases – the
exploration / engineering and construction phase (also associated with pre-final investment decision (FID) and post-FID phases [36]). Execution of both phases is regulated by specific laws, and Skulte LNG terminal project implementation shall include both phases.

Exploration phase for the LNG terminal and underwater floating regasification unit connection to pipeline begins with the acquisition of seabed exploration permit. The National Sea Environment Protection and Management Law [37] provides that right to exploit and, consequently, to explore seabed that shall be tendered. However, according to Ports Law [38] no tendering is applicable if seabed exploitation is planned within sea territory allocated as territory of the port. Location of Skulte LNG terminal is planned within territory of Skulte Port subject to an agreement with the port authorities. It is expected that no tendering procedures will be necessary to gather seabed exploration permit and further exploitation of a respective area.

Construction and operation of the LNG terminal may have a direct and material impact on the environment. Environmental Impact Assessment Law (hereinafter – EIA), provides two types of environmental impact assessment, initial assessment and full assessment [39]. The EIA provides a list of activities that are subject to a particular type of assessment. However, further full assessment of a potential activity may be required if results of initial assessment reveal the need for that. Initial assessment is executed by the state institution, Regional Environmental Administration, within 20 days from the receipt of all documents from activity promoters. Full assessment shall be executed by a licensed assessor. Usually, it takes about 8–12 months to complete. Operation of LNG terminal is an activity with advanced safety requirements; therefore, it is expected that it will be subjected to, at least, an initial assessment of environmental risks. Positive conclusion of initial or full environmental assessment is a prerequisite for further project implementation.

Building of the natural gas transmission pipeline is an activity with a material environmental impact according to the EIA.

At the same time, the EL confers to energy infrastructure operators a right to use third-party land to set up an infrastructure object. It prescribes two options on the acquisition of such a right. The first option is to contract with landowners on the right to use their land. The second option is the acquisition of the right to use the land irrespective of landowners’ consent, if one of following requirements is met:
• building of an infrastructure object is provided in a zoning plan of a respective municipality;
• municipality has confirmed that an infrastructure object is of public interest and particular land plots are necessary to build it;
• an infrastructure object has status of an object of the national interest. The EL provides that in all above cases landowners shall get compensation from infrastructure developers for use of their property [30]. Amount of remuneration is calculated according to regulations of the Cabinet of Ministers.

Possible routes of Skulte LNG connector pipeline are planned mainly through agricultural land plots. Major part of private land plots to be crossed by the pipeline is used for farming purposes and most of them shall remain as agricultural land after pipeline is built. Landowners therefore shall not suffer material damages and legal restrictions to use their property.

Design and construction of underwater
floating regasification unit connection and connector pipeline is subject to the Construction Law [40] and regulations, which specify that building permits shall be issued by relevant municipalities. However, a single building permit shall be issued by the State Construction Control Bureau of Latvia for objects of the national interest with no right for municipalities to object.

5.5. Object of the National Interest

According to the Spatial Development Planning Law of Latvia (hereinafter – SDPL), objects of national interest are objects securing material public interests, protection and sustainable use of the natural resources. Skulte LNG terminal and transmission pipeline might qualify for the status [41]. Currently major part of natural gas for the Baltic countries is sourced in Russia; thus, recent geopolitical developments in Russia and Ukraine have exposed vulnerability and volatility of this source.

Skulte LNG terminal project would allow sourcing LNG from various suppliers worldwide, such as Norway, the USA, Qatar, Algeria, Nigeria, Trinidad and others. Two of the most likely routes could be from the USA or Norway, as shown in Fig. 4.

Fig. 4. Potential import routes from North America and Hammerfest, Norway.
Source: JSC Skulte LNG Terminal

The SDPL provides that the Cabinet of Ministers may confer status of an object of the national interest upon proposal of a competent ministry [41]. For Skulte LNG project, it is the Ministry of Economics. The main advantages of having this status are as follows: challenging building permits for such an object does not stop the building process, energy supply companies acquire statutory right to use third-party land for building of an object of national interest. Such a status would ensure faster and smoother project development, which would be valuable in circumstances, when all the Russian gas import must be reduced to the bare minimum or even completely ceased. In this case, LNG import terminal development in Skulte would ensure fast and efficient natural gas supply routes and source diversification for Latvia [42].
6. CONCLUSIONS

LNG import terminal would help reduce dependency on the pipeline natural gas supplies which, in some cases, due to the insufficient interconnections, may be delivered only from one or limited number of sources. In the context of Latvia, it was evaluated that there was a potentially beneficial role of the LNG terminal development in Skulte, which would help strengthen energy independence of the whole Baltic region as well as introduce new natural gas delivery sources in a cost-efficient way.

LNG terminal in Skulte could also ensure significant capital investment cost reduction compared to other LNG projects in the region, due to already existing infrastructure and the relative closeness of Incukalns UGS. It can also be characterised by easy access and safe manoeuvring of the LNG vessels, adequate terminal and pipeline routing division from the residential areas.

The main benefits of Skulte LNG project are low CapEx compared to other projects proposed in the neighbouring counties. Low cost will be benefitting customers, while price effect will ensure flexibility of supply provided by terminal direct connection to Incukalns UGS that will ensure direct impact on the price. In addition, it will provide possibility for potential traders to buy LNG in spot market in the favourable time periods.

FRU is the most suitable terminal solution for Latvia because of low CapEx, high flexibility and fast project execution time. Direct pipeline connection to Incukalns UGS can provide possibility to avoid building LNG storage tanks onshore that is often the major part of import terminal costs.

To sum up, there is a need for additional natural gas delivery sources, and LNG terminal in Latvia would help the Baltic region with it. If the natural gas security of supply is a national priority, there is a need for public investment in LNG import projects, which can be implemented in the shortest possible terms, with ability to guarantee stable, secure and diversified natural gas supplies.

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