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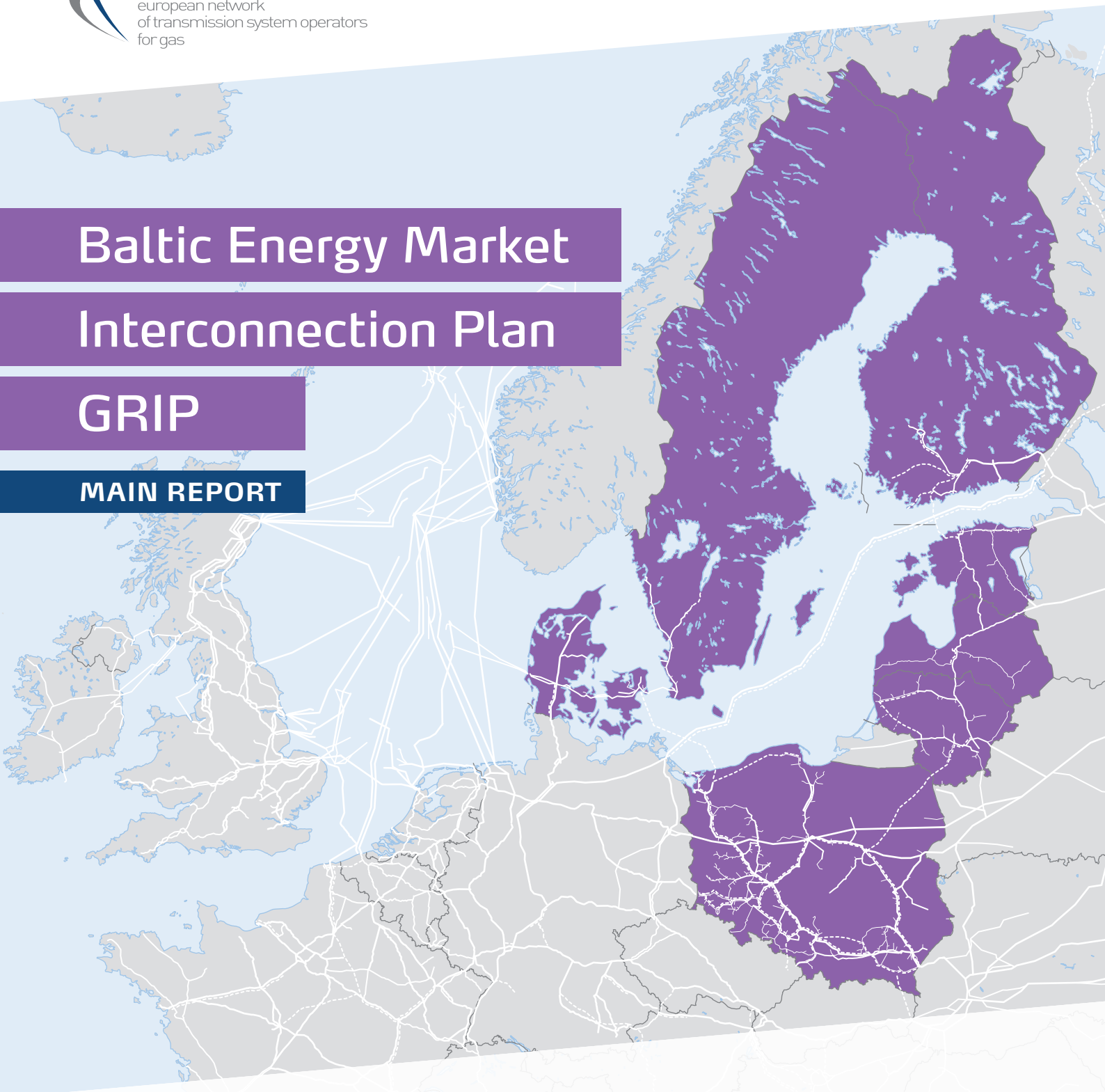
for gas

GAS REGIONAL INVESTMENT PLAN
2014–2023

Baltic Energy Market Interconnection Plan GRIP

MAIN REPORT



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Introduction

The second Gas Regional Investment Plan (GRIP) of the Baltic Energy Market Interconnection Plan (BEMIP) region was prepared by the following national Transmission System Operators (TSO) from the BEMIP region: Gasum Oy (Finland), AS EG Võrguteenus (Estonia), AS Latvijas Gāze (Latvia), GAZ-SYSTEM S.A. (Poland), Energinet.dk (Denmark), Swedegas AB (Sweden) and AB Amber Grid (Lithuania), which also had a role of coordination of the preparation of this edition of the BEMIP GRIP.

The present publication is an update of the first publication of the GRIP of the BEMIP region that was published in March 2012, as well as the update of information on infrastructure projects presented in the Ten Year Network Development Plan (TYNDP) 2013–2022 that was released by ENTSOG in February 2013. The recommendations of the European Agency for the Cooperation of Regulators (ACER) for the GRIP published in March 2012 were taken into account while preparing this publication.

The provision of the Regulation 715/2009, Article 12, requires promoting and facilitating the cooperation of TSOs at a regional level with the aim to create a competitive internal market in natural gas, foster the consistency of their legal, regulatory and technical framework and facilitate integration of the isolated gas systems. In order to contribute to the fulfillment of these tasks every two years the TSOs have to publish GRIPs based on regional cooperation.

Apart from legal obligation to produce GRIPs, the TSOs of the BEMIP region in the context of regional cooperation aim to raise awareness of the need for the development of the regional gas market and regional gas infrastructure projects. The BEMIP region may be regarded as one having a high degree of dependency on a single supplier and the relatively low level of interconnections among the countries belonging to it. The implementation of the major gas infrastructure projects will increase the regional security of supply, diversification of sources and routes, as well as their interdependence and cross border impact in the region.

The TSOs involved in preparation of the GRIP of the BEMIP region expect that this report will provide useful information to its readers and will contribute to the process of making investment decisions and granting support for the projects in need of such support. The TSOs welcome comments and proposals for the improvement of this document that could be of use for future GRIPs publications.

Executive Summary

The completion of the gas internal market, increase of security of supply and fostering of competition are the main priorities outlined in the European Union's (EU) energy policy. The Regulation No. 347/2013 on guidelines for trans-European energy infrastructure aims to accelerate the development of infrastructure projects having regional importance, so called "projects of common interest" (PCI) in the certain priority corridors. The first EU-wide List of PCIs was adopted by the European Commission (EC) on 14 October 2013. It consists of 248 energy infrastructure projects, including 15 projects of gas infrastructure in the BEMIP region.

If implemented, these projects will significantly change the picture of the gas markets in the region, first of all, by interconnecting currently separate sub-regions such as 1) Finland, 2) Estonia, Latvia and Lithuania, 3) Poland, 4) Denmark and Sweden, and integrating even four Member States (Finland, Estonia, Latvia and Lithuania) into common European gas market, and secondly providing access on a considerable scale to global liquefied natural gas (LNG) markets. For the countries in the region that rely, either fully or to a large extent, on a single supplier this would be a major shift, bringing from one side more choices and opportunities for the gas market players, and from another side requiring adequate changes in legislation and commercial practices of gas companies to accommodate an increased market complexity.

With respect to the role of the gas in energy market, the expected paths differ within the region – despite that the total gas demand is expected to increase by 33 % in 2023 compared to 2014 when average daily demand will be at the level of 870 GWh. The increase is mainly driven by expected soaring demand in the biggest market of the region – Poland which forecasts decreasing coal-fired power production. In some other countries, like Estonia, Latvia, Sweden and Finland increase in grid-related gas demand is foreseen, but in the latter strongly surpassed by the off-grid gas usage mainly supplied through LNG infrastructure. In Denmark and Lithuania the demand is expected to drop because of increasing share of renewables in their energy mix. The anticipated demand changes are also determining factor for the development of gas infrastructures.

Despite that the gas consumption in the region is expected to increase, the forecasted changes should be in line with the EU's climate policy, as major increase will be for the substitution of much more polluting fuels – coal for electricity production and district heating in case of Poland and oil products for bunkering purposes in case of Finland. Also growing tendency in overall region is that the gas is more and more used as a back-up fuel for renewables based production of heat and electricity.

In comparison with the first edition, this GRIP maintains the same framework, providing a description of the region's gas markets, including an overview of expected developments of gas demand and supply and evaluating the potential contribution of infrastructure projects to these developments. The document provides an outlook of the latest changes of the EU initiatives related to energy infrastructure, gas market players and the foreseen implications for the planned gas infrastructure thereof. It highlights the changes since the first release of the publication of the GRIP in March 2012. The document provides an update of regional initiatives both in the Eastern Baltic region and in the West Baltic part. The results of latest analysis accomplished jointly by the TSOs of Baltic states and Finland which focused on the modelling of gas supply flows in the Baltic states and Finland are provided. As regards the West Baltic region, the document analyses developments to enhance the security of supply and market integration in Poland, Denmark and Sweden.

This GRIP presents the detailed analysis of impact of the enlisted non-FID gas infrastructure projects on the development of the region's gas market. The information on the projects proposed herein, including third party projects, of the countries belonging to the BEMIP region is provided in the Annex.

Image courtesy of Amber Grid

1 The EU Initiatives on Energy Infrastructure

The Latest Changes in the EU Regulations and Procedures on Energy Sector | PCIs Status and Selection Process

Image courtesy of Swedegas

1.1 The Latest Changes in the EU Regulations and Procedures on Energy Sector

The key priorities of the EU energy policy are associated with its three pillars related to competition, security of supply and sustainability. The actions aimed at achieving these objectives in the gas sector were largely intensified over the last two years, so since the release of the first edition of the BEMIP GRIP in March 2012. In this period a number of new legal acts and tools were made available to authorities, project promoters and other market participants in the Baltic Sea region. Most importantly, their main purpose is to complete the internal market in gas (mostly bridge the gap between the energy islands and gas markets in other EU countries), ensure the adequate level of security of supply and finally to foster competition. The paragraphs below provide a brief summary of the main developments in this area.

First and foremost, the Regulation No. 347/2013 on guidelines on trans-European energy infrastructure (TEN-E Regulation), which entered into force in mid-2013, aims at accelerating the development of energy infrastructure (PCIs) in the priority corridors. This is achieved by providing a set of enhanced rules governing the permit granting process, cross-border allocation of costs and by delivering the criteria of financial assistance from the EU towards the PCIs.

PCIs are selected in 12 Regional Groups, including 4 in the gas sector. It is worth noting that all countries of the BEMIP GRIP region are part of the BEMIP gas group which is focused on ending the isolation of the three Baltic states and Finland and their dependency on a single supplier, reinforcing internal grid infrastructures and increasing diversification and security of supplies in the whole Baltic Sea region. Additionally, Poland contributes to North-South gas interconnections in Central Eastern and South Eastern Europe (NSI East Gas) and Southern Gas Corridor (SGC), while Denmark is a part of North-South gas interconnections in Western Europe (NSI West Gas).

The first list of PCIs was adopted by the Commission on 14 October 2013. The list contains 248 energy infrastructure projects, including 15 in the BEMIP gas region[1)], which can benefit from best practices in the permit granting process, cross-border cost allocation, investment incentives and financial assistance under the Regulation No. 1316/2013 establishing the Connecting Europe Facility (CEF).

In subsequent years the projects applying for PCI status will be selected based on the methodology for the cost-benefit analysis (CBA methodology) which will allow for objective evaluation of costs and benefits of candidate projects.

The aforementioned provisions envisaged in the TEN-E and CEF Regulations are of primary importance for the development of gas infrastructure in the Baltic Sea region which has large investment needs resulting from the current infrastructure and market limitations (lack of interconnections between all networks in the region and high supply dependence from a single source). In particular, the possibility to make use of best practices in the permit granting process can considerably support implementation of projects at the pre-investment stage as it is often responsible for many delays in project implementation. A similar effect might have the introduction of cross-border cost allocation and financial assistance under the CEF Regulation. These both tools might have an impact on securing the financial structure of projects, especially given that on one hand a number of projects in the Baltic Sea region are driven by security of supply considerations, and on other hand the region's

1) More information on the PCI selection process and the PCIs in the BEMIP region is provided in chapter 1.2

markets are relatively small and could not bear the costs of such infrastructure without the EU co-financing.

Furthermore, it is worth noting that network codes development process started in 2011. According to the Regulation 715/2009 on conditions for access to the natural gas transmission networks, ENTSOG is responsible for promoting the completion and functioning of the internal market in natural gas, among other things, by drafting the network codes in 12 areas identified by the Regulation. Since 2011, the first two network codes have already been developed and approved (capacity allocation mechanisms (CAM) and balancing). The third one – on interoperability and data exchange rules has been drafted and passed on by ENTSOG for further adoption procedures in ACER and EC. The subsequent network code on tariffs harmonisation and amendment of CAM network code by introducing provisions on incremental capacity are expected to be covered in 2014. These network codes foster the move towards an enhanced competition and liberalisation on the gas markets in the EU. The network codes once drafted by ENTSOG and approved by EU institutions, are transposed into national network codes and rules by TSOs and national institutions if amendments of other legislation are needed.

Apart from actions of legislative nature, an important discussion on the future of energy markets is currently held between the EU institutions, Member States and other stakeholders. The objective of this measure is to analyse the lessons learnt from the current climate and energy agenda of the EU and to conclude on the main directions of the future evolution of the energy markets. In this context, the role of natural gas seems to be uncertain. However, natural gas given its favourable carbon footprint and availability of its traditional and unconventional sources in different parts of the world may significantly contribute to the energy mix in the EU countries in the future as well.

1.2 PCIs Status and Selection Process

It all started in October 2011, when the EC presented a so called Infrastructure package to enhance TEN-E development in the fields of energy, transport and information society. Among few legislative proposals, the package included TEN-E guidelines, establishing energy infrastructure policy and the proposal for the CEF, providing financial aid for the development of the infrastructure. The TEN-E guidelines included a new way of identifying energy infrastructure projects that can receive the label of PCIs, the label as such embedded in Treaty on the Functioning of the EU (Art. 171), and to benefit from the measures foreseen in the TEN-E guidelines for the facilitation of implementation of such projects.

The standard way for the selection of PCIs would be that the projects eligible for PCI status would have to be at first included in the TYNDP of ENTSOG, satisfy the general and specific criteria set in Art. 4 of TEN-E Regulation and have a cost-benefit analysis (CBA) performed showing that cross-border socio-economic benefits of the project outweigh its costs. The applications for the selection of the project as PCI would have to be submitted for the evaluation of the Regional Groups established following Art. 3 of TEN-E Regulation. Once the Regional Group draws up regional list of PCIs subject to the approval of the Member States to which the PCIs relates, the EC should include it in the Union-wide list of PCIs.

In the 1st quarter of 2012, the EC has established ad-hoc working groups for every priority corridor foreseen in draft TEN-E Regulation. The projects-candidates for PCI status were considered irrespectively whether they are included in TYNDP or not – the open request for project promoters to submit applications was launched in May

2012. The methodology for the evaluation of candidates for PCI status based on the set of criteria provided in draft TEN-E Regulation was developed in parallel with the help from the consultants hired by the EC. In the BEMIP region after the evaluation of projects applications submitted and after coordinating with Member States, the ad-hoc working group selected 15 projects as PCI, however some of them were included into two project clusters: one cluster of Interconnection between Estonia and Finland and four competing LNG terminal projects in Finland, Estonia and Latvia out of which only one LNG terminal project could receive benefits provided in TEN-E Regulation, and another cluster of infrastructure projects in Eastern Baltic area complementing or strongly related with each other. The list of PCIs proposed by the ad-hoc working group was included in the first Union-wide list of PCIs in October 2013 without any amendments at the EC level.

The projects below[1)] were included in the first list of PCIs of BEMIP gas priority corridor:

No.	Project title
8.1	Cluster LNG supply in the Eastern Baltic Region, including the following PCIs:
8.1.1	Interconnector between Estonia and Finland Balticconnector, and
8.1.2	One of the following LNG terminals:
8.1.2.1	Finngulf LNG
8.1.2.2	Paldiski LNG
8.1.2.3	Tallinn LNG
8.1.2.4	Latvian LNG
8.2	Cluster infrastructure upgrade in the Eastern Baltic region, consisting of the following PCIs:
8.2.1	Enhancement of Latvia-Lithuania interconnection
8.2.2	Enhancement of Estonia-Latvia interconnection
8.2.3	Capacity enhancement of Klaipeda-Kiemenai pipeline in Lithuania
8.2.4	Modernization and expansion of Inčukalns Underground Gas Storage
8.3	PCI Poland-Denmark interconnection Baltic Pipe
8.4	PCI Capacity expansion on DK-DE border
8.5	PCI Poland-Lithuania interconnection (GIPL)
8.6	PCI Gothenburg LNG terminal in Sweden
8.7	PCI Capacity extension of Świnoujście LNG terminal in Poland
8.8	PCI Upgrade of entry points Lwówek and Włocławek of Yamal-Europe pipeline in Poland

Table 1.1: Projects included in the first list of PCIs of BEMIP gas priority corridor

1) Compressor stations in gas are considered as part of the PCIs and are not mentioned explicitly, if they are geographically located on the transmission line. If they are placed in a different location, they are explicitly mentioned. These items are subject to the rights and obligations of the TEN-E provisions.

2 Description of the BEMIP Region

Summary of the Latest Changes in the BEMIP Region | Finland | Estonia | Latvia | Lithuania | Poland | Denmark | Sweden

Image courtesy of Latvijas Gāze

2.1 Summary of the Latest Changes in the BEMIP Region

Historically, the gas markets of the BEMIP region mostly has been dependant on a single (or dominant) supplier and segmented. However, the changes are under way. Most of the countries belonging to the BEMIP region such as Finland, Estonia, Latvia and Lithuania are still dependent on a single gas source from Russia. Poland has a possibility of diversification of gas sources. The country imports gas from Russia but also has both a connections to other EU markets (though on a limited scale, hence upgrades of IPs with other EU grids are planned) and possesses its own domestic production. Denmark and Sweden are interconnected to each other and historically are supplied from Danish North Sea gas production. By completion of the project of Ellund-Egtved enhancing the capacity of interconnection between Germany and Denmark they have got the access to other European markets.

Looking at the near future, the infrastructure projects which have already been under implementation will provide alternative gas source – access to LNG market to some of the countries in the region when, the LNG terminals in Świnoujście and Klaipeda will be put into operation by the end of 2014. Besides, the ensurance of physical reverse flow in Polish section of Yamal pipeline will provide the access to Western markets for Poland on much more secure basis starting from Q2 2014. Other planned gas infrastructure projects, currently, are still awaiting for the final investment decision to be taken, will provide more of supply opportunities for the markets and increase security of supply situation.

However, in supply side having a focus on diversification by means of additional infrastructure, on demand side the national energy strategies mostly are orientated at quite limited role of natural gas in primary energy balance, which in case of some countries even taking into account the increasing economies, lead to contraction of gas demand volumes, like in Denmark and Lithuania, or having quite a moderate increase in case of other countries, except Poland, where expected conversion from coal fired power plants, should lead to significant increases in gas consumption.

Most of the countries belonging to the BEMIP region plan to increase the share of renewables in energy consumption by reducing the share of natural gas. Looking at the perspectives of gas transmission in the light of climate-related governmental policies, the anticipated reduction of gas use because of renewables is alleviated by the increasing focus on biogas and synthetic natural gas (SNG), which at most is emphasized in the national energy strategy of Finland, which foresees a cut in natural gas volumes by replacing them with biomass-based solutions and SNG made from local wood.

With quite reserved prospects of grid-related gas consumption, there's an expectation increasing of off-grid consumption of gas. Large part of it accounts for bunkering services for vessels provided in LNG terminals, also increasing use of gas for transportation (trucks and other vehicles) needs. But also LNG terminals built in remote areas (Pansio and Tornio) will provide access to natural gas for industry and other needs.

2.2 Finland

ENERGY POLICY

In March 2013, a ministerial working group on energy and climate policy, appointed by the government of Finland, released an updated version of the national energy and climate strategy. Main objectives of the strategy update include ensuring that the national targets for 2020 are achieved and preparing of a roadmap towards meeting the long-term energy and climate objectives set by the EU. The strategy emphasizes the importance of enhancing cost-efficiency, greater energy self-sufficiency and ensuring the availability of sufficient and moderately priced electric power supply.

Regarding the role of natural gas, the strategy states that approximately 10 % of natural gas will be replaced with biomass-based solutions, which enable the replacement of imported gas while utilizing the current gas pipelines and power plants. The strategy also outlines that replacement of around 10 % of natural gas with SNG made from domestic wood by 2025 will be pursued and a plant for the production of SNG is listed among the biggest energy investments in the near future. Possible funding for a bio-SNG plant from the second round of NER300 funding or other EU sources of funding will be supported. The strategy also encourages construction of facilities that manufacture biofuel from domestic waste and forest-based raw materials will be promoted, along with the use of such fuels in transport as well as in heating.

The strategy states that in order to enhance the functioning of the gas market, stability of gas prices and security of supply, the government should promote arrangements to create a competing gas supply. An LNG terminal project, to be located on the coast of the Gulf of Finland, and the Balticconnector project are included in the list of PCIs, and enable Baltic and/or Finnish parties to the project (companies) to apply for the EU funding.

The strategy points out that due to the small size of the market and national special characteristics, not all of the benefits normally linked to smart metering can be realized in Finland. Therefore, at this stage, it would not be expedient to promote the smart metering of natural gas deliveries through binding provisions.

The updated energy and climate strategy explains openly the Government's positions, both in the EU negotiations and other relevant international contexts, as well as in domestic policy preparation and decision-making.

In 2008, the International Maritime Organisation agreed on a revised version of the so-called MARPOL Annex VI, which sets the limits on sulphur oxide (SOx) and nitrogen oxide (NOx) emissions from ship exhausts. In 2012, the EU adopted a directive that requires the sulphur content in the fuel of vessels plying the Baltic Sea, North Sea and English Channel to be reduced to 0.1 % in 2015. Also, the IMO's Tier III environment protection rules for NOx reduction in defined Emission Control Areas (ECAs), will apply to ships keeled after January 2016. In order to meet the new environmental requirements, which apply to the above mentioned areas, emission reduction measures must be employed. Hence, the role of LNG as a marine fuel will be enhanced but major developments in LNG storage and bunkering terminals must be introduced. To encourage further development of LNG infrastructure, the Government of Finland has decided that investments in national LNG terminals will be supported by a total of 123 million EUR during 2013 and 2014. The construction of LNG terminals would enable a larger number of LNG-powered cargo and passenger vessels to operate on the Baltic Sea. Terminals would also enable transport of natural gas to locations outside the natural gas pipeline network, thereby increasing the diversity and reliability of energy supply, while helping to reduce emissions, particularly in the industrial sector where other fossil fuels are used.

PLAYERS

Gasum is the sole importer and wholesaler on the natural gas market in Finland. There are 23 local distribution companies in Finland. Less than 5 % of the natural gas is supplied by the local distribution companies. The rest is supplied directly from the transmission system. Gasum is the only TSO in Finland and has been appointed system responsible of the Finnish natural gas system. Gasum is a vertically integrated company acting as a wholesaler of gas in addition to the TSO activities. Unbundling of Gasum will be performed when the right to derogate from it expires.

ENERGY MIX

Finland has a rather diversified energy mix which can be seen from Figure 2.1.

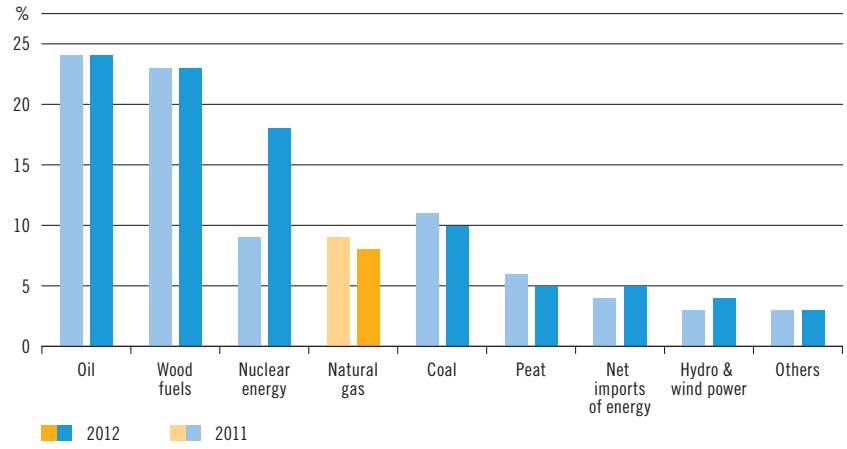


Figure 2.1: Total energy consumption by sources, 2012

SUPPLY / DEMAND

The natural gas supply in Finland is based on import from Russia. Sufficient access to natural gas is ensured on the basis of a supply contract that is valid until 2026.

The structure of the Finnish natural gas market differs from that of the common European market, where the supply of natural gas to private households and other small consumers plays an important role. In Finland, the bulk of natural gas is supplied to major natural gas users, i.e. industrial enterprises, power plants and district heating plants. Local supply of natural gas accounts for only 5 % of the total supply.

In past years, natural gas has accounted for around 8–9 % of Finland's overall energy consumption. Natural gas plays a key role in the combined production of electricity and heat by industry and the power plants of communities. About 2/3 of all natural gas consumed in Finland is used in the co-generation of electricity and heat. Other important uses are the production district heat as well as various industrial processes and feed stock. Natural gas sales are affected by weather conditions, price development in the electricity and fuel markets, and industrial utilization rate.

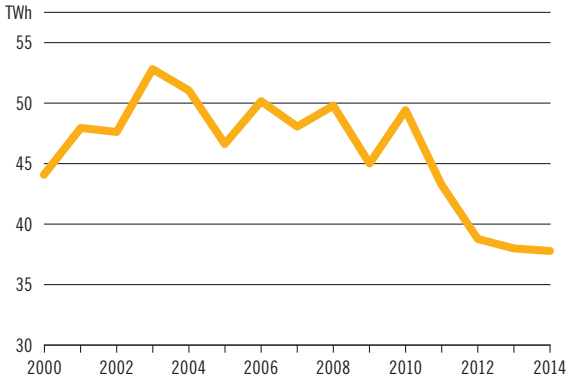
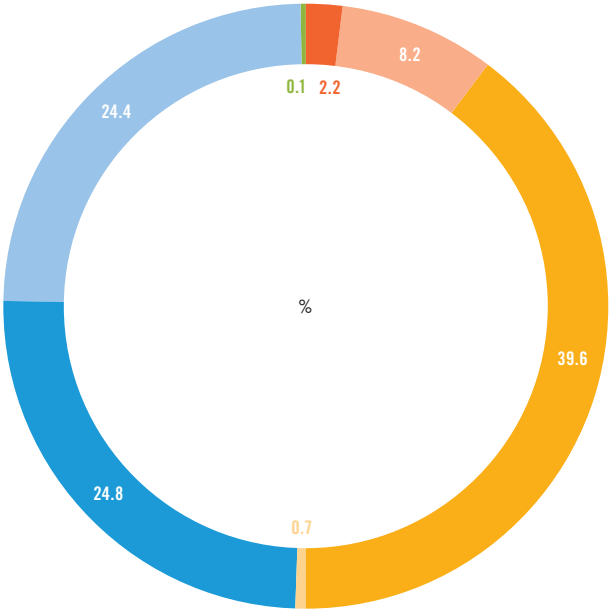


Figure 2.2: Development of natural gas consumption

A clear reduction was seen in Finnish natural gas consumption in 2011 and 2012, with the consumption levels also falling below the longer-term average. In 2013 a total of 36.8 TWh of natural gas was consumed in Finland. The development of the gas consumption in Finland can be seen in Figure 2.2.

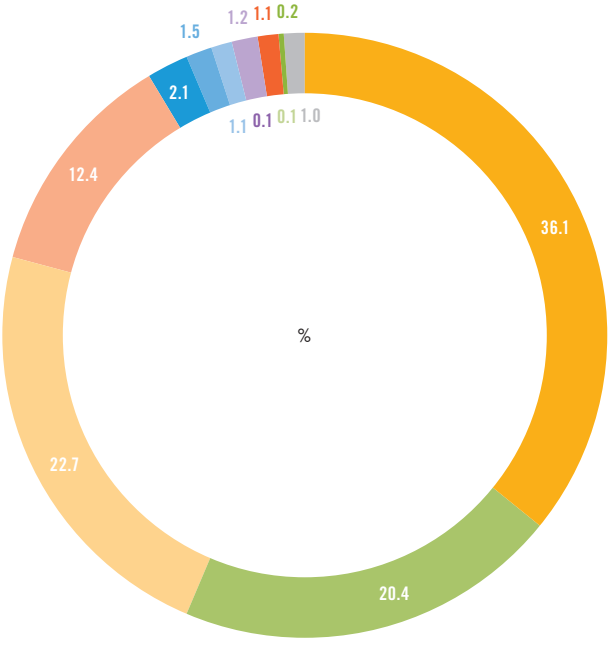
A total of 28 % of district heat production and 9 % of electricity production in Finland were fuelled by natural gas in 2012. Combined heat and power (CHP) production will also remain the biggest use of natural gas in the next few years. The structure of the natural gas consumption can be seen in Figure 2.3.

The consumption of natural gas in different sectors can be seen in Figure 2.4.



Heating: residential and commercial	2.2 %
District heating	8.2 %
Combined district heat and power	39.6 %
Condensing power	0.7 %
Combined heat and power, industry	24.8 %
Industry, other use	24.4 %
Natural gas vehicles	0.1 %

Figure 2.3: Natural gas consumption, 2012



Combined district heat and power	36.1 %
Forest industry	20.4 %
Chemical industry	22.7 %
District heat production	12.4 %
Metal industry	2.1 %
Glass and brick industry	1.5 %
Commercial sector	1.1 %
Food industry	1.2 %
Power production	0.1 %
Residential buildings	1.1 %
Greenhouses	0.1 %
Natural gas vehicles	0.2 %
Other industry	1.0 %

Figure 2.4: Natural gas consumption by market sectors, 2012

National demand

Country: Finland Normal conditions: 0°C Gross calorific value: 11.08 kWh / m³	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Peak demand										
mcm / day	24.0	26.0	26.0	26.0	26.0	26.0	28.0	28.0	28.0	28.0
GWh / day	266.0	288.2	288.2	288.2	288.2	288.2	310.3	310.3	310.3	310.3
Yearly demand										
bcm / year	3.4	3.8	3.7	3.8	3.7	3.7	3.7	3.7	3.7	3.7
TWh / year	37.8	42.6	41.2	41.8	41.3	41.5	41.5	41.5	41.5	41.5

Table 2.1: Forecasts for national demand, Finland

Gasum's subsidiary Gas Exchange Ltd maintains an online marketplace for natural gas short term market trading. Trading takes place in the Gas Exchange online service, which is open around the clock every day of the year. The number of transactions during the year 2013 was 101,000, which corresponds to an average of 277 executed transactions a day. In 2013, 6.1 % of whole gas consumption in Finland was sold through the Gas Exchange.

Gasum aims to become the leading producer of bio-based gases in Finland. Gasum has introduced biogas production facilities in conjunction with the natural gas transmission network so that biogas generated from biomass can, after processing, be fed into the transmission network and supplied to customers. Gasum biogas is the first transport fuel to be granted the Nordic Ecolabel and the Made in Finland label denoting Finnish origin. In 2011, biogas production was 146 mcm and in 2012 it increased to 150.4 mcm. Around 75 % of biogas is produced by landfill plants and around 20 % at wastewater treatment plants. Farms have small-scale reactor plants. In Finland biogas is mainly used for combined heat and power production. The year 2011 saw the completion of Finland's first biogas production plant (in Kouvola) that enables the injection of purified biogas into the natural gas transmission network and in December 2012 the biogas facility in Suomenoja, Espoo started to inject biogas to the grid. Finland's largest planned biogas production and refinement plant in Lahti, is expected to be operational in 2014. Techno-economic potential for biogas (biomass fractions and wood gasification) is about 18 TWh in Finland. While the EU has set the obligation of a 10 % share of renewable energy in transport fuels for 2020, Finland has set a higher national target of 20 %. As the Finnish road transport fuel usage is altogether about 50 TWh in 2020, this means that in future Finland could easily reach the 20 % renewable road transport fuel target merely with biogas.

Synthetic biogas is produced using methods such as wood gasification. The future scenario for synthetic biogas in Finland could include 3 large bio-SNG facilities that are capable of producing approximately 5 TWh / a of energy. Gasum together with Metsä Fibre and Helsingin Energia is currently planning a biorefinery for bio-SNG production in Joutseno, southeastern Finland. The biorefinery would produce bio-SNG from renewable wood raw material for transmission along Gasum's gas network to usage sites such as Helsinki Energy's Vuosaari power plant. The maximum production capacity of the bio-SNG plant planned in Joutseno would be 200 MW.

Power-to-gas is the functional description of the conversion of electrical power into a gaseous energy carrier such as hydrogen or methane. It is an efficient technology for storing the exceeding energy in the form of methane for later use. Gasum is closely following the global developments in power-to-gas technologies and has included this technology in its strategic planning. For example, the Balticconnector gas interconnector between Finland and Estonia would open up the possibility to transfer power-to-gas produced renewable energy for the markets around the Baltic Sea Region.

INFRASTRUCTURE / THIRD PARTY INFRASTRUCTURE

The network of natural gas pipelines covers the south-eastern and southern parts of Finland. In this area, natural gas accounts for about 30 % of the fuels used in the production of electricity and heat. On the scale of the whole country, natural gas accounts some 10 % of the use of primary energy.

Gasum is the natural gas transmission network system operator in Finland. Gasum owns the pipelines needed for natural gas transmission and is responsible for network maintenance and development.

The natural gas transmission network covers the south-eastern and southern parts of Finland and totals around 1,200 km in length. Preventative maintenance helps to ensure the transmission network remains safe and reliable. The central control room of the transmission system is located at Gasum's Natural Gas Centre in Kouvola. The central control room is staffed 24 / 7 throughout the year.

Figure 2.5: Natural gas transmission network, Finland

Gasum has also been in the process of developing a national LNG terminal in Turku and a member of a consortium developing an LNG terminal in Tornio. In Turku, the terminal would have a storage volume of about 30,000 m³ and it would also be used for bunkering. In Tornio, the storage capacity is to be built in phases; one 50,000 – 70,000 m³ LNG storage tank first, with an option for another tank as the demand grows.

In June 2012 the Finnish Government's Cabinet Committee on the EU Affairs approved a strategic policy for the development of the gas network and gas usage in Finland. According to the Cabinet Committee, the State of Finland should promote arrangements that will create competition in gas supply in Finland.

Gasum plans to develop the transmission network by constructing an LNG terminal, Finngulf LNG, in Finland as well as a cross-border gas pipeline, the Balticconnector, which would connect the Finnish and Estonian gas networks with a pipeline laid under the Gulf of Finland.

The Finngulf LNG terminal, located in Inkoo, is planned to have a net storage capacity of 300,000 m³. From the terminal site a 20 km long pipeline shall be built to the existing Finnish gas grid. The planned LNG terminal enables the development of both the up- and downstream parts of the natural gas value chain. In the upstream, the terminal will open global natural gas markets to Finland, thus diversifying the sourcing of natural gas from the prevailing situation in which there is a single supplier. Downstream benefits lay in diversifying the Finnish market's consumer base by enabling the development of a substantial off-grid market for industry and marine use.

The Balticconnector consists of a subsea bi-directional pipeline between Inkoo, Finland and Paldiski, Estonia along with grid enhancements in both countries. The transit capacity of the offshore pipeline will be 7.2 mcm/d, 300,000 m³/h and the compressor stations (CS) in Finland and Estonia enable transit flows between Finland to Estonia as well as between Finland and the Undergroud gas storage (UGS) in Latvia. Once commissioned, the Balticconnector will connect the Finnish and Baltic gas infrastructures and hence, would make LNG from the Finngulf LNG terminal available to Baltic countries. The Balticconnector will ultimately play an important role in integrating the regional gas markets. Once the market area is interconnected, transit flows will significantly increase due to price harmonization flows and utilization of storage services. The rise in transit flows will increase the utilization rate of the transmission system and thus, lower the transmission tariffs. Close cooperation between the regional TSOs on tariff planning enables competitive gas transit pricing. This is especially important in the Baltic Sea region, where the natural gas storage is situated in one specific location.

Should the EU funding not be granted to the Finngulf LNG terminal, Gasum will most likely develop a national LNG solution in Porvoo. The national LNG terminal in Porvoo would have a volume of some 150,000 m³ with bunkering vessel loading facility, LNG road tanker capability and injection capacity to the existing gas transmission network. Together the Finngulf LNG and the Balticconnector projects would significantly improve the regional and national security of supply (SoS), reduce the dependence on single supplier, function as an energy storage and ultimately, link the separate gas grids and storages in a balanced system that would end the isolated market positions of Finland and the Baltic states. Combined, the Finngulf LNG terminal and the Balticconnector projects meet all PCIs identification objectives as it was highlighted by the European Council in 2011: completion of the internal energy market and linkage of isolated regions; increased solidarity between Member States in the energy field; alternative supply or transmission routes; diversification of energy sources and; increased use of renewables compared with traditional sources.

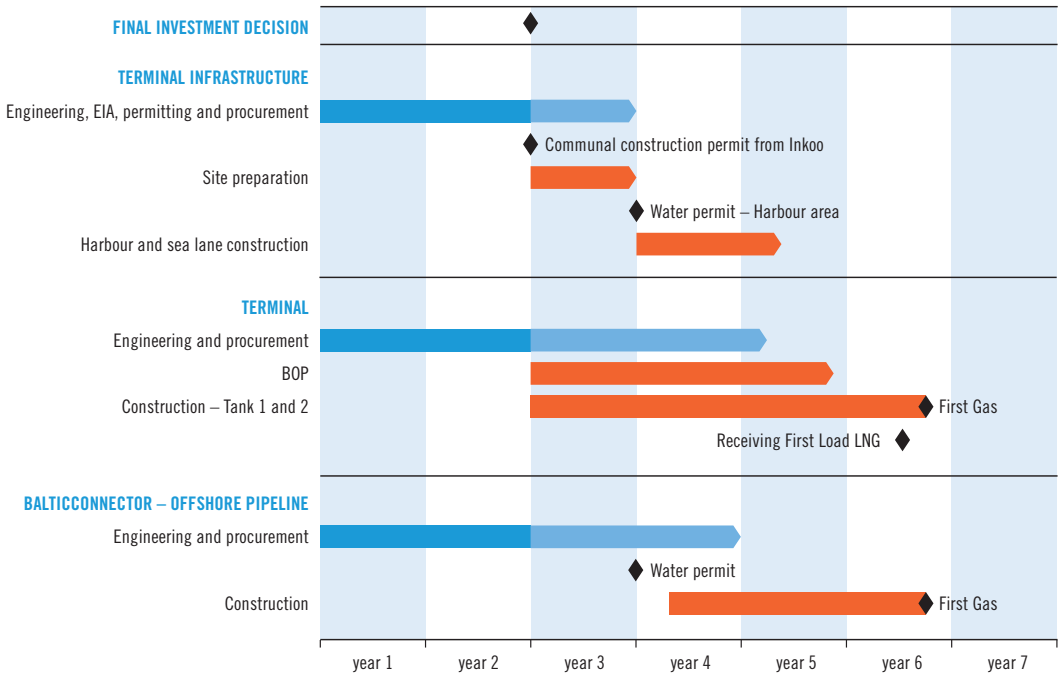


Figure 2.6: The expected timeline of the Finngulf LNG and the Balticconnector projects

Finnish industry and gas market actors plan the development of LNG import, transmission and distribution logistics in Finland. By investing along the whole value chain, market actors aim to ensure efficient regional access to LNG and hence, providing an opportunity for the Finnish industry and transport sector to converse from the existing fuels to the more competitive, cleaner and efficient natural gas. From the Finngulf LNG terminal, LNG will be supplied by feeder vessels to small scale LNG terminals around the Baltic Sea region and by semi-trailers directly to off-grid customers.

The Finnish industry in multiple sectors has indicated substantial interest in off-grid use of LNG. In addition, in the road transport segment, the EU Clean Fuel Strategy aims to have publically accessible natural gas re-fuelling points (CNG), containing common standards, with maximum distances of 150 km Europe-wide and a LNG refueling station every 400 km along the Trans European Core Network. Since the Finnish gas network only covers the southern parts of the country, a majority of the new stations are to be off-grid. This has been identified as a major growth opportunity for the LNG markets in Finland, supported by the Finngulf LNG terminal. The off-grid transport sector is predicted to grow significantly as the regional LNG distribution network is developed, and thus LNG efficiently provided to the markets. By 2030 the regional transport sector is estimated to stand for annual consumption of some 26,000 tons of LNG. The regional marine transport sector is developing as a reaction to the SECA restrictions and indications of significant future growth in the marine transport segment are envisaged. Presently there is one passenger ferry in the Baltic Sea region running on LNG and more investments in LNG powered fleet are currently planned.

Natural gas is the best choice for improved balancing capability and peak load management. The Finngulf LNG terminal located in Finland is an optimal solution for improving the balancing capability and peak load management, as the distance to the major markets is as short as possible. The closer the location of the terminal is to the major markets the more efficiently can it be used to balance the fluctuations in gas consumption and production. The underlying assumption is that LNG will be used for both base load and peak load purposes during the year in Finland.

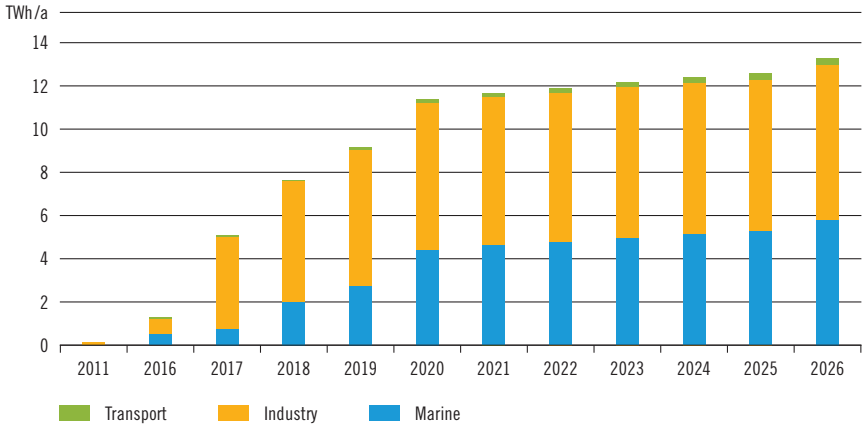


Figure 2.7: Off-grid demand

In the coming years Gasum will invest significantly in the use of natural gas in the transport sector. Currently there are 20 filling stations in the area covered by the Finnish natural gas network and the stations offer both biogas and CNG. The number of gas filling stations is planned to increase annually and by 2020 the number is estimated to be 60. In addition, the Finngulf LNG terminal will enable the development of significant off-grid markets and filling stations can then be located outside the traditional gas network. This will serve the private vehicle base as well as the public and private transport sectors.

Image courtesy of Gasum Oy

LEGAL FRAMEWORK

The Natural Gas Market Act that entered into force in 2000 has implemented Directive 98/30/EC of the European Parliament and of the Council of 22 June 1998 concerning common rules for the internal market in natural gas (DIR-30). The Directive allows Finland to deviate from the regulations concerning the deregulation of the natural gas market as long as the country has only one principal supplier of natural gas, because Finland has not been connected to the natural gas network of any other EU Member State.

Due to this, the Finnish natural gas market has not been deregulated in the literal sense of the word. Only the so-called secondary market in natural gas has been deregulated, and the deregulation concerns only parties that meet certain requirements. Users or retailers of natural gas, who purchase over 5 mcm of natural gas per year, whose metering is based on remote reading and whose pricing has been agreed upon after the Natural Gas Market Act entered into force can participate in the operation of the secondary market. A special market place managed by Kaasupörssi Oy has been founded for trading in the secondary market.

The Energy Market Authority supervises compliance with the Natural Gas Market Act and promotes the operation of a competitive natural gas market.

The Natural Gas Market Act will be revised and is planned to be implemented by the end of 2015. The revision will implement the Gas Directives of the Third Energy Package for the internal EU gas and electricity market to the Finnish legislation. Among other topics, the revision will present the unbundling requirements and the responsibilities of LNG terminal operators.

2.3 Estonia

ENERGY POLICY

In June of 2009 Estonian Parliament published the Energy Strategy for Estonia until 2020.

Vision

The efficient and innovative energy sector supports the sustainable and balanced development of Estonia.

Mission

The Estonian energy strategy aims at diversifying and supporting domestic energy sources in the production of energy in order to ensure continuous energy supply. In addition, the importance of new interconnections for guaranteeing energy supply is underlined. By 2020 the share of any energy source in the energy balance shall not exceed 50 %. It is also important to have several strong energy supply channels from other states, reliable grids and to stockpile fuel and production capacity supplies in a reasonable amount.

In order to ensure sustainable energy supply and consumption, energy efficiency shall be improved by energy producers, transporters and consumers. Estonia has significant resources of oil shale, biomass and wind. The balanced utilization of these can, together with increased energy efficiency and use of CHP for district heating, be cornerstones for the Estonian energy strategy.

For the purpose of supply of energy at a justified price, regulations shall be developed, which would prevent market distortions and abuse of the market position by energy undertakings. At the same time the price of energy carriers shall lead to reasonable investments in energy conservation.

With large interest and support for biomass, oil shale and wind power, the position of natural gas in the Estonian energy landscape remains marginal.

However, the Estonian Government has shown a strong interest for a regional LNG terminal and is wholly supportive of the integration of gas markets through the construction of Balticconnector.

MARKET PLAYERS

The Estonian natural gas transmission system operator is AS EG Võrguteenus. AS EG Võrguteenus is owned by AS Võrguteenus Valdus.

In Estonia, 3 licences to import natural gas have been issued, i.e. licences to AS Eesti Gaas, AS Nitrofert and Baltic Energy Partners OÜ. AS Eesti Gaas is the only gas wholesaler of the Estonian gas market. AS Nitrofert imports gas only for own use. Baltic Energy Partners OÜ has not imported gas.

There are 24 distribution companies active on the Estonian market.

ENERGY MIX

According to 2012 statistics the share of natural gas in Estonia's energy balance was 9.4 %. The share of natural gas in electricity generation was 1.03 %, and in heat production – 39.3 % share was produced from natural gas.

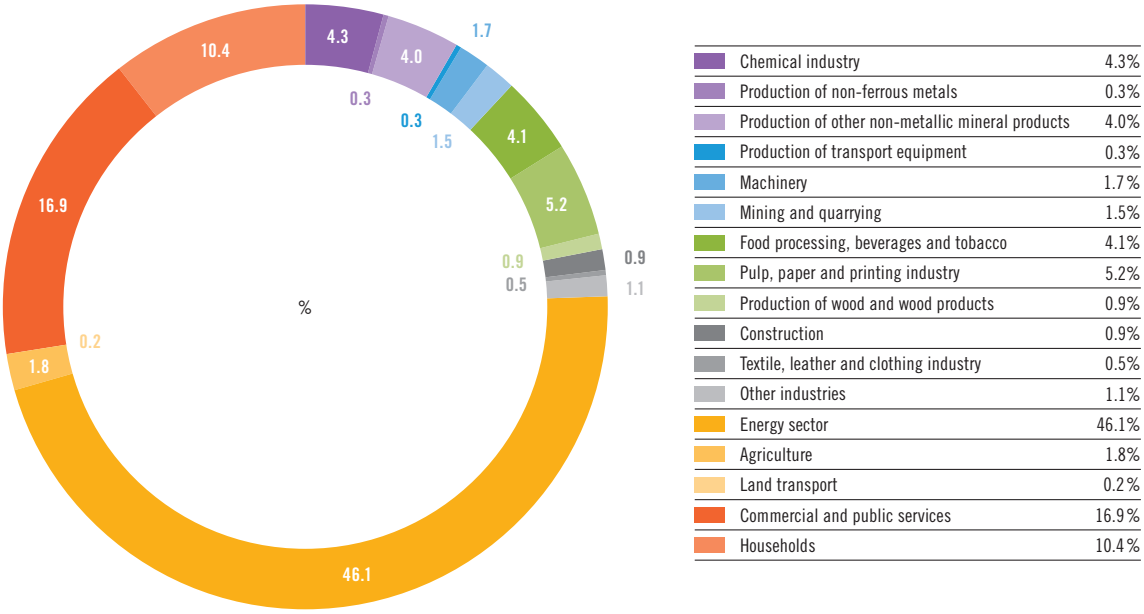


Figure 2.8: Consumption of natural gas by branches in Estonia, 2012

SUPPLY / DEMAND

In 2013 the total annual consumption of natural gas in Estonia was 689 mcm (7.7 TWh).

National demand

Country: Estonia Normal conditions: 0°C Gross calorific value: 11.2 kWh / m³	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Peak demand										
mcm / day	5.7	5.8	5.9	6.0	6.1	6.1	6.1	6.1	6.1	6.1
GWh / day	64	65	66	67	68	69	69	69	69	69
Yearly demand										
bcm / year	0.63	0.64	0.64	0.65	0.66	0.67	0.67	0.67	0.67	0.67
TWh / year	7.06	7.17	7.17	7.28	7.39	7.50	7.50	7.50	7.50	7.50

Table 2.2: Forecasts for national demand, Estonia

Entry and exit point	Max supply mcm/day
Värska GMS (RU – EE)	4
Narva EP (RU – EE)	3
Karksi GMS (LV – EE)	7

Table 2.3: Capacities of gas entry points for Estonia

INFRASTRUCTURE

The Estonian natural gas system is interconnected with transmission networks located in Latvia and Russia. In the period from May to October the gas system is mainly supplied with gas directly from Russia. From November to April gas is basically supplied from the Inčukalns UGS through the Karksi Gas Metering Station or from Russia through the GMS Värska. In particular cases the gas is supplied from Russia through the IP Narva.

The total length of natural gas transmission pipelines is 885 km. Natural gas is supplied to all larger urban areas of Estonia.

DESCRIPTION OF THE GAS TRANSMISSION SYSTEM IN ESTONIA

Gas pipeline	Year of putting into operation	Length (km)	Conventional diameter (mm)	Operating pressure (bar)	Age (years)
Vireši – Tallinn	1991/92	202.4	700	50	20
Vandra – Pärnu	2005/06	50.2	250	50	6
Tallinn – Kohtla – Järve I	1951/53	97.5	200	30	59
Tallinn – Kohtla – Järve II	1962/68	149.1	500	30	44
Kohtla – Järve – Narva	1960	45.1	350/400	30	52
Tartu – Rakvere	1979	133.2	500	50	33
Izborsk – Tartu	1975	85.7	500	50	37
Pskov – Riga	1972	21.3	700	50	40
Izborsk – Inčukalns	1984	21.3	700	50	28
Branch lines		79.2			
Total		**885.0**			

Table 2.4: Gas transmission system

Due to the technical condition, the natural gas pressure is limited in the oldest sections of gas transmission pipelines Tallinn – Kohtla – Järve – Narva.

N-1 [%] = 104.48 %

The N-1 criterion for Estonia is 104.48 %. Taking into account the limitations of the Russian and Estonian transmission systems, the interconnection in IP Narva can be deemed as partially operational. The Estonian gas transmission system can rely on receiving gas only on the cross-border interconnection with Russia through Värska and the connection with Latvia through Karksi. In case of disruption of the largest infrastructure in Estonia-cross-border connection with Latvia, the gas loss would amount to 7.0 mcm/day.

2.4 Latvia

PLAYERS

At present, AS Latvijas Gāze is the only player in the natural gas market in Latvia. According to the share purchase agreement, which was signed with the strategic investors, AS Latvijas Gāze has exclusive rights on transmission, storage, distribution until year 2017 and license for sale of natural gas, as well as unlimited and exclusive right to use Inčukalns Underground Gas Storage (UGS) for the same period. AS Latvijas Gāze carries out transmission, distribution, storage and sale of natural gas in compliance with the licences issued by the Public Utilities Commission.

On 3 December 2009, the Saeima (Latvian Parliament) adopted a decision to postpone liberalisation of the natural gas market in Latvia until 4 April 2014. On 13 March 2014 Saeima approved amendments to the Energy Law providing for introduction of Third Party Access (TPA) in Latvia from 4 April 2014 and unbundling of AS Latvijas Gāze as of 3 April 2017 or earlier, in case the condtions of one major gas supplier and no connection to the common EU gas grid will not be fulfilled.

Regardless of derogation from the gas market liberalization as isolated market, AS Latvijas Gāze is providing non-discriminatory access to the gas transmission and storage based on technical capabilities and separate accounts for gas transmission, storage, distribution and sales as well as non-discriminatory and undisturbed access to the gas distribution networks as set by the Public Utility Commission Rules of 16 July 2008.

ENERGY MIX

In 2012, the total consumption of primary energy resources in Latvia amounted to 50.8 TWh. Natural gas was the main resource for generating of heat energy and electric energy. Total consumption of natural gas reached 14.1 TWh, which corresponds to 28 % of the total primary energy consumption. In total consumption of primary energy sources, firewood with its total consumption forming 12.9 TWh was the most widely used local energy resource, electricity generated in hydropower stations and wind power stations constituted 3.8 TWh.

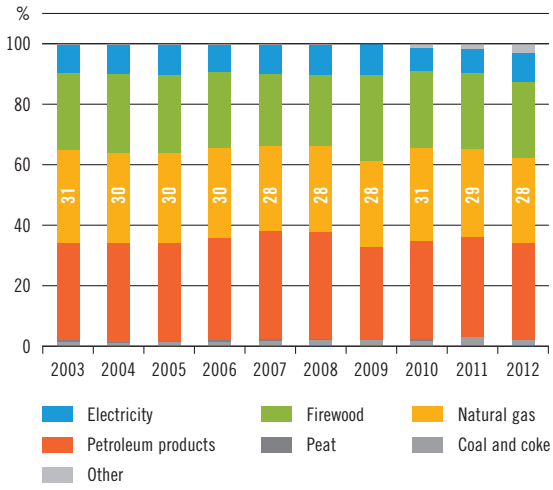


Figure 2.9: Consumption of primary energy resources in Latvia

SUPPLY / DEMAND

The Latvia's gas supply system is not connected to the EU common gas grid, and Latvia has one main gas supplier – the OAO Gazprom and other gas supplier – the ITERA Latvia, which delivers less than 25 % of the total gas consumed in Latvia.

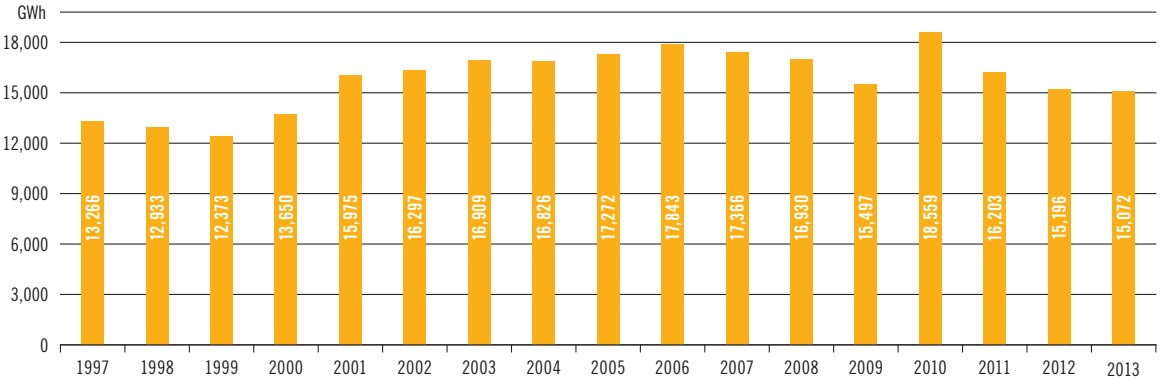


Figure 2.10: Natural gas sales in Latvia

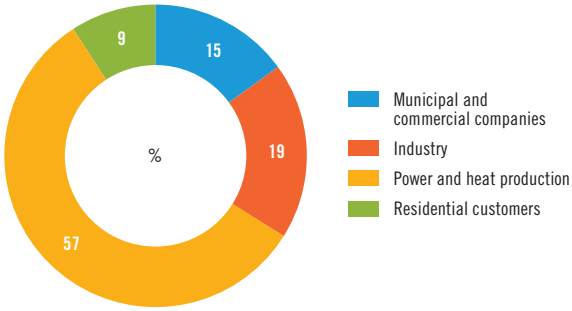


Figure 2.11: Shares of natural gas sales by customer groups in Latvia, 2013

The largest consumers of natural gas are the power company AS Latvenergo and heat supply enterprises, as well as manufacturing sector. Riga region accounts for about 70 % of the total natural gas consumed in Latvia.

In total AS Latvijas Gāze has 443.3 thousand customers, including 432.8 thousand residential customers.

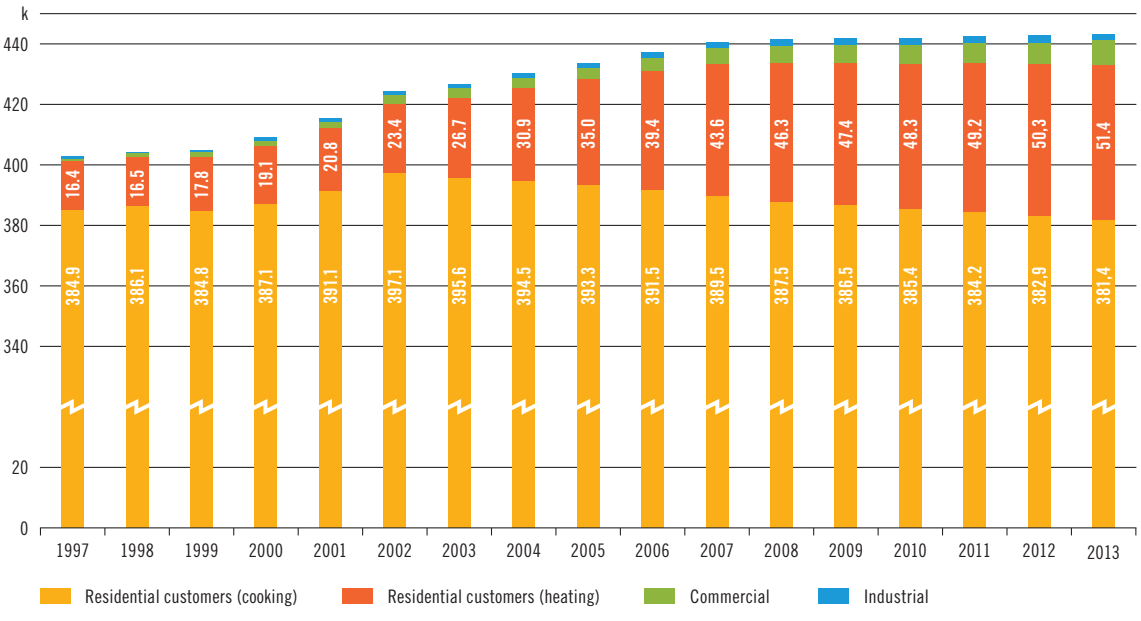


Figure 2.12: Number of customers (in thousands)

National demand

Country: Latvia Normal conditions: 0°C Gross calorific value: 11.16 kWh / m³	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Peak demand										
mcm / day	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
GWh / day	120	120	120	120	120	120	120	120	120	120
Yearly demand										
bcm / year	1.3	1.4	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7
TWh / year	14.5	15.5	16.8	17.3	17.4	17.6	17.7	18.2	18.9	18.9

Table 2.5: Forecasts for national demand, Latvia

INFRASTRUCTURE / THIRD PARTY INFRASTRUCTURE

There is no indigenous gas production in Latvia. All the gas consumed in the country is imported from Russia by two 700 mm pipelines. During the warm period of the year (April – September) part of received gas is injected into Inčukalns UGS and the rest is delivered directly to the consumers. During winter, gas from the underground facility is delivered to Latvian customers, as well as customers in Estonia and NW Russia thus securing reliable gas supply for the whole region. There is also a gas connection to Lithuania, but it has been only used in emergency cases for gas supply to Lithuania or in case of construction works or other situations when there is a need to supply part of customers in Latvia from Lithuanian side. However, after constructing of Klaipeda LNG terminal it is expected that up to 200 mcm of gas annually from the terminal will be transported and stored in the Inčukalns UGS. Since first natural gas supplies to Latvia were started in 1962, part of gas network is old, and the whole transmission system is designed for annual consumption of up to 4 bcm, more than 2 times above the current consumption level in Latvia.

After privatization of AS Latvijas Gāze in 1997, assessment of technical state of infrastructure was carried out and step by step modernization of the whole gas supply system in Latvia was started.

Extensive modernization works were carried out in the last decade. From 1997 till 2013 including, AS Latvijas Gāze for modernization and improvement of safety have spent 384.7 million EUR.

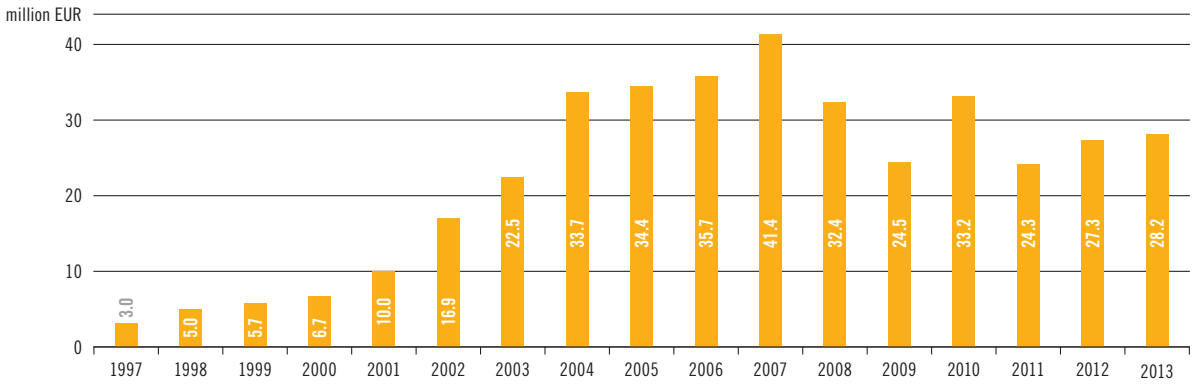


Figure 2.13: Investments in modernization of infrastructure

INČUKALNS UNDERGROUND GAS STORAGE

Total volume of Inčukalns UGS is 4.4 bcm, including working gas volume of 2.3 bcm.

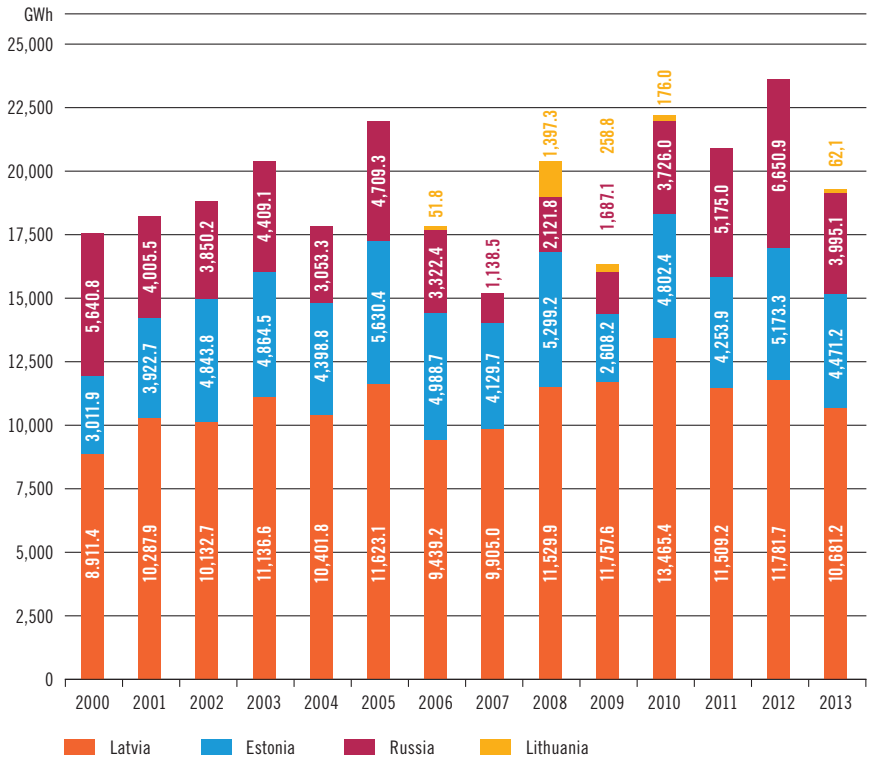


Figure 2.14: Natural gas supply from Inčukalns UGS per country, 2000 – 2013

Inčukalns UGS started its operation already in 1968, and therefore overall modernization was needed in order to meet modern gas storage standards. Before works were started, few technical studies had been carried out with the aim to decide on necessary modernization and replacement measures. For example, German company UGS Mittenwalde GmbH performed Inčukalns UGS safety analysis, and few technical studies had been performed by "Gazpromenergodiagnistica". Based on these studies, a program of necessary measures for modernization and increase of safety was worked out and gradually is successfully implemented. In the time period from 1997 to 2013, AS Latvijas Gāze has invested 114.5 million EUR in modernization of Inčukalns UGS.

In the framework of European Energy Programme for Recovery (EEPR) modernization of 17 wells in Inčukalns UGS was carried out. In 2011 scientific institute VNIIGAZ completed extensive investigation of conditions of the equipment at Inčukalns UGS site and based on the results prepared the Concept of modernization of technological equipment and improvement of operational safety at Inčukalns UGS. The project of modernization and expansion of Inčukalns UGS is included in the list of PCIs (total estimated costs – 376.5 million EUR).

The objective of the project is:

- technical upgrade and increase of gas withdrawal capacity up to 35 mcm per day;
- increase of volume of working gas from 2,300 mcm to 2,835 mcm.

Image courtesy of Latvijas Gāze

The project is divided into three stages: the first two are related to modernization of the storage, and the third provides for its expansion. It is planned to complete the first two stages by 2020.

Modernization and expansion of Inčukalns UGS will not only boost security of supply in the entire East-Baltic region, but also improve efficiency of the regional LNG terminal by offering opportunity to store gas reserves and freely use them in case of uneven supply. After completion of interconnection between Finland and Estonia gas supply security for Finland will also be improved because gas reserves can be kept in the storage.

Implementation of the project of modernization and expansion of Inčukalns UGS together with other PCIs in the East-Baltic region will provide increased gas supply security to consumers by diversifying gas supply sources and routes, as well as integration of gas networks of the Baltic countries and Finland into the common EU gas grid.

GAS TRANSMISSION SYSTEM

Figure 2.15: Gas transmission network, Latvia

The first gas transmission pipeline to Latvia was built in 1962, followed by the two next pipelines in 1966 and 1967. In general, almost 25 % of pipelines are older than 40 years.

Gas pipeline	Year of putting into operation	Length (km)	Conventional diameter (mm)	Operating pressure (bar)	Age (years)
Vilnius – Riga	1962	42.33	500	25	52
Riga – Panevezys	1983	84.03	700	40	31
Iecava – Liepaja	1966	209.64	500 / 350	25	48
Pskov – Riga	1972	160.63	700	47	42
Izborsk – Inčukalns UGS	1984	162.51	700	47	30
Riga – Inčukalns UGS I	1967	41.75	700	40	47
Riga – Inčukalns UGS II	1978	41.74	700	40	36
Riga – Daugavpils	1988	203.00	500	25	26
Vireši – Tallinn	1994	88.00	700	45	20
Upmala – Preiļi – Rezekne	2001 / 2005	66.71	400 / 350	54	13 / 9
Branch lines		139.66			
Total		1,240.00			

Table 2.6: Description of the gas transmission system, Latvia

In order to assess conditions of pipelines already in 1999 JSC Giprospecgaz analysed gas supply system in Latvia and elaborated the Action plan for gas supply system development till 2010 and concept till 2030, which was updated by the same company in 2008. The gas transmission network of Latvia was studied, and particular measures were proposed for increase of gas supply safety. Based on these studies program for inspection of pipelines and repair of discovered defects was elaborated. At present, 98 % of the whole transmission network in Latvia is inspected and it is planned to finish inspection and repair of the defects discovered by the inspection by the end of 2014.

GAS DISTRIBUTION NETWORK

The total length of gas distribution network in Latvia is almost 4,720 km, and only around 1,600 km of the whole network consists of polyethylene pipelines. Therefore, there is well developed cathode protection system in place. In general, all gas regulation stations and units recently have been reconstructed or replaced with modern ones, as well as cathode protection system. The whole distribution system is supervised by SCADA.

At present, AS Latvijas Gāze is working on preparation of the relevant standards in order to prepare for biogas entering the gas distribution system.

LEGAL FRAMEWORK

The Energy Law regulates the energy industry as an infrastructure of the economy that covers acquisition, utilisation of energy resources and generation, purchase, conversion, storage, transmission, distribution, supply of various types of energy to the energy users and consumption of energy resources, as well as prescribes the transmission procedures within the energy industry and the principles for the organisation and development of the activity of energy supply merchants.

The aim of the Law on Regulators and Public Services is to ensure the possibility of receiving continuous, safe and high-quality public services, the tariffs (prices) of which conform to the economically substantiated costs, as well as to promote the development and economically substantiated competition in the regulated sectors, defining the procedure for regulating public services and legal relations in providing public services.

Regulations on Supply and Use of Natural Gas sets gas supply procedures, including reasons and procedures of disconnection from the gas supply, responsibilities of the user and the owner of a gasified object, procedures of metering of gas consumption, issues of payment, etc.

Image courtesy of Latvijas Gāze

2.5 Lithuania

ENERGY POLICY

The National Energy Strategy places strong emphasis on the importance of development of infrastructure projects oriented towards gas supply source diversification, which is expected to result in the enhancement of gas supply security in Lithuania. Out of the gas supply source diversification options available, the Strategy prioritises the LNG terminal option as "economically the most viable option". By the end of 2014, Lithuania will have the LNG terminal in place and, depending on how the projects are scheduled, Lithuania will also have the gas interconnection Poland – Lithuania by the end of 2018. Upon implementation of the aforesaid projects, Lithuania will achieve the goal of its gas supply diversification and create an adequate gas infrastructure related thereto.

In the long term, Lithuania's demand for natural gas is forecasted to decrease due to a higher share of renewables in the heat and electricity production as well as a wider application of energy efficiency technologies.

MARKET PLAYERS

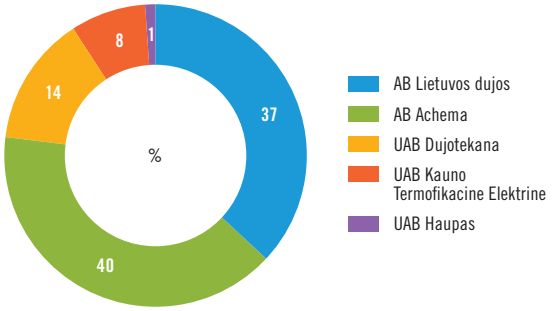


Figure 2.16: Natural gas import structure, 2013

The value chain of the natural gas market consists of gas supply, transmission and distribution.

Natural gas is imported to Lithuania by 5 companies, including 3 gas supply companies: AB Lietuvos Dujos, UAB Dujotekana and UAB Haupas, and 2 major importers AB Achema and UAB Kauno Termofikacine Elektrine (Kaunas Combined Heat and Power Plant) (import mainly for own needs). In 2013, natural gas imports to Lithuania amounted to 28.1 TWh.

In 2013, the major gas importers were AB Achema (40 %) and AB Lietuvos Dujos (37 %).

In 2013, AB Amber Grid transported to third parties 30 TWh of natural gas. There are up to 10 companies that supply natural gas to end-consumers in Lithuania.

By July 2013, the functions of the TSO were performed by AB Lietuvos Dujos. Since August 2013, the gas transmission activity has been carried out by a newly established company, AB Amber Grid. AB Amber Grid was established in implementation of legal acts provisions on the unbundling of the activity of natural gas transmission from vertically integrated company (AB Lietuvos Dujos). According to the provisions of national legislation, by October 2014 the ownership unbundling of AB Amber Grid should be accomplished.

32 % of gas consumed in Lithuania is transported via distribution grids. The major gas distribution company is AB Lietuvos Dujos, which covers approx. 98 % of whole gas distributed in 2012. There are 6 other distribution system operators (DSO) that provide services in individual parts of Lithuania, out of which 4 DSOs operate distribution systems connected to AB Amber Grid gas transmission system, and 2 smaller ones are connected to the gas distribution systems of Belarus and AB Lietuvos Dujos.

ENERGY MIX

In 2012, Lithuania's total energy consumption amounted to 86 TWh. The dominating fuels were natural gas and oil products, whose respective shares in the primary energy balance stood at 36 % and 34 %.

The energy obtained from renewable energy sources amounts to 15 % of the total amount of energy consumed in Lithuania. The EU Directive Regarding the Incentives for Consumption of Renewable Energy Resources has obligated Lithuania to reach 23 % until 2020.

Currently Lithuania has 10 off-grid biogas-fired plants with total installed capacity for electricity of 8.4 MW and with total installed capacity for thermal energy of 25.4 MW. It is forecasted that the installed capacity of biofuel plants will reach 1,232 MW by 2015.

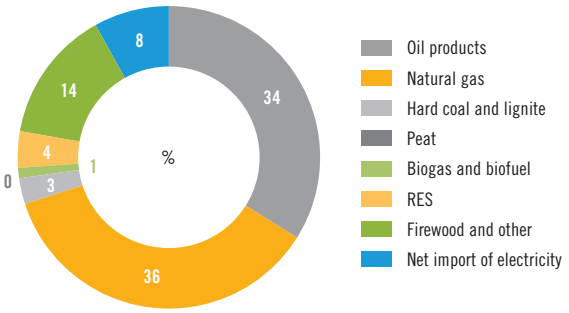


Figure 2.17: Structure of energy consumption, 2012

SUPPLY / DEMAND

Lithuania is supplied by gas from Russia with the transit mainly via Belarus. In 2013, Lithuania's natural gas consumption supplied via transmission network amounted to 27.7 TWh. In 2013, AB Amber Grid had nearly 90 gas network users in Lithuania. The major share of gas was used for the production of energy and fertilizers, respectively 38 % and 41 %.

Also natural gas is transited to the Kaliningrad Region of the Russian Federation through Lithuania. Transit volumes totaled 22.4 TWh in 2013.

National demand

Country: Lithuania Normal conditions: 0°C Gross calorific value: 11.17 kWh / m³	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Peak demand										
mcm / day	15.8	15.4	15.1	15.1	15.2	15.4	15.4	15.5	15.5	15.5
GWh / day	176.6	171.4	168.3	169.1	169.5	171.7	172.3	172.6	173.2	173.2
Yearly demand										
bcm / year	2.5	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4
TWh / year	28.1	26.6	25.7	25.8	25.8	26.2	26.3	26.4	26.5	26.5

Table 2.7: Forecasts for national demand, Lithuania

INFRASTRUCTURE / THIRD PARTY INFRASTRUCTURE

The gas network of Lithuania has a gas pipeline interconnection with the gas system of Belarus (maximum cross border capacity – 324.3 GWh/day), through which gas is mainly supplied to Lithuania and also transited to Kaliningrad Region, a bi-directional interconnection with Latvia, the capacity of which was recently enhanced, providing maximum cross-border capacity from Latvia – 65 GWh/day, and to Latvia – 67.4 GWh/day. The gas transmission system of Lithuania has also an interconnection with the Kaliningrad Region, which is used exclusively for gas transit purposes.

Even though Lithuania through gas interconnection with Latvia has had access to the Inčukalns UGS in Latvia for a long time, nevertheless, previously gas supplies from the Inčukalns UGS in case of emergency could be supplied to Lithuanian consumers only at a limited scale. The implementation of the recent project for the enhancement of the bi-directional capacity of the cross-border gas pipeline linking Lithuania and Latvia has improved the gas supply security and contributed to the development of the regional gas market.

The preparatory works for the Gas Interconnection between Poland and Lithuania (GIPL) have been already under the implementation. In Q2 2013 the Environmental Impact Assessment (EIA) procedures were started. The GIPL will integrate of the Baltic states into the common EU gas market, and create access to the various sources of gas supply, also contributing to the improvement of the gas supply security situation.

In order to enhance the security of gas supplies and to diversify gas supply sources, the project of LNG terminal in Klaipeda is implemented by AB Klaipedos Nafta. The LNG terminal in Klaipeda should be operational at the end of 2014. The maximum entry capacity from LNG terminal in Klaipeda could reach the level of 115 GWh/day, but in Lithuania only once the project of Capacity enhancement of Klaipeda-Kiemenai pipeline will be implemented.

In 2013 the construction of 400 mm pipeline Jurbarkas – Klaipeda was completed. It increased the security of supply of the gas transmission system in the western part of Lithuania and created preconditions for the transportation of gas from the LNG terminal in Klaipeda.

The Capacity Enhancement of Klaipeda-Kiemenai pipeline will open the possibility to supply gas on substantial scale from the LNG terminal in Klaipeda and not only to the consumers in Lithuania but also to the other Baltic states. It will result in diversification of gas supply sources as well as increase of security of supply and competitiveness of the market. The project is planned to be completed by the end of 2015.

In Lithuania the possibility of construction of an UGS facility in Syderiai has been investigated. The exploration works are carried out by AB Lietuvos Energijos Gamyba.

Lithuania's gas transmission system consists of over 2.0 thousand km of high pressure pipelines (maximum operating pressure 46 – 54 bar), 66 gas distribution stations, 3 gas metering stations and 2 compressor stations (42.2 MW).

LEGAL FRAMEWORK

Key legal acts and regulations governing Lithuania's natural gas market:

- The Law on Energy sets out guiding principles of energy policy and energy sector regulation.
- The Law on Natural Gas sets out licensing requirements applicable to gas companies, main principles of gas sector regulation, development of gas systems, mandatory contingency reserves, consumer protection, etc.
- On 30 June 2011, a new Law on Natural Gas was adopted, by which the applicable provisions of the EU Third Energy Package were transposed into Lithuania's national legislation. The new Law on Natural Gas opted for the implementation of the natural gas transmission ownership unbundling. Pursuant to the Law on Implementation of the Law on Natural Gas of the Republic of Lithuania and Plan on Performing the Unbundling of Activities and Control of Natural Gas Companies that do not Conform to the Requirements of the Law on Natural Gas as approved by the Resolution of 28 October 2011 of the Government of the Republic of Lithuania the legal unbundling of transmission activity of AB Lietuvos Dujos was successfully accomplished by 31 July 2013, and a new entity, AB Amber Grid, was established on the basis of the assets, rights and obligations attributed to the natural gas transmission activity. It is only an intermediate step in the entire unbundling process, since in accordance with the Unbundling Plan, by 31 October 2014, also the ownership unbundling of the transmission activity will have to be implemented.
- Methodology of the calculation of state regulated prices in natural gas sector sets out the principles of the calculation of gas transmission, distribution and re-gasification prices.

2.6 Poland

ENERGY POLICY

The Poland's Energy Policy towards 2030 was adopted by the Council of Ministers in November 2009. The document drafted by the Ministry of Economy contains a long-term strategy of the energy sector development and demand forecasts for energy sources. The Policy identifies 6 main directions of development in the energy sector: energy efficiency, security of supply, diversification of energy production, renewable energy, competitiveness and limitation of impact of energy on environment.

Natural gas constitutes an important element of the national energy strategy. The document provides for further development of the gas market, inter alia through the stable outlook for investment in transmission system and cross-border connections, as well as diversification and security of supply. According to the Policy, the total demand for natural gas in Poland is expected to increase (mostly in the power generation sector).

PLAYERS

Value chain of the natural gas market in Poland consists of 6 segments:

- 1 exploration and production,
- 2 transmission,
- 3 storage,
- 4 distribution,
- 5 wholesale, and
- 6 retail trade.

All activities related to the transmission of gas in Poland are fully separated from generation and sales operations. Gas Transmission Operator GAZ-SYSTEM S.A. (GAZ-SYSTEM S.A.) was established in 2004. The company is responsible for the transportation of natural gas and the operation of the transmission network in Poland. GAZ-SYSTEM S.A. operates on the basis of a licence issued by the President of the Energy Regulatory Office (ERO) which is valid until 2030. In addition, the company performs the function of an independent system operator (ISO) on the Polish section of the Yamal pipeline.

The capital group of Polish Oil and Gas Company (PGNiG) holds currently a dominant position on the market. It is the major importer and gas producer in the country. It owns and operates all UGS facilities connected to the transmission system in Poland via the storage company (Operator Systemu Magazynowania). Furthermore, PGNiG has the largest share in the wholesale and retail markets and it owns the major DSO that remains within the vertically integrated structure of PGNiG.

The role of other players active on the market has been increasing with new measures which aim to boost the competition. It needs to be noted that the new transmission network code developed by GAZ-SYSTEM S.A. in 2012 and 2013 introduced significant changes that enable further liberalisation and development of the Polish gas market and the harmonisation with the standards applied among the European TSOs. A similar impact on the functioning of the gas market in Poland will have further development of the natural gas exchange in Poland, introduction of the Gas Release Program and infrastructure development by GAZ-SYSTEM S.A. The Gas Release Program is implemented and supervised by the Polish NRA (Energy Regulatory Office) based on the newly introduced energy law. It puts an obligation on PGNiG to gradually sell increasing volumes of its gas through the Polish Power Exchange.

ENERGY MIX

The structure of energy consumption in Poland is closely linked to significant resources of raw materials (mostly coal and lignite, to a much lesser extent natural gas) that are located in Poland. Total energy consumption in Poland amounted to 102.2 Mtoe in 2011. The Polish energy mix is dominated by solid fuels that accounted for 53.4 % of total energy consumption. The second largest source of primary energy is petroleum with its share in energy mix totalled to 25.9 %. Natural gas is the third major source of primary energy in Poland and accounted for 12.5 % in total energy consumption (below the average for all EU member states – 17.4 %). Its share in energy mix has remained constant since the release of the BEMIP GRIP in March 2012.

SUPPLY / DEMAND

National demand

Country: Poland Normal conditions: 0°C Gross calorific value: 11.03 kWh / m³	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Peak demand										
mcm / day	73.8	77.4	81.2	90.9	101.3	110.9	112.5	114.2	115.6	116.9
GWh / day	815	855	897	1004	1118	1224	1242	1261	1276	1291
Yearly demand										
bcm / year	16.0	16.7	18.3	20.7	23.6	24.8	25.1	25.2	25.3	25.4
TWh / year	177.1	184.4	203	229.4	261.4	274.4	277.0	278.9	280.1	281.3

Table 2.8: Forecasts for national demand, Poland

The demand for gas transmission services has increased since 2005 and it reached the level of 169 TWh in 2013. The growth was mostly observed among industrial and residential customers. In the years to come, the demand increase and a change in the structure of main customers are expected in case of growing role of natural gas in the electricity production due to environmental reasons and the need to replace ageing power generation units.

Natural gas supplies in Poland amounted to 171.9 TWh in 2012. Approximately 74 % of gas injected into the transmission system was imported, while remaining 26 % came from domestic production. As far as import is concerned, the largest quantities of gas were transported from eastern direction (119.5 TWh, including 10.4 TWh via the virtual reverse flow on the Yamal pipeline), Germany (11.9 TWh) and the Czech Republic (6.3 TWh). In 2012, indigenous production reached 46.7 TWh. The main three areas, where natural gas is extracted, include the Carpathian and Greater Poland regions.

Natural gas production in Poland may increase due to unconventional gas. Preliminary analyses suggest that Poland might have large gas deposits. Poland's Ministry of Environment has already granted more than 100 licenses for exploration of unconventional gas. Perspectives for unconventional gas deposits have been assessed by relevant companies. The most promising deposits are believed to be located in the Pomerania region.

Figure 2.18: Main areas of natural gas exploration, Poland

Figure 2.19: Potential location of unconventional gas reserves, Poland (based on the Poland's Geological Institute's maps)

INFRASTRUCTURE / THIRD PARTY INFRASTRUCTURE

At the end of 2013, gas transmission system in Poland consisted of: high pressure gas pipelines with total length of 10,077 km, 63 entry points, 966 exit points, 882 gas stations, 14 compressor stations and 57 system nodes.

The gas network in Poland is connected to the European grid, but mainly along the East-West axis. There are six major entry points into the transmission network that are located at Drozdowicze (Ukraine), Wysokoje (Belarus), Lwówek and Włocławek (Belarus, on the Yamal-Europe pipeline), Lasów (Germany), Cieszyn (Czech Republic). Total capacity of all cross-border points amounts to approximately 210 TWh / year.

GAZ-SYSTEM S.A. has been taking steps to build new interconnection points and expand the ones that already exist. The company is currently constructing LNG terminal in Świnoujście (via its SPV, Polskie LNG) and more than 1,000 km of new gas pipelines. The most important pipelines will be situated in north-western and central Poland. In addition, a physical reverse flow on the Yamal–Europe pipeline will be put into operation (virtual reverse is operational since November 2011). All of these investments will be completed in 2014. They will enable to foster Poland's energy security through the creation of technical conditions to diversify the natural gas supply. These activities are also conducive to the further liberalisation of the gas market in Poland and enhancement of its competitiveness.

In the mid-term (until 2018 and in the perspective of 2023), GAZ-SYSTEM S.A. plans to commission projects aimed at enhancing the transmission system in Poland and constructing new cross-border interconnections with the systems in Lithuania, Slovakia and the Czech Republic. Additionally, GAZ-SYSTEM S.A. plans to upgrade the LNG terminal in Świnoujście and realise the Baltic Pipe project.

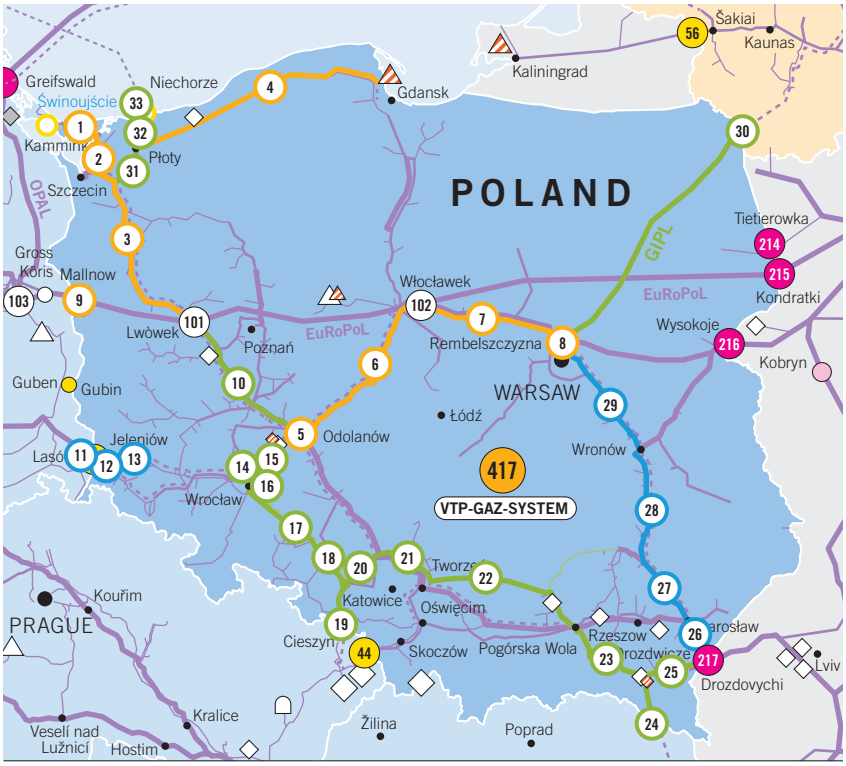


Figure 2.20: Development of gas transmission system, Poland

2013 – 2016
2017 – 2020
2021 – 2023

There are 6 UGS facilities connected to the transmission system in Poland. Their total working capacity amounts to 19 TWh. The majority of UGS facilities are located in depleted reservoirs, while one is located in a salt cavern. Storage capacity is expected to increase up to more than 33 TWh in 2015.

Figure 2.21: Location of UGSs, Poland

Existing

Under construction

LEGAL FRAMEWORK

Description of the most important legal acts that determine the functioning the natural gas sector in Poland:

- Energy law – it is the main act on the energy market in Poland. The law refers to electricity, gas, heat and renewable energy sectors. The objectives of the energy law is to create conditions, inter alia, for: sustainable development of the country, energy security, economical and rational use of energy sources, development of competition and fulfilment of obligations arising from international agreements. The energy law was amended to implement relevant provisions referring to the gas sector as provided for in the Third Energy Package. At present, a separate package of three legal acts governing electricity, gas sectors and renewables is drafted.
- The Law on compulsory reserves of fuel and natural gas – it sets forth the rules concerning creation, maintaining and financing, inter alia, of natural gas reserves. The law determines the minimum mandatory reserves (30 days of sales of the entity) that should be stored by producers and TSOs.
- Regulation on conditions of functioning of the gas system – the regulation specifies the maximum possible share of gas originating from one source of supply (understood as the country of origin), at the level of: 70 % – in the period between 2010–2014, 59 % – in the period between 2015–2018, 49 % – in the period between 2019–2020.
- Regulation on principles of tariff calculation and settlement of the gas trade – the regulation provides for detailed principles of components of: gas tariffs, calculation of regulated revenue and calculation of gas prices and other charges (including transmission charges).
- The transmission network code – according to the energy law, the code is developed by GAZ-SYSTEM S.A. in cooperation with the Energy Regulatory Office and the network users. The network code was amended in 2012 and 2013 to implement operational instruments for the development of a fully liberalised, competitive and exchange-based gas market in Poland. The network code transposes the provisions set forth in the Third Energy Package (congestion management procedures, capacity allocation mechanisms, balancing).


Image courtesy of GAZ-SYSTEM S.A.

2.7 Denmark

ENERGY POLICY

Since the 1980's the Danish Energy policy has focused on ensuring energy efficiency by promoting combined heat and power production. Since the 1990's the energy policy has focused on introducing wind power into the electricity system and promoting other forms of renewable energy – especially biomass in large CHPs.

In the latest years discussions have focused on decreasing the amount of fossil fuels in the coming years with the aim of an energy system based solely on renewable energy from year 2050.

Danish energy long-term energy planning entails the following targets:

- All energy must come from renewables in 2050 (including transport sector);
- Set targets for the development of wind energy by 2020;
- Electricity and heat production should be based only on renewable energy by 2035;
- Coal as such and oil burners in households should be phased out by 2030.

The amount of wind power should be increased to 50 % in 2020.

MARKET PLAYERS

Owners of the physical infrastructure include:

1 Energinet.dk is the gas transmission company in Denmark that owns and operates the natural gas transmission system.

2 Dong Gas Distribution, HMN Naturgas, Naturgas Fyn Distribution and Aalborg Kommune, Gasforsyningen are distribution companies. They own and operate the distribution system in each of the six distribution areas.

3 2 storage companies in Denmark own and operate the gas storage facility at Stenlille on Sealand and at Lille Torup in Northern Jutland.

Currently, there are 27 registered shippers in the Danish transmission system including companies with primary business interest in the adjacent Swedish gas system. Approximately 10 supply companies offer gas on competitive terms to smaller consumers with additional specialised suppliers catering to large scale industrial users.

Gas is traded bilaterally on Gas Transfer Facility (GTF) and multilaterally on the Gas Point Nordic (GPN), gas exchange. As much as 70 % of the Danish consumption was exchanged at the GTF.

GPN was established in 2007, and since 2012 has been 100 % owned by Energinet.dk. It organises physical trade of natural gas. The products offered are Day contracts, Within day contracts, Weekend contracts, Swap contracts, Balance of Month Contracts and a following-month contract.

ENERGY MIX

The energy mix in Denmark is dominated by oil, natural gas and coal. Renewable energy accounted for 23 % of the energy consumption in 2012.

Denmark has been net exporter of natural gas since the beginning of the 1980's, and is expected to remain the net exporter until 2021.

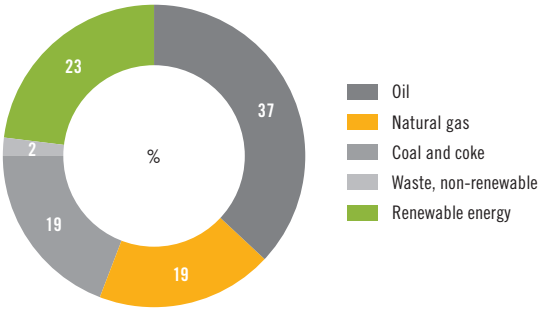


Figure 2.22: Total energy consumption in Denmark, 2012 (Source: Danish Energy Agency)

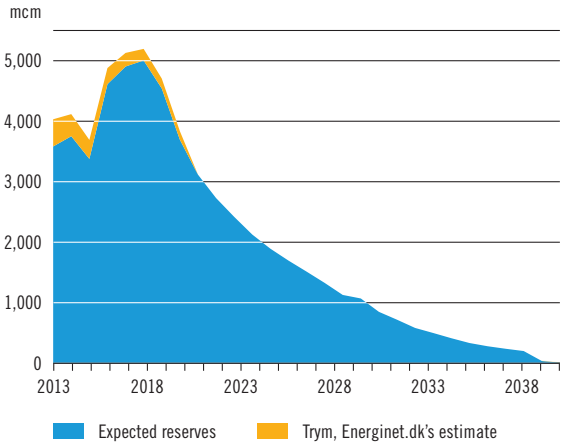


Figure 2.23: Expected Danish natural gas production, 2013 – 2040 (Source: Danish Energy Agency)

SUPPLY / DEMAND

In spring 2013, the supply-demand situation became near-critical as Energinet.dk issued 2 Early Warnings only weeks apart due to a critical gas supply situation. Early Warning is the lowest warning level in Energinet.dk's emergency supply preparedness. The next steps are "Alert" and "Emergency".

The crisis was caused by a rare overlap of a number of unfortunate circumstances:

First warning

In March 2013, gas supplies were more or less normal; only supplies from the Danish part of the North Sea were a little lower than expected. On the other hand, the spring temperatures were extraordinary low, and more gas than expected was therefore being used, leading to declining stocks that could be depleted by April 2013.

This prompted Energinet.dk (the TSO and responsible one for the emergency preparedness) to issue an Early Warning to the market players on 18 March 2013 asking them to rectify the situation and restore balance to the market. The market caught the signals, supplies from the North Sea rose again and after 10 days, on 27 March 2013, the situation was called off.

Second warning

On 27 April 2013, Mærsk Oil & Gas, which operates the Tyra platform in the North Sea responsible for 90 % of the total Danish gas production, announced that they expected to suspend production for 6 days due to repairs. Then, on 28 April 2013, Stenlille, one of two internal gas storage facilities, announced that the withdrawal capacity would be reduced the next 3 – 4 days. The technical issues were solved, but complications arose which in fact interrupted North Sea supplies for 10 days – the longest interruption in North Sea gas supplies to date.

After the critical situation in March, the gas stocks were depleted, prompting Energinet.dk to issue yet another Early Warning on 29 April 2013.

The gas stocks approached a lower level, corresponding to the volumes the TSO is obliged to reserve for protected consumers such as private customers, hospitals and small enterprises. In the beginning of May 2013 the situation was sufficiently critical that Energinet.dk considered increasing the warning level to "Alert".

Indications that repairs on the Tyra platform progressed as planned and meant that the Early Warning was eventually called off with a return to a stable supply level.

Overall supply-demand balance

Temporarily, the overall gas balance is tight. Natural gas supplies from the Danish part of the North Sea have been declining markedly over recent years. However, production is expected to recover somewhat from 2015 and for some years ahead. The margin arrives from new field development, while supplies from producing fields are dwindling.

The expected expansion in Germany in combination with supplies from the North Sea, will secure the gas supply to Sweden and Denmark at least until 2020, as sufficient import capacity will be established to cover the expected demand.

After 2020, the expected demand in Denmark will be covered by increased import and by supplies from the North Sea and green gases.

National demand

Country: Denmark Normal conditions: 0°C Gross calorific value: 12.1 kWh/m³	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Peak demand										
mcm/day	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
GWh/day	213.0	213.0	213.0	213.0	213.0	213.0	213.0	213.0	213.0	213.0
Yearly demand										
bcm/year	3.1	2.8	2.9	2.8	2.7	2.6	2.4	2.4	2.3	2.2
TWh/year	36.0	35.3	34.2	33.0	31.9	30.7	29.5	28.7	27.8	26.9

Table 2.9: Forecasts for national demand, Denmark

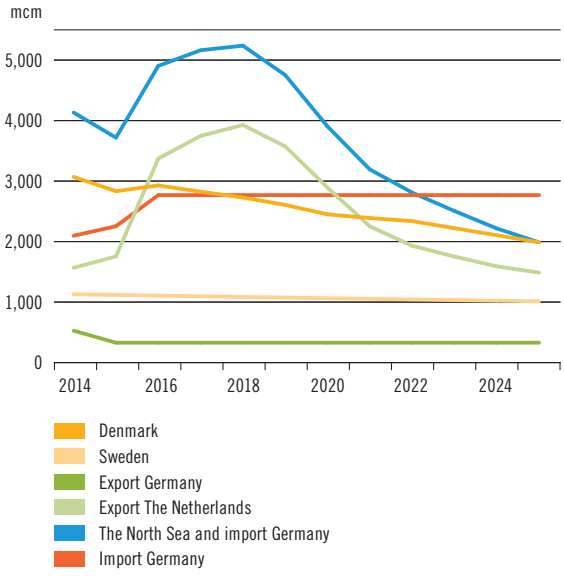


Figure 2.24: Projection of gas production, supplies and consumption, 2014 – 2025

In 2013, Energinet.dk made a projection of gas consumption in Sweden and Denmark up to 2025. The Danish system expansion towards Germany was completed in 2013. The supply picture assumes that the first phase of the expansion in Germany will be completed in 2014. It is further assumed that the Danish Hejre gas field will commence production in 2015.

In its projection, Energinet.dk also assumes that further expansion of the North German system has been completed by the end of 2015. In this way, the Danish and Swedish markets will be supplied from Germany and from the North Sea at least until 2025. The projected gas consumption is shown in figure 2.24.

The total natural gas and biogas consumption in Denmark, excluding field consumption in the North Sea, is expected to decline from approximately 3.5 bcm/year (151 PJ) in 2013 to approximately 2.8 bcm/year (118 PJ) in 2022.

Towards a greener gas system

Energinet.dk has been working to introduce gas from renewable energy (green gas or RE gas) into the network. Biogas from liquid manure will make the gas system greener, with other RE gases to be added later.

A greener gas system is a key element to converting the energy system to 100 % renewable energy by 2050. Via the gas network, RE gases can reach new markets and new applications such as transport. Small volumes of biogas have already been transported in the gas system.

The biogas volumes in Denmark are expected to increase significantly in the years to come as several of the technical and market-related obstacles have been eliminated. This includes, among other things, the possibility of supplying biogas to the gas network, after which it can be traded and used as natural gas. In 2013, common rules on bio-natural gas trading were introduced, allowing biogas to be traded across borders.

What are RE gases?

Biogas and other RE gas are renewable energy from sources that are replenished on an ongoing basis. Since the biomass has absorbed the same amount of CO_2 during its growth as it is emitted by burning, biogas helps to reduce CO_2 emissions when it replaces fossil fuels.

The RE gases that are expected to play a role in the future energy system:

- Biogas from anaerobic degasification;
- Biogas from thermal gasification;
- Gas produced by means of electrolysis based on renewable energy sources.

Biogas consumption

Up to 2022, production of RE gases is expected to cover biogas only. In October 2012, the Danish Energy Agency assessed that the production of biogas will grow from approximately 6.6 PJ in 2013 to approximately 20 PJ in 2022. These energy volumes correspond to 0.17 and 0.51 bcm/year of upgraded biogas.

INFRASTRUCTURE/THIRD PARTY INFRASTRUCTURE

Existing infrastructure

The gas infrastructure in Denmark consists of 2 offshore pipelines sending gas from the Danish part of the North Sea to an onshore facility in Nybro and an onshore transmission grid from west to east and from Ålborg in the north and to the Danish/German border in the south. From the landing point in Nybro and to the central point in Egtved the pipeline is doubled as there are the pipeline from Egtved to the Danish/German border and undersea lines crossing Lillebælt and Storebælt. In Dragør the Danish system is connected to Sweden. The onshore transmission grid is approximately 860 km of 80 bar pipelines and 42 measuring and regulator stations. The transmission system is connected to 2 underground storages and to about 17,000 km of distribution grids.

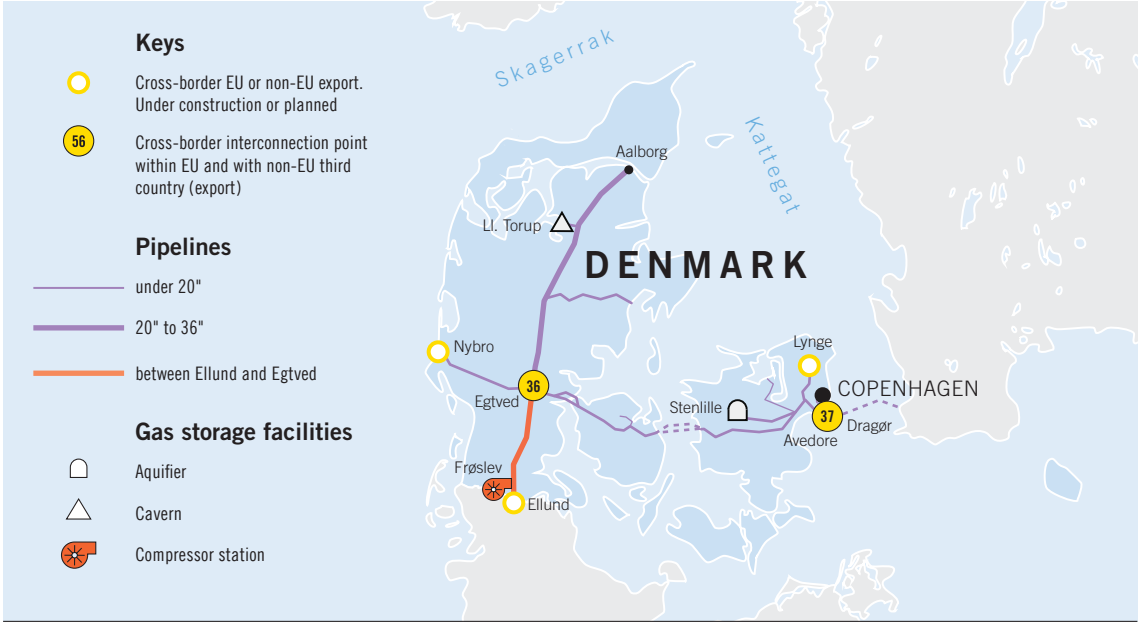


Figure 2.25: The Danish gas production, storage and transmission system

New infrastructure completed in 2013

In September 2013 a new compressor station and a new 93 km pipeline parallel to the existing pipeline from Egtved to Ellund (Germany) was put into operation.

The new pipeline opens for increasing volumes of gas supplied from Germany to Denmark (and Sweden). The expansion of the natural gas network increases the gas transmission network capacity, enabling Sweden and Denmark to import natural gas through Germany when the production of natural gas in the North Sea declines.

The expansion also helps to increase the security of supply as it ensures that multiple sources and suppliers can supply gas to Sweden and Denmark. In addition, competition in the gas market is strengthened to the benefit of consumers.

As the physical capacity between Germany and Denmark is increased, the local gas market is also closer integrated with the north-western European gas market.

Potential new projects

Baltic Pipe: A connection between Denmark and Poland (Baltic Pipe) has been investigated in previous years. It would make possible to transport gas between Denmark and Poland. The project is further described in the Chapter 4.2.

Norway-Denmark: Interconnection between Norwegian and Danish offshore infrastructure would strengthen and diversify supply to the Danish-Swedish gas market. In conjunction with Baltic Pipe, the project would give Polish and Baltic gas consumers access to Norwegian suppliers. Under current market conditions, the project is deemed unfeasible. The project is currently shelved while dialogue between Danish and Norwegian operators aim to improve framework conditions and a commercial set-up that would improve the feasibility of a future interconnection.

LEGAL FRAMEWORK

The function of the natural gas market is regulated by the Natural Gas Act, where the latest version is from October 2011.

2.8 Sweden

ENERGY POLICY

The Swedish energy policy is largely influenced by national as well as international instruments, especially EU policies. The Swedish government has defined 4 main goals for 2020:

- 50 % of Sweden's energy use shall come from renewable energy sources;
- 10 % renewable energy in the transportation sector;
- 20 % more efficient energy usage;
- 40 % reduction of climate gases compared to 1990.

Beyond 2020, 2 goals are defined:

- In 2030 Sweden shall have a vehicle fleet that is independent of fossil energy;
- In 2050 Sweden shall have no emissions of carbon dioxide.

Even though natural gas is not a large energy source in Sweden, it may play an important role in reaching the defined goals. Oil and coal can be replaced by natural gas and biogas for sectors such as industry, heat and power, vehicle fleet and the marine fuel market (LNG). Investments have been made, especially for various biogas and LNG projects.

MARKET PLAYERS

Since 1 June 2013, Swedegas is the new TSO in Sweden. Before that, Svenska Kraftnät, a state owned authority, had that responsibility. On 1 October 2011, Swedegas acquired the transmission system branches from E.ON (230 km pipelines, 32 measuring and regulator stations and the only Swedish storage facility) which made Swedegas the owner of the complete transmission system, comprising 620 km pipelines and 41 measuring and regulator stations. The system is located in the southwest part of Sweden with only one entry point which is located in Dragör, Denmark. This means that the Swedish natural gas market is totally dependent on import from Denmark.

The Swedish gas market actors consist of a TSO, 6 Distributors (DSO), 7 Gas Suppliers (GS) and 4 Balance Responsibles (BR). The BRs enable planning, settlement and invoicing in the natural gas system. In addition to the DSOs, there are a few larger industries connected to the transmission system.

ENERGY MIX

The energy mix in Sweden is dominated by biofuel, oil, hydro and nuclear. There is no production of natural gas in Sweden and nearly all gas is imported from Denmark through the pipeline system. 10–15 TWh is currently a normal value for the total yearly volume of natural gas but in 2010 the volume had a peak of 19 TWh. The reason for this was a very cold winter and that a gas-fired CHP plant was implemented in the system. In 2013 the total yearly volume was 13 TWh.

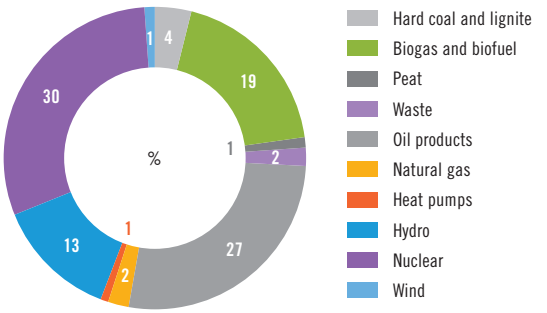


Figure 2.26: Structure of energy consumption, 2012

A limited volume of biogas is produced in Sweden and 8 facilities are connected to the distribution grid. 2 larger facilities, GoBiGas and Jordberga, will within short start producing biogas directly into the transmission grid. GoBiGas will start producing biogas on a small scale in March 2014 but it is expected to produce biogas equivalent of 1 TWh in 2020. Jordberga will start producing biogas in middle of 2014 (140 GWh/year). This is an important step to reach the main goals defined by the Swedish Government.

SUPPLY/DEMAND

The Swedish gas market has approximately 37,000 customers of which households amount to 33,400. Half of the households use natural gas for heating and cooking while the rest use it for cooking only. However, these customers use only 2 % of the total amount of the consumed gas. The remaining customers consist of CHP units, district heating units and larger industries. 60 largest customers use approximately 80 % of the total volume.

National demand

Country: Sweden Normal conditions: 0°C Gross calorific value: 12.01 kWh/m³	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Peak demand										
mcm/day	7.8	8.1	8.4	8.8	9.1	9.3	9.5	9.5	9.5	9.5
GWh/day	94.0	97.0	101.0	106.0	109.0	112.0	114.0	114.0	114.0	114.0
Yearly demand										
bcm/year	1.4	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.7	1.7
TWh/year	17.2	17.5	18.2	18.8	19.2	19.5	20.0	20.0	20.0	20.0

Table 2.10: Forecasts for national demand, Sweden

INFRASTRUCTURE/THIRD PARTY INFRASTRUCTURE

The Swedish transmission grid consists of 620 km pipelines, 41 measuring and regulator stations and 6 gas metering stations located in the southwest part of Sweden. The transmission grid is connected to about 26,000 km of distribution grids. The system has a pipeline interconnection with the Danish gas system with a maximum cross border capacity of 73 GWh/day. This pipeline interconnection is from Dragör in Denmark to Klagshamn in Sweden. Due to Swedish legislation the gas needs to be odourised in the Swedish gas system which has been done by adding a special chemical at a facility in Klagshamn.

The transmission system is connected to an UGS, Skallen storage facility, located in the west coast close to Halmstad. The storage has a volume of 10 mcm which corresponds to 120 GWh. The size of the storage does not allow seasonal storage but is limited to peak shaving services.

Today only one LNG terminal is in operation. It is located in Nynäshamn, south of Stockholm, and has a storage volume of 9,300 tons. No pipelines exist in this area and therefore the customers (a local refinery, industries and Stockholm town) are supplied with gas by trucks. In Lysekil, on the Swedish west coast, an LNG terminal will be fully operational in the 2Q 2014. Lysekil will also offer only gas supply by trucks. In Gothenburg, an LNG terminal is planned to be operational in 2016. This terminal, however, will probably be connected to already existing pipelines a few years later.

The Swedish market is also supplied with LNG from Norway, delivered by trucks from the Norwegian companies Skangass and Gasnor.

As shown in the TYNDP 2013–2022, Sweden has a vulnerable supply position due to the single cross-border point in the gas system. This weakness is expected to be mitigated primarily by the Ellund project (increasing capacity between Germany and Denmark) but also by the LNG terminal in Gothenburg (probably FID status within short) and increasing biogas production.

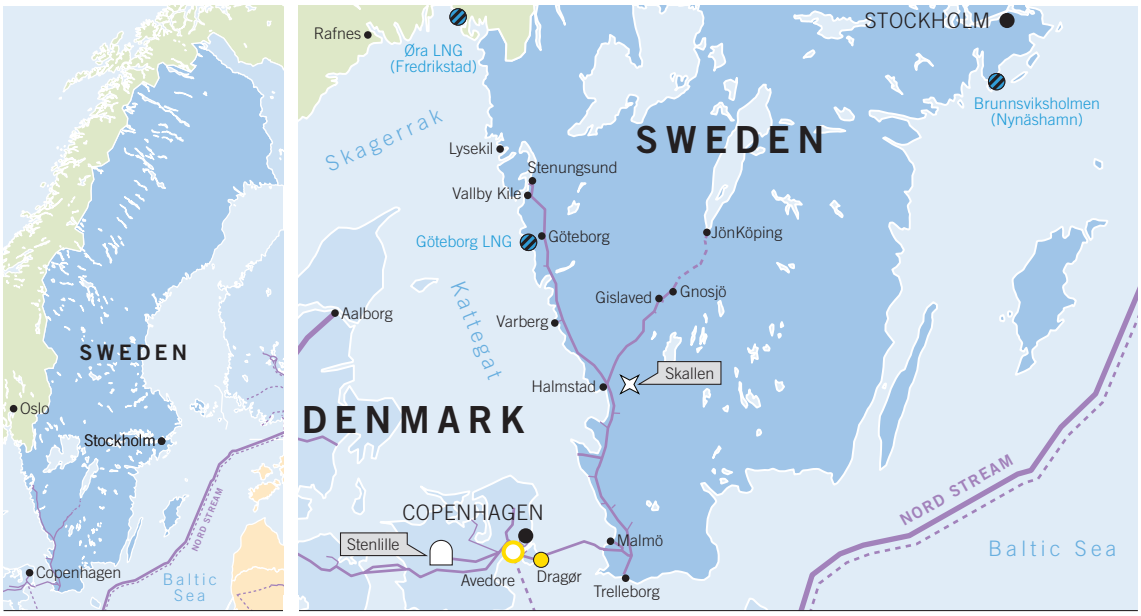


Figure 2.27: Natural gas transmission system

LEGAL FRAMEWORK

The Swedish gas market is regulated by the Natural Gas Act from 2005. Energimarknadsinspektionen, EI, is the regulator that is checking and ensuring that the Natural Gas Act is being complied to by the gas companies. The Third Energy Package was fully implemented during 2012.

The market model for the natural gas market was finalized in 2007 and is based on the electricity market model. The Danish market is used by the gas actors to book capacities. Hence, no capacity trading between shippers and the TSO exists in Sweden.

3 BEMIP Experience so Far

Analysis of Interoperability of Gas Infrastructure Projects | Market Integration Process in the West Baltic Region

Image courtesy of Gasum Oy

3.1 Analysis of Interoperability of Gas Infrastructure Projects

of the Eastern-Baltic cluster proposed in relation to Projects of Common Interest list in BEMIP region and Joint Preventive Action Plan of Estonia, Latvia, Lithuania and Finland

In order to facilitate the development of PCIs TEN-E Regulation provides for establishment of close cooperation between TSOs of interlinked projects and carrying out consultations with the TSOs from the Member States to which the project provides a significant net positive impact. In order to meet these provisions as well as gain information for preparation of the Joint Preventive Action Plan and GRIP, TSOs of Finland, Estonia, Latvia and Lithuania at their joint meeting on 1 February 2013 in Riga, Latvia, decided to establish the East-Baltic TSO Working Group. The Working Group had 6 meetings.

The TSOs represented at this Working Group were AS EG Võrguteenus (Estonia), AB Amber Grid (Lithuania) (AB Lietuvos Dujos until 31 July 2013), Gasum Oy (Finland) and AS Latvijas Gāze (Latvia). Working Group agreed to carry out the study **Analysis of interoperability of gas infrastructure projects of the Eastern-Baltic cluster proposed in relation to Projects of Common Interest list in BEMIP region and the Joint Preventive Action Plan of Estonia, Latvia, Lithuania and Finland** (the Study). Following the suggestion of AS Latvijas Gāze and taking into consideration the time constrains for preparation of this analysis, the members of the Working Group agreed to charge with this task a long-term technical consultant of AS Latvijas Gāze – Olimps Ltd. All regional TSOs have been extensively consulted during the preparation of the analysis. The results of analysis were presented to the representatives of ministries and national regulatory authorities from Lithuania, Latvia, Estonia and Finland on 30 August 2013. For purpose of market analysis East-Baltic TSOs agreed on market data to be used for further assessment for each country and the whole region. During consultation process, agreement was reached also on particular scenarios, including, supply and disruption scenarios. Finally, the East-Baltic TSOs Working Group jointly prepared and expressed consent to the findings and conclusions of the Study.

In particular, the following projects are assessed in the Study:

- cluster of complementary and interdependent projects **Infrastructure upgrade in the Eastern Baltic region** (capacity enhancement of Latvia – Lithuania interconnection, enhancement of Estonia-Latvia interconnection, capacity enhancement of Klaipeda – Kiemenai pipeline in Lithuania, modernization and expansion of Inčukalns Underground Gas Storage);
- cluster of competing projects **LNG supply in the Eastern Baltic Region** (interconnection between Estonia and Finland Balticconnector, regional Finngulf LNG or Paldiski LNG or Tallinn LNG or LNG terminal in Latvia).

Based on the study carried out by Booz&co on the most favorable location of the regional LNG terminal in the East-Baltic region only option of LNG terminal in the Gulf of Finland (Finland or Estonia), in particular, Finngulf LNG terminal and Paldiski LNG terminal were assessed. In addition, impact of interconnection between Poland and Lithuania (GIPL) on the East-Baltic region also was analysed.

The focus of the Study was the modeling of gas supply flows in the Baltic states and Finland. Modeling is made by means of the Plant Flow software developed by Bentley System Incorporated, as a mathematical model of combined pipeline systems of Latvia, Lithuania, Estonia and Balticconnector pipeline between Estonia and Finland. The Study is concentrating on the area of Lithuania, Latvia, Estonia and Finland.

The model was applied for calculations of gas flows on normal business day of cold weather conditions and flow distributions in the joint gas supply system of East-Baltic countries in the event of various emergency situations at the entry points, i.e. gas sources.

In framework of the work, the authors applied the data of forecasts on the development of the gas market produced by the Estonian, Latvian, Lithuanian and Finnish TSOs, based on their estimates made at Q1 2013 and ENTSOG **Ten Year Network Development Plan 2013–2022** information, updated in summer 2013.

As agreed by the TSOs of Estonia, Latvia, Lithuania and Finland, the calculations were based on the most probable baseline scenario. Calculations were made for years 2015 and 2020 assuming that the proposed projects will be implemented. For winter of 2015 the case of normal business day and 7 disruption scenarios were analysed.

LEGEND OF THE MAPS IN THIS CHAPTER

Keys

Cross-border EU or non-EU export. Under construction or planned

LNG Import terminal. Under construction or planned

56 Cross-border interconnection point within EU and with non-EU third country (export)

91 Cross-border interconnection point within EU and with non-EU third country (import)

Non-EU Cross-border interconnection point

Transport by pipeline

under 20"

20" to 36"

project

DN 700 Pipeline diameter

Gas storage facilities

Aquifier

Cavern

Storage existing or planned

Gas storage facilities in non-ENTSOG Member countries

Project facilities

23.51 Gas flow rate in million cubic meters per day (mcm/d)

9.62 LNG flow rate in million cubic meters per day (mcm/d)

Compressor station

Closed valve

Gas flow/pressure regulator

27.0 bar Pressure in control points

80.0 37.9 bar Gas pressure increase on Compressor station (from/to)

73.0/50.0 bar Pressure reduction on flow regulator (from/to)

Disruption point

25.68 mcm/d Gas consumption in million cubic meters per day (mcm/d)

-6.0 mcm/d Gas deficit in million cubic meters per day (mcm/d)

Bottle neck

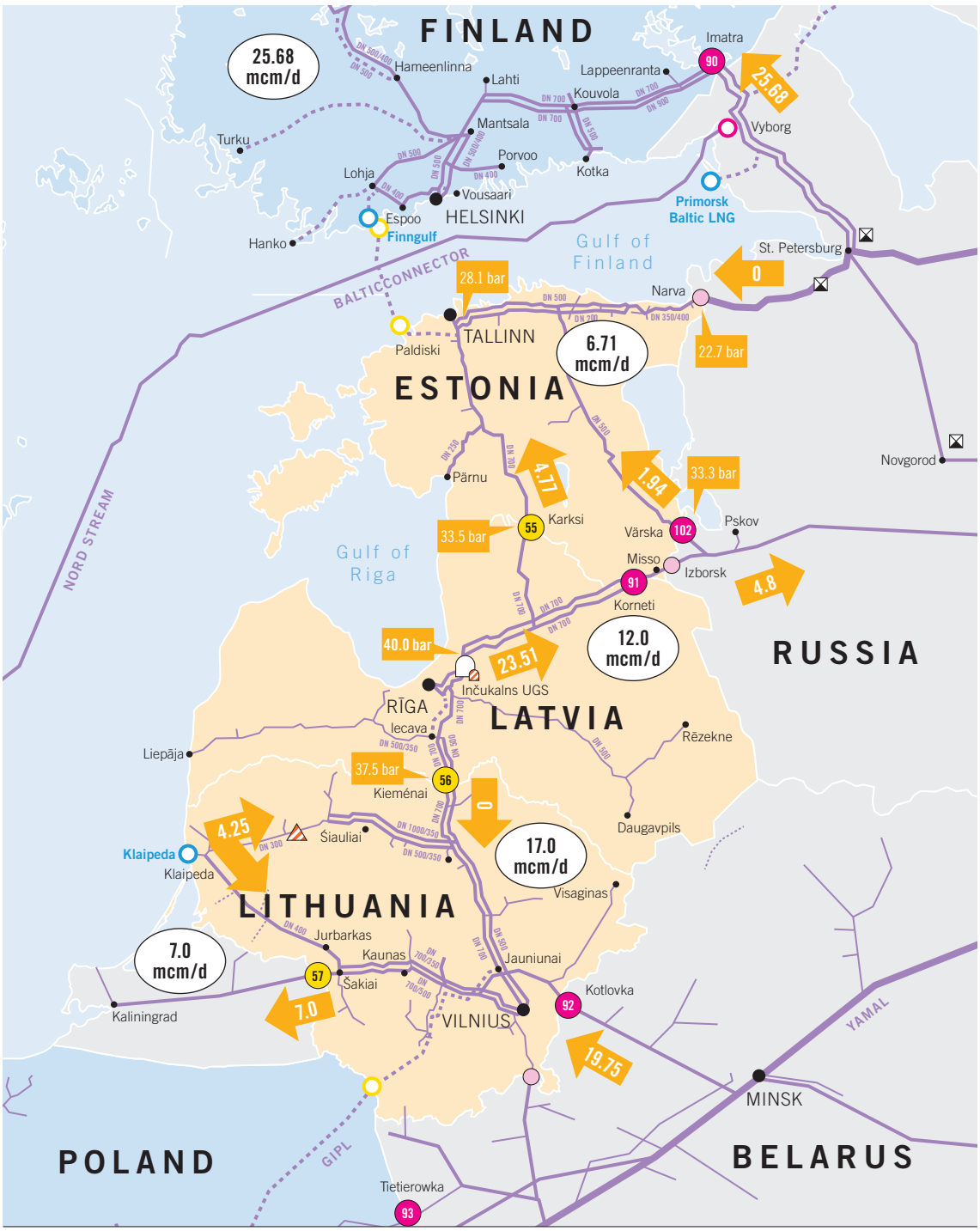


Figure 3.1: Gas flows in normal cold winter business day, 2015 (Legend see page 50)

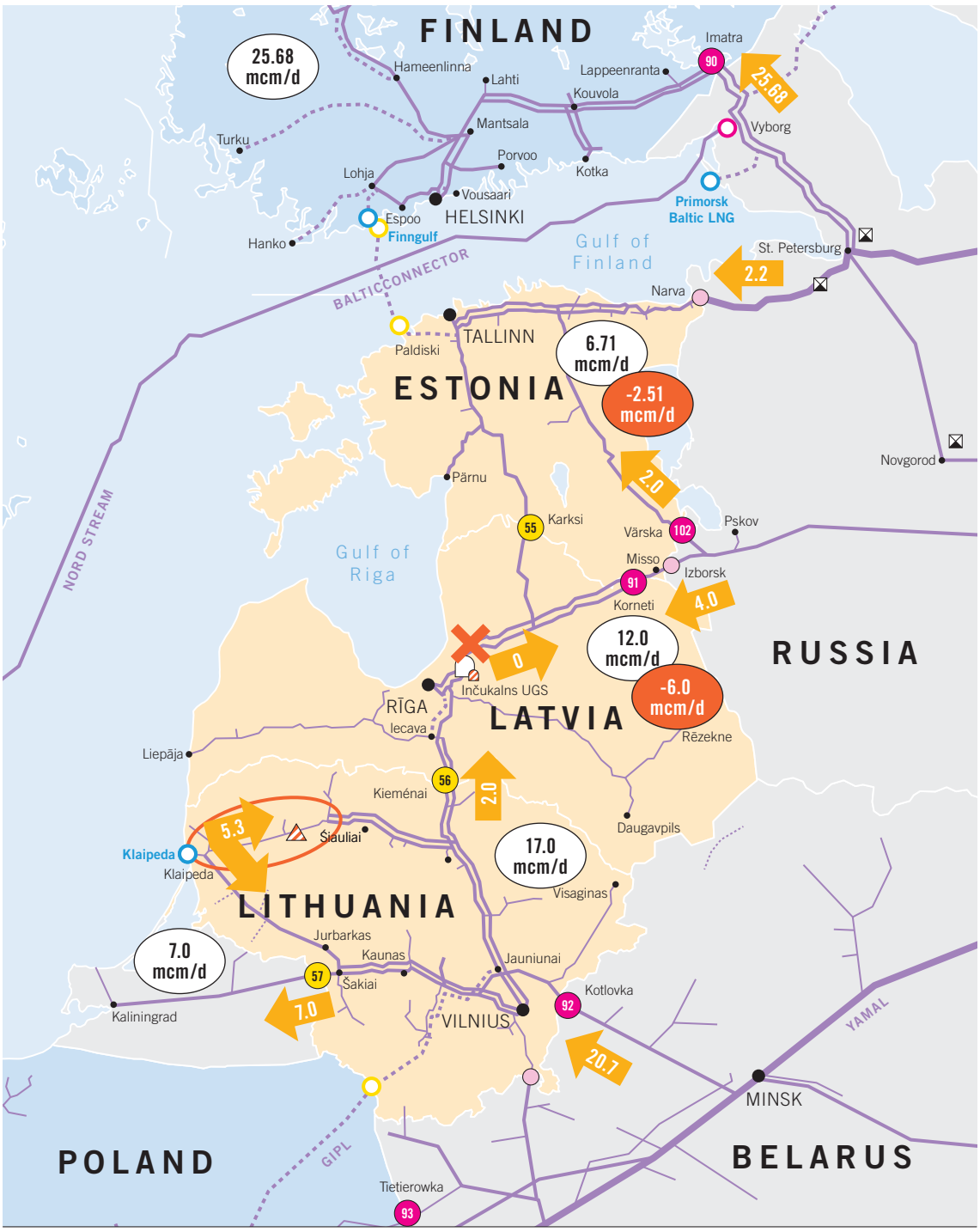


Figure 3.2: Disruption scenario – disruption of gas supply from Inčukalns UGS in cold winter day and possible gas flows in order to minimize the deficit of gas, 2015 (Legend see page 50)

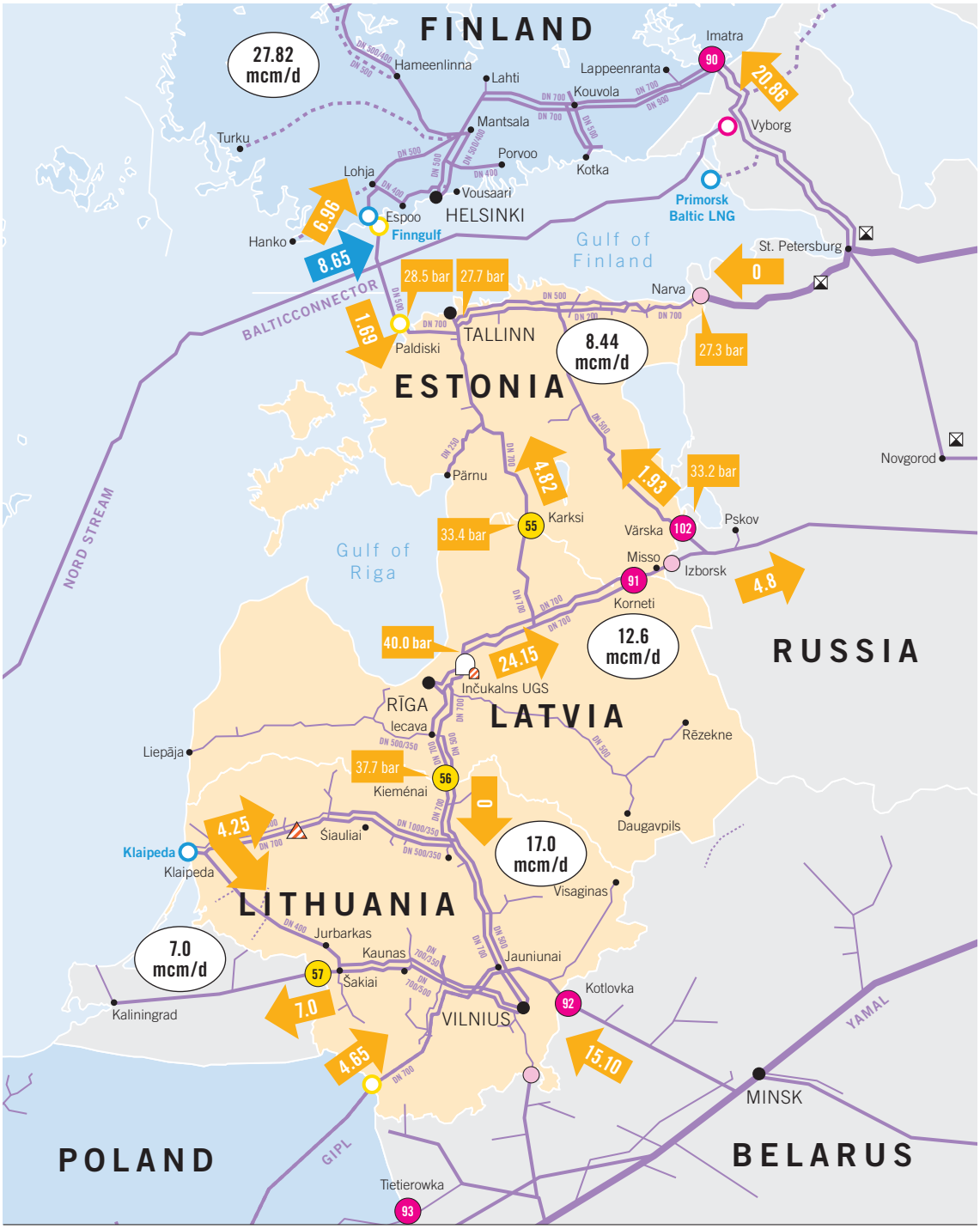


Figure 3.3: Gas flows in normal cold winter business day, 2020 (Legend see page 50)

For winter 2020 case of normal winter day and 20 disruption scenarios were analysed. Hereby 3 disruption scenarios are shown as examples: disruption from Kotlovka, Inkoo LNG terminal and Inčukalns UGS. The results of the modeling clearly show that robustness of the East-Baltic joint system after implementation of all projects assessed in the Study is significantly increased and the gas flows can be rearranged in a way that no country is experiencing significant gas deficit in case of gas supply disruptions.

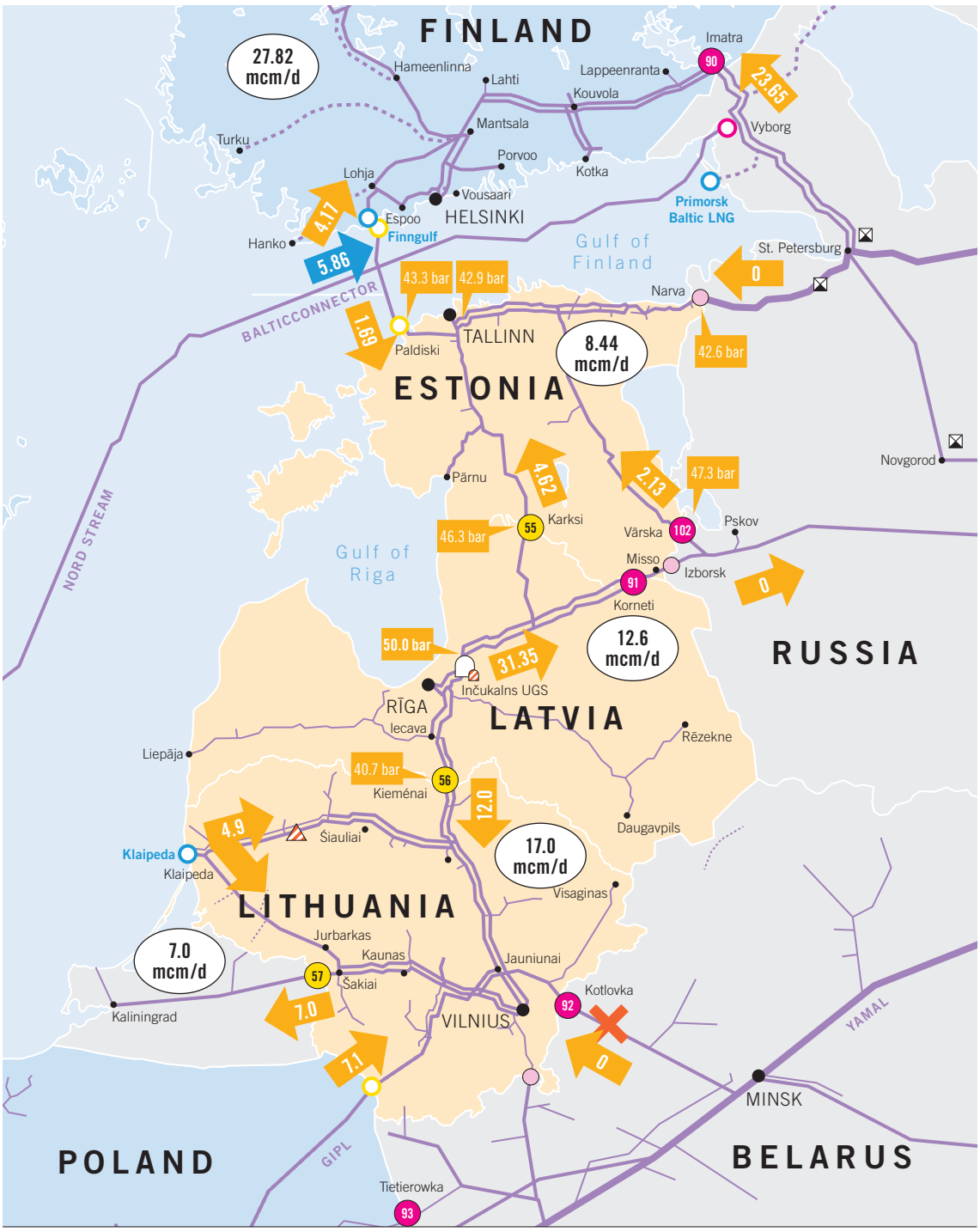


Figure 3.4: Disruption scenario – gas flow disruption from Kotlovka and possible gas flows in order to minimize gas deficit, 2020 (Legend see page 50)

In case of gas disruption through Kotlovka gas demand for Lithuania can be fully covered from Klaipeda LNG terminal and Inčukalns UGS. No other country of the East-Baltic region is experiencing any gas deficit as well.

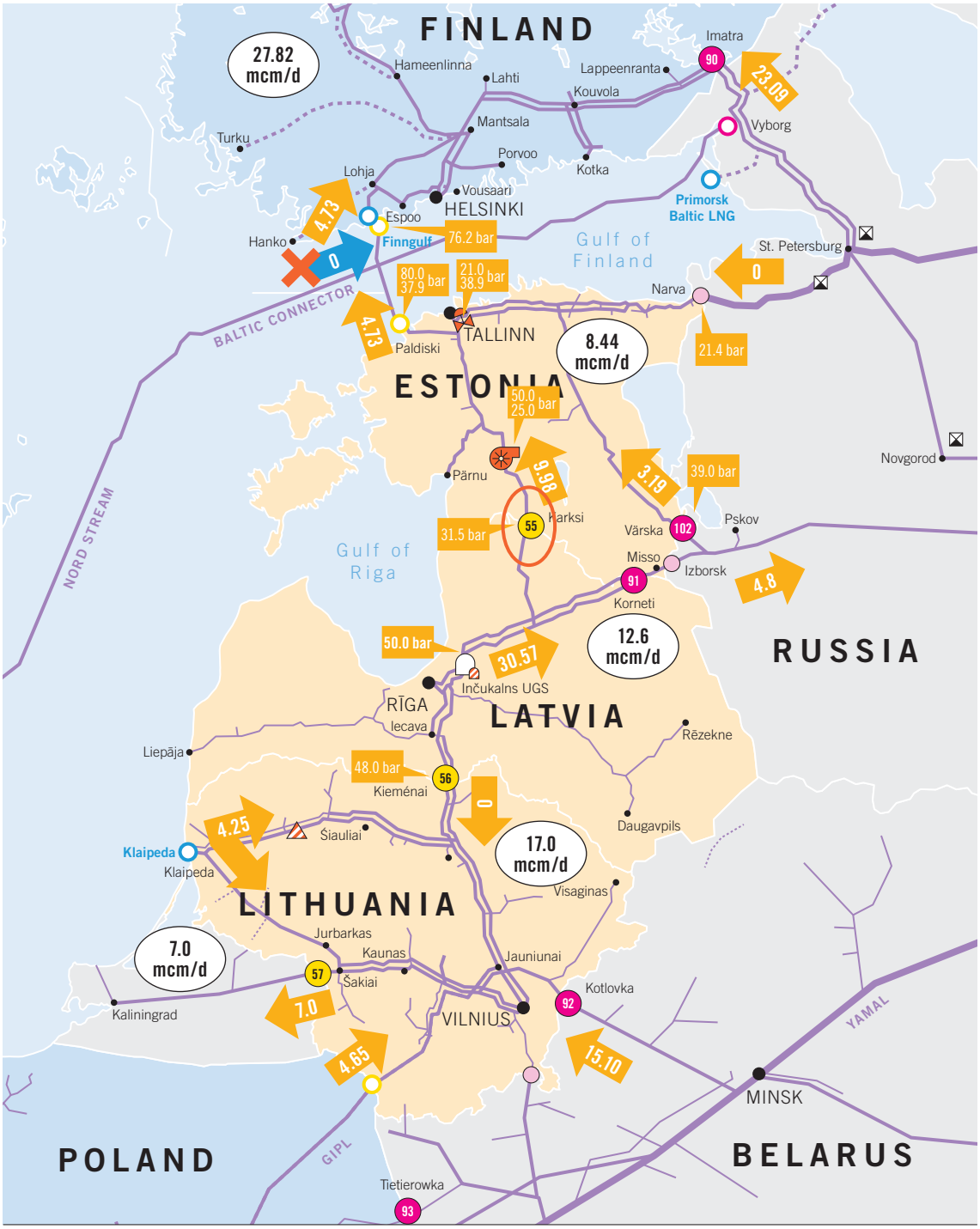


Figure 3.5: Disruption scenario – gas flow disruption from LNG terminal in Inkoo and possible gas flows in order to minimize gas deficit, 2020 (Legend see page 50)

In case of gas supply disruption from Inkoo LNG terminal in Finland all countries of the East-Baltic region also do not experience any gas shortages, and significant volumes of gas needed for Finland can be delivered from Inčukalns UGS through Balticconector via Estonia.

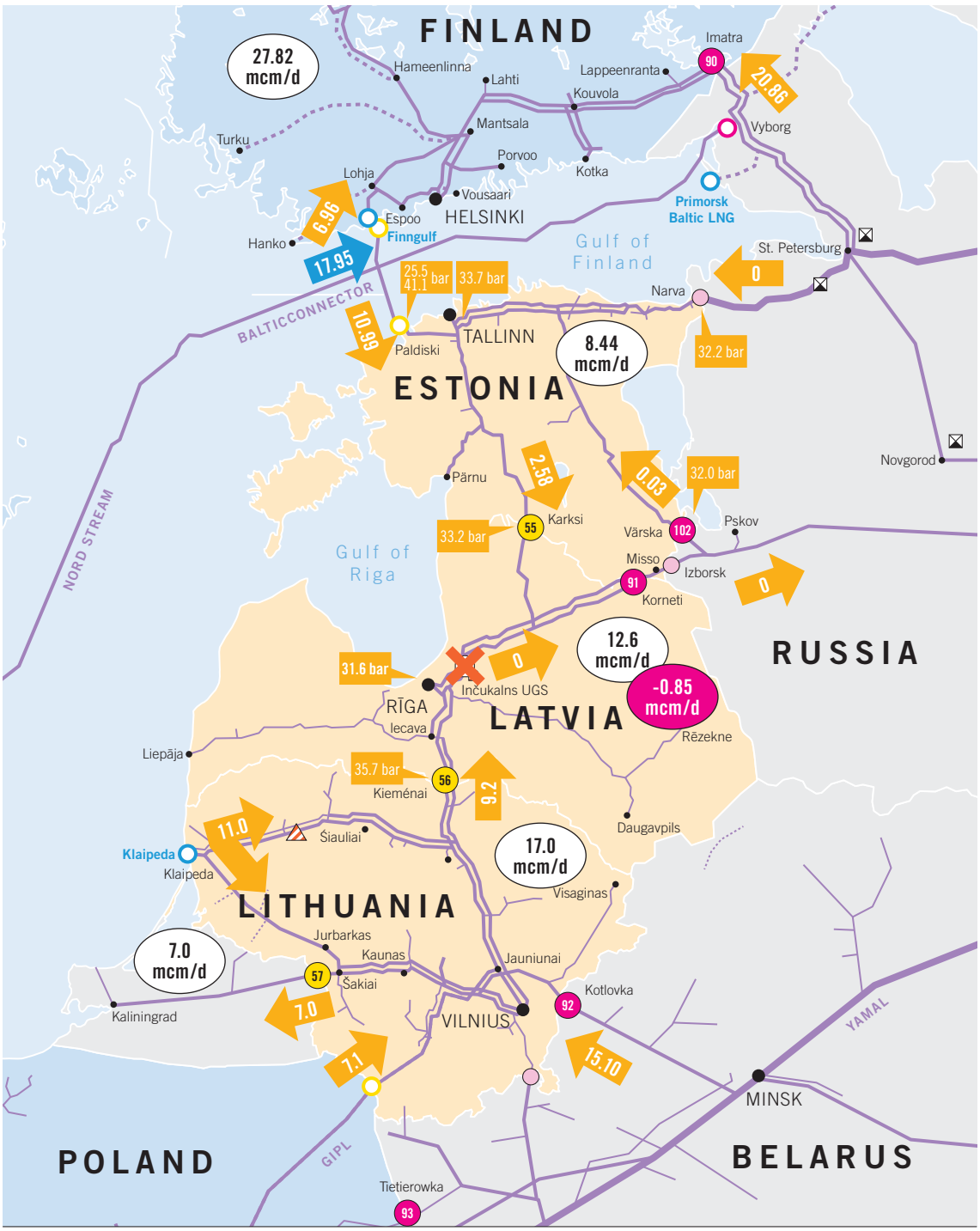


Figure 3.6: Disruption scenario – gas flow disruption from Inčukalns UGS and possible gas flows in order to minimize gas deficit, 2020 (Legend see page 50)

Since after implementation of the project of modernization of Inčukalns UGS the largest infrastructure of the East-Baltic region with the technical capacity of 35 mcm/day is becoming Inčukalns UGS, in case of failure of this facility results of modeling show that Latvia still may experience some gas deficit, and it is possible that this kind of gas supply disruption can adversary influence also Estonia. However, in case gas is available from Russia all countries of the region are fully supplied.

Figure 3.7: Gas flows for gas injection into Inčukalns UGS in summer, 2020 (Legend see page 50)

In addition, the case of gas injection into Inčukalns UGS in summer of 2020 is also assessed.

The following main conclusions are made and practical suggestions proposed for further development of the East-Baltic gas infrastructure based on the results of modeling:

1 Putting into operation Klaipeda LNG terminal provides diversification of gas market in Lithuania. However, due to limitations of gas transportation system it does not solve the problem of gas shortage in Lithuania in case of gas supply interruption through GMS Kotlovka. Presence of Klaipeda LNG terminal without enhancement of gas transmission system makes no significant impact on gas supply organization in other East-Baltic region countries in emergency cases.

2 Since gas supply via Gas metering station (GM) Kiemenai is limited to 12 mcm/day, pipe diameter DN500 would be feasible solution for construction of gas pipeline Riga-Iecava-Kiemenai.

3 To organize the optimal gas flow from Inčukalns UGS to Finland, depending on technical conditions of Estonian networks (two different systems – MOP 55 and 38 bar) a pressure reduction unit shall be arranged in the area of Tallinn (Estonia).

4 Depending on technical conditions of pipelines and based on results of mandatory regular inspections, pressure in the gas transport systems of Latvia and Estonia that are involved in gas transit shall be gradually increased up to the project conditions.

5 In order to provide the same volume of gas to Finland, which is the largest market in the region, from regional LNG terminal that is located in Estonia (Paldiski) the diameter of Balticconector DN600 shall be used instead of DN500 with additional compressor capacity in Finland in case regional LNG terminal is located in Finland (Inkoo).

In addition to modeling of gas flows, criteria N-1 was calculated as provided for by the Regulation (EU) No. 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC, were requirement of continuous operation of the natural gas infrastructure in the case of disruption of the single largest element in the system is defined as compliance with the so-called N-1 criterion, if the disruption occurs in the regime of peak load.

Results of calculations of criteria N-1 according to the formula provided by the Regulation (EU) No. 994/2010 are reflected in Table 3.1.

Values in %	2012	2015	2020
Lithuania	35.41	67.88	175.88
Latvia	206.88	206.88	333.33
Estonia	104.48	104.48	201.42
Finland	102.38	93.82	176.48
Regional			215.68

Table 3.1: N-1 results 2012, 2015, 2020

However, the formula proposed by the Regulation (EU) No. 994/2010 on N-1 criteria calculation does not reflect the real situation because it does not take into consideration availability of gas and the technical conditions of the pipelines, but is based only on technical max capacity of the entry points. Therefore, an alternative calculation of criteria N-1 is proposed. In this case, N-1 for Latvia is only 49.42 % and for Estonia 62.69 % in 2015 with significant improvement in 2020 after implementation of suggested projects, respectively 206.35 % in Latvia and 168.25 % in Estonia.

In order to integrate the East-Baltic "energy island" to the common EU gas grid, as the current Study proves, all projects that are included in the proposed list of the PCIs are vitally important and shall be implemented. The total estimated costs of all listed projects together are close to **1.8 billion EUR** with the time span of implementation from **2013 to 2025**.

The new gas infrastructure investments are critical for the regional capacity and security of supply and/or for the supply diversification in the region.

Depending on the gas market development in the East-Baltic region, commissioning of some projects might be delayed comparing to the initial plan or even some of them may be downscaled. However, in any case the total investment needed for the East-Baltic region exceeds 1 billion EUR by 2020, which in no way can be covered by the gas market alone. Moreover, taking into consideration nature of the projects many of them may lack commercial viability, but demonstrate significant

positive externalities. Therefore referring to the Article 14 of the Regulation (EU) No. 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No. 1364/2006/EC and amending Regulations (EC) No. 713/2009, (EC) No. 714/2009 and (EC) No. 715/2009 they are eligible to the Union's financial assistance.

The analysis of interoperability of gas infrastructure projects of Eastern-Baltic region, which was carried out using mathematical model of combined pipeline systems of Lithuania, Latvia, Estonia and Balticconnector pipeline between Estonia and Finland, by calculation of gas flow distribution in the joint gas supply system of East-Baltic countries in normal conditions and in the event of various emergency situations, leads us to the following conclusions:

1. **The projects included into the list of PCIs of East-Baltic region are closely interlinked and successful completion of all proposed projects by 2020 will solve the problem of gas supply security and provide diversification of gas sources and routes for entire gas market of the East-Baltic region.** Calculations of supply standard N-1 as provided for by the SoS Regulation for every country separately and for the entire region shows that in case of failure of the largest gas infrastructure, capacities of remaining infrastructure are sufficient and capable for provision of requested amount of gas on the day of extremely high demand.
2. Construction of LNG terminal in Finngulf and interconnecting pipeline Balticconnector between Finland and Estonia along with other intra-Baltic projects solve the issue of gas supply diversification for the entire East-Baltic region at the same time increasing regional security of supply.
3. Modernization and expansion of Inčukalns UGS not only boosts security of supply in the entire East-Baltic region, but also improves efficiency of the regional LNG terminal by offering opportunity to store gas reserves and freely use them in case of uneven supply. Gas supply security for Finland also is improved because gas reserves can be kept in the storage. Moreover, calculations prove that in case of failure of the storage in winter not only Latvia, but under certain conditions also Estonia might experience tangible gas deficit.
4. Reconstruction and enhancement of gas metering station Karksi, including installation of compressor unit, first, secures reverse flow on Latvian – Estonian interconnection, thus creating highly flexible gas transport system. This project not only improves security of supply for Estonia, but also is necessary for Finland in order to get access to Inčukalns UGS and for Latvia to receive gas from LNG terminal.
5. Construction of interconnection gas pipeline between Poland and Lithuania GIPL, new gas pipeline Klaipeda – Kursenai in Lithuania and new interconnection gas pipeline Riga – Iecava – Kiemenai not only completely guarantee security of gas supply to Lithuania, but also greatly enhance the security of gas supply to Latvia. Lithuania acquires a new source of gas and the possibility of wider diversification of its market. Latvia in its turn gets free access to the LNG terminal in Klaipeda and the opportunity to diversify its sources of gas supply.
6. With putting into operation LNG terminal in Klaipeda and construction of Jurbarkas – Klaipeda gas pipeline, the security of supply of Lithuanian gas market is moderately improving, but not entirely secured. Gas market diversification is reached only for Lithuania. For the rest of the East-Baltic region due to limitation of gas transmission system situation remains unchanged.
7. TSOs of the East-Baltic region: AB Amber Grid, AS Latvijas Gāze, AS EG Võrguteenus and Gasum Oy, expresses their hopes that the joint analysis of interoperability of projects proposed for PCIs list will help the Commission and the regulators to assess better importance of these projects for the regional gas supply security, diversification of sources and routes, their interdependence and cross border impact, and take positive decisions regarding granting adequate support for these projects. Total costs of the projects together are close to 1.8 billion EUR, and it is not possible to cover these costs by the relatively small East-Baltic gas market.

3.2 Market Integration Process in the West Baltic Region

A dedicated West Baltic Task Force (TF) was established to draft an Action Plan which was adopted by the High Level Group in March 2011. The Action Plan identified concrete measures with the aim to integrate the markets and increase the security of supply in Denmark, Poland and Sweden.

- Axis Germany – Denmark:
  The combination of the realisation of the integrated open season in the Netherlands and Germany including investments on the German side of the German / Danish border together with the grid extension in Denmark implemented in 2013 will form this interconnection at the border point Ellund.
- Axis Norway – Denmark and / or Sweden:
  Capacity between Norwegian gas sources and Denmark via the existing entry point in Nybro can be realized by means of the extension of the Norwegian offshore grid and its connection with and the usage of the existing Danish offshore and onshore infrastructure. As an option, this may be supported by the additional connection between the Norwegian offshore system and the existing Swedish onshore system.
- Axis Poland – Denmark:
  This interconnection can be realized by means of the Baltic Pipe and has to be seen in the context of the LNG terminal in Świnoujście in the vicinity of the southern endpoint of the Baltic Pipe, and realisation of the axis Germany – Poland.
- Axis Poland – Germany:
  This axis provided for upgrade and further development of Poland – Germany interconnection in Lasów, as well as introduction of reverse flow and physical reverse flow on Yamal-Europe pipeline (to be in line with EU regulation).

Image courtesy of Energinet.dk

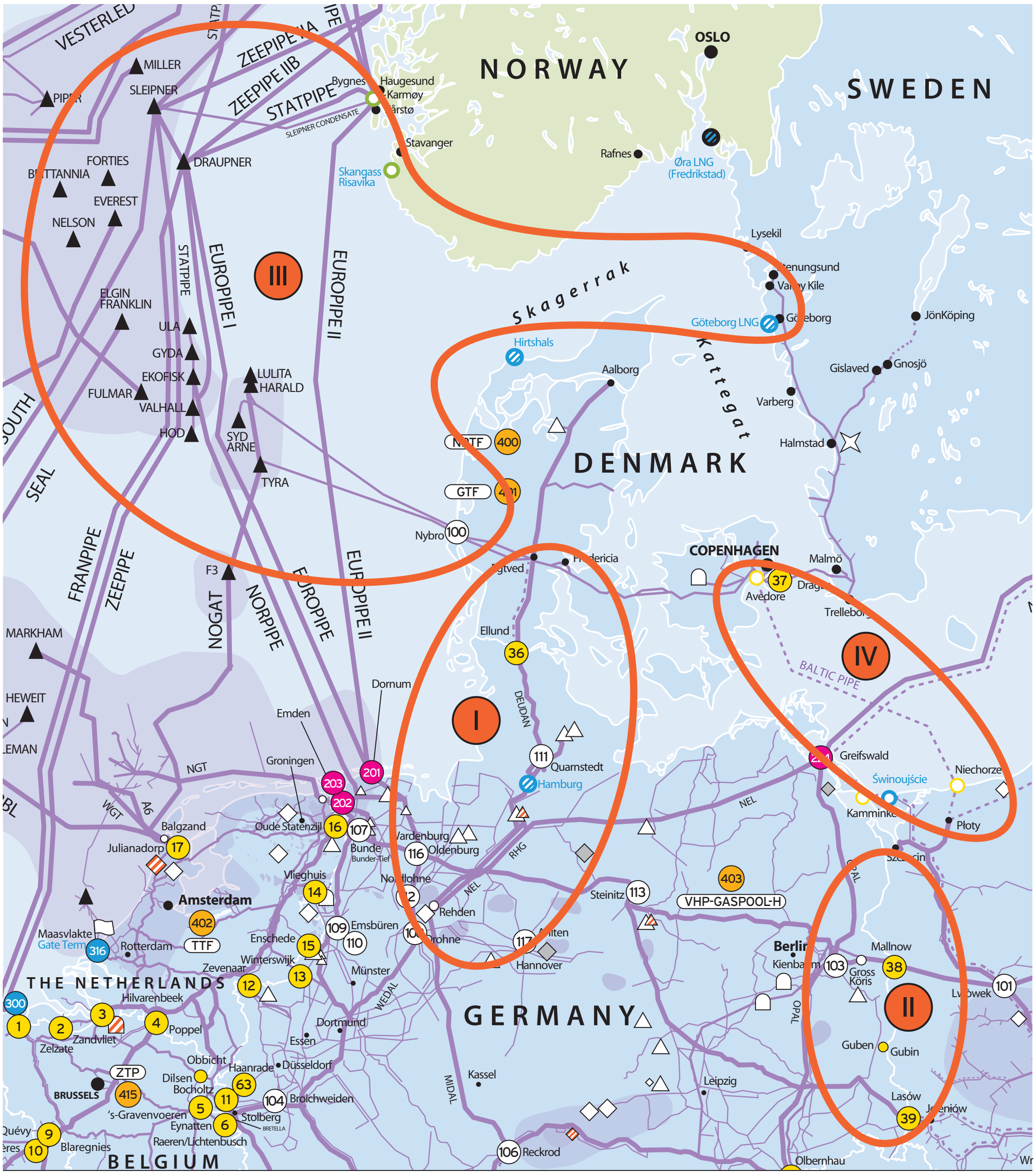


Figure 3.8: The visualisation of the four main axes

The Action Plan specifies a number of Actions to be taken by stakeholders in the period between mid-2011 to mid-2014. Table 3.2 presents the status of actions undertaken by the end of 2013.

Objective		Activity / Responsibilities		Status end 2013	Target dates
I	Interconnection between Germany and Denmark	1.a	German regulator Bundesnetzagentur (BNetzA) and Gasunie Deutschland (GuD) are to enter into the final phase of their dialogue on the subject of the integrated open season in order to provide for the desired new transport capacities at the cross border interconnection point in Ellund.	FID for the two stage German EXELL 1 and 2 projects has been obtained by GuD. Step 1 is in operation from late 2014 and step 2 a year later. Both expansion projects are progressing according to time schedules.	2014 and 2015
II	Interconnection between Germany and Poland	2.a	Yamal-Europe Pipeline Operators will cooperate on introduction of virtual reverse flow in 2011. GAZ-SYSTEM and Gascade are responsible for this action.	The Network Code (NC) on the Polish section of the Yamal-Europe Pipeline was approved by the Poland's Energy Regulatory Authority on 31 August 2011. Virtual reverse flow was introduced on 1 November 2011.	2011
		2.b	GAZ-SYSTEM, Gascade Transport and EUROPOLGAZ should make all arrangements in order to introduce physical reverse flow on the Yamal-Europe pipeline in 2013, in line with the provisions of Regulation on security of gas supply. GAZ-SYSTEM, Gascade, EUROPOLGAZ are responsible for this action.	The physical reverse flow at the Polish section of the Yamal-Europe pipeline is to be put into operation in the Q2 2014, following the upgrade of the Mallnow metering station. The new capacity within physical reverse flow is to be auctioned from Q2 2014 onwards.	2013 / 2014
		2.c	The commercial parties involved in the construction of new interconnectors should clarify the legal and permitting barriers in Germany and Poland in more detail. Commercial parties involved in the interconnectors project are responsible for this action.	GAZ-SYSTEM completed the investments necessary to upgrade the capacity at the PL-DE interconnection point in Lasów. Additional Capacity Allocation Procedure was conducted in mid-2011. The allocation of the additional volumes of gas is available from January 2012.	2011 / 2012
		2.d	The market interest for the project between Germany and Poland should be evaluated. Commercial parties and TSOs involved in the projects are responsible for this action.	Project parties are engaged in dialogue on the possible evaluation of market interest for an interconnection between Börnicke and Police.	2014
III	Interconnection from Norway to Denmark and / or Sweden	3.a	Gassco will continue to analyse a connection to Denmark in the ongoing Gas Infrastructure Reinforcement (GIR) project. Study results were presented to the sponsor group in spring 2011. Gassco is responsible for this action.	GIR project is concluded without proving the projects feasibility. Project ownership has moved to Mærsk (operator in North Sea and platform owner). Current market condition does not favor an investment decision this side of 2018.	
		3.b	Energinet.dk will participate in these analyses and will ensure dialogue between all the potential stakeholders in a Norwegian / Danish interconnection. Energinet.dk is responsible for this action.	Energinet.dk has conducted meetings with Gassco, with Statoil and with Danish North Sea operators. Energinet.dk hosted a workshop on the topic. Energinet.dk does not own gas offshore infrastruture and is consequently an indirect project partner.	
		3.c	The Danish Energy Regulator have conducted analysis of the offshore pipeline tariffs together with the Danish Energy Agency analyse access rules and include analyses of all parts of the Danish offshore system. The Danish Energy Regulatory Authority and the Danish Energy Agency are responsible for this action.	The Danish Energy Regulatory Authority has reached a final decision (January 2014) on future offshore pipeline tariffs setting and effectively reducing transportation tariffs with ~50 %. Dong Energy has in February 2014 decided to dispute this decision.	
		3.d	Operators of offshore infrastructure should be encouraged to analyse the potential impacts on future tariffs of increased volumes through their assets and share these analyses with the potential investors at the relevant point in time. The owners of this infrastructure (Dong Energy, Shell and Mærsk) are responsible for this action.	Tariffs for use of platforms and for further transportation to Denmark or Netherlands are published – see also above.	
		3.f	A regional TYNDP should focus on the need for connecting Norwegian Gas sources with the region (Denmark, Sweden, Poland) and implications for regional security of supply. The conclusion should be discussed between TSOs, regulators and stakeholders. ENTSOG, Baltic Gas and ACER are responsible for this action.		

Objective		Activity / Responsibilities		Status end 2013	Target dates
IV.	Interconnection between Denmark and Poland	4.a	The gas demand and the outlook of the level of security of supply in Denmark and Sweden with regard to the possible supply from LNG terminal in Świnoujście in combination with Baltic Pipe should be assessed by competent authorities in the framework of the new SoS Regulation (risk assessment, action plans), and the development in the axis Germany-Poland. The "Competent authorities" as pointed out in the new SoS Regulation are responsible for this action.	The process is still ongoing.	12/2012
		4.b	The issue appropriate allocation of tariffs when transporting gas through a series of systems could be addressed by ACER and ENTSOG in the work with Framework Guidelines for Tariff Harmonisation and the subsequent network codes. The National competent authorities, ACER and ENTSOG are responsible for this action.	ENTSOG started the work on the Tariff Network Code at the beginning of 2014.	2014
		4.c	When implementing the third package provision on tariff the issue of risk sharing between TSOs and shippers in the light of long-term infrastructure investments and short-/medium-term capacity bookings could be analysed by ACER and ENTSOG, likewise the EC could pay attention to this aspect in the work with the Energy Infrastructure package. ACER, ENTSOG, EC are responsible for this action.	Implementation is ongoing.	12/2011
		4.d	The commercial parties should re-investigate the market potential of Baltic pipe. If no strong commercial interest confirmed, its contribution to the regional security of supplies and market integration should be fully assessed by the EC. The results should be discussed by competent authorities with the aim to see which further measures are needed. The potential role of the Energy Infrastructure Package in this respect is noted. The commercial parties are responsible for this action.	GAZ-SYSTEM is conducting the preparatory works regarding the Baltic Pipe project. A dialogue with Energinet.dk is taking place with regard to the future development of the project.	2014

Table 3.2: Status of actions undertaken since West Baltic Task Force was adopted

Table 3.2 confirms gradual development of priorities set out by the West Baltic TF in the recent years. In this period a number of new projects were put into operation, such as the introduction of virtual and physical reverse flow on the Yamal–Europe pipeline, the upgrade of PL–DE interconnection in Lasów or the extension of DE–DK interconnection in Ellund.

The importance and positive effects linked to subsequent projects aimed at integrating the gas transmission networks between Poland, Denmark and Sweden was underpinned in the PCI selection process in 2013. It needs to be noted that the project, namely Baltic Pipe is currently at relatively early stage of development and its eventual implementation depends, to a large extend, on market signals and regulatory framework. Currently both do not favour an investment decision.

4 Investment Projects of the Region

Map of Planned Infrastructure Projects | Analysis of non-FID Projects

Image courtesy of Amber Grid

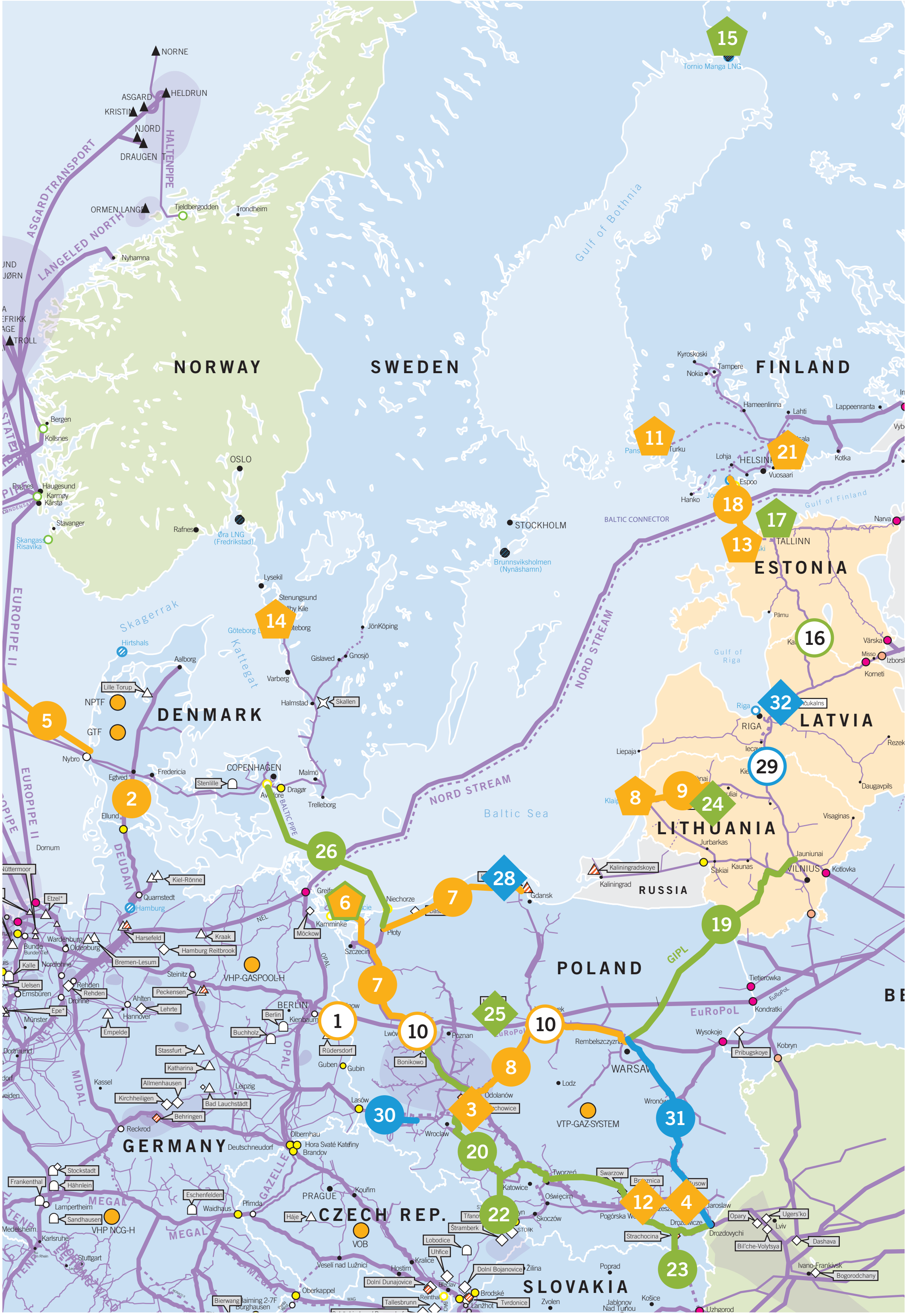
4.1 Map of Planned Infrastructure Projects

This chapter provides an outlook of major gas infrastructure development in the BEMIP region until 2025. The projects are presented in a schematic way on the map on the following page.

No.	Promoter	Project name	Code[1)]	Commissioning
	IMPLEMENTATION UP TO 2016			
1	GAZ-SYSTEM S.A.	Physical reverse flow on the metering station in Mallnow	TRA-F-326	2013
2	Energinet.dk	Ellund-Egtved	TRA-F-015	2013
3	PGNiG	PMG Husów	UGS-F-202	2014
4	PGNiG	PMG Wierzchowice	UGS-F-220	2014
5	Maersk Oil and Gas AS	Tie-in of Norwegian off-shore natural gas transmission system to Danish off-shore natural gas infrastructure	TRA-N-218	2014
6	GAZ-SYSTEM S.A.	LNG terminal in Świnoujście	LNG-F-246	2014
7	GAZ-SYSTEM S.A.	Upgrade of gas infrastructure in northern and central Poland	TRA-F-248	2014
8	AB Klaipedos Nafta	Klaipeda LNG terminal	LNG-F-058	2014
9	AB Amber Grid	Capacity enhancement of Klaipeda – Kiemenai pipeline in Lithuania	TRA-N-238	2015
10	GAZ-SYSTEM S.A.	Upgrade of the entry points in Lwówek and Włocławek on the Yamal-Europe pipeline	TRA-N-276	2015
11	Gasum Oy	Pansio LNG	LNG-N-277	2015
12	PGNiG	PMG Brzeznica	UGS-F-201	2016
13	Swedegas AB	Gothenburg LNG (preliminary)	LNG-N-032	2016
14	Balti Gaas plc	Paldiski LNG Terminal	LNG-N-079	2016
	IMPLEMENTATION 2017 – 2020			
15	Manga LNG Oy	Tornio ManGa LNG Terminal project	LNG-N-194	2017
16	AS EG Võrguteenus	Karksi GMS	TRA-N-084	2017
17	Elering	Tallinn LNG Terminal	LNG-N-146	2017
18	Gasum Oy / AS EG Võrguteenus	Balticconnector	TRA-N-023 / TRA-N-072	2018
19	GAZ-SYSTEM S.A. / AB Amber Grid	Gas Interconnection Poland-Lithuania (GIPL)	TRA-N-212	2018
20	GAZ-SYSTEM S.A.	North-South corridor in Western Poland	TRA-N-247	2018
21	Gasum Oy	Finngulf	LNG-N-024	2019
22	GAZ-SYSTEM S.A.	PL – CZ interconnection	TRA-N-273	2019
23	GAZ-SYSTEM S.A.	PL – SK interconnection	TRA-N-275	2019
24	Lietuvos Energijos Gamyba AB	Syderiai Underground Gas Storage	UGS-N-034	2019
25	PGNiG	KPMG Mogilnio	UGS-F-200	2020
26	GAZ-SYSTEM S.A.	PL-DK interconnection (Baltic Pipe)	TRA-N-271	2020
27	GAZ-SYSTEM S.A.	Upgrade of the LNG terminal in Świnoujście	LNG-N-272	2020
	IMPLEMENTATION 2021 – 2023			
28	PGNiG	KPMG Kosakowo	UGS-F-199	2021
29	AS Latvijas Gāze / AB Amber Grid	Enhancement of Latvia – Lithuania interconnection	TRA-N-131	2021
30	GAZ-SYSTEM S.A.	Upgrade of PL – DE interconnection in Lasów	TRA-N-274	2021
31	GAZ-SYSTEM S.A.	North-South Gas Corridor in Eastern Poland	TRA-N-245	2023
32	AS Latvijas Gāze	Modernisation of Inčukalns Underground Gas Storage	UGS-N-130	2025

Table 4.1: Planned infrastructure projects

1) In the project code „F“ means FID, and „N“ non-FID.



2013 – 2016	LNG project
2017 – 2020	Storage project
2021 – 2023	Pipeline project
	Transmission project (node, CS)

Figure 4.1: Planned investment projects in the BEMIP region, 2013 – 2025

4.2 Analysis of non-FID Projects

ANALYSIS OF THE FINNGULF LNG TERMINAL

Planning of a large scale LNG import terminal, the Finngulf LNG terminal is ongoing in Finland with the Finnish TSO acting as the project promoter. The Finngulf LNG terminal will be located in Inkoo, on the Southern coastline of Finland. Inkoo is also the landing point of the Balticconnector gas interconnector between Finland and Estonia. Inkoo is a suitable location for the LNG terminal as the onshore pipeline connecting the terminal to the natural gas transmission network is of reasonable length and the fairway of the Inkoo port is proper for large-scale LNG vessels. In addition, the terminal is ideally located to serve the on-grid and off-grid natural gas needs of the entire Eastern Baltic Sea region as well as to quickly respond to fluctuations in energy consumption. A national EIA report for the terminal project was completed in June 2013 and the national authorities gave their final comments in September 2013 confirming the fulfilment of requirements set for the EIA and that the process was done according to lawful requirements for the EIA process.

The Finngulf LNG terminal is planned to have a net storage capacity of 300,000 m³ with an estimated annual energy throughput of 15–28 TWh. From the terminal site a 20 km long pipeline will be built to the existing Finnish gas grid with a network injection capacity of 12 mcm/day to Finland and via Balticconnector pipeline 7.2 mcm/day to Estonia. The project includes the construction and operation of a single-berth marine jetty designed to berth and unload a "benchmark" type LNG vessel with transportation capacity of approximately 150,000 m³. Marine design, following national guidelines for fairway designing, including fairway, turning circle and harbour basin, is based on the aforementioned design vessel. Although LNG for marine bunker fuel may be imported and exported from the same terminal, a jetty will also be constructed to accommodate smaller vessels.

The Finngulf LNG terminal and the Balticconnector efficiently integrate the regional gas markets as well as play a key role in the process of connecting the region to the European energy network. The Finngulf LNG terminal will also connect the regional gas markets to the global LNG markets, thus significantly diversifying the gas supply to the regional markets. In addition, sourcing from the global natural gas markets will narrow the current price gap between the regional and the global markets. The Finngulf LNG terminal will greatly enhance the regional security of gas supply while the Balticconnector will connect the Finnish and the Baltic gas infrastructures, make LNG available to the Baltic countries as well as give the Finnish gas market access to the Latvian UGS. The increase in the security of supply will enhance the regional resilience as well as decrease the costs of disruptions. The Finngulf LNG terminal provides the best possible choice for peak load management and balancing ability, expected to increase in the future in the region, due to its location in the largest regional gas market. The Finngulf LNG terminal will also provide the region with significant off-grid potential and therefore, the terminal can reduce the utilization of more polluting fuels, increase investments into gas-related infrastructure therefore replacing investments in power generation utilizing more polluting fuels, and add to the utilization of biogas.

The Finngulf LNG terminal and the Balticconnector interconnector form a project cluster and hence, both projects need to materialize in order to provide the optimal benefits to the region. Both projects were included in the first EU-wide List of PCIs. The final investment decision for both projects will be made in 2015.

ANALYSIS OF THE BALTICCONNECTOR

The Balticconnector gas interconnector between Finland and Estonia is being developed jointly by the Finnish (Gasum Oy) and Estonian (AS EG Võrguteenus) TSOs. The project promoters indicated their full commitment to the Balticconnector project by signing a MoU in December 2012. The Balticconnector consists of an 81 km subsea bi-directional pipeline between Inkoo, Finland and Paldiski, Estonia along with grid enhancements in both countries. The transit capacity of the offshore pipeline will be 7.2 mcm/day, 300,000 m³/h and CSs to be built in Finland and Estonia will enable transit flows from Finland to Estonia as well as between Finland and the Inčukalns UGS in Latvia. The EIA programme on the Finnish side was finalized in November 2013 and currently the EIA process continues with the impact assessment and EIA report drafting phase. On the Estonian side, the superficies license which is a prerequisite for the launching of EIA has been acquired.

The Balticconnector gas interconnector together with the Finngulf LNG terminal significantly enhances the security of supply in the Eastern Baltic Sea region by ending the prevailing single-supplier situation, enabling the provision of LNG from the Finngulf LNG terminal to the Baltic countries and providing the Finnish gas market with access to the Inčukalns UGS in Latvia. The Balticconnector plays a vital role in successfully connecting the Finnish and Baltic gas transmission networks and thus, the further development of a regional gas market. In addition, through Balticconnector and other regional grid enhancements, the Eastern Baltic Sea region gas markets can then be connected to the single European energy market. The Balticconnector and the Finngulf LNG terminal provide an optimal solution for satisfying the regional gas demand as they provide diversification of supply sources, regional price convergence and an adequate level of capacity. Furthermore, the Balticconnector provides the regional market with greater opportunities to utilize natural gas as a perfect low-emission fuel for peak shaving power production and further develop the position and possibilities for biogas production and utilization through larger markets.

The Balticconnector and the Finngulf LNG terminal form a project cluster and hence, both projects need to materialize in order to provide the optimal benefits to the region. Both projects were included in the first EU-wide List of PCIs. The final investment decision for both projects will be made in 2015.

Image courtesy of AS Latvijās Gaze

KARKSI GMS

The project promoter of Karksi GMS is AS EG Võrguteenus, the Estonian TSO. The aim of reconstruction of Karksi GMS is to allow to meter bi-directional gas flows at the Estonian-Latvian interconnection.

In this cluster it is also planned to construct a CS. The construction of the CS is conditional to the construction of Balticconnector because there is no possibility and need to transmit gas through the Estonian grid to Latvia. To increase the maximum capacity of gas transmitted from the Balticconnector to Latvian grid and vice versa and providing the Finnish gas market with better access to the Inčukalns UGS the CS has to be constructed.

MODERNISATION AND EXPANSION OF INČUKALNS UGS

Since 1968 Inčukalns UGS has been used as a natural gas source for the Baltic countries and the north-western part of Russia in winter. Gas into the storage is injected in summer and in winter natural gas customers in Latvia are receiving gas only from the storage. Also, Estonia mainly is supplied from the storage in winter and for Lithuania gas from the storage is used in case of necessity. In 2013 the project of modernization and expansion of Inčukalns UGS was included into the list of PCIs. Capacity of Inčukalns UGS is 4.45 bcm, of which 2.3 bcm is active or working natural gas. Maximum gas injection capacity of Inčukalns UGS is 18 mcm/day, and maximum working pressure – 105 bars. On its turn, maximal gas extraction capacity currently reaches 30 mcm/day.

However, to use effectively Inčukalns storage for the needs of the common gas supply system of the East-Baltic region, maximum daily extraction capacity should be increased up to 35 mcm.

Specialists of AS Latvijas Gāze in cooperation with experts from Gazprom VNIIGAZ have developed technical justification of the planned activities and estimated capital costs. Total required investment amount is estimated **376.5 million EUR**.

The main tasks of the project are:

- technical upgrade and increase of gas extraction capacity up to 35 mcm/day;
- increase of volume of working gas from 2,300 mcm to 2,835 mcm.

In the first two stages (until 2020) modernization of gas collection points, reconstruction of gas compressor units and installation of a new gas compressor unit, as well as upgrade of 90 wells is envisaged. As a result of these measures the daily withdrawal volume of 35 mcm per day would be reached. Total required investment for the first two stages is **135 million EUR**.

Within next 5 years (Stage 3) it is envisaged to increase the active volume of gas up to 2,835 mcm, which requires addition estimated financial investment in the amount of **241.5 million EUR**, including costs of cushion gas.

In order to receive decision on the Cross Border Cost Allocation, AS Latvijas Gāze as the project promoter has submitted this project to the National Regulatory Authorities of Latvia, Lithuania, Estonia and Finland.

The project of modernization and expansion of Inčukalns UGS is essential for efficient operation of the East-Baltic joint gas system, and its implementation together with other projects of the region (Intra-Baltic Connections, GIPL, Balticconnector and LNG terminal in the Gulf of Finland) will ensure increased gas supply security to consumers by diversifying gas supply sources and routes, as well as integrating gas networks of the Baltic countries and Finland to the common EU gas grid.

ENHANCEMENT OF LATVIA – LITHUANIA GAS INTERCONNECTION

The enhancement of bi-directional capacity up to 12 mcm/day between Latvia and Lithuania could increase the opportunities for a cross-border trade, for higher usage of Latvian Inčukalns UGS and would increase security of supply and flexibility of the gas transmission systems in Latvia and Lithuania.

The project is highly dependent on the implementation of other infrastructure projects in the region, and the benefits or the threats to this project are different under any certain scenario of gas infrastructure development in the region. In case gas interconnection with Poland is constructed and/or capacity in Klaipeda-Kiemenai pipeline is enhanced, there is almost no need of this project for security of supply reasons. However in such a case this project could successfully serve for the diversification of supply on a higher scale to Latvia and Estonia, both from European western markets or LNG market. Moreover, when gas interconnection with Poland is constructed, this project may be needed to provide an access to the Latvian Inčukalns UGS at a sufficient scale for both Lithuanian and Polish market players. If the plans of construction of regional LNG terminal in Finland and Estonia are realised together with Balticconector project, providing diversified supply route from the Gulf of Finland area, the need of this project for diversification purposes also becomes questionable.

Summarizing, depending on what other investment projects are implemented in the region, this project may appear to be very beneficial and important for regional gas market, or not needed at all. The costs and benefits of this project should be thoroughly assessed and FID decision on this project should be taken when the prospects of other major gas infrastructures in the region will be clear.

CAPACITY ENHANCEMENT OF KLAIPEDA – KIEMENAI PIPELINE (KKP) IN LITHUANIA

In October 2013 the KKP project was included into the list of PCIs. In December 2013 Lithuanian Government granted the project the status of a project of national economic importance.

The KKP project is aimed to establish sufficient capacity to transport natural gas from the LNG terminal in Klaipeda which will be in operation starting from the end of 2014 to the natural gas consumers in Lithuania and other Baltic countries (Latvia and Estonia), thus creating opportunities for the countries of the Baltic region to diversify the sources of gas supply, enhance the market competitiveness and the security of gas supply.

The project involves construction of a 110 km DN800 pipeline from the LNG terminal connection point near Klaipeda to Kursenai. The maximum entry capacity from LNG terminal in Klaipeda (after implementation of the KKP project) will amount to 115 GWh/day which will enable transportation of additional flow through the Klaipeda – Kiemenai pipeline to other Baltic states up to a full capacity of the existing gas interconnection between Lithuania and Latvia. The commissioning of the KKP project is expected by the end of 2015. The total investment will make up 64 million EUR.

It is expected to receive up to 50 % co-funding for eligible costs from the CEF and the remaining part of project costs will be covered by the beneficiaries themselves.

THE GAS INTERCONNECTION POLAND – LITHUANIA (GIPL)

GIPL is aimed at the establishing of a well-functioning new bidirectional interconnection between the Poland and Lithuania gas transmission systems in order to integrate the isolated gas markets of the Baltic states into the European gas market grids, by introducing an alternative gas supply route to the Baltic states. This interconnection will diversify the gas supply sources, increase the security of supply and would serve for the enhancement of competition in the gas market of the eastern Baltic region. Also, the GIPL project will provide the opportunity for the Polish market players of using the Latvian Inčukalns UGS facility. In October 2013 the GIPL project was included into the list of PCIs adopted by the EC.

The GIPL project involves construction of DN700 pipeline from the CS in Rembelszczyzna (Poland) to the CS Jauniunai (Lithuania), the capacity enhancement of Rembelszczyzna compressor station and supporting infrastructure in Poland enabling higher imports of gas from variable sources – into Polish national gas transmission system. The total length of the DN700 pipeline is 534 km, i.e. 357 km on the Polish side and 177 km on the Lithuanian side. The initial GIPL capacity would enable to transport up to 73 GWh/day of gas to the Baltic states.

The expected load factor amounts to 20 % of the maximum load. A gradual approach to the GIPL implementation is proposed with plans to commission the pipeline at the end of 2018 in case this pipeline will be provided with priority status both in Poland and Lithuania. Depending on market developments, there is a possibility to increase the maximum load up to 125 GWh/day by installing additional compressing capacity along the pipeline.

Given large benefits of the GIPL project in terms of security of supply and market integration coupled with its lack of commercial viability for the project promoters, it is expected to receive up to 75 % co-funding for eligible costs from CEF and the remaining part would be covered by the beneficiaries and also through cross-border cost allocation procedures as foreseen in TEN-E Regulation.

Image courtesy of GAZ-SYSTEM S. A.

UPGRADE OF THE LNG TERMINAL IN ŚWINOUJŚCIE

The LNG terminal in Świnoujście will be the first LNG terminal in the Baltic Sea region. In the first stage of operation (as of 2014), the terminal will enable the re-gasification of up to 54 TWh/year of natural gas. In the following years, depending on the increase of demand for gas, it will be possible to increase the capacity up to 84 TWh/year, without the need to expand the site on which the terminal is constructed.

The extension of the project will enable to benefit from the economies of scale, as relatively low investment costs (no need to construct facility from scratch, majority of costs will be related to construction of the 3rd storage tank) may bring further benefits to gas consumers in the Baltic Sea area and the Central and Eastern Europe (CEE) region.

The terminal may provide a new source of supply for Lithuania and the other Baltic states once GIPL is implemented. The project may also constitute a regional solution supplying local LNG terminals in the Baltic Sea area (smaller vessels) and addressing the "clean transport" goals. In this case it is worth mentioning that LNG/CNG supplies from the terminal in Świnoujście may be used in road, rail and maritime transport in the Baltic Sea area and thus contribute to the reduction of greenhouse gas emissions. Furthermore, the supplies from the LNG terminal in Świnoujście may be directed through the planned Baltic Pipe to Denmark and Sweden and by means of upgraded transmission system in Poland, PL–CZ and PL–SK interconnections towards the South, to other CEE countries.

The project was granted the PCI status in the BEMIP gas regional group. This label clearly confirms high added value of the project towards completion of a single gas market in the Baltic Sea region.

A market screening procedure for the upgrade of the LNG terminal in Świnoujście was conducted by Polskie LNG (SPV of GAZ-SYSTEM S.A.) in late 2012 and early 2013. The results of the survey are sufficient to underpin the terminal's expansion, including the construction of the third tank. In 2020, the demand for additional services along with the regasification capacity already contracted are expected to achieve the approximate maximum regasification capacity the extended terminal will be capable to deliver. The additional services which were under assessment embraced: LNG truck and rail cistern loading, bunkering services and reloading to smaller vessels, including LNG storage in the terminal in the period from 2015 to 2029.

Image courtesy of GAZ-SYSTEM S.A.

BALTIC PIPE

The aim of Baltic Pipe is to interconnect the Polish and Danish gas transmission systems creating a market link and allowing for gas transport from North Sea fields to Poland and also in the reverse direction from Poland to the Danish-Swedish market.

Construction of Baltic Pipe will contribute to development of infrastructure necessary to interconnect the West Baltic Sea area. This will in turn enhance market integration, diversify supply sources and routes, as well as improve system resilience of the transmission grid in the region. Furthermore and in combination with other system expansion projects, the pipeline could give access to new supply sources, namely Norwegian gas for the CEE region and the Baltic states, and LNG supplies transported from the LNG terminal in Świnoujście to the Danish-Swedish market.

The project is granted PCI status in the BEMIP gas regional group, which confirms added value of the project towards completion of a single internal gas market in the Baltic Sea region.

Implementation of Baltic Pipe was primarily linked to the Skanled project that was suspended by its investors in 2009. Despite the suspension of the Skanled project and the lack of decisions on the construction of other links between Norway and Denmark, GAZ-SYSTEM S.A. decided to continue all preparatory works for the Baltic Pipe project including, in particular, the definition and approval of the final route of the gas pipeline in its offshore and onshore parts. In the event of future improvement of investment conditions for the Baltic Pipe project, further steps are planned to be taken.

UPGRADE OF THE ENTRY POINTS IN LWÓWEK AND WŁOCŁAWEK ON THE YAMAL-EUROPE PIPELINE

The main objective of the project is to upgrade the capacity of the entry points in Lwówek and Włocławek on the Yamal-Europe pipeline. The project will enable to benefit from the economies of scale, as low investment costs will allow for higher gas deliveries via physical reverse on the Yamal-Europe pipeline to entry into the transmission system in Poland and later on in the Baltic states and other CEE countries.

The upgrade the capacity of the entry points in Lwówek and Włocławek on the Yamal-Europe pipeline will have an impact on:

- enhancing competition in Poland and regional (Baltic states, CEE) markets by significantly facilitating access to the Western European gas markets (in particular GASPOOL and NetConnect in Germany);
- increasing security of supply in the Baltic Sea and CEE regions by diversifying supply routes and counterparts (access to the Western European gas markets);
- creating well-interconnected gas infrastructure between Western Europe (Germany), the Baltic Sea and CEE regions;
- contributing to elimination of the energy islands, as the project may constitute a source of gas supplies for the Baltic states (via GIPL);
- creating a physical hub and/or a virtual hub in Poland.

The project was granted the PCI status in the BEMIP gas regional group. This label clearly confirms its high added value towards completion of a single gas market in the Baltic Sea region.

POLAND – CZECH REPUBLIC INTERCONNECTION

The project aims to increase the cross-border capacity between Poland and the Czech Republic by establishing a large transportation corridor that will allow for flexible transport of gas between Poland, the Czech Republic and other CEE counters. This will in turn:

- increase the security of gas supply and provide the overall flexibility for the CEE region and diversify the supply routes for the CEE region;
- improve European gas grid interconnection;
- increase the security and reliability of the cross-border gas transmission between the Czech Republic and Poland (fulfilment of N-1 rule in Poland);
- create a robust and well-functioning internal market in the Czech Republic and Poland and promote the competition;
- contribute to the creation of an integrated and competitive gas market in CEE region.

The project was granted the PCI status in the NSI EAST Gas regional group. This confirms the importance of PL-CZ interconnection in the context of the development of the integrated and competitive natural gas market in Central Europe, as well as its contribution to security of supply and diversification of natural gas supply sources.

POLAND – SLOVAKIA INTERCONNECTION

The main goal of the project is to create an important part of the North-South gas interconnections in Central Eastern by implementing a missing interconnection between transmission systems in Poland and Slovakia. This will contribute towards the increase of the security of gas supplies in the CEE region through the diversification of supply sources and routes, as well as integration of Sub-Carpathian Market Area and enhancing market functionality.

Increased volumes of gas delivered to Poland through the Poland-Slovakia Interconnection, e.g. from the Caspian area (through Southern Corridor), and then available on the Polish gas market may be potentially contracted for the Baltic states gas markets (through Gas Interconnection Poland – Lithuania – BEMIP) and/or Denmark and Sweden (through Baltic Pipe – BEMIP).

Gas entering Polish transmission system at LNG terminal may through interconnection with Slovakia be directed to the Baumgarten hub (Central European Gas Hub – CEGH) and will thus increase market liquidity in the region.

The project was granted the PCI status in the NSI EAST Gas regional group. This confirms the importance of PL-SK interconnection in the context of the development of the integrated and competitive natural gas market in Central Europe, as well as its contribution to security of supply and diversification of natural gas supply sources.

CAPACITY EXPANSION ELLUND

Egtved Danish system expansion aiming at increasing import capacity from Germany in the Ellund border-point has been in operation since October 2013, and consists of a CS in Egtved and a pipeline looping between Ellund and Egtved. Supplementary system expansion in the adjacent Northern German systems matches new expanded import capacity in Ellund. The new installations have been supported by the EU Recovery Funds and contain wider system benefits than import alone. Capacity in Dragør border-point towards Sweden is to be expanded from 250,000 m³/h to 300,000 m³/h from October 2014. Additionally, the new compressor unit in Egtved facilitates a potential later interconnection with Poland through a Baltic Pipe and system interaction with offshore pipelines towards Danish, and possibly also Norwegian North Sea fields.

INTERCONNECTION FROM NORWAY TO DENMARK AND/OR SWEDEN

Interconnection between Norwegian and Danish offshore systems has been economically assessed by Gassco and by Danish field operators concluding that a business case under current market conditions is not feasible. Dialogue between the parties aims to establish framework conditions that would make the interconnection project feasible.

GO4LNG

Sweden currently has only one ongoing non-FID project, GO4LNG. Behind this project is Swedegas, Vopak and the port of Gothenburg.

The LNG terminal will be located in Gothenburg and is expected to be operational in 2016. On completion, the total capacity will be approximately 20–30,000 m³. The terminal will make LNG distribution possible through rail and road. In a few years the terminal is expected to be connected to the existing gas grid in Gothenburg.

The terminal will be built according to the Open Access principle that means that any company that is interested in supplying LNG to the Swedish market can contract capacity at the terminal.

More information on the projects is available at
www.swedegas.com/Home/lng_terminal/lng_terminal

Image courtesy of Swedegas

Conclusions

If we compare the situation with the previous GRIP, the progress in implementation of major investments in the region is clearly seen. In Poland a highly demanded reverse capacity in Yamal pipeline is used to import gas from Western gas markets. Ellund-Egtved project in Denmark enabled higher import capacities for Danish and Swedish markets and substantially increase flexibity to cope with security of supply issues.

2014 will mark the onset of era of LNG terminals in the BEMIP region, with two LNG import terminals in Świnoujście and Klaipeda being operational by the end of the year. However, due to inexistent (in case of Poland) and limited infrastructure (in case of Lithuania) with other countries in the region, the use of these terminals for the needs of other countries in the region will be dependant on still non-FID transmission infrastructure (Gas Interconnection Poland-Lithuania, Capacity enhancement of Klaipeda-Kiemenai pipeline and Latvia-Lithuania interconnection) planned to be built. Modernization and expansion of Inčukalns UGS will enable the East-Baltic region not only to improve security of gas supply, but also to take advantages from the winter-summer gas price swing. Looking further, a set of LNG terminal projects are planned to be implemented in the region: Regional LNG terminal in the Gulf of Finland (Finland or Estonia) and two other LNG terminals located off-grid in Finland (Pansio and Tornio ManGa), Gothenburg LNG in Sweden and expansion of LNG terminal in Świnoujście.

In addition in Poland the interconnection projects with other neigbouring countries – Czech Republic and Slovakia, as well as the enhancement of entry capacity from Yamal Pipeline – are planned. Additional entry capacities will provide market opportunities for the substantially growing demand and better integration with EU gas markets.

The implementation of all these projects will make substantial change the supply framework, market structure, use of transmission networks and underground gas storages.

However, investments decisions on these projects will depend largely on external financing. 15 infrastructure projects, belonging to the BEMIP region, are included in the first EU-wide List of PCIs which was adopted by the EC on 14 October 2013. The PCI status should alleviate and enable implementation of these projects, as the natural size of the regional markets in contrast with investment needs for the diversification and integration of the region is relatively small, making the implementation of key projects impossible without the EU financial support. In addition, a process of cross-border cost allocation, in which the costs of infrastructure of regional importance is distributed between the benefiting Member States, was started following the procedures of TEN-E Regulation. In spring of 2014, the National Regulatory Authorities should take a decision on the cost allocation on the projects like Finngulf LNG terminal and Balticconnector, Gas Interconnection Poland – Lithuania, Gas Interconnection Poland – Czech, Gas Interconnection Poland – Slovakia, Modernization of Inčukalns Underground Gas Storage, Capacity enhancement of Klaipeda-Kiemenai pipeline. Such process will be a challenge both for National Regulatory Authorities and TSOs which Investement requests are being analysed.

The TSOs of the BEMIP region have prepared the second Gas Regional Investment Plan. Now they are faced with challenge for implementing it, adjusting it to the changing environment and thus achieving the targets set for the upcoming years.

Assumptions

Country	Gross calorific value, kWh/m³ Temperature (0°C)
Finland	11.08
Estonia	11.20
Latvia	11.16
Lithuania	11.17
Poland	11.03
Denmark	12.10
Sweden	12.01

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Abbreviations

ACER	The European Agency for the Cooperation of Regulators
bcm	Billion normal cubic meters
BEMIP	Baltic Energy Market Interconnection Plan
BR	Balance Responsible
CAM	Capacity Allocation Mechanism
CBA	Cost Benefit Analysis
CEE	Central East European
CEF	Connecting Europe Facility
CHP	Combined Heat and Power
CNG	Natural Gas Refuelling Point
CS	Compressor Station
CZ	Czech Republic
DK	Denmark
DSO	Distribution System Operator
EC	European Commission
EE	Estonia
EIA	Environmental Impact Assessment
ENTSOG	European Network of Transmission System Operators for Gas
ERO	Energy Regulatory Office
EU	European Union
FI	Finland
FID	Final Investment Decision
GIR	Gas Infrastructure Reinforcement
GM	Gas Metering
GPN	Gas Point Nordic
GRIP	Gas Regional Investment Plan
GS	Gas Supplier
GTF	Gas Transfer Facility
IP	Interconnection Point
ISO	Independent System Operator
LT	Lithuania
LNG	Liquefied Natural Gas
LV	Latvia
mcm	Million normal cubic meters
NC	Network Code
PL	Poland
PCI	Project of Common Interest
RE	Renewable Energy
SE	Sweden
SK	Slovakia
SNG	Synthetic Natural Gas
SoS	Security of Supply
TEN-E	Trans-European energy networks
TF	Task Force
TPA	Third Party Access
TSO	Transmission System Operator
TYNDP	European Ten Year Network Development Plan
UGS	Underground Gas Storage

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