CENTRUM BALTICUM

Natural gas revolution and the Baltic Sea region

Edited by Kari Liuhto

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List of authors

Reinis Āboltiņš is a European policy researcher specialising in energy policy at the *Centre for Public Policy PROVIDUS*, the leading public policy think-tank in Latvia. He has written extensively on national, regional and EU energy policy, as well as energy-related climate issues. He is a member of the Energy Committee of the Economic Council under the auspices of the Ministry of Economics and a consultant at the Parliament's European Affairs Committee. He is also an active invited expert at the Energy and Transport Working Groups of the Foreign Investors' Council in Latvia.

Tomasz Dąborowski is Senior Fellow at the Warsaw-based Centre for Eastern Studies, governmental research institution dealing with analyses and forecast studies of the political and economic situation in Central and Eastern Europe. He specialises in energy policy of Central and South East European countries. Dąborowski was co-ordinator of international research project "*Gas Target Model for Visegrad Countries*" conducted by the Centre for Eastern Studies with Florence School of Regulation, Regional Centre for Energy Policy Research in Budapest and Research Centre of the Slovak Foreign Policy Association. Dąborowski has Master's Degree in International Relations from Warsaw School of Economics as well as completion certificate from the Centre for East European Studies at the University of Warsaw.

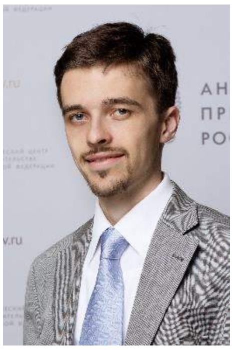
David Dusseault is the Senior Market Analyst for Gasum OY's Energy Trading Unit. Prior to moving to the private sector, Dusseault was Acting Professor for Russian Energy Policy at Aleksanteri Institute, University of Helsinki where he obtained his Ph.D. in Political Science. Currently, his focus is on emerging business models of midstream energy companies.

Jakub M. Godzimirski is Research Professor at the Norwegian Institute of International Affairs (NUPI). He holds a Ph.D. in social anthropology. Between 1995 and 2012, he served as Senior Research Fellow at the Centre and Department of Russian and Eurasian Studies at NUPI. In 2009–2010, he was the Head of the NUPI Energy Programme. In 2012–2013, he was the Head of NUPI's Research Group on European Affairs and since 2014 he is again member of NUPI's Russia team. His present research interests include Russian foreign and security policy, with a focus on energy's role and Russia's relations with the West. He has edited several volumes on these issues and published many peer-reviewed articles and book chapters on Russian energy policy and its reception in Europe.

Leonid M. Grigoryev is Tenured Professor, Head of Department of Global Economy, Higher School of Economics (HSE), Moscow. In addition, he is Chief Adviser of the Head of Analytical Center under the Government of the Russian Federation and the member of the Board of Trustees - WWF-Russia. He has published more than three hundred research works, edited a dozen of books and produced a numerous scientific media works. His key interests lay with Russian Transition as he served as a Deputy Minister of Finance in the Transition Government in 1991-1992. In last two decades, he has worked extensively for instance on global growth, energy, but also on elites, middle class and inequality, and BRICS.

Hannu Hernesniemi (Lic.Soc.Sc. in Economics) is Chief Analyst at the National Emergency Supply Agency of Finland. Before this, he had a long career as Researcher and Research Director at ETLA, The Research Institute of the Finnish Economy. He has studied the competitive edge of the Finnish industrial clusters including energy cluster. Currently, he follows the development of gas, oil and bio fuel markets from the security of supply point of view.

Vidmantas Jankauskas has a forty-year-experience working in the energy sector. Since graduating from the Vilnius University, he worked for 22 years at the Lithuanian Energy Institute, then for the next 10 years was a Chairman of the Lithuanian National Energy Control Commission (regulator), and since 2008 he is working as an international energy regulatory expert in various projects funded by the European Commission and the World Bank. He is also a professor of the Vilnius Gediminas Technical University.



Alexander Kurdin is Head of Department for Strategic Research in Energy, Analytical Center for the Government of the Russian Federation. In addition, he is Deputy Head of Chair of Competition and Industrial Policy at the Department of Economics, Lomonosov Moscow State University, Associate Professor at the Department of World Economy, National Research University Higher School of Economics (HSE) and Senior Research Fellow at the Center for Competition and Economic Regulation Studies, The Russian Presidential Academy of National Economy and Public Administration.

Lovisa Källmark is a Master student in Environmental Economics and Management at the Swedish University of Agricultural Sciences in Uppsala. Her main research interests are sustainable economic growth with a particular focus on renewable energy sources. Her master thesis, due January 2016, focuses on estimating demand functions for biofuels in the Swedish transport sector.

Chloé Le Coq is an Assistant Professor at Stockholm School of Economics at Stockholm Institute of Transition Economics (SITE). Her main research interests are industrial organisation and experimental economics, with particular focus on the energy markets and their regulation. Her recent work includes empirical studies on energy security issues and experimental studies of the electricity auction.

Kari Liuhto received his Ph.D. from the University of Glasgow, the United Kingdom (1997), and the degree of Doctor of Science from Turku School of Economics, Finland (2000). Liuhto holds a tenure professorship in International Business and he has been Director of the Pan-European Institute at the University of Turku since 2003 and Director of Centrum Balticum Foundation since 2011. Professor Liuhto has been involved in several Russia-related projects funded by the European Commission, the European Parliament, the United Nations and various Finnish ministries.

Alari Purju is a Head of Department of Logistics and Transport at Tallinn University of Technology (TUT). He has been working as a Dean of the Faculty of Economics and Business Administration of TUT, as an advisor to the Minister of Economic Affairs of Estonia. He has been also a consultant for the World Bank (The Commission for Growth and Development), the OECD, the EU Commission, participated in evaluation of Latvian higher education institutions as a consultant hired by the European Social Fund project. Professor Purju holds Ph.D. from the Institute of Economics of the Academy of Science of Estonia and MA in Economics from New York State University in Albany and Central European University.

Mr. ***Pål Rasmussen*** is the Secretary General of the International Gas Union (IGU) and has 25 years of experience form the gas industry. Before assuming the position of Secretary General, Rasmussen worked for Gassco A/S in Norway in various positions, including long-range planning, business plans, improvement programmes and new infrastructure development projects. Gassco A/S is operator of the transmission system, bringing Norwegian gas to Europe. He was Chairman of the Norwegian Gas Association in the period between 2009-2014, and he has been involved in IGU activities in the same period. Rasmussen holds a master degree in economics and management.

Dr. ***Tatiana Romanova*** is an Associate Professor in St. Petersburg State University (since 2006), Jean Monnet Chair (since 2011), and member of various international and Russian professional associations (including UACES, ISA, CFDP, RIAC). She has researched extensively on EU-Russian economic and political relations, energy policy in Europe, legal approximation, EU institutions and policies. She is the author of three books on the EU and EU-Russian relations (in Russian) as well as of a vast number of journal articles and book chapters on EU-Russian relations, especially in the field of energy (both in English and in Russian).

Dr. ***Thomas Sattich*** is an Associate Researcher at the Institute for European Studies at the Vrije Universiteit Brussel, where he is working on energy- and industry-related topics. With various publications on EU energy policy and Germany's energy transition (Energiewende), his focus lies on the power sector, the integration of renewables and the adaptation of the electricity transmission infrastructure to the needs of Europe's sustainability agenda.

Dr. ***Andrey Shadurskiy*** is a senior lecturer at the School of International Relations, St. Petersburg State University. He holds degrees in European Studies and Economics. Dr. Shadurskiy has defended his thesis on impact of globalisation of natural gas markets on energy security of the European Union. His interests lie in energy security, globalisation of LNG markets and unconventional gas policy developments.

Dr. ***Kirsten Westphal*** is based at the Stiftung Wissenschaft und Politik (SWP), the German Institute for International and Security Affairs in Berlin Germany. She is assigned for International Energy Relations and Global Energy Security. She has worked as a consultant in the energy industry. Moreover, she has worked in several EU and OSCE (long term) missions in Latin America, Eastern Europe, the CIS and Asia. She has published widely on international energy relations and EU external energy relations with a book on *Global Energy Governance in a Multipolar World* (with Dries Lesage and Thijs van de Graaf), Aldershot/ Burlington Ashgate 2010; and the following publications on *Russian Energy Supplies to Europe, The Crimea Crisis: Mutual Dependencies, Lasting Collateral Damage and Strategic Alternatives for the EU,* SWP Comments 2014/16; *Institutional change in European natural gas markets and implications for energy security: Lessons from the German case*. in: Energy Policy, Vol. 74, 2014, 35-43 and *The Cardinal Sins of European Energy Policy: Nongovernance in an Uncertain Global Landscape*, in: Global Policy, Vol. 5, Special Issue, October 2014, 38-51 (with Kacper Szulecki).

Professor ***Dariusz Zarzecki***, dr hab., is Head of Department of Investments and Business Valuation, University of Szczecin in Poland. As an expert in the fields of financial analysis, investment planning and business valuation, he is a frequent speaker to professional conferences and courses and an author of articles and books on various aspects of business valuation. Professor Zarzecki is also a director with Zarzecki, Lasota & spólnicy Sp. z o.o. in Szczecin, Poland. He was a member of the Supervisory Board of the Korporacja Polskie Stocznie SA (Polish Shipyards Corporation). Between 1995 and 1997, he was a director with Deloitte & Touche, and from 2001 till 2002, President of the Supervisory Board of PKO BP S.A. - Poland's largest retail bank. He was also a Vice-President of the Supervisory Board of Dragmor, and a member of the Supervisory Board of the Paper Mill SKOLWIN S.A. Professor Zarzecki's practice includes business valuation and investment appraisal assignments. He was involved in many privatisations and restructuring programmes. He has received several awards, including the Minister of Labour Award (1990) and the Minister of Education Award (2000) - for a book on business valuation methods published by the Foundation for Development of Accountancy in Poland. He is also a Director of the MBA Programme at the University of Szczecin.

Introduction

Kari Liuhto

Natural gas is an important fuel globally and has maintained its share of global energy consumption at around 24% despite the impressive growth (40%) in the world's primary energy consumption (PEC) since the beginning of the millennium. Pipelines dominate international gas trade, but the share of liquefied natural gas (LNG) is increasing. In 2001, LNG accounted for 26% of international gas trade, whereas its share was already 31% by 2013. In volume terms, international LNG trade has more than doubled i.e. it has increased from 143 billion cubic metres (bcm) in 2001 to 325 bcm in 2013 (British Petroleum, 2002; 2014; International Gas Union, 2014).

The EU is following the global gas trend (Noël, 2008). Natural gas accounted for 23% of energy consumption within the EU-28 in 2013. On the other hand, LNG accounts for twice as great a share of the global gas trade (31%), whereas LNG covered just 14% of the EU's external gas supply in 2013. However, the share of LNG may grow, since the EU's LNG terminals have unutilised capacity, new LNG terminals are under construction, and the USA may become an LNG exporter (Eurogas, 2014). It remains to be seen what LNG export volumes by the USA will amount to and where the USA will ship its LNG. Even if US LNG exports are non-existent at the moment (only 0.1 bcm in 2013), it should be borne in mind that US gas production has increased by 200 bcm since the beginning of the millennium (British Petroleum, 2002; 2014). Theoretically speaking, the EU could meet approximately a half of its total gas consumption with this extra gas production of 200 bcm in the USA (European Commission, 2014).

The littoral states of the Baltic Sea vary significantly in terms of their dependence on natural gas. Among EU countries in the Baltic Sea region (BSR), Lithuania is the most dependent on gas (gas covers some 30% of the country's PEC), whereas gas plays an insignificant role in Swedish energy consumption (accounting for only a few percent of consumption). Despite the varying importance of gas, all EU members in the Baltic Sea region are net importers of gas, excluding Denmark, which exports a few billion cubic meters of gas. Most Danish gas exports are sent to Sweden and Germany via a pipeline. The Danish Energy Agency (2014) estimates that Denmark will remain a net exporter of gas until 2025. Poland, on the other hand, will remain a net gas importer for years to come, since its shale gas revolution has so far produced more paper (media stories) than gas.

The region's non-EU members, Norway and Russia, are major exporters of natural gas. Norway exported over 100 bcm of gas and Russia over 200 bcm in 2013. Some 95% of their gas exports were conducted via pipelines. Over a third of Norwegian gas exports were delivered to the BSR, mainly to Germany. The respective share for Russia was one quarter, Germany being the major recipient of Russian gas within the BSR (British Petroleum, 2014). Until the construction of the Nynäshamn LNG terminal in Sweden in 2011, all gas to the BSR was transported via a pipeline. In December 2014, the region's second LNG terminal was opened in Klaipeda, Lithuania. Poland will be the third BSR country to open its own LNG terminal. The Polish LNG terminal is scheduled to begin operating this year. Finland plans to finalise several small-scale LNG terminals and one large-scale unit on its territory by the end of this decade. In addition, Estonia and Latvia may construct their own units.

The construction of LNG terminals is important to the diversification of the aforementioned countries' gas supply, since 100% of gas consumed by Estonia, Finland, Latvia and Lithuania originated from Russia prior to December 2014. The respective share for Germany is 30-40% and for Poland it is 60% (Liuhto, 2014). Russia has traditionally been the dominant gas supplier within the BSR. Although Russian gas dominance within the BSR will decrease, the country will nevertheless remain a strategic supplier of gas and other fuels in the region. Whereas Russia was earlier considered as a reliable energy supplier, Russia's gas disputes with Belarus and Ukraine, and the contemporary Ukrainian crisis has shaken this image, accelerating the process of diversification among gas importing countries in the BSR countries.

The global gas revolution may lead to rather unexpected reactions on the Russian side as well, including the construction of an LNG sending terminal on the BSR shoreline. Furthermore, Russia may erect an LNG receiving terminal in Kaliningrad in order to guarantee the gas supply to this region, which is sandwiched between Lithuania and Poland. In this respect, it should be remembered that the Kaliningrad region is heavily dependent on gas deliveries from the mainland and all natural gas to the region is transported via Belarus and Lithuania. LNG terminals may therefore also improve the energy supply security of Russia.

The LNG import terminal boom is not the only phenomenon reshaping the BSR's energy supply. Germany's decision to close down all of its nuclear power stations by 2022 (Energiewende) is probably an even more profound game changer in the region, as Germany is the EU's largest energy consumer and some seven percent of its PEC was met by nuclear energy in 2013 (British Petroleum, 2014). The strategic significance of nuclear power to Germany can be illustrated by pointing out that Finland could meet nearly all of its energy consumption based on the German nuclear power stations to be closed approximately 2,000 days from now.

Mayor **Aleksi Randell**, Chairman of Centrum Balticum Foundation, asked me to produce a topical policy briefing for the annual BSR Forum of Finland, to be held in Turku on the 4th of June, 2015. In response, I have brought together an international team of some 20 experts representing most littoral states in the region. I hope that this policy briefing makes a positive contribution to the discussion of a secure and predictable energy supply within the BSR. I would like to thank all of the authors who have dedicated their time and experience to producing this publication. Since the trade in energy can enhance international co-operation, I would like to finish this introduction with the words of **Dwight Eisenhower**, who stated the following in an address he gave after the Second World War (Life, 1947, 89): "*Though force can protect in emergency, only justice, fairness, consideration and cooperation can finally lead men to the dawn of eternal peace.*"

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The global gas market: An international perspective

Pål Rasmussen

Executive summary

Natural gas has become fundamental part of the global energy mix. The increasing reserve base and well developed technical and commercial infrastructure place natural gas in an excellent position to be part of the long-term solution in meeting the global energy challenges. Benefits of using natural gas range from improved air quality in towns and cities, improved working conditions, a cleaner and more efficient local economy, more competitive energy supplies with better security and the prospect of prosperity for all. From an international perspective, we see the global gas 'revolution' as an ongoing dynamic and evolutionary process in which natural gas technology, investment and trade continue to develop and spread throughout the world.

In this article, we will review some of the step changes in economics and politics that have created challenges or stimulated the global gas market since the start of this millennium, and discuss the implications for key regional energy markets, such as the Baltic Sea region. We should also remind ourselves of the 'gas chain' that has been the fundamental basis for long-term natural gas investment and expansion. We are now entering a new era, in which shorter-term and smaller scale investment is equally important, and this has fundamental implications for new markets and new uses of gas in all its forms.

IGU has no doubt that minimising pollution and mitigating climate change must be central features of sustainable energy policy, both locally and globally. But policy makers must not forget the important role that natural gas already plays in helping us achieve a low-carbon future. Not only is natural gas the perfect partner for intermittent renewable energy sources, switching to natural gas now, instead of using more polluting fuels, is often the most efficient and timely solution.

Finally, we will look briefly at how companies are adapting to the continuously changing international energy business. There are exciting developments taking place in the Baltic Sea region. Although the gas market here is small-scale by global standards, the Baltic Sea region is at the cutting edge of technology and is developing a gas industry with potentially wide impact.

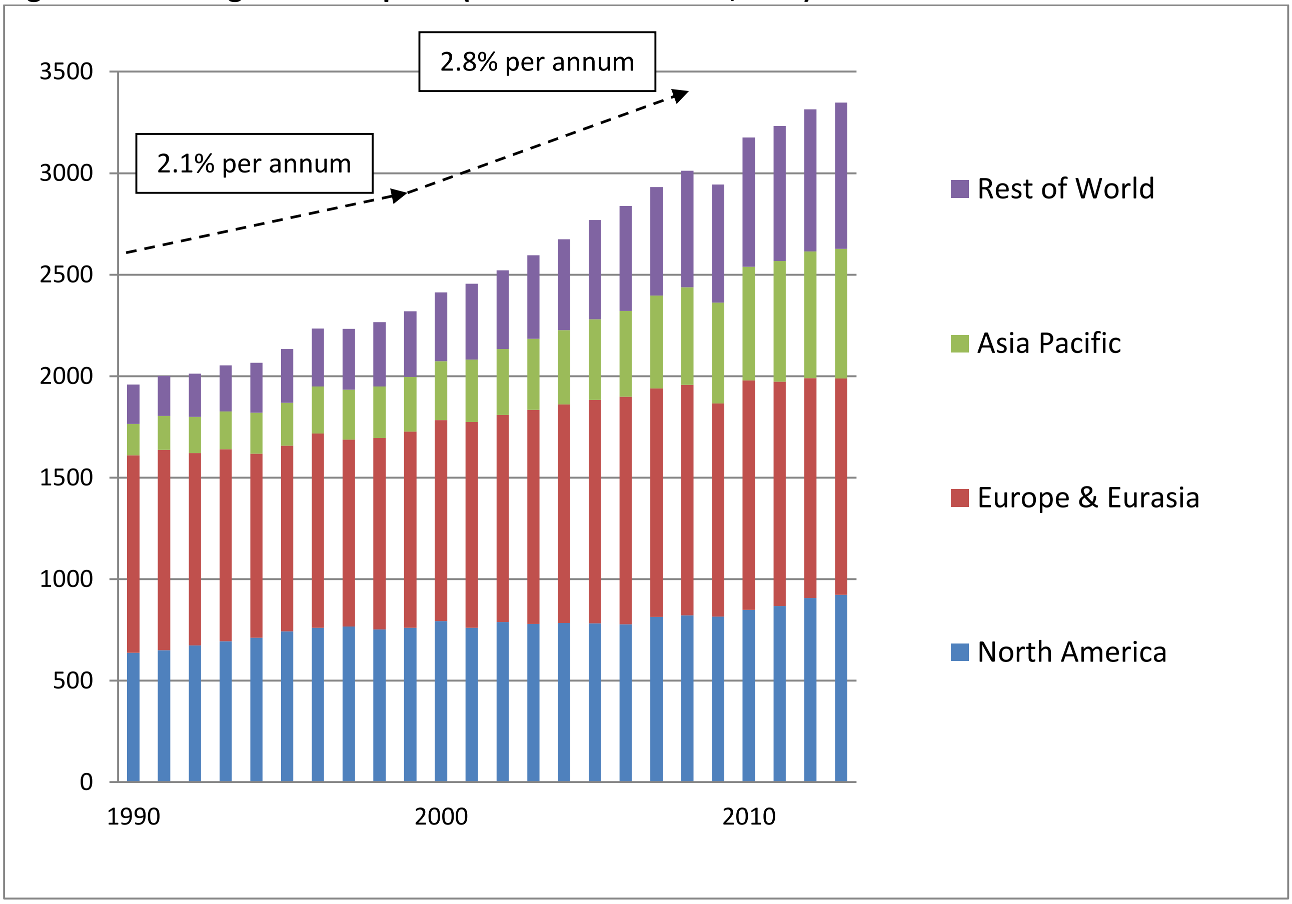
Events that have influenced recent gas market development

Fifteen years ago, at the beginning of the millennium, the world had experienced a decade of economic growth built in part on increased international trade and supported by greater freedom in global capital markets. The current drive for a low-carbon energy solution had its roots in this period too, with the 1992 UN Framework Convention on Climate Change, which committed National signatories to reduce their emissions of Greenhouse Gases. This led to the adoption of the Kyoto Protocol in December 1997, which entered into force in February 2005. This was also the decade of new developments in information technology and web-based communication that were to survive the '.com bubble'[1] and become the mainstay of many activities in the world today.

[1] Following the establishment of the World Wide Web, many new information technology companies were founded in the mid—late 1990's, and most internet-based stock prices rose rapidly. Some companies then collapsed completely

During the 1990's, the gas industry continued to invest for the longer-term, and as we entered the 2000's gas market growth, which had averaged 2.1% rate over the previous ten years, was set to increase to an average of 2.8%. People active in the gas industry could see the benefits of natural gas and there were optimistic forecasts about even stronger growth of global and regional gas markets.

Figure 1. Annual gas consumption (billion cubic meters, bcm)



An important political event in the Baltic region took place in June 2004, when Estonia, Latvia, Lithuania, and Poland joined the European Union along with the Czech Republic, Cyprus, Hungary, Malta, Slovakia and Slovenia. This profound enlargement of the European Union has brought further challenges and opportunities for the integration of the 'Internal Energy Market', not least for investment in natural gas infrastructure and diversity of imported gas supplies for Europe.

But, let's fast-forward a few years to 2007, when a financial crisis was starting to cause some of the world's largest banks to fall into administration. At the same time commodity prices, including energy, were rising: the following year, oil peaked at over $140/barrel (bbl) during the summer. Despite this, as seen in Figure 1, 2008 was the year that global gas demand reached 3000 bcm for the first time. But then, the effects of the global economic downturn started to bite and demand in several markets collapsed with severe effects on manufacturing industry and on energy demand, notably in some developed economies.

when this '.com bubble' burst, while others recovered to establish global positions in new forms of communication and commerce.

Furthermore, 2009 began in Europe with a disruption of Russian gas supplies through Ukraine. Although this was resolved more quickly than the similar contractual dispute in 2006, the disruption led to concerns about supply security and a renewed interest in geopolitics and the need for energy diversity. Globally, the economic squeeze reduced energy demand even with oil prices tumbling to below $40/bbl and natural gas prices falling too. For the first time in recent history, annual global gas demand decreased significantly (by 2.3% in 2009 compared with 2008).

The long-term outlook for the gas industry seemed very challenging, particularly in Europe. Overall, however, the IGU 2030 Gas Industry Study, presented at the World Gas Conference in Buenos Aires, looked forward to natural gas increasing its market share from 22% to 25% of global energy consumption, and an even higher percentage if Governments would properly recognise the environmental benefits of natural gas.

The new decade started optimistically, but April 2010 was to be a month of disruption and disasters; Volcanic ash from the eruption of Eyjafjallajökull in Iceland led to the closure of airspace over most of Europe and a few days later the Deepwater Horizon drilling rig explosion killed 11 people, caused the rig to sink and oil discharge in the Gulf of Mexico. The year overall saw a resurgence of natural gas across the world, while in the US natural gas prices stayed low and production increased to over 600 bcm, supported by the increasingly successful exploitation of shale gas onshore.

On 11 March 2011, a 9.0 magnitude earthquake caused a tsunami wave, which severely damaged the Fukushima Daiichi nuclear power plant. There were almost immediate political reactions across the world, including a decision by Germany to permanently close all its nuclear capacity by 2022. Separately, on a socio-political front, popular uprisings and demonstrations spread across much of North Africa and the Middle East in a phenomenon that became known as 'the Arab Spring'. 2011 was the year that the International Energy Agency (IEA) asked the question "*Are we entering the golden age of gas?*". Certainly this seemed to be the case for the global LNG market, which expanded by 10%. The shale gas 'revolution' was progressing rapidly in the USA. With self-sufficiency of natural gas in North America established, instead of importing LNG the industry was now signing the first export deals for future US LNG exports broadly priced at 'Henry Hub plus'.

By May 2012, Japan itself had shut down all its nuclear reactors, but thanks to LNG imports it was able to use natural gas to make up much of the 30% loss of power generation capability. Globally however, international gas trade changed little year-on-year and surprisingly LNG trade actually decreased. Whilst the global gas market had become better connected than ever before the high spot price for LNG and fierce competition with coal for power generation was having a dramatic effect. 2013 saw a return to modest gas demand growth of 1.4% in the global energy market.

During 2014, probably the most significant event was the decline in oil prices from well over $100/bbl to a range of $50-60/bbl by the end of the year. This has profound implications for the natural gas industry and we will look at natural gas price movements late in this article. At the time of writing, authoritative global demand data for 2014 is not yet published, but indications are that the gas market has continued to expand, despite a further squeeze in Europe caused by slow economic growth, highly-subsidised renewable energy and warmer than average temperatures that reduced demand for space heating. Natural gas consumption in the European Union actually decreased by 11% to 409 bcm in 2014, and the industry is seriously considering strategic adjustments for the future.

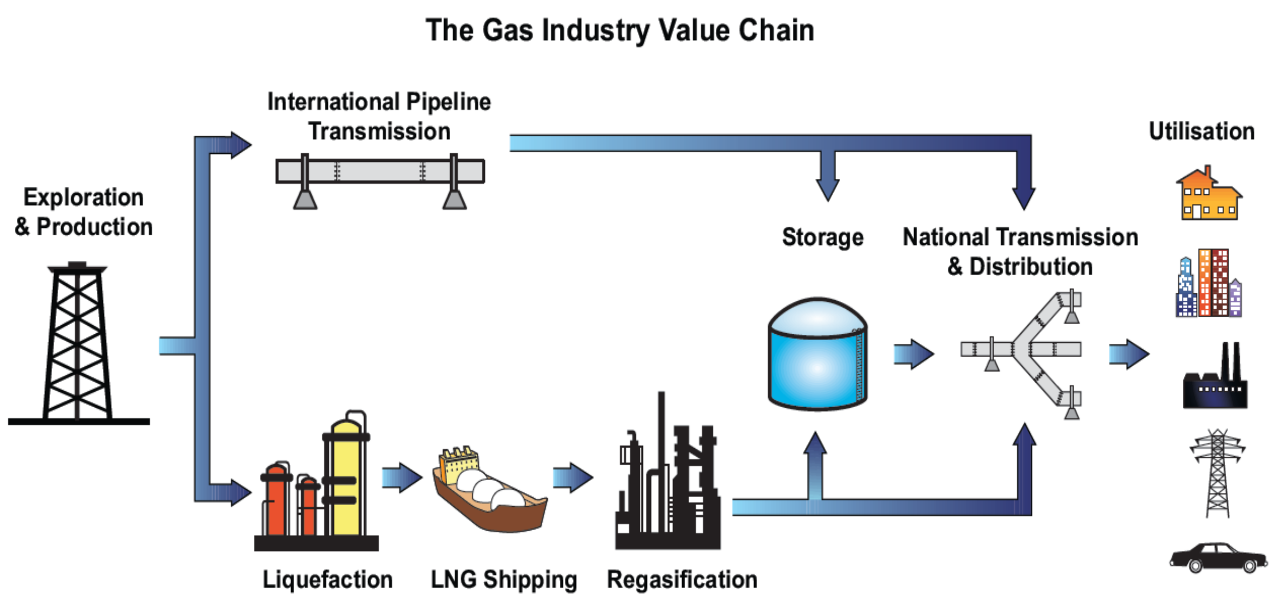
Throughout all this, the natural gas industry has developed and adapted to change. As the gas business has grown globally the interactions across the world have become increasingly significant, in particular with many more countries involved in LNG trade. International relationships and trade in natural gas will be even more important in the future. This is particularly the case in Europe, where the decline in indigenous gas production seems inevitable. Reshaping the gas market in Europe to be ready for future challenges may well need to take a new course. There will still be 'mega projects' in other parts of the world, and there may well still be significant natural gas resources to be found and developed in some locations in Europe, but we are already seeing a new approach to the gas value chain developing.

So that we can explore this phenomenon, I would like to describe briefly the traditional gas business, including some basic technical information, so that we can understand better the investments throughout the gas business and how they have been linked into a value chain. This structure is now starting to behave like a global network, with new delivery routes, new market sectors and new market participants doing business in new ways.

The natural gas value chain

Natural gas is a mixture of hydrocarbons, of which by far the largest component is the simplest hydrocarbon, methane (CH_4). Methane is an odourless, colourless, non-toxic gas which is lighter than air. Synthetic natural gas and bio-gas are examples of increasingly important components that are being integrated into natural gas systems, but conventional and unconventional natural gas production, still provides more than 99% of global gas supplies. The gas business throughout the world has involved long-term investment 'from drill bit to burner tip' to bring natural gas to final customers. The IGU diagram (Figure 2) illustrates, in a simplified form, the main components of the traditional gas value chain.

Figure 2. The gas industry value chain



Exploration, production and processing

Most of the natural gas that has been discovered so far was almost certainly formed by similar biogenic processes to those that created oil reserves. Over millions of years the residues of decomposed organic material under intense pressures and temperatures, have become hydrocarbon minerals, including natural gas. These hydrocarbon minerals can be found both in the original source rock where they were formed (including shale formations) and also in more porous reservoir rocks that are the conventional oil and gas fields.

Natural gas also includes some heavier hydrocarbons, such as ethane (C_2H_6), propane (C_3H_8), butane (C_4H_{10}), and there can be a wide range of different non-hydrocarbon gases that also occur in the mixture in the reservoir rocks. Indeed, gas production has often been a by-product of oil production and is then termed 'associated gas'. Three different types of natural gas production can broadly be categorise by the type of reservoir.

- 'Dry gas fields' requiring very little processing of the reservoir fluids needed to achieve pipeline quality gas;
- 'Condensate gas fields' in which the heavier natural gas hydrocarbons can be separated as natural gas liquids (NGLs); and
- Oil fields with 'associated gas', sometimes with a natural gas cap that can be produced separately or temporarily re-injected to enhance oil production.

Development plans and investment decisions depend on the expected relative revenue streams from the gas and liquid hydrocarbons, but even for dry gas fields the reservoirs themselves can vary in fundamental characteristics like the permeability of the reservoir rock. Extremely tight formations (for example shale gas reservoirs) require stimulation to enable the natural gas to be produced.

Natural gas is abundant, but the reservoirs that are simple in structure and closest to markets tend to be developed first. This means that investors may face a choice between developing remote conventional gas reserves or more difficult unconventional gas that is closer to the market and requires use of new technology. In practice both types of investment has occurred; as new technology is developed and proven the techniques can be applied more widely and the global economic reserve base increases.

Natural gas occurs in other forms, most notably as methane hydrate crystals. This is potentially a vast future source of natural gas, but for which at present production technology has not yet found an economically viable solution.

Once produced the natural gas is likely to need some processing. If it is dry gas with very few impurities then it might be sufficient to check the gas quality and make sure that it is adjusted to the correct pressure and temperature for the next stage of its journey. More likely, however, is that it will also be necessary to treat the 'wet' gas that has come from the upstream reservoir to deal with one or more components that need to be removed to satisfy the gas quality requirements for onward transportation.

International and national high pressure pipelines

The locations of natural gas reserves are more diverse than for oil, but even so a large proportion of natural gas needs to be transported from the producing countries and regions with more gas than is needed internally like Norway, Russia, Qatar, the Caspian area and North Africa to the consuming countries and regions with demand that cannot be satisfied by indigenous gas supplies, such as Japan, China and the European Union.

International high pressure pipelines provide direct links from producers to consumers. Good relationships with any transit country (through which the pipeline passes) are essential to maintain high reliability of gas supply. Technically, these high pressure pipelines are immense feats of engineering that continue to be the main way by which vast international flows of gas are transported. Because the pipeline usually locks the gas producer into a particular route to a certain market, the commercial and political conditions both in the transit countries and in the downstream market are crucial. This leads investors to favour projects that are backed by long-term contracts in which one party has a strong market position midstream or downstream.

Globally, however, there is, in total, far greater investment in gas transmission pipelines taking place within individual countries, for example in the USA and in China. The shale gas revolution in North America changed indigenous supply patterns and led to many new onshore pipeline projects to enable higher levels of gas production to be brought to market. In the USA, however, several of the main shale gas formations are relatively well positioned, either with good proximity to the final market or in economic reach of existing infrastructure. In contrast, the geographical challenge to deliver indigenous natural gas to the main consuming areas has been far more demanding in China. The final length of the second West-East Pipeline linking gas production in the west to consuming areas in the east was over 8,700 kilometres, including both east and west sections and eight branches, making it probably the world's longest natural gas pipeline. Construction of a third West-East Pipeline, to bring additional supplies from Turkmenistan as demand for natural gas in China continues to grow, is scheduled for completion before the end of 2015.

Liquefaction, LNG shipping and regasification

Gas liquefaction, so that natural gas can be more easily transported by ship (or occasionally by road tanker) to the market where it is then regasified, has become almost as important as pipelines as a means of international delivery of natural gas. Liquefaction involves pre-treatment to remove oil condensates, purify the natural gas from pollutants like sulphur or carbon dioxide, remove any traces of heavy metals and control the moisture level. Then the processed natural gas is refrigerated to reach a temperature down to approximately minus 161 degrees Celsius. This refrigeration process involves compression, condensation and expansion of refrigerants that exchange heat with the natural gas until it becomes a liquefied natural gas (LNG) occupying 1/600th of the volume.

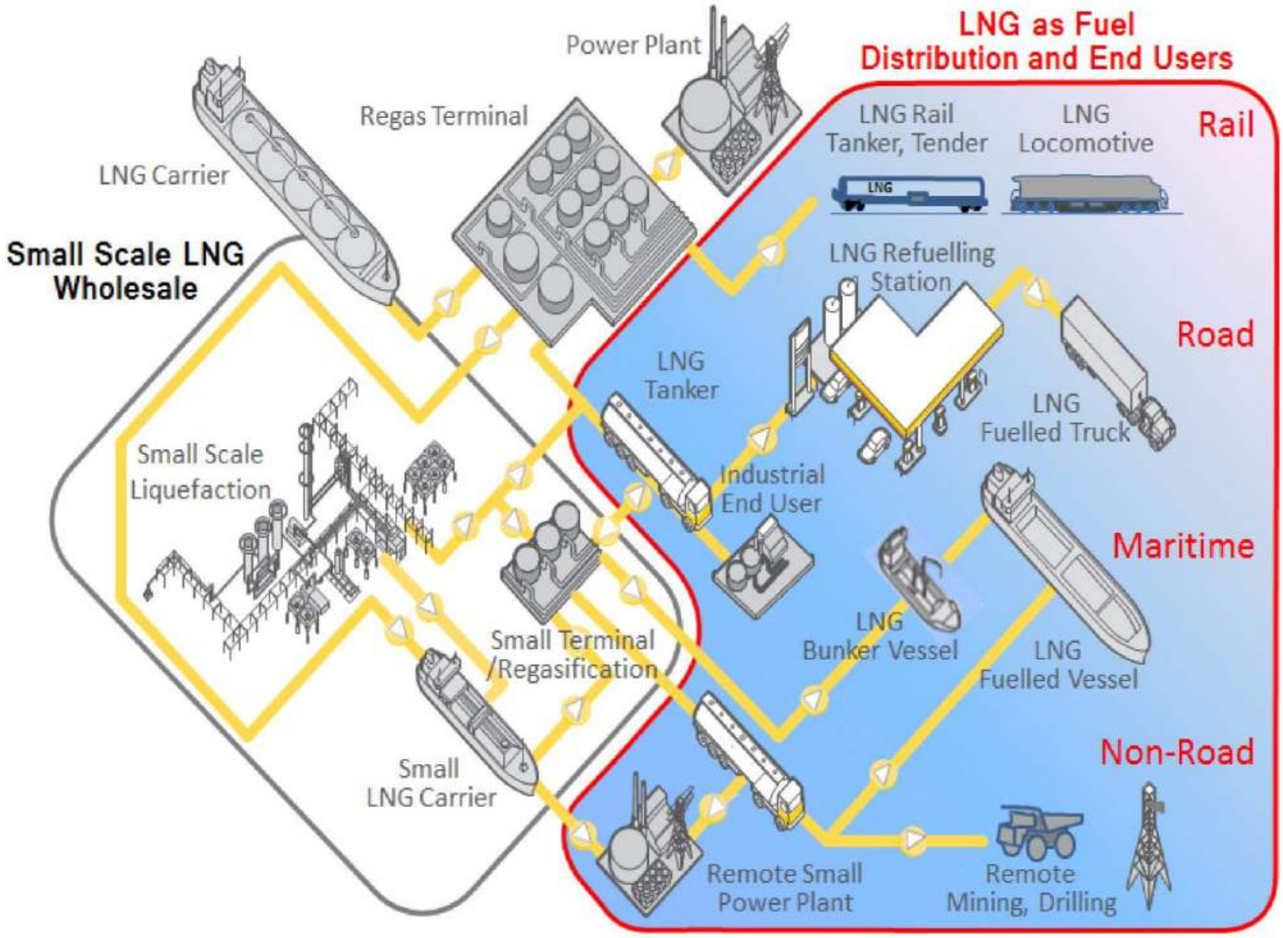
A large enough LNG fleet of ships (or road tankers) is essential to prevent bottlenecks developing in the supply chain. Since January 1959 when the Methane Pioneer set off for Europe with its modest cargo of liquefied natural gas from the Louisiana Gulf coast of the USA, international LNG trade has developed a global fleet that now amounts to over 380 active ships, the largest carrying up to 266,000 m^3 of LNG. Annual worldwide deliveries are equivalent to well over 300 bcm of natural gas, about 10% of global consumption.

Some countries have long been reliant on LNG, and like Japan and Korea have based successful downstream markets on a range of LNG supplies, but with the growth of international gas trade many more countries now have LNG reception terminals and there is a flourishing market in LNG deliveries and diversions to the markets with highest value. This flexibility is of course only possible when there are sufficient ships available (a diversion may well result in a longer route) and sufficient capacity in the regasification terminals to where a ship might be diverted. The capacity in the regasification terminal comprises not only the delivery slot to enable the ship to be unloaded, but also short-term storage of the unloaded LNG and regasification (in which LNG is warmed up) before compressing the natural gas into a national or local transmission pipeline.

LNG is set to be an exciting growth area, with bold and innovative solutions being applied both upstream and downstream. An example of upstream innovation is the Shell operated Prelude gas field development off the NW coast of Australia. Rather than pipe the produced gas to the shore, the project involves a very large liquefaction ship that will float above the gas field and load LNG into conventional LNG carriers for onward delivery to market.

Downstream, there are many more innovations in the LNG market, as illustrated in Figure 3, which is taken from the IGU 2015 LNG Review. The 're-export' market from receiving terminals is evolving to distribute LNG as a fuel to further downstream markets. Thus supplying off-grid networks with gas and fueling the heavy trucking business (e.g. in China, the USA and Europe) and bunker business for barges notably in Europe. In the not too distant future we might also see the deep sea shipping fleet becoming an important market for LNG.

Figure 3. Distribution and use of LNG



Storage

The ability to liquefy natural gas means that it can be stored and made available at very high delivery rates, but the process of liquefaction and storing LNG is often expensive. In many parts of the world gas demand is very seasonal and the storage of very large volumes of gas that are needed (for example for residential space heating in northern hemisphere winters) is best achieved underground in natural geological formations, particularly if such structures can be found near the local pipeline grid that serves the centres of gas demand. Most of these structures used to be oil or gas reservoirs, which benefit from unproduced 'cushion' gas as well as confidence that the natural integrity has been proven for containing reservoir fluids at high pressures. Occasionally the geological conditions are right for gas storage in highly permeable rock that benefits from a hermetically sealed cap, like the sandstone formation in Latvia that allowed the development of the 4.4 bcm (2.3 bcm working volume) Inčukalns Underground Gas Storage (UGS) Facility, one of the largest in Europe.

In all forms of UGS an important component of the storage facility is the 'cushion' gas that remains in the store so that a reasonable withdrawal rate can be achieved. The 'working gas' in the store is injected (compressed) into the UGS on top of the cushion gas and it is this working volume that is taken out for the heating season or for other commercial reasons during the storage cycle.

Another form of UGS, which offers potentially higher delivery rates albeit sustainable perhaps over a number of weeks rather than throughout the winter months, is salt cavities. Here, the storage cavities of the optimum shape and size are leached out from the underground salt formation.

The ability of storage facilities to add flexibility to the gas network and to help balance the inputs and off-takes of gas suppliers is extremely important. Increased use of intermittent renewable energy sources creates more stress on energy grids. The ability of fast-response gas storage to respond to within-day fluctuations is allowing new dynamic ways to use storage, particularly for portfolio optimisation and improvements in overall efficiency in liberalised markets.

In comparison with the difficulties of storing electricity or stockpiling coal, natural gas provides very efficient and highly effective ways of storing potentially vast amounts of energy with minimal impact on the environment and with the ability for rapid response through already connected networks. In aggregate this may also provide sufficient flexibility for national or regional 'strategic' purposes.

Local transmission and distribution

The energy carried though a typical gas transmission pipe is far more than can be transmitted through the biggest high voltage electricity cables. Gas in the transmission system is at high pressure (typically 50-80 bar) and, depending on the final use, may pass through a series of pressure reductions, metering and quality checks leading to low pressure distribution pipeline systems with their own pressure and flow controls and final metering at the supply point of the end consumer. Technology is enabling gas operations and gas markets to develop in ways that should lead to further efficiency improvements in grid operation and utilisation. Smart grid technology as well as Smart metering still have a long way to go but have already demonstrated significant fuel savings through grid optimisation at Transmission level.

The regulatory focus in competitive supply markets tends to be on the pipeline systems, with regional groupings of energy regulators aiming to enable third party access (TPA). In Europe, of course, we have ACER, the Agency for the Cooperation of Energy Regulators, which is instrumental in encouraging a consistent approach to all the gas transmission grids in the EU. Other regional regulatory initiatives aim to foster competition and introduce incentives particularly for the interconnection or expansion of gas infrastructure in less developed markets.

Whilst transmission and distribution pipelines can become relatively safe cash-generating assets in a mature market, the initial investment typically requires large capital input for a low-margin business that is not providing an economic return until the market has grown, and may take decades to reach payback. Initial downstream investment is often at least partially in public ownership, with the distribution (pipeline) activity in the same company as the local monopoly gas retail business. Clarity about government policies for public and private ownership is essential to avoid problems for potential investors. The regulatory regime must also be clear, so that the access conditions are understood and the tariff structure does not distort the market.

LNG provides an alternative approach to the local distribution of natural gas, by LNG road tanker (sometimes referred to as a virtual pipeline). As the markets expand for natural gas as a land vehicle fuel, either as LNG or CNG (Compressed Natural Gas), as well as fuel for ships, the use of these 'virtual pipeline' routes could add greater flexibility and security to the energy system as well as enabling locations to be serviced that might otherwise be sub-economic.

Utilisation

The economic availability of natural gas combined with its qualities of efficiency, quality, reliability, convenience and responsiveness to the consumers' needs make it an ideal choice for a wide range of uses in many part of the world.

High efficiency gas boilers are the mainstream residential gas appliance in many countries. Commercial customers also prefer natural gas for space heating, either directly or as the fuel for a Combined Heat and Power system. Gas is also an ideal fuel for district heating systems and makes an excellent partner with intermittent renewable energy sources like wind and solar power.

Industrial gas demand requires a more competitive offering in relation to other fuels, but the proven high efficiency appliances that already exist for natural gas could be a springboard for further growth in the manufacturing sector.

Natural gas is also a useful feedstock for the petrochemical industry, and there are indications that this use is developing in some producing nations as an alternative to exporting LNG or constructing a new international pipeline.

Figure 4. Natural gas in the transportation sector

Source: IGU report Natural gas as a transportation fuel and IVECO.

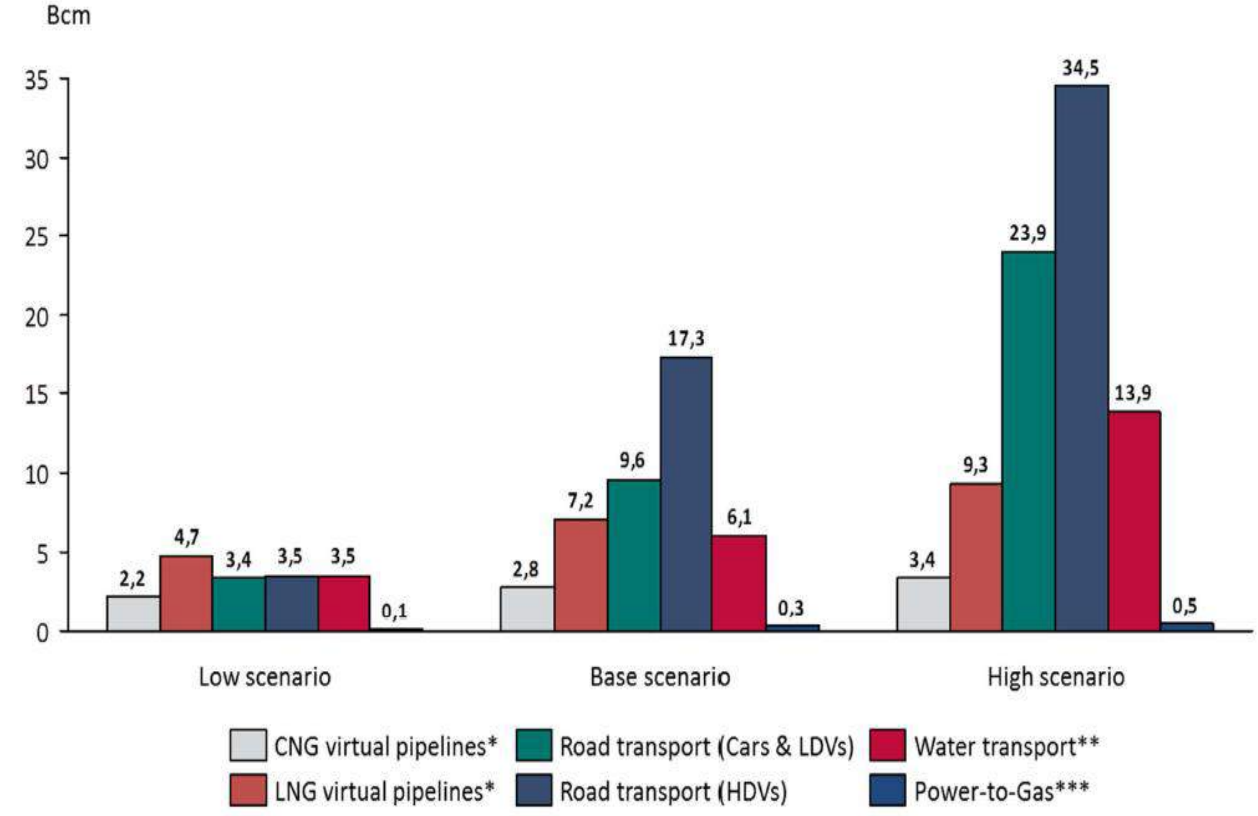
Whilst at a relatively low level, the use of natural gas as a transport fuel is possibly the most rapidly growing sector across the world. There are encouraging signs both onshore, with compressed natural gas fuelling millions more cars, trucks, busses and lorries, and offshore with LNG-fuelled ships being favoured over more polluting rivals in environmentally sensitive areas like here in the Baltic Sea region. The Gas Target Model for Europe, published by the Agency for Cooperation of Energy Regulators in January 2015, includes projections of new uses of gas in the EU across four main areas, which are closely linked either with renewable energy or LNG:

- Natural Gas Vehicles (NGVs) using CNG or LNG;
- Water transportation;
- Power to Gas (P2G) technologies, using surplus renewable energy; and
- Virtual Pipelines (Truck loading of LNG).

With the right political support and economic stimulus, Figure 5 shows that the contribution from these sectors could be very significant on a European scale within just five years.

Globally, however, the use of natural gas for high efficiency, low-emission power generation remains the largest and most important growth sector, but the prospects vary across different regions of the world. How much and how rapidly the global gas market will grow is dependent on fundamental economics, which in turn are influenced by political attitudes to energy and to climate change.

Figure 5. ACER gas target model assessment of 'new uses of gas'



* Virtual pipelines: supply of CNG and LNG filling stations not included in the values
**Water transport: data used are projections for 2020
*** Power-to-Gas: hydrogen output converted to natural gas equivalent, using GCV of Russian gas

Wholesale gas prices and how they are formed?

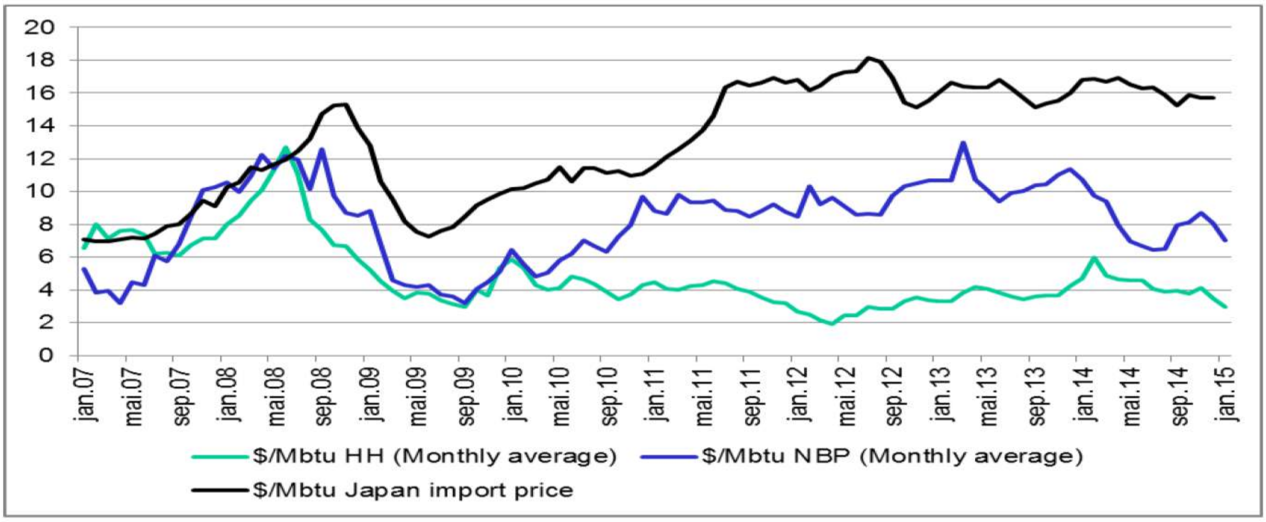
Natural gas prices, and how they are formed, influence the economic viability of investment and market development. One aspect of the IGU Committee work over the last ten years has been to monitor wholesale gas price trends. There are several aspects to this work, which are described in detail in the 2015 Report by the IGU Strategy Committee.

Whilst the global energy markets are better connected than ever before, the average wholesale natural gas prices at the beginning of this year at Henry Hub in the USA were under $3/million British thermal units (mmBtu), Europe was around $7-8/mmBtu and Japanese LNG over $15/mmBtu.

Figure 6 shows how natural gas prices rose in these three markets during 2007 and 2008, and then collapsed following the oil price fall in summer 2008. Wholesale gas prices are formed in different ways throughout the world. Where price formation is based on traded gas markets, as in the USA and the United Kingdom, an adjustment to the perception of available supply and demand for natural gas is quickly reflected in the wholesale price. Price formation that contractually links the natural gas price to an index of a competing fuel (e.g. crude oil as in many Japanese LNG purchase contracts, or oil products as in many Russian international sales contracts) both delay and dampen the changes. By the summer of 2009 natural gas wholesale prices across the world had 'bottomed-out', but with the oil-indexed prices remaining significantly higher than the traded gas market prices.

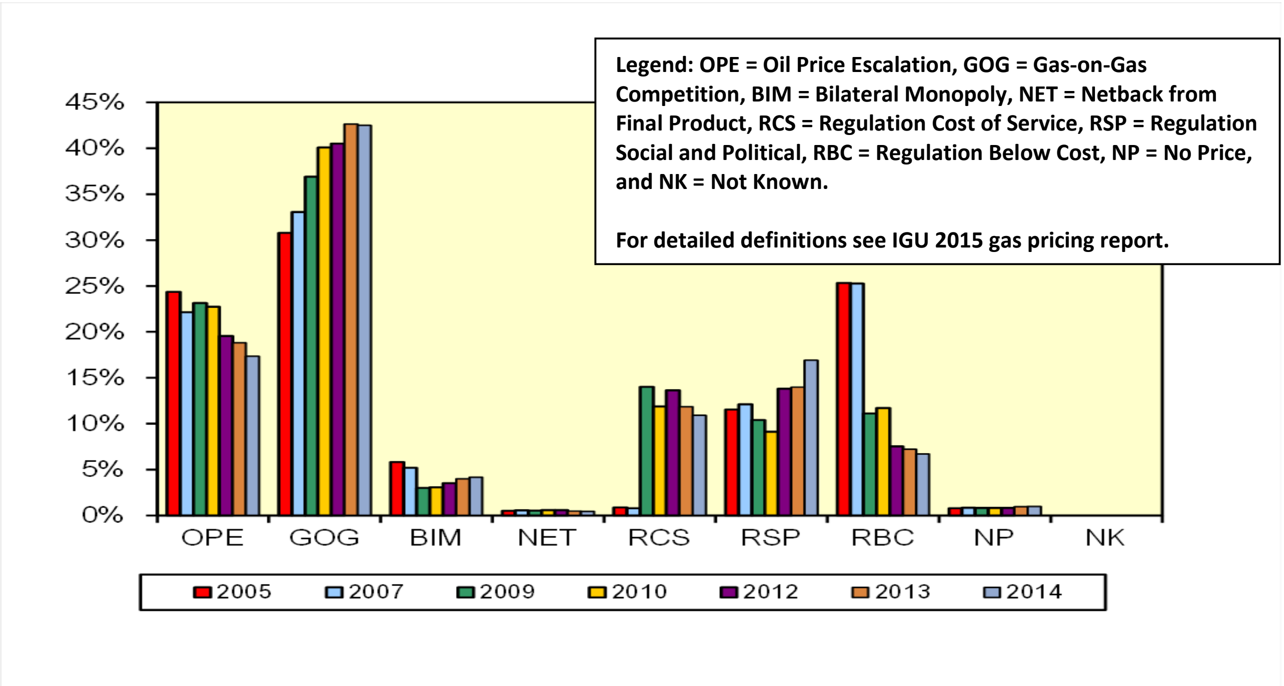
Then, in 2010 divergence into three clear pricing areas occurred, with the US shale gas surplus keeping Henry Hub prices low and, with no physical ability to export the surplus gas (instead the USA exported some displaced indigenous coal) while the gas prices in Europe and Asia were pulled up by the higher oil price and the increased gas demand.

Figure 6. Average wholesale gas prices in Japan, the United Kingdom, and the USA



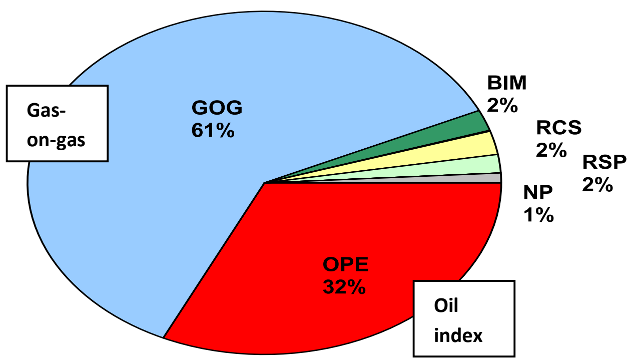
IGU has carried out several surveys to determine how the methods of gas price formation have changed over the last decade. During this time there has been a slow movement away from 'oil'-indexation and an increase in gas market based pricing where this is technically possible. Regulatory and government determinations of wholesale gas prices still remain important, particularly in less developed markets, but the types of regulatory controls are themselves changing to more cost-reflective methods.

Figure 7. Global trends in wholesale gas price formation mechanisms



The trend towards wholesale natural gas prices being based on the prices in traded gas markets has been driven by the expansion of gas-on-gas competitive markets in which consumers have been able to seek suppliers with the lowest price offerings. At the same time, the contractual linkage of the natural gas price to relatively high-priced oil products has placed the agreements with traditional large gas supplying countries like Russia under considerable pressure. With the fall in oil prices the differential between oil-indexed and gas hub traded prices is now changing. But already in Europe[2] overall, as shown in Figure 8 there has been sufficient confidence in the traded gas markets to link more than 60% of the physical wholesale gas sales to the prices at gas hubs in competitive markets.

Figure 8. Price formation mechanism for wholesale gas in Europe in 2014



Legend:
OPE = Oil Price Escalation, GOG = Gas-on-Gas Competition, BIM = Bilateral Monopoly, RCS = Regulation Cost of Service, RSP = Regulation Social and Political, RBC Regulation Below Cost, NP = No Price,

For detailed definitions see IGU 2015 gas pricing report.

A partnership with renewable energy

There is a growing realisation that natural gas can be a perfect partner for renewable energy. There are, however, difficult challenges in making investment decisions in capital intensive projects when the plant is not expected to operate most of the time.

Some bespoke projects already successfully combine gas and renewable energy because of the local circumstances, but in general an energy market design is needed to ensure that there can be widespread and large-scale implementation.

The way natural gas is priced can also influence whether the best environmental choice are made, and this can work both ways. Where the wholesale natural gas price is too high then efficient low emission gas-fired CCGTs cannot compete with cheap coal-fired plant, whereas if the gas price were unusually low (as occurs in parts of the Middle East, for example) then worthwhile renewable energy projects face undue economic barriers.

Governments or their agencies have an important role to help the market achieve the best economic solutions for sustainable and secure development of the energy system. Among the things that IGU has recommended are:

- to encourage investment in research and technology to deliver their political objectives;
- to avoid picking winners and losers, but rather to incentivise those industries that deliver results (e.g. better to have a ‘cost for carbon’ than ongoing subsidy of a particular source of energy);

[2] The countries in the IGU definition of Europe are set out in the IGU Strategy Committee 2015 Report.

- to ensure that there are no undue subsidies or taxes that distort the market; and
- to see first if the removal of existing incentives or obligations would be a more efficient solution than adding a new incentive or obligation on energy companies.

There are already signs that, with such good practice, the world might be turning a corner and getting CO2 emissions on a downward trend. In March 2015, the IEA announced that global anthropogenic CO2 emissions had stabilised in 2014 while world GDP increased (by 3%). This was the first time in 40 years that the global economy grew without increasing emissions, and was attributed to changes in energy consumption patterns in China and OECD countries. Increased use of solar and wind energy no doubt contributed to this success, but the continuing shale gas revolution in North America combined with the expansion of the Chinese natural gas market were probably decisive factors that have enabled CO2 reductions from the world's two dominant energy consumers.

Adapting gas business models to the changing energy world

Investor groups associate companies with a particular part of the natural gas value chain because the risks, required skill sets, and critical success factors vary considerably. Often there are different laws and fiscal systems governing the upstream, midstream and downstream components. To manage the commercial risks, however, companies have often sought to integrate along the value chain, particularly if there are is no developed trading hub available to enable them to manage price and volume risks.

Throughout the gas chain the investor assesses and manages the risks in the hope of achieving a return on their investment. Commercial risk relates primarily to the investment and operating costs and the volumes and prices of gas. Political and regulatory uncertainties can be the determining factor as to whether or not the commercial risk is acceptable.

Whatever the prevailing ideology and legislative systems, successful natural gas development and continued industry growth needs to be based on co-operation and mutual commercial prosperity all along the value chain.

Business models, however, continue to change. Physically, the gas industry still relies on large infrastructure to create the backbone of the business, but increasingly there are many smaller projects that, joined together, create an even stronger market. We can image this as a large single chain being slowly replaced by a woven mesh that is both more flexible and more resilient for the benefit of the final customers. Within this mesh there should be room for local energy sources, whether synthetic natural gas, bio-methane or shale gas, as well as a diversity of traditional and conventional deliveries of LNG and pipeline gas.

In conclusion: the Baltic Sea regional gas market in focus

The gas market in the Baltic Sea region is quite diverse internally, but until recently it was characterised by a lack of connectivity with the rest of Europe and a lack of supply diversity in most countries. There have already been some investments made to address these issues, notably with the LNG reception terminal at Świnoujście in Poland and the Klaipėda floating LNG storage and regasification facility in Lithuania. Since 2010 Finland has had an LNG production facility in operation at Porvoo in the South of the country. Plans for LNG terminals at the port of Turku and at Tornio in the North aim to bring LNG directly to Finland, making the gas and fuel markets more versatile and supplying LNG for vessels operating on the Baltic Sea. There are several other LNG import, storage or redistribution projects under consideration, including a large-scale terminal at Inkoo near the landing point of a proposed Baltic Interconnector offshore pipeline linking the Estonian and Finnish gas markets. A further dimension would be a St Petersburg LNG facility. This idea was re-launched last year as a project in which the plant's output would be supplied to the Kaliningrad area and also used for bunkering and small LNG cargoes in the Baltic Sea region.

Encouraged by the new SECA (Sulphur Emission Control Areas) rules, ferries are changing fuel to LNG. In Sweden (Gotenburg), ferries have already switched to LNG as bunker fuel, being much more environmentally friendly than the Marine Fuel Oil that was previously used

In addition to the well-known Nord Stream offshore pipeline development, there have also been enhancements to the onshore pipeline systems to allow reverse flow from Germany to Poland, and to increase the capacity to Denmark and Sweden. Plans for further interconnection seem limited because of uncertainty about future gas demand growth in the region. Transporting gas as LNG may well allow better economic options in such cases.

In Poland, where natural gas is recognised as an environmentally advantageous replacement for coal-fired power generation and where indigenous shale gas production remains a real possibility, the national demand for natural gas is expected to rise significantly. In some countries in the Baltic Sea region however, the national energy plans suggest that natural gas consumption is expected to be displaced by renewable energy. Each country may well have a different optimum balance, but we can learn two lessons from what is happening in the rest of Europe and indeed throughout the world. Firstly, gas markets that are better connected can support each other at times of stress or disruption of the energy markets, and secondly the increase in the use of intermittent renewable energy sources requires a reliable low-carbon partner such as natural gas. For a sustainable future it is important to retain, and better to grow, the share of gas in the energy mix.

Technology continues to develop and to provide solutions for the variety of energy challenges faced in the region. Here you are at the cutting edge, breaking new ground with the Klaipėda floating LNG terminal in Lithuania, exploiting bio-gas potential for vehicle transport in Sweden and creating Synthetic Natural Gas from wood in Finland. Developments in the fuel and bunker market already make this the primary local growth area for LNG. Further developments in utilisation of gas in all its forms will help to expand the global market and establish natural gas new sectors with overall benefits for energy efficiency and the environment.

We live in a complex world of change, with wide ranging risks that are faced by countries and companies. Here in the Baltic Sea region, as in the rest of the world, we need to strive for closer co-operation and to improve our shared commercial and technical understanding of what is needed to facilitate investment in the gas market. This will help to deliver a secure low-carbon energy future for us all.

Let the dynamic evolution continue!

LNG in the Baltic Sea region in the context of EU-Russian relations

Tatiana Romanova [1]

Executive summary

1) EU-Russian relations oscillate between market relations and geopolitics. They are now in their geopolitical phase, with both Moscow and Brussels doing their best to minimise mutual dependence and to diversify export markets or suppliers respectively. The Baltic Sea region has, therefore, become a showcase of the EU-Russian diversification race rather than a testing ground for deeper co-operation (as it was previously conceptualised).

2) Both Russia and the EU have multiple LNG projects, many of which are located in the Baltic Sea region. Poland, Lithuania, Estonia / Finland and, possibly, Latvia implement them to provide alternative channels of gas transportation and to ease their dependence on Russia (and Gazprom as the only supplier). Russian LNG terminals are meant to supply Asian markets, EU member states, which at present are not supplied with Gazprom natural gas, or to provide an alternative channel of gas transportation to Kaliningrad.

3) The EU's Baltic projects were propelled by the geopolitical motivation. However, they also brought clear market benefits (decrease of Gazprom prices and, therefore, of the bill for final consumers). Moreover, EU LNG facilities have consistently tried to improve their market profitability. The key barrier here is the lack of co-operation among the EU member states, the wish of nearly every country in the region to benefit from an LNG facility of its own.

4) Russian projects, on the other hand, departed from the market rationale (diversification of export markets towards Asian consumers, which were ready to pay higher prices than European clients, as well as the interest to new, growing markets). They were also instrumental in bringing an end to Gazprom's export monopoly. Yet current decreases in Asian prices coupled with the Russian wish to diversify away from the EU's markets activate the geopolitical logics in the Russian projects.

5) There is a space for not only mutual diversification but also for EU-Russian co-operation in the field of LNG. However, given the current state of Russia's relations with the West and the profound lack of mutual trust, co-operation over LNG remains a remote, at best mid-term possibility.

Introduction

The year 2015 is noteworthy for the liquefied natural gas (LNG) as it is the 100th anniversary of the first commercial license for the liquefaction of natural gas and the 51st anniversary of the trade contract for the supply of LNG to Europe (from Algeria to the United Kingdom). Since that time trade in LNG multiplied while technologies for both liquefaction and gasification became cheaper and, therefore, more competitive vis-à-vis the traditional, pipeline natural gas and more accessible and commercially attractive. Initially LNG was an exception rather than a rule in Europe (terminals were

[1] I would like to thank Sean Berwald, MA student at the European University at St. Petersburg studying (Energy Policy in Eurasia Program), for his most useful and inspiring research assistance in the part dealing with Polish and Lithuanian LNG terminals. His masters thesis to be completed in June 2015 is centered upon the Klaipeda LNG terminal.

mainly located in Spain, France and Italy due to the specificity of their geography of supply). However, gradually LNG terminals spread to other parts of the European Union.

Several factors contributed towards the popularity of LNG. It brings an end to regional markets of natural gas, which emerged in the 20th century due to the constraints of gas pipelines. Global natural gas markets will offer a possibility of price arbitration and, ultimately, of fairer market conditions for the trade in natural gas. Furthermore, LNG is associated with a possibility of ending infrastructural dependence that is a characteristic of pipeline gas; of bringing more flexibility in the relations between producers and consumers (although most LNG facilities are still constructed on the basis of long-term contracts).

The Baltic Sea region joined the race for LNG facilities fairly recently. Lithuania opened its floating terminal in Klaipeda in 2014. Poland is to complete its project in Świnoujście in 2015. Finland and Estonia are fleshing the details of their shared LNG project. Latvia is contemplating a possibility of its own LNG terminal. This is a novelty in three respects. Firstly, it brings the end to the Baltic Sea market being dominated by pipeline gas. Secondly, the arrival of the LNG will limit region vulnerability vis-à-vis dependence on Russia with Gazprom's pricing, looking at times very arbitrarily (Table 1). Thirdly, it ends market isolation of the Baltic States as well as Finland and Poland, allowing them to join the emergent global market for natural gas.

Russia has also become involved in the LNG revolution. Its current strategy presupposes a significant increase in the production of the LNG. In addition to the facility, which functions in the island of Sakhalin, it plans to develop one or two new terminals for liquefaction in the Pacific region and several others in the Baltic Sea region, or in its vicinity. These are Gazprom's projects in Shtokman, Ust-Luga and Kaliningrad, Novatek's Yamal and Gydan facilities and the Pechora LNG, developed by the alliance of Rosneft and Alltech.

The key objective of this article is to put these LNG developments in the context of EU-Russian energy relations; to examine whether they break current patterns of EU-Russian energy relations or rather reaffirm them. The Baltic Sea region is a litmus test for EU-Russian relations as it is the territory where the partners come closest. As a result, in various frameworks (such as the Northern Dimension or EU-Russian Common Spaces) the Baltic Sea region has always been dealt with as a pilot region. The region is also very rich in the quality of EU-Russian relations because it includes both erstwhile critiques of Russia (such as Lithuania or Poland) and pragmatic partners, like Finland.

The article will briefly examine key trends of EU-Russian energy relations, it will then analyse LNG developments in the EU and in Russia and will conclude by outlining the consequences of these LNG developments for EU-Russian energy relations.

EU-Russian partnership: from integration to the race of diversification

EU-Russian relations are frequently described as oscillating between the two poles, markets and geopolitics: markets / institutions and regions / empires (Clingendael, 2004); market forces and geopolitics (Finon and Locatelli, 2007); geopolitics and multilateral governance (Westphal, 2006); and market governance and geostrategic approach (Young, 2007). In a very crude way, geopolitics is about power politics, the use of energy resource to pursue varying foreign policy goals, and about realist visions of international relations. Markets, in turn, are about energy resources being just a commodity, which moves globally on the basis of market principles and with the help of clearly defined institutions, it is about a liberal approach to international relations. The simplified version of this argument would state that Russia sticks to geopolitics, trying to use in particular natural gas as a foreign policy instrument, to coerce its partners into its policy line whereas the markets and institutionalism approach characterise the EU.

Table 1. Russian natural gas prices for the Baltic Sea countries (2013), USD per 1000 cubic meters[2]

Country	Prices in USD
Denmark	495
Estonia	442
Finland	385
Germany	379
Latvia	416
Lithuania	500
Poland	526

Source: FRE/RL, 2014.

However, a more nuanced approach is required to understand the specificity of EU-Russian energy relations. Russian propensity to use natural gas prices to reward or punish is well known and is well demonstrated by the difference in the prices and their formulas (Table 1) and by 'technical' interruptions, which many of its clients have encountered in the past. At the same time, Russian companies are interested in stable business relations, although their approach cannot always be classified as a market one and is rather shaped by the system of state capitalism, which is in place in Russia. Similarly, the EU cannot be characterised simply by market approach; rather it securitises its dependence on Russia from time to time, which leads to its geopolitical rather than market / institution strategy (limiting dependence on cheaper Russian gas, constructing pipelines / LNG facilities for alternative, more expensive supply, et cetera). Hence, rather than differentiating the EU and Russia as an illustration of two different approaches to energy relations, their relations should be examined as moving along the continuum 'markets – geopolitics'.

The EU's first significant shift to geopolitics in this millennium took place following the 2006 gas supply crisis when due to the disagreement between Ukraine and Russia, the supply to customers, whose gas transited Ukraine, fell. The EU finally became aware of its inability to extend liberalisation legislation on Russia. The EU concern led to a new Green Paper on energy security (European Commission, 2006) and Second Strategic Energy Review (European Commission, 2008), both called for the diversification away from Russia. The 2009 gas supply crisis underlined the need for the EU to diversify away from Russia. The EU's LNG imports surged as a result in 2010 and 2011 (Table 2) and new projects for regasification facilities were put in place while the construction of the others intensified.

However, the decrease in oil prices in 2008 (which led to the fall in the prices for natural gas, supplied by Russia on the basis of long-term contracts) and the overall economic crisis in the EU moderated this policy change. Furthermore, increased demand for the LNG from Japan (as a result of the Fukushima accident) meant that Asian LNG prices re-bounced and the LNG supply in Europe became short. Russia, in the meantime, stressed its good reputation of a stable and credible

[2] The accuracy of these figures is disputable at least. For example, the price for Lithuania, calculated on the basis of the official sources (LIE, 2014) was $ 462.07 in 2013, not $ 500. However, the table is mainly meant to demonstrate the wide variation in prices, calculated on the basis of the same methodology.

supplier. The temporary departure of Vladimir Putin from the Kremlin as well as the emphasis of Russia on modernisation agenda contributed to the shift of the quality of EU-Russian energy co-operation to the market pole. Poland and Lithuania, however, remained staunch critiques of Moscow and continued their LNG projects.

Table 2. European consumption and imports (billion cubic meters)

	2008	2009	2010	2011	2012	2013
European demand	583.7	550.4	585.4	541.1	531.8	526.2
Sources of supply Domestic production	309.0	293.3	295.8	275.0	274.5	269.2
Pipeline imports	217.1	190.4	187.9	185.4	190.1	201.5
LNG imports	57.6	70.5	89.2	89.4	66.0	48.2
Storage withdrawal	0.1	-3.8	12.5	-8.7	1.1	7.4

Source: Fattouh, Rogers and Stewart, 2015, 23.

The EU-Russian Energy Roadmap for the period to 2050, eventually signed in March 2013, dominated the discussion of that time. The Roadmap took note of the difference in the market regulation on both sides and some plans of diversification, but it presupposed the formation of 'a common, subcontinent wide, energy market' with 'gradual approximation of rules, standards and markets in the field of energy' and shared infrastructure (EU and Russia, 2013). Hence, the EU and Russia still opted for the mutually beneficial co-operation, although Lithuania and Poland voiced critique of authoritarian regulation in Russia and of the abuse of Gazprom's dominant position.

The current shift to geopolitics in EU-Russian energy relations started in 2012 and predominated in late 2013. Several events contributed to it. Firstly, Vladimir Putin's return to the Kremlin buried hopes of modernisation already by the end of 2012. Secondly, the geopolitical competition in Ukraine became acute in 2013 with Kiev postponing the association agreement and then going through a fundamental change in the political regime in 2014. Thirdly, Russian responses to the political changes in Ukraine (in both Crimea and Eastern Ukraine) made it look more aggressive than ever since the end of the Cold War and challenged the possibilities of business as usual between Brussels and Moscow. Both concerns about co-operating with Russia in the new circumstances in principle and about the dependence on Russian gas played a role for the EU. The situation was further aggravated by the uncertainty of the transit through Ukraine.

As a result the EU issued three documents one after another, that argued for the diversification away from Russia. The first one, a new Energy Security Strategy, was published in May 2014. It reminded EU stakeholders of the 2006 and 2009 crises of gas supply (due to the interruption of the transit though Ukraine) and classified 'strong dependence from a single external supplier' as the 'most pressing' security issue (European Commission, 2014a). It, therefore, called for the co-ordinated actions of the Commission and European External Action Service to improve solidarity, complete the internal market, moderate the demand and diversify the gas supply. The second document, which the Commission published in October 2014, was a stress test, which demonstrated the potential damage that interruption of the Russian gas supply to the EU could make (European Commission, 2014b). This document also flagged Finland and the Baltic States as most vulnerable in the case of possible interruption of the supply from Russia. Finally, the Energy Union communication (European Commission, 2015) reaffirmed the call for the diversification away from Russia (through the construction of the Southern corridor and LNG facilities).

In contrast to the previous crises, however, Russia did not attempt to dissuade the fears of the EU. On the contrary, Gazprom refused from the move to the downstream market in the EU by not renewing its request for the 100% use of the OPAL system, which links Nord Stream with gas consumers in Germany and neighbouring countries. The company also cancelled South Stream, which was blocked by the EU's demands to put it in line with the Third liberalisation package. Alexei Miller (2015) also proclaimed a departure from the model of mutual dependence to that of mutual diversification and Eurasian markets, in the Russian case. Furthermore, Russia intensified co-operation with China, and two major gas pipelines are in the agenda of co-operation with Beijing.

On top, interest of Russian companies to the production of LNG gas intensified (with the view of sending it to Asian and Latin American markets). Finally, Russian energy strategy for the period to 2035 (it is the 2009 document, revised and extended in 2015) stresses higher competition in the energy market and singles out fast entry to the Asian markets as the first priority for Russia. While admitting that European and CIS markets will remain key (and there is a need to overcome the current crisis with them), the new strategy foresees increase in the share of the Asian markets in the overall Russian gas exports from 6% to 31% and a corresponding improvement in the LNG production (Russian Federation, 2015).

Thus, the mutual race of diversification became well established in EU-Russian energy relations at present. LNG plays an increasingly important role in this process for both sides, which manifests itself in the Baltic Sea region. In order to investigate it in more details, the next part of this essay addresses the LNG in the EU's part of the Baltic Sea region while the final part will look at the LNG in the Russian North-West.

LNG in the EU (the Baltic vector)

The most recent strategic energy thinking of the European Union is expressed in its Energy Union communication. It promises to 'explore the full potential' of LNG and conceptualises it as "*a back-up in crisis situations when insufficient gas is coming into Europe through existing pipeline systems*", and as a leverage "*to bring world natural gas prices closer together*" (European Commission, 2015). The Commission recognises that "*LNG prices have over recent years been higher compared to pipeline gas due in particular to high liquefaction, regasification and transportation costs and demand in Asia*", however, these price concerns do not stop it from exploring the option of increasing the supply of LNG to the EU. Rather, the Commission takes its usual regulatory position, promising "*a comprehensive LNG strategy*" that will take into consideration necessary LNG infrastructure (including gas storage facilities) as well as barriers to "*LNG imports from the USA and other LNG producers*" (European Commission, 2015).

In sum, the document makes it clear that the EU will explore the option of LNG despite the price constraints (that is against the normal market logics). The benefits are twofold. The first one is supply flexibility, which eases the EU's dependence on Russia, at least in acute crises. The second one is firm linkage with the world prices, which will potentially allow EU member states to challenge prices for Russian pipeline gas, indexed after oil prices and perceived at times to be too high compared to other world prices. While the second benefit is in line with the markets' logics, the first one falls into the geopolitical game.

The Baltic Sea region is a relative newcomer to the LNG business but a very active one. The first large scale facility was completed in the end of 2014 in Lithuania and the second one is to be launched in Poland. These are two states, highly critical of Russia, and also those with the highest prices for Russian gas in the region (Table 1). Estonia, Finland, and Latvia also explore possibilities for LNG facilities.[3] In relative terms, Baltic LNG facilities are (and will remain) modest compared to existent and planned terminals in France, Italy, Spain or the United Kingdom (International Gas Union, 2014). However, in regional terms and in terms of EU-Russian co-operation they are game changers. They effectively transfer the region from the previous pattern (testing ground for deeper EU-Russian co-operation) to the testing ground of diversification but also of new market pressure on Russia. Let us look at these facilities in more details.

The first LNG project was started in 2008 in Poland after years of discussion. The PGNiG (Polskie Górnictwo Naftowe i Gazownictwo), key Polish energy company, signed a 20-year contract in 2009 with QatarGas for 2014-2034 before the construction was initiated in March 2011. According to the project documents (No author, 2010), the ground terminal will initially have the import capacity of 5 billion cubic meters (bcm) annually, to regasify and further transport via Polish transmission system (with the Polish annual consumption of about 18.16 bcm and imports of 12.37 bcm (US EIA, 2015), the facility allows to cover about 40% of its imports). The capacity of the terminal will be further extended to 7.5 bcm. The project documents also clearly state that the project is part and parcel of the "*national strategy to diversify Poland's gas supply and to improve continuous natural gas supply throughout the country*" (US EIA, 2015). It was initially planned that the terminal would become operational in the end of 2014, however, due to the financing problems, at the time of writing it is expected that the first LNG loads will only be taken in summer 2015. The costs of construction are some € 674 million, of which the EU provided € 147 million (LNG News, 2013).

The Lithuanian project was also started in 2011 and was completed in late 2014. In technical terms it is completely different; it includes a special floating LNG regasification terminal (completed and owned by Norwegian Hoegh LNG), which entered Klaipeda port in 2014. This terminal was commissioned before any long-term contract was signed, which is in contrast to the usual practice in the LNG business of today. It began its operation in December 2014 when the first Norwegian gas was delivered to Lithuania. The annual capacity of the Lithuanian terminal is 4.5 bcm, which is enough to cover not only 100% of the Lithuanian consumption but also a significant part of Latvian and Estonian gas demand (none of the three countries produce natural gas, their annual consumption in 2013 was 3.31, 1.47 and 0.65 bcm respectively, which makes 5.43 bcm in total (US EIA, 2015)). However, at present only a fraction of the terminal's capacity is used (0.540 bcm, this amount was contracted for the next five years from Norwegian Statoil). The LNG price is formed on the basis of the NBP spot prices. The final costs of the terminal, jetty and the pipeline amounted to € 206 million; Lithuania will also pay additional € 640 million during 10 years of renting of Independence tanker and its facilities.

[3] There are also multiple projects of small LNG terminals, mainly for the purpose of ship refueling, operational, under construction or planned in Sweden and Finland. They are not considered in this paper because they have no significance for EU-Russian relations.

The Lithuanian authorities have consistently (and much more vocally than in any other country of the region) emphasised the role of the terminal in assuring an alternative to Russia supply of natural gas. It is for this reason that the terminal and tanker is called Independence whereas its arrival and start of the operation was accompanied by the slogan "*An Island No More*", emphasising that Lithuania is no longer an island, insulated from the global gas markets and having to rely only on the supply from Russia. The costs of the LNG fluctuate a lot, so it is difficult to assess the commercial side of the project. It is for this reason that the so-called 25% rule was introduced in Lithuania (it obliges the state gas network company to buy at least 25% of its gas from the LNG). Various estimates were also made to prove that the terminal would bring some savings to Lithuanian consumers (whereas Gazprom officials send a message that final consumers will pay for the political whim of the Lithuanian political elite).

However, the Lithuanian terminal brought some significant commercial benefits almost immediately. Some of them were expected: Lithuania managed to renegotiate its contract with Gazprom and to receive a 20% discount for the Russian pipeline gas (to $ 370), supplied on the basis of the contract, which is valid until 2016. The overall commercial loss for Gazprom is negligible (both in terms of the loss of the share in the Lithuanian market or the reduction in price). Moreover, the discount is in line with the current strategy of the company (adopting long-term contracts to the new situation). However, the political impact on Gazprom is more profound. The terminal demonstrated the possibility to renegotiate the deal with the Russian monopolist, and to use it as a leverage in negotiating future supply. Furthermore, Lithuania was lucky as by the end of 2014 the Asian markets became saturated with LNG, prices fell and the excess of LNG was redirected to Europe, which contributed to further decrease of prices in the region. Although it was a sheer coincidence, it yet became a further justification of the terminal for Lithuania and a further illustration of how useful it was to seek independence of Russia with the help of LNG terminals.

What remains problematic for the Independence terminal, however, is the access to the markets of other Baltic countries. Estonia tried a purchase on 10th December 2014 (100,000 cubic meters were delivered through Latvia). The interconnector between Latvia and Lithuania was upgraded and Lithuanian LNG operator remains interested in the Incukalns gas storage facilities in Latvia. However, further supply is blocked for some years because of, at least, two barriers. One is the slow implementation of the EU's third liberalisation package for natural gas in Latvia, which inter alia presupposes full unbundling of the pipeline system. The privatisation deal of 1997, which gave Gazprom 34% of the shares of Latvijas Gāze (key energy operator in Latvia), equipped the latter with the legal monopoly for 20 years. Furthermore, Latvia also applied for the derogation from the third-party access provision of the third package (in line with the privatisation agreement). This barrier is temporary and will be terminated by 2017.

A more significant problem comes from competing projects. The most advanced is the Finnish-Estonian project, which has been negotiated for a few years by now. The European Commission rejected the initial proposal of the two neighbouring countries but Helsinki and Tallinn managed to come to another agreement by November 2014. Their project presupposes the construction of two facilities (a larger one in Finnish Inkoo and a smaller in Estonian Paldiski) and a 80-km Balticconnector between them by 2019. The capacity of the Finnish terminal is tentatively set at somewhere between 4 and 8 bcm, according to various sources (with the annual consumption in Finland at the level of 3.5 bcm (US EIA, 2015)) whereas the Estonian terminal will be much smaller, commensurate with the size of that market. The deal also presupposes future access to the Latvian gas storage capacities. The total costs of the Finnish-Estonian project are assessed as € 500 million. However, the implementation will depend on the availability of EU funding. Estonia also reserved the right to proceed with its own terminal in 2016 if the Finnish-Estonian project does not advance sufficiently by that time. Finally, Latvian authorities voiced a possibility of constructing their terminal, if the Finnish-Estonian project is not implemented.

In sum, the real threat to the commercial viability of the Lithuanian Independence terminal comes at the moment not from Gazprom or from global markets but rather from the lack of the solidarity among EU neighbouring members, from their wish to profit individually from additional LNG capacities. Hence, the infrastructure, which was designed on the basis of the geopolitical logics, or is justified by these reasons at present, faces a serious market test even in the very favourable market situation.

Table 3. A summary of the Baltic LNG terminals key characteristics

Name (location)	Years of construction	Companies – key stakeholders	Annual capacity (Planned annual capacity), billion cubic meters	Storage capacity (Planned storage capacity), cubic meters	Costs of construction (EU contribution)
Independence (Lithuania)	2011-2014	Hoengh LNG 50%, Klaipedos Nafta 50%	4	170,000	€ 206 million
Swinoujscie (Poland)	2011-2014 (2015)	PGNIG, Gaz-System / Polskie LNG	5 (7.5)	320,000 (480 000)	€ 674 million (€ 147 million)
Inkoo – Paldiski (Finland – Estonia)	To be completed by 2019	Gasum, Balti Gaas	4-8 (Finland) 1-2 (Estonia)	180,000-320,000 (Estonia) 165,000-360,000 (Finland)	€ 500 million (subsidies from the EU are to be requested)
Skulte / Riga (Latvia)	2016-2019	BW Maritime Latvenergo	5-8	180,000-280.000	€ 150 million

Source: GLE, 2014.

One possible solution is to rely only on the Lithuanian facility and to abandon Estonian / Finnish and Latvian projects. This is a non-existent option, however, for the countries in the region. Another solution can be in constructing the Finnish part of the Finnish-Estonian project not only as a receiving / regasification terminal but also as an import / liquefaction facility. In this case the Finnish capacity could function, depending on the situation, either to feed the neighbouring countries or to send the Russian (Gazprom) gas from Europe to Asian and Latin American markets (in addition to the Russian facilities yet to be constructed as described below). This approach would be in line with the traditions of co-operation between Russia and Finland. However, it requires a substantial change in the current climate of EU-Russian relations before it will come true.

In sum, LNG facilities have been so far mainly driven in the Baltic Sea region by the geopolitical logics, diversifying away from Russia. This argument was most pronounced in Lithuania, which even constructed a terminal without any long-term contract. The Polish project, although relying on the EU's assistance, has been more sensitive to the markets, it did not start until a long-term contract for gas supply was concluded. It still suffers from insufficient finance and is to come into operation only later in 2015. As the facilities are constructed, the other, more market-oriented, concerns come into play. The terminals allow negotiating better deals and provide a direct link with the global LNG prices. So far the global dynamics has also been favourable to the Lithuanian Independence facility, which, in turn, reinforces the image of a commercially successful project, winning over Gazprom. Therefore, the political losses of Gazprom as a result of this project are much more profound compared to the real commercial losses. However, to make the projects commercially viable, solidarity of EU member states has to come into play.

Estonia and Finland (and possibly Latvia) are planning their terminals. The demand in the Baltic Sea region is not enough for all these capacities. One obvious possibility for the three terminals to exist (Lithuanian, Polish and Finnish / Estonian) is to construct the latter in such a way that it can work both to import and export LNG, facilitating exports from Russia. Hence, the shift to co-operation with Russia becomes vital for the market rational in case all projects are implemented. This approach is commensurate with the traditions of the relations between Russia and Finland. However, it requires a change in the overall climate of EU-Russian relations.

Russia in the LNG market in the Baltic Sea region

While most Russian natural gas is still delivered to final consumers via pipeline, Russia watches closely all the developments in the LNG market. It started producing LNG in Sakhalin in 2009 and since then Russian ambitions, linked to the LNG market, have constantly grown. Alexander Novak, Russian Minister of Energy, mentioned the export target of 80 million tonnes to be achieved already by 2030, which will increase the Russian share in the LNG market from the current 4.5% (8th place) to 30% by 2030. The currently discussed energy strategy of Russia presupposes increase in the Russian production of LNG to 100 million tonnes by 2035 (Russian Federation, 2015). These figures demonstrate how serious Russia is about improving its positions in the LNG market.

Three facts are crucial for the Russian advance in the LNG market. Firstly, the precautions are taken to make sure that LNG does not compete with the Russian pipeline gas. According to the above-mentioned adjusted energy strategy, Russia will seek to maintain long-term contracts for pipeline gas in Europe and the CIS, while adopting them to new circumstances. The LNG is mainly destined to the Asian markets, and to the European markets where Russian pipeline gas is not supplied. Russia already delivers LNG to Japan, South Korea and Taiwan, and seeks to increase its share in those markets. This approach represents a wish to diversify its export markets and to, therefore, minimise its dependence on the traditional European market (and on all regulatory changes there, especially on the highly-criticised third liberalisation package). The global demand for LNG is expected to multiply two fold to reach 500 million tonnes by 2030 (although that will depend on the pricing dynamics); hence, Russian interest is understandable.

Secondly, LNG technologies re-shape Russian export strategy. In late 2013 Russian companies, which had by January 2013 construction of LNG facilities in their gas development or transportation projects, as well as companies, operating in inland sea waters, territorial sea or continental shelf and had directly or indirectly at least 50% of state participation in their capital, got the right to export their LNG. Effectively, this meant the break of the Gazprom export monopoly, which was severely criticised and which allowed reproaching Russia for using its natural gas sector for foreign policy rather than business purposes. De facto, Rosneft (the largest Russian state-owned oil company) and Novatek, the largest alternative gas producer acquired independence vis-à-vis Gazprom in accessing export markets. The main justification for this liberalisation, however, has been not the EU but the fear of losing Asian markets in case they are left to Gazprom only, which is relatively slow in developing new deposits to feed Asian markets. Hence, in its new export strategy Russia bets on independent gas producers.

Thirdly, and finally, the LNG has been praised for its ability to link directly producers and consumers, and to avoid any transit risk. Given the history of problems between Russia and Ukraine (both overall political and gas-specific), which negatively affected the reputation of Gazprom, the importance of this argument is hard to overestimate.

All three tendencies manifest themselves perfectly in the case of Russian facilities, located in the North-West of Russia, which forms a geographical part of the Baltic Sea Region. The Baltic LNG is the facility, planned by Gazprom. It is the only one located at the shore of the Baltic Sea, in Ust-Luga. The annual capacity of the facility is planned at the level of 10 million tonnes and it will target the markets of Portugal, Spain and the United Kingdom (where Russian pipeline gas currently does not reach) as well as Latin America and India; the first line of 5 million tonnes should come on operation in 2019. The second Gazprom facility is at Shtokman, with the total capacity of 10 million tonnes (7.5 million tonnes initially) it was also scheduled for 2019. However, the project has been postponed indefinitely due to the difficulties of the gas field development. Finally, Gazprom voiced the possibility of constructing an LNG terminal in Kaliningrad to supply it directly (as opposed to being currently dependent on pipeline transit through Lithuania, which became more independent due to its LNG facility). The project is still at the stage of discussion.

The next two facilities belong to Novatek. The more mature Yamal LNG is scheduled to go on line already in 2017. It is developed in co-operation with French Total and Chinese CNPC (each having 20%). This LNG targets, according to already existing contracts, at Spain as well as China and India (Asian markets are to be reached in co-operation with Gazprom). The final capacity is projected to reach 16.5 million tonnes. In 2014 Novatek also acquired the right to export LNG from its Gydan[4] deposits (referred to as Arctic LNG 1, 2 and 3). This project is still in the early stage of implementation and might be postponed due to the current shortage of finance.

Finally, the Pechora LNG is to be mentioned. The project acquired significance following the deal between Alltech (which owns some gas deposits and LNG plans) and Rosneft. The two companies concluded a framework (non-binding) agreement in June 2014. The possibility of attracting a technological investor (i.e. possessing skills and knowledge for the development of LNG) has been discussed but is difficult to realise because of current sanctions that complicate all the new deals, especially involving Rosneft. Moreover, the Pechora LNG so far has no right to export its production, which is planned at the level of 8-10 million tonnes (with 4 million tonnes to be produced already by 2018). One explanation is that Gazprom lobbied against export permit for the Pechora LNG because of the fear of competition over European markets (RBC, 2014). This fact confirms that the Russian strategy of LNG development in the region is not about bringing more competition in the European gas supply but rather about the diversification of export markets. Therefore, independent gas producers are only permitted to develop within these limits. Table 4 summarises key LNG projects in the North-West of Russia.

[4] A peninsular in the Kara Sea.

Table 4. A summary of the Russian LNG plans in the North-West of Russia

Name (location)	Annual capacity (Planned annual capacity), million tonnes	Year of construction	Partners	Resource base	Destination markets	Costs of construction
Baltic LNG	5.15 (10)	2019	Gazprom LNG St Petersburg, Gazprom Bank	Unspecified	Spain, Portugal, United Kingdom, Latin America, India	$ 9-12 billion
Shtokman	7.5 (10)	2019	Gazprom, Total	Shtokman gas field	Unspecified	Unspecified
Yamal LNG	10 (16.5)	2017	Novatek, Total, CNPC	South Tambeyskoe field	Spain, Portugal, United Kingdom, India, China	$ 20-27 billion
Gydan (Arctic 1,2,3) LNG	10 (15-16.5)	2018	Novatek	Geofizicheskoye, Salamanovskoe, Utrenneye and Obskiy	Unspecified	Unspecified
Pechora LNG	4 (10)	2018 (originally 2015)	Alltech Rosneft Potentially an additional (technical) investor	Kumzhinskoye and Korovinskoye (Alltech) + Layavozhskoe and Vaneivisskoe (to be acquired from the state fund)	Unspecified	$ 6.6 billion
Kaliningrad	2-8	2018	Gazprom	For the purpose of supply to Kaliningrad		Unspecified

Source: GLE, 2014; LNG Congress, 2015.

Hence, Russian companies demonstrate a growing activity in the production of the LNG, including in the close vicinity of the EU (in the North-West of Russia). If all the plans are realised, Russia, indeed, can greatly increase its share in the global LNG market as well as the share of LNG in its export. The obvious limitation here at present is the Western sectorial sanctions, imposed in July 2014 and further tightened in September 2014. These sanctions limit access to financial markets, which already led to the delay in some Arctic projects. Furthermore, current context complicates the search for new partners (including technological) because of the overall reputation of Russia and its key companies, unknown structure of ownership in Russian companies, which makes it difficult to find out sometimes whether their owners are under sanctions or not, and opaque nature of the Western sanctions themselves. As a result, the technological side of the projects remains problematic. Finally, the current price dynamics in oil and gas markets is not favourable.

Russian companies, however, confirm the trend, which was identified in the case of the EU's companies and member states. Although LNG facilities are located in the proximity to the EU, they are meant not for co-operation with the EU but rather for the diversification away from it, for increasing the share of Asian and Latin American consumers and, as a result, improvement of the negotiation position vis-à-vis the EU. Some additional exports in the EU remain a possibility but it will be limited to the regions where Gazprom pipeline gas does not reach (and where long-term contracts with Russia do not exist). Curiously, in these cases Russia will move from challenging the EU's third liberalisation package to making full use of it.

Finally, the development of the Russian LNG thinking was different from that of the EU. Whereas in the EU LNG attracted the interest because of their ability to cope with geopolitical risks and then the market concerns came into play, Russian companies put business interests first (access to profitable Asian markets with high prices for LNG). Diversification away from European consumers became more important in 2014, which is during the most recent move of EU-Russian energy relations to the geopolitical phase. It remains to be seen, therefore, whether Russian interest to the Asian LNG market will stay in place given that the prices there fell. If it does, it will require assessment from the points of both market logics and geopolitical interest.

Finally, a possibility of co-operating with Finland in the exports of Russian LNG has been mentioned above. While this is an opportunity for both players (a way to use new capacities for Finland and an opportunity for Russia to increase the amount of exported LNG), it will require improvement of trust in EU-Russian relations. Thus it remains a medium-term possibility rather than an immediate business opportunity.

Conclusions

Current contribution demonstrated that EU-Russian energy relations fluctuate between being geopolitical and market-oriented. The current stage is definitely geopolitically oriented for both sides, mostly due to the international context and to the strategic competition between Russia and the West in Ukraine and wider shared neighbourhood.

In contrast to the previous geopolitical turn, Russia does not try to pacify the situation and to reaffirm its reputation of a stable supplier. Rather Moscow turned to a more active strategy of diversifying its export markets, thus in practice (and not just in words) engaging with the EU into the diversification race.

LNG developments are important for this race of diversification. For the EU it is a way to bring alternative suppliers in the market whereas for Russia LNG is a means to advance to alternative markets and, therefore, to decrease the influence of the EU's regulation on its export revenues. Hence, the Baltic Sea region turns from the pilot co-operation area to the pilot area of mutual diversification.

While geopolitics (and securitisation) allow some not very commercially sound projects to happen in the EU (and possibly in Russia), the market rationale strike back. In the EU, it is used to justify the projects and to decrease the final costs of natural gas for consumers. Furthermore, possibilities to improve the commercial basis of the projects are also searched.

It remains to be seen to what extent Russia will be able to realise its LNG projects, given the change in the Asian LNG markets and the current lack of finance and western technical investors. In other words, to which extent the shift from markets to geopolitics affect these projects. The role of these projects in easing the influence of the EU's regulation also remains to be seen.

Although the Baltic Sea region became a showcase of the current race of diversification in energy between the EU and Russia, significant possibilities for co-operation remain. One is co-operation in the construction of the facilities. Another one is their shared exploitation (like in the case with the planned Finnish / Estonian terminal). Lastly, by exporting to the new EU member states Russia might further contribute to the EU's liberalisation while making use of its third liberalisation package (instead of fighting against it).

Whether these opportunities will come true, however, depends mostly on the overall climate of EU-Russian relations; they require improved trust among the partners and mutual reengagement. Therefore, at present these opportunities remain a rather medium-term perspective. However, when they come true, the Baltic Sea region will have a chance to return to its role of the testing ground of alternative, deeper co-operation between the EU and Russia. It is obvious that in this capacity the Baltic Sea region will benefit both sides much more, and will lead to much more sound and commercially profitable investments.

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Recent changes in Russian gas industry: Domestic consequences and implications for exports

Leonid M. Grigoryev and Alexander Kurdin

Executive summary

In the early 2010's, Russian gas industry faced several important challenges. Old-fashioned industry structure inherited from the Soviet Union is being reformed, which leads to the intensification of domestic competition, partial liberalisation of internal markets and export LNG supplies. The structure of production capacities changes: Russian producers have to shift gas extraction to Northern regions, Eastern Siberia and Far East, which increases costs and brings additional risks. The slowdown of the economy since 2012 resulted in the decline of domestic demand. The uncertainty is aggravated by the vulnerability of the European demand for Russian gas since 2008.

The economic and political events of 2014 and 2015 made the situation even more risky: for Russian producers, but also for European consumers. Restrictions on financing because of Western sanctions and low oil prices could limit investments in Russian gas projects or shift main efforts of Russian producers to the Eastern direction in exports.

Additional uncertainty provoked by the Ukrainian crisis is unprofitable for both parties: Russia and the EU, especially countries in the Baltic Sea region, heavily dependent on Russian supplies. Trust was damaged on both sides; and now Gazprom is trying to reduce its transportation dependency, political risks and to turn its strategy in the EU to an outside supplier mostly. Political measures should be aimed at decreasing the uncertainty for the future for both sides.

Introduction

Russian gas industry stays in the centre of the complex web of interest, including domestic households, power sector and manufacturing; and two important export markets, Europe and Asia. Gazprom and independent producers are supposed to supply all of them, invest in production and transportation capacities in Russia and abroad to provide sufficient gas supplies, secure transport of gas, and pay taxes. All of that covers around 650 billion cubic meters (bcm) of output and transportation – more than the whole EU consumption.

Since 2006 the time passes all in the transit conflict with Ukraine. Probably, that is the hottest topic of Russian–European gas relations, usually emerging in the coldest weather. Russian authorities and Gazprom desperately try to avoid it in the future by different means: from the sponsorship of loyal regimes to the bypass of Ukraine by sea and by land.

Last years have brought new factors to consider: coal renaissance in the EU provoked by the shale revolution in the USA; the blocking of the South Stream construction by Brussels; and the mostly unexpected abandoning South Stream by Gazprom with a detour to Turkey in Central East European gas map; and the last but not the least – the drop in oil prices.

The new Energy strategy of the Russian Federation is still in the process of discussion in the Government, and delayed probably until the fall of 2015. Together with the General scheme of gas industry development it will constitute a sketch of the long-term (2035 and 2050) official vision of Russian gas prospects. The Government plans to cover almost the whole spectrum of controversial questions, but nevertheless, sometimes without direct answers. The reason is obvious: the level of uncertainty now, in 2015, is extremely high. The future of the gas industry will be defined by the demand growth, investment costs and interfuel competition inside Russia; and competition in the export markets. The domestic situation has completely changed since the 2000's: Gazprom had reached breakeven point for domestic sales only in 2010, and it has already opened an opportunity for growth to independent producers, which are now able to sell gas at a discount to regulated price. However, the aggregate domestic demand is now being threatened by the recession, especially by the slowdown in manufacturing since 2011. China gas contract works as stabiliser in the face of vulnerable demand at home and in Europe. Still in this new environment, the Russian gas industry will face the need of adaptation to limitations on the West and hard budget constraints in the medium term. New constraints on prices and investments from 2014–2015 will add some pain as well. The EU has lost the chance (in recent years) for huge 'free' investments in its infrastructure, especially Balkan countries. Now Gazprom will be extremely pragmatic, trying to minimise economic and political costs of its development.

Nord Stream has formatted the Baltic Sea supply corridor. It is a clear case of the trade-off between the security of supplies for the EU and the political pressing against Gazprom. One of the comments from observers: it took a year in 'someplace' for the translation of Gazprom's application into German – till it had just expired. For Russia, it is time to be realistic on the domestic energy policy, and for Gazprom – on its international plans.

Before going into details on gas, it is worth mentioning that Russia is producing roughly 10% of global primary energy (exporting about a half of it). This huge output is supported by 6% of GDP (total capital formation share in Russia is 22% of GDP) invested in energy sector. Natural gas is an important but not a single field for energy investments in Russia; and it is an issue for the next Russian Energy Strategy. Also, the International Energy Agency in its 2014 Outlook reiterated its usual forecast for Russian investments till 2035 as 6% of global energy investments, regardless to the oil prices or political nuances of Russian supplies to the global energy demand in the future.

In this article, we discuss main challenges faced only by Russian gas industry. We are looking for possible answers and their implications for the energy security of European consumers, especially of those from the Baltic Sea region, and for the security of Russia as the producing state highly dependent on hydrocarbon exports. Our objective is to identify main risks for gas supplies to Europe in this new, even more vulnerable environment, looking through the lens of the Russian gas industry and trying to represent the logic of main actors.

Trends in the Russian gas industry

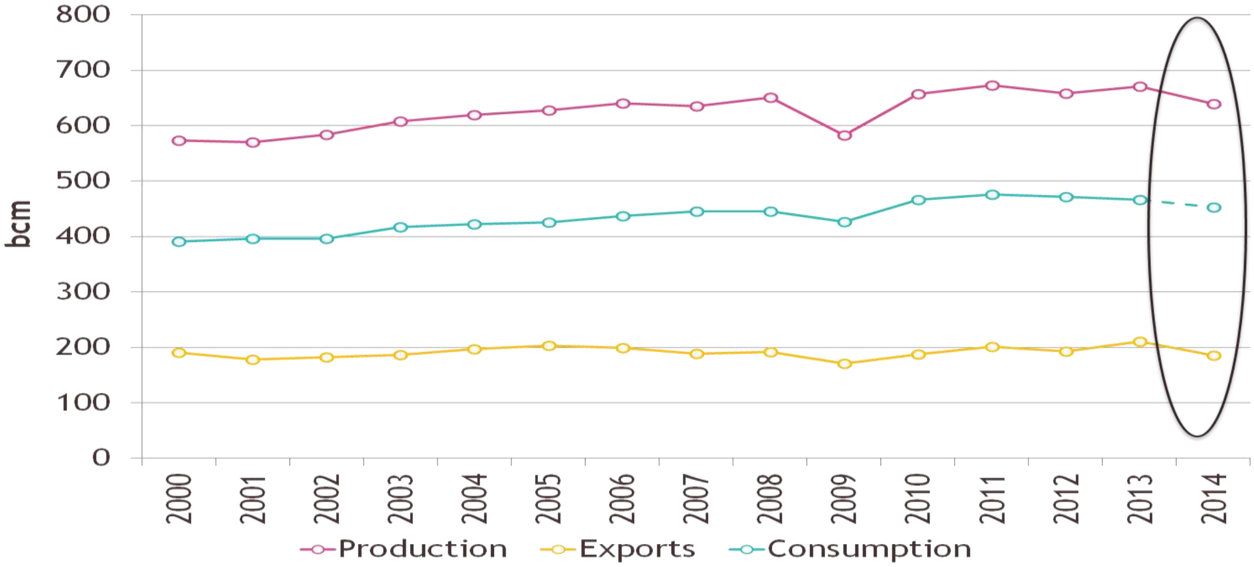
Here we turn to the fundamental changes, which were seen in the Russian gas industry during the last decade. On the one hand, these changes keep in step with the dynamics of the national economy and the economies of main importers. On the other hand, considerable measures to reform the industry have been undertaken inside Russia, though they cannot be labelled as decisive steps.

It is difficult to add something to the analysis of the general situation in Russian gas industry after the publication of outstanding work edited by Henderson and Pirani (2014), and we recommend that book as the source of in-depth analysis made just before the latest recession and Western sanctions on the Russian Federation. Valuable insights into the modern situation are also given in the survey of the International Energy Agency (IEA, 2014). Important views of Russian specialists on domestic markets and prices may be found in the reports (Energy Center Skolkovo, 2013; Makarov and Mitrova, 2013), and the prospects on international developments are described in the annual energy forecast published by the Energy Research Institute of Russian Academy of Sciences and Analytical Center for the Government of the Russian Federation (ERI RAS, AC, 2014).

The gas industry of Russia has suffered from the transition crisis of the 1990's but the fall of production in natural terms was not so dramatic, as it was in the oil industry. Oil production declined approximately by a half from the late 1980's to the mid-1990's, while the lowest point of gas production was reached in 1997, at the level of 561 bcm[1], which was only by 11% lower than in 1991. Exports were flat and even slightly growing, and domestic consumption fell by 23%. This decrease is quite impressive under normal economic conditions but in comparison with the turbulence of other Russian economic indicators in the 1990's it may be considered as relative stability.

In the 2000's production and domestic consumption were steadily growing, while exports to Europe and the CIS remained around the same level – just under 200 bcm per year (Graph 1). However, the recovery of gas production and consumption was going initially in the framework of inherited Soviet-fashioned structure of the gas industry with regulated prices, integrated production and transportation capacities under the umbrella of state-owned monopolist Gazprom and a negligible role of independent (non-Gazprom) producers and traders.

Graph 1. Indicators of the Russian gas industry



Source: IEA, Rosstat and estimates of Analytical Center for the Government of Russia for 2014.

[1] Hereinafter in this chapter, the figures are taken from the IEA, unless another source is indicated. It is necessary to make a reservation on data: the analysis of the Russian gas industry is somewhat hampered because of the inconsistency of quantitative data. In Russia, it is generally accepted to use volumetric indicators of gas flows, which are differently interpreted in calorific terms in international sources. In addition, there are some misconceptions in assessing Russian exports, imports and re-exports from Central Asia.

Gas industry in Russia is considered as a donor for the economy, not a financial donor such as the oil industry, but a donor of cheap energy. It is generally accepted and technically proved (Tarr, 2010) that in the early 2000's the price for Russian consumers (households and industrial enterprises) was heavily subsidised by the state, at the expense of Gazprom, and these subsidies decreased but still remained in place until the late 2000's. Of course, this burden on Gazprom was compensated by its monopolistic export positions and growing external prices.

However, this situation was considered by Russian regulators as unsustainable on the base of several factors. Firstly, the infrastructure and the production capacities were ageing, and investment was needed not only to replace old pipelines and maintain old gas fields. Also new investments should go into developing the transportation network and to go ahead in exploration and development of new gas-producing areas. Secondly, there was a need to intensify energy savings through economic incentives in order to prevent wasteful energy consumption, also inherited from the Soviet times. Thirdly, the reform of natural monopolies, which comprised the promotion of competition, was an important part of Putin's initial economic programme (the liberal one): in 2000 Putin's programme had declared the economic policy generally based on free market and fair competition ideas. Some initiatives of that time – the most remarkable is low (13%) and flat personal income tax rate – still play an important role in Russia, while the whole environment for the entrepreneurship remained unfriendly, and dirigisme gained a foothold since the mid-2000's.

The first two factors are introducing the necessity to raise domestic prices and, consequently, Gazprom's domestic revenue. Of course, the latter coincided with the interests of the state owned giant, unlike the third argument – the development of competition. However, the growth of attractiveness of the domestic market, coupled with legally proclaimed non-discriminatory access to pipelines and antitrust control over Gazprom's market behaviour, automatically led to the emergence of ambitious domestic competitors.

Initially, there was an official plan to raise regulated tariffs gradually to netback parity and then to leave them afloat, while keeping regulated gas transportation tariffs. However, the growth of export prices in the late 2000's would involve much higher domestic gas prices than it was planned, and the idea of netback parity was actually abandoned. Nevertheless, regulated wholesale gas tariffs increased almost tenfold (!) from 2000 to 2014. Of course, the base level of 2000 was very low; prices for households have always been lower than for industrial consumers. In 2011–2012, regulated prices overcame $100 per 1000 cubic meters.

Independent gas producers (IGPs) were permitted to sell gas at free prices but it was not of considerable importance approximately until 2010, when domestic markets became profitable due to the price growth. IGPs obtained an opportunity to sell gas at a discount to regulated price, and that was a very important contribution to their development.

The first remarkable change to mention in this chapter is the redistribution of power in the gas industry, especially in the domestic market. The share of IGPs in domestic gas production increased from 15% in 2005 to more than 32% in 2014. In fact, it does not mean the emergence of real competition everywhere. For now it would be more correct to say that there is more or less visible competition in several regions, and the dominant position of Gazprom or one of IGPs in the most part of regions (regional monopolies). However, it changes the agenda of gas market reforms and affects the incentives of market players. The important success of IGPs was the partial liberalisation of LNG exports[2]. This reform opens new opportunities for IGPs: now they can conclude direct contracts with foreign consumers. Presumably it might promote the realisation of IGP's LNG projects, namely Yamal LNG by Novatek (16.5 mn tonnes per year) and Dalnevostochny LNG by Rosneft (5 mn tonnes per year), with supplies starting before 2020. Western sanctions have already hit those projects. Nevertheless, Yamal LNG will most likely start its operations as planned or with a slight delay; Dalnevostochny LNG may be reviewed, while other projects are yet under consideration.

The liberalisation of pipeline exports giving to IGPs much larger extent of access to European markets may not be realised in the foreseeable future. However, the changes of the export model (such as the separation of an export operator from Gazprom) are under discussion. Anyway, the position of IGPs should be taken into consideration while analysing the Russian gas industry. Gazprom is losing the domestic market to them, which could make it more active and more flexible in export markets. At the same time, it is difficult to expect the cut-throat competition between Gazprom and IGPs, at least because largest IGPs are state-owned Rosneft and private – but also closely related to the authorities – Novatek.

The second change in the gas industry is the objective necessity to develop new areas of gas extraction in the face of the exhaustion of old fields. Historically, the most part of Russian natural gas was extracted in the single area – Nadym-Pur-Taz (NPT) region. The situation had not changed for a long time – for instance, in 1990 and in 2005 the share of NPT region in the aggregate Russian gas production reached 90%. However, in 2014, according to the data of ERI RAS, only 75% of Russian gas was produced in NPT region (because of local production declines), and in 2030 its share may be lower than 50% (it is planned that local declines will be compensated by production growth in other regions). It is substituted by Eastern Siberia, Far East and Yamal peninsula. Unlike the NPT region, these areas often lack necessary infrastructure and offer harsh climate conditions.

The consequence of this shift to the North and to the East is the increase in average production costs (including transportation costs) and the need for new extensive investments and new technologies. As a result, we have seen more activity in attracting foreign partners from Russian producers and authorities, with Exxon, BP, Total, Statoil, Eni as major counterparts (but sanctions may also shift that trend to the Eastern firms: CNPC and others). At the same time, those producers – Gazprom as well as prospective LNG producers (Novatek and Rosneft) – face the necessity to optimise their costs in order to preserve their market niches in a more competitive global environment.

The unsatisfactory state of gas infrastructure is not a new phenomenon but it should be carefully considered. The situation does not improve and is now deteriorating. According to the figures published by Gazprom, in 2010 the length of Gazprom's trunklines older than 30 years was 49,000 km (30% of all Russian gas trunklines), in 2013 the respective figure was 71,000 km (42% of all Russian gas trunklines; 29,600 km, or 17.5%, were older than 40 years), while the operating life of

[2] According to the Russian law until 2013, only one company – Gazprom – had the exclusive right to export gas by pipeline or by means of LNG production and transportation. There was an active discussion in Russia and abroad on possible liberalisation of gas exports. Finally, in 2013 the law 'On natural gas exports' was changed, and the new version together with later explications stated that largest IGPs – Novatek and Rosneft – obtained the right to export LNG (but not to export gas by pipeline). This liberalisation is named 'partial' because all the other oil and gas companies are still excluded from natural gas exports.

gas trunkline without restoration normally is estimated at 40 years[3]. The decay of Russian domestic gas infrastructure may constitute a serious threat not only to the domestic, but also to the European energy security in the unlikely extreme case, if Gazprom's investments will not be sufficient (for instance, because of 'too harsh' Western financial sanctions) to restore it. Gazprom assures that it will handle this problem.

The third change to mention is the slowdown of Russian demand for gas. On the one hand, it can ease the pressure on exploration and development in new gas-producing areas. On the other hand, if those projects are stopped, than their restoration (when needed) may be more costly and less timely. Finally, this slowdown – in addition to competition – pushes Gazprom (and other producers) to be more active in the export markets.

The healthy domestic demand was the main driving force behind the gas production growth in Russia since 2000. Gas remains the main source of primary energy in Russia covering more than a half of the country's total energy needs (Table 1). However, after the post-crisis recovery the situation has changed.

Table 1. Energy balance of Russia, 2012, million tonnes oil equivalent (mtoe)

	Production	Imports	Exports	Stock change and internat. bunkers	Consumption	Share in consumption, %
Coal	200.4	18.3	85.2	-0.4	133.2	17.6
Petroleum	521.3	2.6	346.7	-8.3	168.8	22.3
Natural gas	540.6	6.6	158.8	-1.5	387.0	51.2
Nuclear	46.6	0.0	0.0	0.0	46.6	6.2
Hydro	14.3	0.0	0.0	0.0	14.3	1.9
Renewable energy sources (RES)	8.1	0.0	0.3	0.0	7.8	1.0
Total	1331.6	27.7	592.6	-10.1	756.6	100.0

Source: IEA, 2014.

In 2012 Russia faced first signs of a significant slowdown of capital formation (mostly in non-energy industries), long before Western sanctions and drop of oil prices took place. It was provoked by the group of structural constraints. One of the most obvious aspects of the slowdown was the stoppage of manufacturing growth in 2013. Not surprisingly, the growth of domestic gas market has also stopped. In 2012–2014, there were three consecutive years of decrease in domestic natural gas demand in Russia. In the face of such trends the forecasts are also revised. The latest publicly available (as of mid-March 2015) version of new Energy strategy (until 2035) implies that by 2030

[3] This figure was mentioned in formal exploitation rules before 2013; now the rules are more flexible.

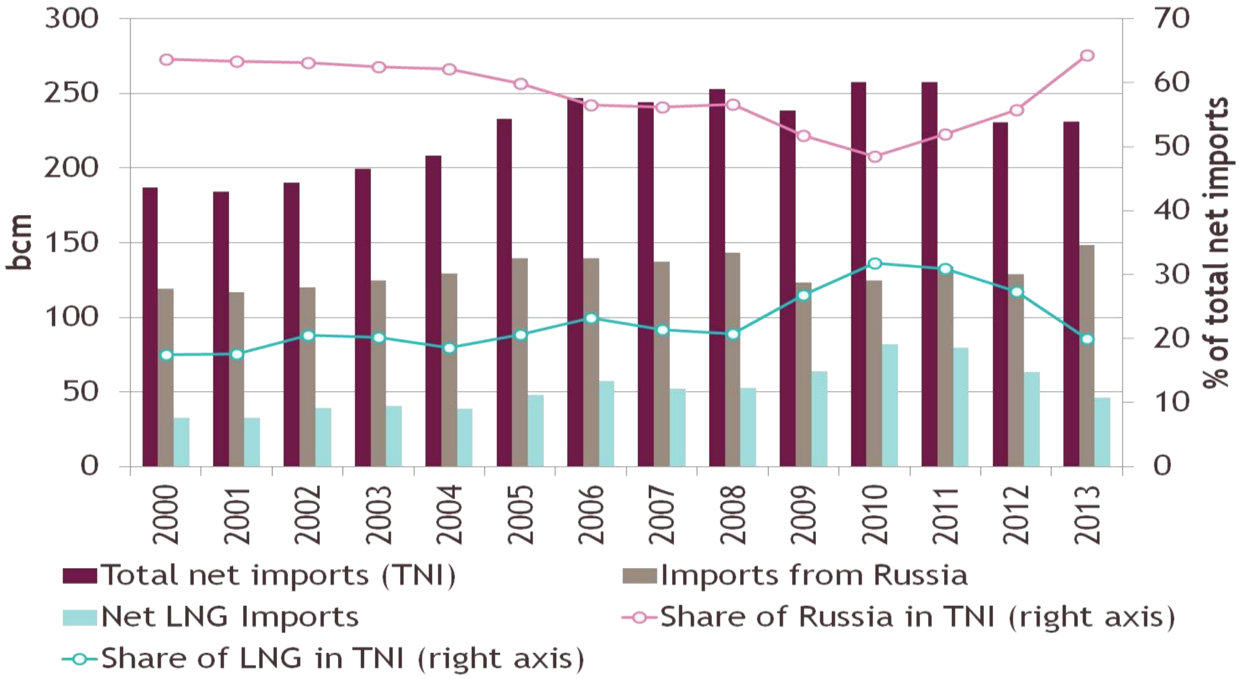
the forecasted gas demand in Russia may be by 15% lower than it was predicted in the previous version of the Energy strategy published in 2009.

European demand

The exports of Russian gas have become more vulnerable under global turbulence and European energy policy experiments – and that is the fourth change to emphasise in this chapter. This statement includes not only unstable volumes or values of gas sold but also transportation difficulties.

After 2008 Gazprom lost a significant part of European exports, mainly due to high oil-indexed prices and an intensive competition from LNG producers (Graph 2). But we must mark, that we take its share as measured by 'total net imports' into the European countries of OECD. We include Norway with substantial supplies around 100 bcm **–** so they are not considered as imports to Europe. It makes the real picture of the Gazprom role. The important contribution was also made by coal: its consumption in Europe increased too due to the inflow of cheap coal, previously used in the USA but now crowded out by cheaper and cleaner shale gas to Europe.

Graph 2. Indicators of net natural gas imports from Russia to the European countries of OECD in comparison with net LNG imports to the European countries of OECD



Source: IEA, 2014.

Nevertheless, the position of Gazprom on the market has been restored in 2012–2014. According to different estimates, the Russian gas giant has become much more flexible in terms of gas prices after several litigations against European companies. At the same time, prices offered by the European hubs at the time were high enough, approaching Gazprom prices. As a result, expensive LNG supplies partially lost their positions to the benefit of Gazprom. But in 2014 situation has changed again: European hub prices fell due to a mild winter 2013/14 and abundant reserves in storages. So, Gazprom made some step back. The drop of oil prices in 2014/15 will lead to the next decline in Gazprom prices by summer 2015. To summarise, the latest dynamics of European gas market prices and quantities were quite unstable. The fluctuations of prices created the very difficult situation for Gazprom, especially because the firm had reached the break-even point on domestic sales only in 2010, and after that its positions were being met by the increasing competition at home.

The long-term prospects of demand are also limited due to an active support of renewables by the EU and national authorities and their persistent political trend to get rid of the Russian gas (to a maximum possible extent). That uncertainty was multiplied by a very cautious, if not hostile, attitude of the European bureaucracy towards Gazprom's transit projects. The intention of Gazprom was always clear: to obtain direct route to the EU without transit intermediaries.

One of clear examples is shown in the Baltic Sea region. The Nord Stream gas pipeline was launched finally but is not fully loaded (only by 2/3, that is 35–40 bcm, in 2014, according to our estimates) due to a permanent conflict with the Commission on the use of the pipeline OPAL. OPAL (35 bcm per year) and NEL (20 bcm per year) are two outlets of Nord Stream (55 bcm per year). The European Commission denies the right of Gazprom to use OPAL at full capacity – as Gazprom planned to obtain an exemption – and requires to reserve one half of capacities for third parties. Gazprom argues that nobody else physically can use the pipeline, because actually OPAL is the extension of Nord Stream, but the Commission insists on the application of general rules. This position is sometimes informally qualified as 'bizarre' even by the European energy producers, and may be interpreted as an instrument of pressure on Gazprom and an attempt to preserve transit through Ukraine[4]. The question is still pending as of April 2015.

The case of South Stream is even more demonstrative. The bilateral intergovernmental agreements between Russia and other participant countries finally lost any importance due to unsolvable contradictions between the Commission and Gazprom on the application of unbundling gas production and transportation.

Generally speaking, we see the old contradiction of gas industry business models. Gazprom is used to the business model from Russia (though even in Russia it is now contested) and has been trying to apply it in the EU by going into midstream and downstream capacities. It means additional costs for the pipeline construction but probably decreases Gazprom's risks in the face of political uncertainty and gives some market power (primarily over incumbent intermediaries in the European gas markets). The Commission promotes unbundling transportation, distribution and storage from producers – especially from strongest ones, such as Gazprom – through the regulations of the Third energy package and tries to develop competition in this manner (common nickname – 'Gazprom clause'). Gazprom is ready to operate on the basis of the Third Package inside the EU, but not for bringing its gas inside EU borders.

The positions of the both parties have changed, since the pre-crisis period due to a significant decrease in the EU's need for natural gas imports. It may be simply illustrated by the change in the IEA's annual forecast. In 2008, the IEA predicted that natural gas imports to the EU will reach around 580 bcm in 2030. In 2014, the forecast fell to only 400 bcm of gas imports.

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[4] From the practical point of view all new pipelines: Yamal, Blue Stream, Nord Stream, - are the diversification from 100% dependency on the Ukrainian transit of Russian gas export to European countries since 1991 breakdown of the USSR.

The stabilisation of gas consumption together with the emergence of actual and possible new supplies (such as planned supplies from the USA – even if their volumes will be marginal, presumably no more than 30 bcm until 2040 (ERI RAS, AC, 2014)) seemingly strengthens the position of the Commission. Huge gas inflows from Russia via Nord Stream, Yamal, Bratstvo (Brotherhood) and former South Stream, actually transformed into Turkish Stream, are now seen not as vital supplies but only as useful diversification routes, which may be manipulated depending on the current political situation. However, recent developments may somewhat change the picture.

The new reality

Latest events concerning the relations between Russia and the EU have brought new inputs into gas geopolitics, as well as into pure economics of gas supply and demand. The economy of Russia was hit by Western sanctions and oil price drop, in addition to abovementioned structural constraints, which led it to a painful recession. According to IMF estimates of April 2015, the Russian GDP may fall by 3.8% in 2015 and by 1.1% in 2016. Alexey Ulyukayev, Minister of Economic Development of Russia, in April 2015 was more optimistic: he predicted that in 2015 GDP will contract by 3% but the recovery will start already in 2016 (growth rate will be 2.3%)[5].

The recession may reinforce the slowdown of the domestic demand for natural gas, put additional constraints on Gazprom's revenues. Together with limitations on Western financing it may have a considerable impact on the investment programme of the Russian gas industry. On the one hand, it may even lead to the enhancement of the efficiency. On the other hand, the worst-case scenario may strengthen the threats specified in this chapter: the exhaustion of old gas fields and the unsatisfactory state of the domestic infrastructure.

In the medium term, the decrease of financial resources is unlikely for extending gas supplies from Russia – at least current package of supply contracts is considered as 'sacred'. Gazprom states that it is ready to almost double the supply to the EU at current time. In the long run it is still an issue to invest in more supplies in Europe or to continue to move to Asia for the growing markets. A shift of power back from consumers to producers in the European gas market, primarily in the Baltic Sea region may happen, if Russia will not keep providing abundant gas supplies. Another point underlined by Gazprom concerns the reservation of 'capacity to supply' on contracts up to the maximum while the demand stays at contract minimum – well known issue in the European electricity market.

The cancellation of South Stream may look like as the suspension of Gazprom's interests in the European markets but, most probably, it is not the case. It is just the attempt to leave the dead-end of South Stream under the pressure of time constraints. Gazprom is constructing huge domestic pipeline system to supply gas to the coast of Black Sea (Russian Southern Corridor), and Russian authorities have to do something with vulnerable Ukrainian transit. The Turkish detour is not the best, while not the worst option. Of course, Nord Stream alone cannot compensate for the Ukrainian transit, which Gazprom is firmly going to abandon since 2020 at latest after an expiration of the Transit Contract of 2009. Gazprom has time until the end of 2019 to find a way to avoid difficult transit way, deliver gas on contracts, and save on political costs for Russia.

[5] http://www.gazeta.ru/business/2015/04/01/6621993.shtml

Chinese gas contract concluded in 2014 is a desirable stabilising factor for the Russian gas industry. However, it should be emphasised again that it does not mean the fundamental change of Russian interests. Latest developments led to the intensification of the relationships with China but the existing infrastructure (and pipelines under construction) and production capacities do not permit to sharply change the direction of gas flows in the foreseeable future.

Nevertheless, the Eastern vector of Russian gas politics is more and more feasible because of the Chinese energy diversification policy 'from coal', the high price for Australian gas and other specifically Asian factors. The question is, whether the Russian gas can be sold at competitive prices, which at the same time will provide reasonable profits for Gazprom and 'government take'. The drop in oil prices and a possible weakening of external (European) demand for Russian oil and petroleum products, which represent the main source of Russian budgetary incomes, makes it more important to extract resource rent also from the gas industry. Purely political motivation will not be sustainable. But long-term contracts with stable volumes, financial support (probably, not direct investments in pipeline construction, which will be financed mainly by Gazprom itself, but the opportunities to obtain loans from Chinese financial institutions and other Eastern partners) and absence of annoying and costly regulations could lead to a gradual re-orientation of gas flows at the long-term expense of the European partners. Growing Russian export potential will leave both export directions viable but sanctions and low prices can now restrict those opportunities.

Consumers in the Baltic Sea region are constructing (or planning) LNG terminals and waiting for LNG inflows from the USA, Middle East and Africa. However, American gas supplies for now cannot be considered as absolutely reliable either. Gas business in the USA was partially financed by the sales of liquid products. If prices for liquids remain low, and European gas prices will not be attractive (the decrease of 2014–2015 raises doubts on it), then only deficit Asian markets could absorb the most part of American supplies. Middle East and Africa are permanently under unstable political conditions – from 'Arab Spring' to Syria, another shock in Libya, ISIL and now Yemen (as of March 2015) and cannot be considered as absolutely reliable suppliers as well.

Difficulties on the South will require Gazprom to assure the delivery on contracts and reduce political costs of transportation. Expected reduction of pipeline gas prices by the 3rd quarter of 2015 will change the situation. And probably it raises the relative importance of the Baltic Sea region for supply of the EU. Gazprom approach has changed to lower political costs and pragmatic approach to market challenges.

Conclusion

The developments of the early 2010's produced a favourable impression on the progress in the relationship between Russia and the EU in the area of gas supplies. The launch of Nord Stream, signs of mutual understanding on the problem of South Stream (at least with the nations concerned), renewed growth of Gazprom's share in European gas imports and a relative stability in usually vulnerable Ukraine, as well as pro-competitive, liberal changes in the Russian gas industry seemingly might provide a new framework for those relations, more stable, pragmatic and mutually beneficial. The events of 2014 and 2015 have clearly destroyed this rosy picture. For now many things are to be restored by both Russian and European parties. And the first thing to restore is confidence.

It is needless to recall that Gazprom and European partners have always accurately fulfilled their commitments. But now the main question is the long-term reliability of this partnership. Despite the strong economic fundamentals for its development, political inputs are undermining it to some extent. That is why we need a renewed programme of gas co-operation between Russia and the EU that could give additional guarantees for both parties during this period of uncertainty. It means that both parties together should sketch the general complex plan of promoting stable gas supplies, which will include the solution of accumulated contradictions. Probably, it can be made in the framework of renewed the Russia-EU Energy Dialogue (stopped by EU so far). For now, in 2014 and 2015, we see mostly negotiations on specific problems or unilateral strategic declarations, not bilateral strategic solutions. As we have showed above, vulnerability of domestic and external demand, the limitations on investments in Russia may need the more strategic approach to avoid threats in the future in the case of non-co-operative behaviour of the parties concerned. This is now – a theme for the next Russian Energy Strategy.

Experts and businesses should promote a step back from this ‘frontier of sanctions’, where we stand now. Long-term mutual blockade makes the ‘unfavourable non-co-operative equilibrium’ probable in the future. The positive experience of co-operation should prevent us from the further deterioration of the relationships.

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Evaluating possibilities for new LNG exports from Russia

Andrey Shadurskiy

Executive summary

Despite Russia's ambitious plans to drastically increase its share in international LNG markets by 2020, five years before the deadline it still has only one operational large-scale LNG plant on Sakhalin Island. The only other LNG export project under construction, ambitious Yamal LNG is still looking for almost half of necessary total funding and has experienced delays in government-funded construction of port infrastructure. Other projects, such as Baltic LNG, Pechora LNG, Vladivostok LNG and new Sakhalin export facilities have been repeatedly hit by changing demand patterns, geopolitical and domestic struggles, and most recently – sanctions. Most of the challenges are self-indicted and may lead to Russia missing a window of opportunity in LNG markets before vast foreign competing projects come online.

The 2013 liberalisation of LNG exports has only been nominal: LNG projects are still in fact approved at the very top of Russian politics and their configuration is a product of political compromise, not competition. In this environment, it is sanctions, both financial and technological, that become the decisive obstacle for the successful implementation of Russia's LNG exports strategy. If sanctions persist, Russia will have to focus on completion of already advanced Yamal LNG, the expansion of PSA-regulated Sakhalin II LNG's capacity and very competitive small-to-middle capacity project in the Finnish Gulf. This alone, in search of funding, will make Russia vulnerable in a bigger framework of energy negotiations. The full-scale development of once ambitious plans to gain a larger share in international LNG markets will be impossible.

Introduction

In the autumn of 2013, Alexander Novak, Russia's Minister for Energy, declared Russia's plans to produce 40-45 million tonnes of LNG by 2020, increasing the share in international markets to 11-12%. According to the same plans, Russia would produce up to 80 million tonnes of LNG by 2030, an almost tenfold increase over the current volume (Россия к 2030 г. может нарастить производство СПГ в 8 раз, до 80 млн тонн - Минэнерго, 2013). These plans have since been assessed as unrealistic (Mitrova, 2013). At that moment, Russia is planning to develop as many as six different large-scale LNG projects: 1) Yamal, 2) Vladivostok, 3) Pechora, 4) Baltic, 5) Sakhalin I (Far Eastern), and 6) 3rd train of Sakhalin II. Timing was crucial in expectation of Australian mega-projects coming online in the next several years[1] (Dispenza, 2015) and the USA planning to become another major exporter of natural gas. Although most of the mid-term US LNG exports will add to the European LNG market and their influence in Asia is projected to be marginal, they will nevertheless strengthen competition on the suppliers' side, adding strain on expensive Russian LNG projects and improving negotiation positions of consumers (Goldwyn, 2014).

As most of the new LNG projects are planned with Asian markets in mind, they are instrumental for the strategy of diversification of Russia's natural gas exports. In 2013, only 5% of Russian natural gas was exported to the east, entirely as LNG from Sakhalin II project (Новак, 2015). According to plans of Russia's Ministry of Energy, already by 2020 Asian consumers should import 40-60% of all Russian

[1] According to GIIGNL, 53.8 million tonnes per annum of additional Australian liquefaction capacity will go online in 2015-2017, adding nearly 20% to the total global capacity.

gas exports. China is poised to become the major importer, though planned pipeline deliveries will dwarf all LNG deliveries. Japan, at the same time, is supposed take a quarter of all Russia's LNG exports. There are also hopes for Indonesia becoming a new significant importer of Russian gas as its own gas production capacities will be declining. In the meanwhile, the liberalisation of the Indian domestic gas market opens another potentially at the same time economically lucrative and politically important export destination.

Despite the ambitious plans, Russia is now lagging behind competitors in developing its LNG exporting capacities. Most of the projects have been postponed several times, cancelled and revived again. Both domestic and global factors influenced these decisions. The latest crisis and Western sanctions contributed to already high level of uncertainty that has become restrictive for foreign partners. The limited liberalisation of LNG exports does not seem to have played a decisively positive role in making Russian projects more attractive to investors.

The objective of this article is to provide an overview of the existing LNG export projects in Russia, find common patterns how these projects have been developing and thus assess prospects of new LNG exports from Russia in the middle-term, taking into account political and economic developments up to February 2015. As overview of international LNG markets and forecast of LNG demand is widely available and also present in the current book, this article will focus on presenting the supply-side analysis.

Yamal LNG

Yamal LNG is the most challenging of all the new large-scale LNG export projects in Russia, but at the same time the closest to completion. LNG from the Arctic port of Sabetta will be delivered to international markets both via Eastern and Western routes. The Eastern route will be available from July to November, whereas the Western route - from December to June. On the Western route LNG will be reloaded from arctic-class tankers to conventional ones at the Fluxys terminal in Zeebrugge, Belgium ('Ямал СПГ' заключил соглашение с бельгийской Fluxys о перевалке СПГ на терминал в Бельгию, 2014). Using the Western route when the Arctic passage is not available will allow for all year-round exports to Asia, which is the major destination market for Yamal LNG.

Proven and probable reserves of the Yuzhno-Tambeyskoye gas field that will mainly feed Yamal LNG comprise over 900 billion cubic meters (bcm), more prospective fields are located in the proximity and can be used at later stages of the project. Gazprom started to study feasibility of LNG exports from Yamal early in the 2000's. As with Stockman field the gas from Yamal was initially destined for the North American market ('ВНИИГАЗ' направил в Минтранс программу освоения Ямала, 2003). In 2006, Gazprom was already reported negotiating orders for necessary equipment with Sevmash plant ('Газпром' разрабатывает проект завода СПГ на Ямале, 2006).

In 2007, when Gazprom was the third largest public oil and gas company in the world, it was reluctant to co-operate on Yamal with foreign companies, although Shell and Gasunie expressed direct interest ('Газпром' не жаждет иностранных инвестиций в арктический газ, 2007). Already in 2008, however, Gazprom declared that it would need foreign help in constructing LNG plant and mentioned ConocoPhillips and ExxonMobil as potential partners. Around that time, Yamal LNG shares started to be consolidated by Gennadiy Timchenko and companies affiliated with him. In 2009, Timchenko increased his share in Novatek, second largest and very dynamic gas producer in Russia, to own 23% of the company (Marson, 2013). Same year Novatek bought from him a 51%-

stake of Yamal LNG shares. Experts reported that Timchenko acquired the assets at a price several times lower than of market estimates (Мордюшенко and Ребров, 2009). The aforementioned experts argue that Timchenko initially bought a blocking stake of Yamal LNG shares from Gazprombank for $ 78 million, whereas in 2009 an option for a minority package of 23.9% of shares bought by Novatek from Timchenko listed a much higher price tag of $ 450 million.

The transfer of Yamal LNG shares to Timchenko and Novatek had become possible because Gazprom decided to focus on Stockman and Sakhalin projects, being sceptical about Yamal LNG potential. This assessment was reflected in the General development scheme of gas industry, designed in collaboration of Ministry for Energy and Gazprom. At the same time, Yamal LNG was very favourably presented in another strategic document: programme of integrated development of oil and gas resources of the Yamal peninsula. That document stipulated massive state support for the project with tax cuts and massive public investment in necessary infrastructure.

In the end of 2009, Yamal's projects and the LNG project on top of it were promoted at the highest possible level in Russia: first, in September 2009 Vladimir Putin organised a meeting in Salekhard that brought together most of the Russian federal ministers and heads and representatives of the largest foreign oil and gas and energy service companies, including E.ON, Mitsui, Shell, Statoil, Eni, Total, GDF Suez, ConocoPhillips, ExxonMobil and others. The crisis hit Russia the hardest in 2009 and independent development of the project was out of the question (Мартынов, 2009). This meeting, personal involvement of Putin and the state guarantees also very clearly shifted the project from a business one to a political and geopolitical one.

A month later, a strategy of Yamal LNG development followed, bringing the promises to life: the Russian Government promised not to levy mineral extraction tax for the Yamal gas destined for LNG and freed the LNG from the export duty. The LNG plant was to be built in three stages between 2012 and 2018, the Government supported the project extensively with developing necessary infrastructure (Комплексный план по развитию производства сжиженного природного газа на Ямале, 2010). Construction of the port was projected to cost the Government more than $ 2.5 billion alone, but it would be strategic not only for the LNG project, rather than for the grand project of using the Northern Sea route. This immediately distinguished Yamal LNG from the Stockman project that had only been looking for the same support.

Pre-FEED (Front-End Engineering and Design) of Yamal LNG in 2011 estimated the costs at $ 15-20 billion, but the figure did not include either costs of building Arctic tankers fleet or creating port infrastructure (НОВАТЭК предварительно оценивает ‘Ямал СПГ’ в $15-20 млрд, 2011). The latter however was to be carried out and funded by the Russian Government. About a half of the LNG project costs was supposed to be financed by participating companies, mostly from the foreign ones, another half with external investment. For Novatek alone the project has been too challenging and Gazprom clearly indicated priority of Stockman, signing in 2012 a memorandum stipulating its interest in Yamal LNG only after Stockman would have been realised (Газпром и НОВАТЭК подписали меморандум а реализации проекта ‘Ямал-СПГ’, 2012). Same year, Vladimir Putin estimated the total costs of the project at 1,000 billion Russian roubles or $ 35.5 billion (Арзуманов, 2013). With all the support it was however possible to find a foreign partner – Total that already participated in the Stockman project.

However, despite the efforts of the Russian Government and of Putin himself, Novatek found it difficult to attract additional foreign investors other than Total. By September 2013, only little more than 60 billion roubles or about $ 1.8 billion has been invested by private investors (Совещание по вопросам реализации проекта «Ямал СПГ» и строительства порта Сабетта, 2013), by December 2013 about $ 2.6 billion (Доля 'НОВАТЭКа' в финансировании 'Ямал СПГ' составляет 20%, 2014). A stumbling block could lie in the Russian LNG export regime that granted exclusive export rights to Gazprom only. Novatek may also had hoped for Qatari investment, but that happened to be a part of the larger game involving the Syrian issue and Russia chose in favour of supporting Bashar al-Assad. In November 2011, assault on Vladimir Titorenko, Russian Ambassador to Qatar, has marked end of hopes not only for Qatar's support of the Yamal project, but also for the already feeble idea of an LNG exporters' cartel. A decisive moment for the project could have happened when the Russian Government ended Gazprom's monopoly of exporting LNG. At the same time, despite the high-level presentation and support of the project foreign investors could be unsatisfied with the rising resource nationalism in Russia.

The final investment decision for Yamal LNG had been postponed and taken only at the end of 2013. The project costs increased by a third, totalling $ 26.9 billion and reflecting an international trend for raising costs of LNG projects. Novatek also explained the raised costs with a lot of fixed-price contracts being signed to reduce the risks. Investment experts from Sberbank CIB, however, assessed the project as still potentially profitable and much more efficient than a number of competing projects, including Sakhalin II (Барсуков, 2013). The calculations did not however include the costs of building a fleet of Arctic tankers and port infrastructure. Higher maintenance costs may also influence projections that Yamal LNG will be generating profit at LNG price exceeding $ 7 /million British thermal units (mmBtu).

There are still very considerable doubts about the funding of Yamal LNG. 30% of funding comes directly from participating companies through contributions to the charter capital and 70% must be raised in a capital market (Мордюшенко, 2014). After Western sanctions had first included Timchenko and then both Novatek and major Russian banks, the usual paths of securing syndicated credits were shut. VneshEkonomBank (VEB) planned to be one of the underwriters of the credit in the first half of 2014 (ВЭБ: Привлечение синдкредита для проекта 'Ямал СПГ' ожидается в I полугодии 2014 г, 2013), but this has not happened. So far, in 2015 VEB provided Yamal LNG only with a $-1-billion credit.

Yamal LNG also set high hopes on Chinese capital. Selling a 20% stake to CNPC in early 2014 had been preceded by a governmental agreement that stipulated support from the Chinese side in securing funding for the project. That was particularly important after in April 2014 Mitsubishi and Mitsui had abandoned the plans to join the project because of the elevated risks. Expectations about China had been high: after negotiations in Shanghai in May 2014 Timchenko mentioned that the project could receive in total as much as $ 20 billion from Chinese banks with the first tranche coming already in the end of 2014 (Серов, 2014). By November 2014, Timchenko spoke however only about "*not $20bn, but more than $10bn*" of potential Chinese funding in the first half of 2015 and admitted that Novatek had difficulties selling additional 9% of stakes in Yamal LNG to foreign investors, including Chinese and Indian (Лабыкин, 2014).

At the World Economic Forum in Davos in 2015, Leonid Mikhelson, Novatek's CEO, further postponed first tranches from China to the second half of 2015 and dismissed the ideas of selling additional 9% of shares referring to the approved support from the Russian Fund of National Welfare totalling 150 billion roubles or approximately $ 2.5 billion (Внешнее финансирование проекта ‘Ямал СПГ’ от Китая начнется с 1 июля - глава ‘НОВАТЭКа’, 2015). In February 2015, Russian Ministry of Finance bought the first package of bonds, issued by Yamal LNG, providing the company with $ 1.2 billion. At that time the project was reported to be 25% complete and amass $ 10.5 billion or roughly 40% of total investment in LNG production facilities (Компания Total: строительство объектов ‘Ямал СПГ’ завершено на 20-25%, 2015).

Profitability of Yamal LNG may also be questioned. Back in 2012 it was positively assessed by the experts of the energy centre at Skolkovo, but the main advantage over the doomed Stockman was declared as “*freedom from long-term contracts with oil-linked pricing*” (Российские газовые проекты в Арктике могут оказаться неконкурентоспособными, 2010). Yamal LNG has however since had all available capacities booked and most of the contracts are either completely or partially oil-linked. Prices in both 3 million tonnes per annum (MTpa) contracts to supply LNG to PetroChina and Gazprom Marketing and Trade (unspecified destination, but likely to be India) have been linked either to oil or oil basket. Contracts with Total (4 MTpa) and Gas Natural Fenosa (2.5 MTpa) are reported to include a partial link to oil prices; so must do LNG marketed through Novatek Gas and Power (2.86 MTpa). Only 5% (0.82 MTpa) are reserved for free market operations (Ратников, 2014).

In 2013, the governmental strategy of Yamal LNG development was updated to include neighbouring gas fields as a mineral tax- and export duty-free source for the second LNG exporting facility that could partially use infrastructure from the first project (О внесении изменений в комплексный план по развитию производства сжиженного природного газа на полуострове Ямал, 2003). It allowed planning to begin construction of the second plant for 2018 with the first exports scheduled for 2022 and the combined final capacity reaching 25-30 million tonnes of LNG (Ходякова, 2013). Taking into account high infrastructure development costs that are mainly related to the first stage and funded by the Russian Government, the second stage could raise profitability of Yamal LNG.

New Sakhalin projects

A foreign consortium for development of Sakhalin II project was established back in 1994, but an LNG exporting facility was first planned in the beginning of the 2000’s. It was supposed to go online in 2006-2008 and include two trains, each with a capacity of 4.8 MTpa. Started as an exclusively foreign consortium with a favourable production sharing agreement, Sakhalin II later experienced a clumsy acquisition of its major stake by Gazprom. So far, Sakhalin II remains the only operating Russian LNG plant, having exported more than 10 million tonnes of LNG in 2014. The principal consumer is Japan, followed by Korea, India and Kuwait. Success of Sakhalin II and the proximity of the region to the major LNG consumers have led to new LNG-related plans for Sakhalin.

In 2011, Rosneft and ExxonMobil signed a strategic partnership agreement. It largely defined co-operation in Arctic oil projects, but after the 2013 expansion also mentioned plans to develop LNG exporting facility in Far Eastern Russia (Rosneft and ExxonMobil Expand Strategic Cooperation, 2013). In April 2013, Igor Sechin, Rosneft’s CEO, estimated the resource base for the prospective LNG plant to be 600 bcm available at balance of Rosneft and further 500 bcm of ExxonMobil. The first stage stipulated a 5-MTpa unit, but taking into account combined reserves, a second unit could also be planned (Мощность I очереди завода СПГ на Сахалине составит 5 млн т, 2013).

By the end of 2013, when the $ 12-15 billion project drew close to defining potential partners and customers (ONGC, SODECO, Marubeni, Vitol) and selecting a subcontractor for construction, Gazprom started voicing very strong opposition towards Rosneft's plans. The main argument was based on the LNG project being a part of the PSA-based Sakhalin I, where project costs are supposed to be compensated by the Russian Government. Rosneft later confirmed that the LNG plant will not belong to the framework of Sakhalin I and the Government will not bear any additional costs. The second argument voiced by Gazprom was that it would be more economically efficient to use infrastructure of Sakhalin II to process and export additional 8-10 bcm of gas from Sakhalin I (Газпром против строительства Роснефтью нового завода СПГ на Сахалине, 2013).

The underlying argument has, however, been that Russia's gas export strategy should be carefully orchestrated, so there is no unnecessary competition that could drive prices down. Vice-premier Arkady Dvorkovich declared immediately that the final decision on priority of projects would be taken by a special governmental commission. A year later, in September 2014, the decision, now between Gazprom's Vladivostok LNG and Rosneft's Far Eastern LNG was postponed to the mid-2015. Accordingly, the final investment decision on Rosneft's project was also postponed, to the end of 2015, making obsolete the initial plans to start operating the plant already in 2018 (Решение о приоритетном СПГ-проекте на Сахалине будет принято до середины 2015 г. - Минэнерго РФ, 2014).

Another reason for Gazprom to fiercely oppose competing projects in the Russian Far East is that it, together with its partners plan to expand the liquefaction facilities of Sakhalin II project. Alexei Miller has confirmed that the investment decision on the 3rd train of Sakhalin LNG is expected in the second half of 2015. Gazprom's board of directors has confirmed its LNG project priorities in the end of February 2015, listing both Baltic and Vladivostok projects as planned and expressing interest in the third train at Sakhalin II (Gazprom expanding new export routes, 2015). Rosneft’s project was at the same time weakened by a dispute between the Russian Government and ExxonMobil over the tax regime and huge payback of taxes paid by Sakhalin I project.

Vladivostok LNG

Primorsky Krai was initially supposed to become the site of the second Russian LNG exporting facility. It would feed on both Sakhalin and Eastern Siberian gas projects (Кудисов, 2009). Plans for a LNG plant near Vladivostok first emerged in 2008. The project main potential customer could be Japan, but flexibility of the LNG did not exclude other Asian consumers. Despite simultaneous plans for a gas pipeline Sakhalin-Khabarovsk-Vladivostok the LNG project had from the start been linked to the development of new gas resources in Eastern Siberia: Chayandinskoye and Kovyktinsoe fields with potential combined reserves totalling 2,800 bcm of natural gas. The expansion of Sakhalin I as well as the development of Sakhalin III projects could also feed Vladivostok LNG, but would not be sufficient alone.

By 2012 plans for Vladivostok LNG became more detailed: it would be developed in co-operation of Gazprom and five Japanese energy companies and begin operation in 2017, exporting 10 MTpa at the full capacity in 2020. The costs of the project were estimated by various sources to be between $ 7.3 billion and $ 13.5 billion. At the same time, Shell was pushing Gazprom to expand Sakhalin II project with the third train, but an own project looked more lucrative for the Russian company. It is very important that back then Gazprom set priority of its Eastern LNG export projects above any pipeline ones.

Although Gazprom claimed in the end of 2014 that sanctions would not affect the schedule of Vladivostok LNG, a new set of challenges contributed to new uncertainty: the Chayandinskoye field became the resource base for the planned ‘Power of Siberia’ pipeline to China; at the same time, China approached Russia with a proposal to use the existing and prospective pipeline infrastructure for exports from Yuzhno-Kirikinskoe field at Sakhalin, another potential source of gas for Vladivostok LNG. Tight funding conditions could also make Gazprom to choose between Vladivostok LNG and expansion of highly successful Sakhalin II project. To complicate decisions even further, Igor Sechin’s Rosneft started lobbying for its own LNG exports project coupled with the expansion of Sakhalin I facilities. On the demand side, Japan started to reconsider its nuclear energy strategy, potentially reducing future demand for new LNG imports. It would not obliterate economics of new Russian LNG exports, but pushed Russia closer towards choosing between Far-Eastern projects rather than developing all of them.

So far, Vladivostok LNG remains a “*topical project*” in words of both Russia’s Ministry of Energy and Gazprom, but the ultimate decision may be expected no sooner than in the 3rd quarter of 2015 and will involve a lot of lobbying struggle between Rosneft and Gazprom, as the Russian Government is likely to support only a single project in the Far East. Such a project could potentially be an optimal economic solution, but this track is now marred with numerous disputes, such as a legal one over Rosneft’s access to Gazprom’s pipelines at Sakhalin.

Pechora LNG

Pechora LNG used to be the only LNG project planned by other than major Russian oil and gas companies – but by a smaller private group Alltech. It would feed from Kumzhinskoe and Korovinskoe gas fields, totalling 145 bcm of reserves.

Plans for Pechora LNG project first surfaced in 2010 when the project was estimated to cost $ 3.9 billion, capacity of 2.6 MTpa and be implemented by 2015. Among the possible partners, Alltech named CNOOC, KOGAS and PetroVietnam. All the gas was destined for the Asian markets, but the project was soon postponed because of failed negotiations with Gazprom-Export over actual export sales of gas. At that moment, there was no other possibility for any independent LNG projects to have Gazprom's agreement. Clearly, Gazprom was not interested in competition to the existing Sakhalin II and planned Stockman projects.

Over the next two years the local authorities in the Nenets Autonomous District, highly interested in a project that could bring jobs and tax revenues, promoted it and reportedly made Gazprom interested. The claims, however, were not supported and only another year later the Russian Ministry for Energy reported that the project could be realised in co-operation with either Gazprom or Rosneft.

In May 2014, Rosneft indeed decided to participate in Pechora LNG and buy a major stake of shares. Immediately after that, the chair of the Duma committee for energy filed a bill to extent the number of companies allowed to export LNG to include Pechora LNG. At the same time, Rosneft claimed that it would use gas from Pechora in the domestic market.

By the autumn 2014, Arkady Dvorkovich declared that the final decision about Pechora LNG would be taken by the President of Russia after the considerations on how the project would affect Russia's positions in LNG markets and if there would be no unnecessary competition introduced (Аркадий ДВОРКОВИЧ: мнение Москвы определит позицию правительства в вопросе о возврате зимнего времени, 2014).

Putin's decision was apparently a negative one: three ministries recommended State Duma to reject the proposed bill. The decision may have been influenced by a letter sent by a deputy head of Gazprom to Ministry of Energy and asking to decline Pechora LNG's rights to export LNG - for the sake of excluding competition between Russian LNG projects (Подобедова and Дзядко, 2014). Although economics of the Pechora LNG project initially looked promising, the Government's decision means that the project is postponed for indefinite time. Co-ordination (or lack of real liberalisation) of LNG exports means that Russia will not allow constructing a direct competitor for Yamal LNG, no matter how much Rosneft would be interested in accessing LNG market.

Baltic LNG

Gazprom discussed a plan for an LNG liquefying plant in the Leningrad region at the shore of the Baltic Sea in 2006. The costs were estimated at $ 3.7 billion, capacity of the plant should have been five million tonnes per annum and it was planned to go online in 2011-2012. The likely partners in the project were PetroCanada, Mitsubishi and Eni. In 2008, however, the project was cancelled in favour of Nord Stream and Stockman LNG that were deemed more competitive by Gazprom. In 2009, Gazprom shortly came to reconsider Baltic LNG amid the new wave of geopolitical tensions, but by the end of that year completely ruled it out, defining the new LNG priorities: Yamal, Vladivostok (as an outlet for gas from Eastern Siberia), Stockman and expansion of Sakhalin II.

In 2013, Gazprom surprised everyone announcing an "*essentially new LNG project*" in the Leningrad region, not to be confused with the old 'Baltic LNG'. At the same time, it was researching prospects of bunkering LNG as a marine fuel, anticipating new regulations on emissions of sulphur compounds by ships in the Baltic Sea to be enforced from 2015. The new LNG project could therefore be focused both on large- and small-scale LNG supplies.

Besides entering the LNG bunkering market, the competitive edge of the project was in a short distance to European consumers, allowing for swap operations with suppliers switching to Asian markets, and also in access to the united gas system that meant that the project would not depend on a single gas field or production region.

Uncertainty over the project, however, persisted and Gazprom found it difficult to attract foreign partners. Total had initially been interested in exchanging its stake in the ill-fated Stockman for the Baltic project, but the plans did not come true. The planned capacity of the plant was 10 MTpa and Gazprom wanted to sell a 49%-stake in the project only on condition of signing for minimum of 6 MTpa from it. With the most of European LNG terminals significantly underloaded and gas demand staying low it hardly was a lucrative deal.

By the end of 2013, two Gazprom's Baltic LNG projects emerged, both a small-scale and large-scale. It however proved difficult to find foreign investors for more expensive large-scale plan. From the beginning of 2014, Gazprom had to rely on direct participation and funding from Gazprombank in the project at the phase preceding a final investment decision. This decision was supposed not only to optimise Gazprom's investment programme, but also keep on developing the project when it could be too costly to postpone it in face of rising competition in LNG markets (Барсуков, 2014). At the investor day in London in March 2014 Gazprom announced that launching Baltic LNG would be postponed to 2019, whereas Vladivostok LNG should start operating in 2018 as planned. The announcement could mirror a more distinct shift in the export strategy of Gazprom towards Asian consumers, both in response to geopolitical situation, lacklustre economic outlook for Europe and differences in gas prices in the two markets.

Gazprom made a preliminary investment decision regarding Baltic LNG in October 2014, choosing location Ust-Luga at the southern coast of the Finnish Gulf and expanding potential final capacity of the plant from 10 to 15 MTpa. However, in February 2015 completion of the project was postponed once again, this time to 2021. An unnamed source in Gazprom was reported to say that all of the companies LNG projects were being assessed but without a haste to make final decisions (Серов and Старинская, 2015). The news had been preceded by a revelation from Total, the most likely foreign partner of Gazprom in Baltic LNG, that it would not participate in the project. Apart from limited funding, an uncertainty over sanctions in technological could have played its role in postponing Baltic LNG: in construction of LNG facilities Gazprom is reported to be fully dependent on Air Products and Chemicals from the USA and Linde from Germany (Серов, 2015).

In the latest change of the tide, Gazprom was reported to take the final decision to implement the project with a projected capacity of 10 MTpa and a European company as a technologic partner (Газпром принял инвестрешение строительства Baltic LNG, подписал две декларации с Ленобластью, 2015). Either Gazprom hopes for positive demand and price dynamics in the European market or rather sees Baltic LNG as a strategic element in the new configuration of natural gas supplies in the Baltic Sea region: after Lithuania acquired an LNG importing facility, it can potentially stop transit of natural gas from the mainland Russia to the Kaliningrad region without endangering own energy security. The Kaliningrad LNG importing facility is scheduled to come online already in 2017 and will have to rely on other suppliers before Baltic LNG is complete (Регазификационный терминал СПГ в Калининградской области, 2015).

The latest news on the small-scale plant which is reported to be funded by Gazprombank and potentially also Gasum have been positive: the 0.66 Mtpa project is supposed to come online already in 2017 and cost no more than $ 0.5 billion. The LNG produced at the plant can be used both for bunkering and delivered on-shore for residential and industrial consumers in the region. However, implementation of the larger project at Ust-Luga may make this plant redundant.

Table 1. A summary of Russia's plans for new LNG exports

Project	Major investors	Capacity (million tonnes per annum)	Costs (USD billion)	Scheduled for	Current status
Yamal LNG	Novatek, Total, CNPC	16.5	26.9	2017	Under construction
Baltic LNG	Gazprom, Gazprombank	10	7.1	2021	Planned, FID
Sakhalin II LNG, 3rd train	Gazprom, Shell, Mitsui, Mitsubishi	5	n.a.	2022	Planned, pre-FEED
Far Eastern LNG (Sakhalin I)	Rosneft, ExxonMobil	5	12-15	2018	Planned
Vladivostok LNG	Gazprom, Gazprombank	10	7.3-13.5	2018	Planned
Pechora LNG	Alltech, Rosneft	2.6	3.9	n.a.	Planned
Vysotsk LNG	Gazprom, Gasum	0.66	0.5	2017	Planned

Conclusions

The total combined capacity of all the existing LNG projects that could theoretically be completed by 2020 in Russia is around 40-45 million tonnes per annum – the figure initially mentioned in 2013 by the Ministry of Energy as a reference one. It is, however, absolutely clear now that such a capacity will not be achieved in time. With only Yamal LNG under construction and in search for the other $ 10-15 billion of investment, there is little chance that other projects will come online by 2020.

If financial sanctions persist, Yamal LNG's only hope for funding is left with China, further improving Chinese position in negotiations over pipeline projects from Russia. Russia's position is particularly vulnerable if it really wants to build the Western (Altai) pipeline first and only then the Eastern (Power of Siberia) one (Pinchuk, Burmistrova and Golubkova, 2015). It is not only the cheaper and thus very tempting option for Gazprom in present conditions. The Western route would also mean making European and Chinese consumers compete for the same source of gas – a move very much desired by Russia (Miller, 2015). China however prefers the Eastern route over the Western and may use potential funding for Yamal LNG as a leverage in negotiations.

Ironically, both options – decisions in favour of either the Western or Eastern route – may endanger feasibility of Vladivostok LNG. In the first case, it will have to reckon for Sakhalin's gas only, but direct LNG exports from Sakhalin will have much more economic sense. In the second case, it may be postponed once again in favour of channelling all new Eastern Siberian gas to China over a pipeline. Thus it is either the expansion of Sakhalin II or LNG project for Sakhalin I that look most promising now. Taking into account recent tensions between Vladimir Putin and Igor Sechin, reported by Bloomberg (Arkhipov et al., 2015) and also legal and tax issues between ExxonMobil and the Russian Government, the expansion of Sakhalin II LNG exporting capacities or shared use of existing and new infrastructure by Sakhalin I and II projects seem to be the most viable options.

All the ambitious plans concerning LNG came along the liberalisation of LNG exports from Russia which was expected to raise attractiveness of Russian LNG projects to foreign and domestic investors alike. Over the time, the scope and significance of liberalisation have however become debatable. The term used – 'liberalisation' may be itself misleading, because the reform meant only transferring decisions on new LNG projects from Gazprom to the Government of Russia or, according to vice-premier Arkady Dvorkovich, to the level of the President of Russia.

So far, the liberalisation of LNG exports has had only marginal effect on development of new projects. It has spared Novatek or Rosneft from Gazprom export agency charges. The ultimate fate of LNG projects is however decided not by market, but in very top echelons of power in Kremlin which in chase for geopolitical aims may lead to suboptimal economic outcomes, makes projects vulnerable to high-profile lobbying and contributes to uncertainty for potential investors.

As recently as in 2013, Russia did not take European markets for a perspective destination for LNG exports, not only due to lower prices, but also because of the developed pipeline infrastructure with the region. Recently, Gazprom indicated strong resolution to stop exporting gas through Ukraine, negotiations with very well leveraged Turkey over the new track of the 'Southern route' proved to be extremely slow and difficult, lower gas prices in Asia and signs of recovery seem to have revived Europe as a destination for LNG. It would however be a mistake to consider it a decisive factor for speeding up Europe-focused Russia projects, such as Baltic LNG.

Not only it is still very unlikely because of sanctions, most of all financial, and uncertainty of foreign investors over the end of the ‘new Cold war’, but because no Russian LNG project may in short- and middle-term substitute the Ukrainian gas transport system. Most of the Central, Eastern Europe and Balkan countries most dependent on Russian energy supplies are not exposed to the developments in LNG markets as they have no access to it. A proper European common gas market would be an answer to this problem, but it is insomuch a political as a technical challenge. Russia’s own pessimism over the European destination has been reflected in February 2015 decision by Gazprom to postpone launching Baltic LNG to 2021. Taking into account limited funding options and financial sanctions Russia should focus on the projects in the most advanced stage of development – Yamal, with already available infrastructure – at Sakhalin and medium- to small-scale project in the Finnish Gulf.

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The German gas market: Change as the major determinant

Kirsten Westphal

Executive summary

Change is the major determinant of the German gas market. The market is in a sensitive transition due to three interrelated factors: 1) global gas markets are rapidly changing; 2) the EU's energy market packages have changed the functioning of the gas markets, the economics of natural gas, the corporate business models and transformed the natural gas undertakings; and 3) the German energy transition (Energiewende) per se aims at transforming and decarbonising the country's energy mix. In other words: natural gas economics is in flux – but even more so are geopolitics changing. Political perceptions are increasingly determining EU's energy relations with Russia since the Annexation of Crimea and ongoing fighting in Eastern Ukraine. Geopolitics are prevailing over energy economics. This in turn re-shapes German (gas) politics. Whereas Germany's role seems to grow in the EU's foreign relations with Russia, Germany's room for manoeuvre in natural gas politics has been constrained by EU's regulatory power. The Energy Union process started by the new Juncker Commission will further change the (business and political) environment for Germany as well as the EU-28. It is far too early to assess its outcome, but certainly the incremental processes of regulatory and legal harmonisation and coupling of market areas will gain further momentum. Germany's influence in creating the Energy Union will be profound, though, in particular in external energy relations.

Introduction

Natural gas markets are changing rapidly worldwide. The EU is sandwiched in between an ever more energy self-sufficient North America with relatively low gas prices, and an Asian-Pacific gas market that is more attractive because of higher price level and promising demand growth (IEA, 2013, 261-300). Germany is a taker of these developments. As a net importer, Germany and the EU are exposed to international market developments and economics. Indeed, the gas glut in 2009 and 2010 was the result of the shale gas revolution, diverted LNG flows from the USA to Europe and the economic crises, the former of which turned out to be the decisive factor (besides the EU's internal market packages) to break with the previous market structures and business models in the German gas market. In turn, the demand surge that occurred in Japan and South Korea after the Fukushima Daiichi nuclear catastrophe in March 2011 resulted in a temporarily tightened LNG supply to Europe.

The big question is whether gas will be available as required, in sufficient quantity, at cost-efficient prices and exactly where it is needed today and in the future. The decisive factors are market attractiveness (price levels and market scope) as well as existing infrastructure links. Germany itself is an integral part of the interconnected North-West European gas market, but is also of strategic importance for Central European and Baltic gas markets.

Natural gas economics is in flux. EU market fundamentals are changing towards the establishment of a functioning internal gas market. Formal institutions for this purpose are currently being developed through the EU's Third Energy Package, an evolution that has repercussions for the market structure, transactions and business models, as well as for the very nature of the energy companies themselves (for more detail, see Westphal 2014).

The striking issue is that natural gas has been the forgotten fuel and almost a 'non-issue' of German policies. Traditionally, energy policy has been linked to domestic developments in Germany. This tendency has been reinforced by the German energy transition (Energiewende)[1] because it is primarily conducted through the lens of the power sector. The major focus on a power sector transition reinforces the inward looking energy policy. This is striking against the backdrop of the country's high import dependency on oil, gas, and hard coal. Moreover, natural gas is generally viewed as a bridge or a transition fuel into a more sustainable energy system. This is due to the fact because highly flexible natural gas fired power plants are seen as a back-up and enabler of renewable energy installations in the electricity sector.

International gas market developments such as the shale gas revolution in the USA and the subsequent transatlantic price gas (with much lower gas prices in the USA) has raised debates around energy costs. Furthermore, the Annexation of Crimea and the military destabilisation in Eastern Ukraine has risen political and public attention for natural gas markets and policies. The same is true for the EU's Energy Union Package.

The following contribution will look into German gas market and policy developments between 2000 and 2015. It starts from the hypotheses that sensitive transformation is going on at different levels. The contribution aims at mapping the newly emerging natural gas landscape from a German perspective. It analyses the developments through the prism of balancing the strategic triangle of supply security, competitive energy prices and supply security. Natural gas policies in fact are closely related to prioritising and balancing the three objectives. Change is the major determinant. How does the ongoing transition impact on Germany's role and position in the Baltics, the EU and global natural gas markets in particular vis-à-vis external suppliers, such as Russia and Norway?

Germany's gas market: Figures and facts

Natural gas counted for 20.5% in the German primary energy mix in 2014 (AGEB, 2015). The gas consumption in 2014 was 76 billion cubic meters (bcm), 11.6% less than in 2013 (Platts, 2015) due to warm weather conditions but also due to commercial circumstances.

Gas is consumed to 33 % by private households, to 14% by commerce and services, to 12% by power generation, to 4% by long-distance heating and to 37% by the industrial sector. This look at the consumer matrix for natural gas allows a mapping of interests and factors that influence German gas policies and gas market development. A major determining factor is that almost 50% of heating in Germany stems from natural gas (BDEW, 2015a). This is a sensitive issue for security of supply provisions as the share of protected consumers in overall German gas consumption is quite high. The fact that the industry nevertheless is the largest gas consumer illustrates concerns over transatlantic price gaps. This debate is closely related to the power sector, where cheap, but dirty coal has been the commercial choice number one.

[1] The Energiewende is based on the Energy Concept of 2011 and rests upon two major pillars: first, enlarging the share of renewable energy in energy consumption, and second, phasing out nuclear power by 2022. A third pillar comprises of energy saving and energy efficiency. The 2011 Energy Concept aims to increase the share of renewable energy in final energy consumption to 18% by 2020 and then to 60% by 2050, and in electricity generation even 80%. Germany aims at reducing greenhouse gas emissions by 40% by 2020, by 55% by 2040, and by 80-95% by 2050 (compared to 1990 levels). Energy efficiency is another component of the 2011 Energy Concept. Final energy consumption shall decrease by 20% by 2020 and by 50% by 2050 (compared to 2008). Moreover, the insulation rate for buildings is supposed to double. In the transport sector, the final energy use shall decrease by 10% by 2020 and by 40% by 2050. Additionally, there is a programme to promote 6 million e-vehicles by 2030.

Germany's own gas production is depleting. The share of domestic production has been decreasing in German overall gas supply from domestic production decreased from 16% to 10% between 2004 and 2014 (BDEW, 2015b). German production in in 2012 was 10.8 bcm, in 2014 was 9.8 bcm and is expected to halve to 5.1 bcm in 2025 (FNB, 2015, 20, 22). Given the current environment, it is very unlikely that fracking will substitute for production depletion sufficiently. The German recently adopted legal framework contains very strict rules for fracking and unconventional gas production. Moreover, local public protest can be a further curtailing factor.

The major natural gas supplier to Germany is and remains Russia (see Table 1). Natural gas supply in Germany has shifted slightly between 2004 and 2014: Russia's share increased from 35% to 38%, the Dutch share increased from 19% to 26%, the Norwegian share decreased from 24% to 22%, the share of Denmark, Great Britain and others decreased from 6% to 4%.

Table 1. Share of natural gas imports

Year	Denmark (%)	Netherlands (%)	Norway (%)	Russian Federation (%)	Others (%)	Total imports (%)
1970	0	100	0	0	0	100
1980	0	46	21	34	0	100
1990	1	33	17	49	0	100
2000	0	22	27	46	5	100
2005	0	21	32	42	5	100
2009	0	20	37	38	5	100
2013	0	26	29	39	6	100

Source: Bundesamt für Wirtschaft und Ausfuhrkontrolle, http://www.bafa.de/bafa/de/energie/erdgas/ausgewaehlte_statistiken/index.html

Germany is the largest gas market in the EU. It stands for 19% of EU-28's final natural gas consumption (Eurogas, 2013, 4). Moreover, it is major natural gas hub on the EU continent for Russian gas and increasingly for Norwegian gas to South and East of the EU market. Germany has no liquefied natural gas (LNG) import facilities, all imports and exports are via pipeline. Other EU gas markets are supplied via Germany, putting the country into a crucial position in terms of supply security and EU market resilience (EU Commission, 2014). Germany has the largest storage facilities in the EU with a capacity of almost 24 bcm. These are the fourth largest storages worldwide (BMWI, 2014).

The German Energiewende and natural gas politics

The above described German gas matrix has to be analysed through the prism of the Energiewende. German and EU energy policies have been informed by the strategic triangle of sustainability, competitiveness, and supply security for many years. In general, balancing these objectives is a rather theoretical ideal; in reality, trade-offs and priority-setting take place. The prioritisation and definition of the objectives is subjected to political swings and public opinion.

Germany's Energiewende aims at a transition towards a more sustainable energy system. Natural gas could play a role on the path toward a low-carbon energy system (Dröge and Westphal, 2013; Dickel, 2014). Yet, what happened in Germany is that the price of power on the energy exchange fell significantly since 2011, due to the guaranteed feed-in tariff for wind and solar energy, plus the technical need to keep coal and nuclear power plants running at a certain level. The economics of the 'energy only' market and its so-called merit order effect came into play: the share of generated electricity from renewables is on many days so high that it brings about low or even negative energy prices on the energy exchange. As a result, only the cheap (coal-fired) conventional power plants become commercially viable. In addition, the EU's European Emissions Trading Scheme (EU ETS), a market-based mechanism, has lost most of its vigour. The price of CO2 emissions allowances has reached levels at which it no longer has an impact on the use of fossil fuels, in spite of its original design. Respectively, natural gas is losing out to (cheaper but dirtier) coal in these applications (AGEB, 2014).

What adds to the problem is that the 'old mechanism' of indexing long-term contracts (LTCs) does no longer function: it followed the principle of basing gas prices on those for competing alternatives, mostly heavy and light fuel oil and coal, in a way that ensured that gas was always competitive, by keeping its price below that of competing fuels. This informal institutional design had paved the way for increased gas consumption in the past. The market mechanisms of the ETS has not lived up to the expectations, and the traditional mechanism to support natural gas is no longer in place with negative effects for Germany's CO2 emissions.

What further adds to a potential decrease in natural gas consumption are potentially greater efforts in energy efficiency and insulation. A fuel switch to gas in transport could alter the picture. Regulatory uncertainties are significant on the EU level and in Germany. Subsequently, the German estimated gas demand ranges from minus seven per cent to minus 26% until 2024 (compared to the 2012 level) (FNB Gas, 2014, 22), which translates as a difference of 162 TWh (FNB Gas, 2014, 23). This constitutes a challenge for balancing the security of supply and demand, as well as for adapting infrastructure needs to the new supply situation, as it involves difficult cost and benefit calculations.

With respect to Energiewende in can be summarised that the role of natural gas has not been thoroughly defined yet: natural gas is a back and enabler for renewables in the electricity sector and it could help to decrease Greenhouse Gas emissions and respirable dust in transport. As a consequence of that, there is no predictable gas demand, but instead high regulatory and political uncertainty in Germany. Gas consumption in Germany is expected to decrease between -4% (between 2012 and 2025) and -21 % in the same period (FNB, 2015, 21f). This is a difference of 143 TWh (ibid).

Competitiveness and market liberalisation[2]

An angle of the strategic triangle is related to economic competitiveness, liberalisation, affordable and cost-efficient energy, depending on the interpretation.

Between 2011 and 2013, the effects of the shale gas revolution in the USA had been a major point of reference in the German debate on competitiveness and cost-efficient energy supply. The price gap to the US market is indeed a challenge to German and EU economic competitiveness. The price gap has narrowed down, but still persists: USA Henry Hub prices were below USD 3 per million British thermal units (mmBtu) and the prices at UK's National Balancing Point slightly below USD 8

[2] The following two chapters are an updated and revised summary of Westphal, K. (2014) Institutional change in European natural gas markets and implications for energy security: Lessons from the German case, Energy Policy Vol. 74 (2014), 35-43.

per mmBtu in March 2015 (EnergyComment, 2015, 3). The German border price has been slightly above, prices at virtual trading hubs slightly below NBP. However, the price is more than double than in the USA.

Besides, the Internal Market Liberalisation has resulted in profound market transition. Coinciding with the institutional change, which has fundamentally altered the domestic market structure, the business models and the underlying rationales transformed. The gas glut 2009/ 2010 has given impetus to market reorganisation.

The pre-Third Internal Market-Package structures of Germany's 'old world' differed substantially from today's ones. Unlike other EU states, where 'national champions' with state participation dominate (or once dominated) the entire demand-side chain, the pre-reform German gas market was organised in three phases. At the first ('intermediary') level were large vertically integrated gas companies that were also active in production and/or importing supplied gas to regional wholesalers and major distributors. These regional wholesale companies and distributors delivered gas to regional and local (municipal) distributors, which at the third level supplied the end consumers (Schiffer, 1994; Dickel and Westphal, 2012; Westphal, 2012). Transactions between the companies occurred at the intersection of the levels, and centred on the aggregation of required gas volumes. The time frame of these transactions was long-term.

At the same time, the German market was divided into many regions with monopoly distribution concessions. To secure their extraordinary positions, the companies had to take care about supply security. The 'price', a non-transparent market and monopoly prices, was paid by customers in Germany as a premium for a high level of supply security.

The large, vertically integrated importing/producing companies could pass on the minimum pay obligations of their LTCs downstream because of the existing exclusive concessions and demarcations. These were abolished in April 1998, and replaced with long-term downstream contracts that largely reflected the conditions of the long-term import contracts. The disruptive regulatory change occurred in 2006, when the Federal Cartel Office issued a decision applicable until September 30, 2010, restricting downstream long-term contracts by posing certain time limitations on contracted volumes. Until the 'gas glut' in 2009, the terms of import LTCs could be passed on, based on a lack of excess supply capacity in the German market. This situation changed abruptly with the arrival of large volumes of Qatari LNG to northwest European LNG terminals.

The major outcome was that the 'incumbents', the importing companies, such as Ruhrgas and VNG, came under pressure. They were locked into expensive, long-term, oil-indexed contracts with minimum take-or-pay clauses. At the same time, the spot markets became highly liquid, and experienced dumping prices. No longer locked into LTCs, the buyers at the second phase were able to purchase much cheaper gas on a spot basis. The incumbents ended up offering part of their long-term gas on the exchanges, as well. The intermediary market segment was squeezed significantly; incumbents lost their dominant role, as major foreign producing companies integrated downstream into this segment to supply gas directly on the virtual hub.

In 2015, the German gas market is still in a sensitive transition. As a consequence of the previous demarcations and regional concessions, as well as the three-level market structures described above, the level of fragmentation of Germany's gas system is evident in the two market areas and the transmission operations. Germany has two market areas (Net Connect Germany and Gaspool) since 2011, because it succeeded in merging 19 regional markets within a few years. Seventeen transmissions system operators (TSOs) operate in these two market areas as a result of unbundling of the old incumbents on the intermediary as well as on the regional wholesale level (FNB, 2014; Bundesnetzagentur/ Bundeskartellamt, 2014, 72). The gas market is fully liberalised, privatised and split. Germany's market structure comprises 7,000 distribution system operators, approximately 800 wholesalers and suppliers, almost 40 gas importers and exporters and almost 30 storage system operators (Bundesnetzagentur/ Bundeskartellamt, 2014, 72).

Germany is one of the EU member states that has largely privatised, unbundled, separated and sold the assets of energy companies also to foreign companies. Actors from outside the sector, such as insurers and pension fund managers, have entered as investors, reckoning with reliable returns. Since 2013, the TSOs have had an association (FNB) to facilitate the Ten-Year Network Development Plans. Last, but not least, the Network Development Plans are significant undertakings, requiring much co-ordination in Germany, as they involve a variety of formal institutions: the Ministry for Economics and Energy (BMWI) and the regulatory agency (BNetzA), as well as the 17 TSOs, among others (Netzentwicklungsplan, 2014). Transaction costs are consequently very high.

Within Germany, the number of companies involved in gas trade increased significantly and trading has started with actual churn rates ranging from 3.5–3.8% at the virtual hubs (GasPool, 2014b; NetConnectGermany, 2014).

Despite of the ongoing liberalisation process, the natural gas import portfolio has not changed substantially. The oligopoly of the large suppliers persisted due to the German pipeline-based import structure (Bafa, 2014). Germany's top supplier remains Russia (Gazprom), followed by Norway (mostly Statoil), the Netherlands (mostly Gasterra) (see Table 1), domestic producers and other countries.

Security of supply and geopolitics are back

With the Annexation of Crimea and the military destabilisation of Eastern Ukraine and the subsequent deterioration of the EU-Russian relationship, energy security is back on the top of the political agenda in Germany. Perceptions of Russia as an energy supplier are changing in the German political elite, questioning the traditional 'mantra' of Russia as a reliable supplier. Trust is lost and fears of further escalation are growing.

Yet, this is just the last and most alarming situation in a series of incidents that has put a spotlight on structural and physical challenges to supply security in Germany. What became evident is that supply security has to focus also downstream on the whole supply chain from production to the end consumer. The year 2009 proved to be a watershed year because of the Russian-Ukrainian gas dispute (for more detail, see Westphal, 2009), when deliveries through Ukraine came to a complete stop for almost a fortnight. Germany's South was the most affected part of the country, experiencing delivery shortfalls of up to 60%. Germany as a whole suffered cuts of only 10 to 15%. The ex post evaluation by the administration and business representatives concluded that dispatching and crisis management worked very well because of Germany's sophisticated distribution system and storage capacities. German companies argued later in EU discussions on the security of supply directive in favour of maintaining crisis reaction mechanisms on a commercial basis and in the framework of the existing infrastructure, wanting to maintain the new status quo. In February 2009, however, a de facto 'bundled' structure in gas trade existed; unbundling had just started. The challenge in today's German gas market is 'unbundled responsibility' for the functioning of the systems. Under such complex market structures with a diversity of market players, not only are transaction costs increasing, but also dispatching, balancing and co-ordination have become a challenge. The cold snap of February 2012 can be seen as a case in point. During this extreme weather event, demand spiked across the continent. At the same time, Russia had to cut supplies to Germany by 10 to 35%. This situation exposed conspicuous vulnerabilities (see BDEW, 2012; Westphal, 2012). Whereas Italy, Poland and Greece declared major supply disruptions under the EU directive on the security of gas supply, Germany was largely able to deal with the shortfall using market-based measures, chiefly, by withdrawing gas from storage facilities. However, the striking point is that the situation became more critical in Southern Germany, compared to 2009, when the actual loss of supplied volumes was much higher. In 2012, demand was very high, market areas were much larger and because of that, more gas flows went to Italy and France. TSOs responded to the critical situation in the network by restricting supplies to customers with interruptible contracts, and called upon private households to turn their heating lower. In the context of Energiewende's nuclear phase-out, closing down three gas-fired power plants prompted a critical situation of new quality, because shutting down these power stations brought the electricity grid close to a blackout.

To summarise, resilience is an issue for the German gas system. The German gas market has undergone substantial change due to the EU internal market packages. The formal political-institutional setting has also changed; now, the Ministry of Economics (BMWI) together with the German regulatory authority (BNetzA) is in charge of the functioning of the gas system in co-ordination with the market actors.

Storage has become a focal point, too. This is due to changing perception of import dependency and the need for emergency provisions, but also due to the new regulatory environment. Another issue is the use of storage on purely commercial terms. Storage facilities are an essential element to react to a crisis situation, but they have also been used to balance between seasons. Commercially, they are attractive in order to react to price spikes. What could be observed in the German market is that market incentives proved to be too low to fill the storage facilities. After a long, cold winter, storage reached a historical record in spring / summer 2013. Representatives of the large TSOs noticed the problem. Despite of the fact that Germany has large storage facilities of almost 24 bcm, risks of shortage emerged. If price spreads between summer and winter are very low, commercial actors lack the incentive to store natural gas. The situation was later solved as commercial players reacted, whether that happened in response to pleas (also from the BMWI and the BNetzA) or because of the companies own considerations remained largely open. However, it became obvious that this presents a structural shortcoming as storages are a blind spot of regulation in Germany (v. Lewinski and Bews, 2013). Under the impact of Russia-Ukraine crisis, the German Bundesrat has taken up a Bavarian initiative. Bavaria had asked to create a 45-day national gas reserve. The BMWI currently conducts a study on a emergency stocks and other options to create more resilience of the system.

Security of supply has many facets in the German market: a major challenge is the replacement of Dutch / German low calorific gas with high calorific gas from other sources because of depletion that is already taking place. The share of Dutch L-Gas will slightly decrease between 2015-2020, but then shrink by half till 2025 (FNB, 2015, 96) provided that the situation of earthquakes around Groningen does not aggravate. The path of German L-Gas is comparable. This transition is already going own below public radar but will reach its peak between 2020 and 2025. It implies shifting transport flows in the German network and beyond.

The major public concern relates to import dependency. The largest transport corridor for Russian gas to Europe runs through Ukraine. Half of Russia's 160 bcm of natural gas exports passed through Ukraine to Europe in 2013. Transport alternatives are offered by Nord Stream to Greifswald (capacity 55 bcm/year) capacity and the Yamal pipeline through Belarus to the Baltic states, Poland and Germany (annual capacity 33 bcm). And then there is Blue Stream from Russia to Turkey, with an annual capacity of 16 bcm. The import situation is the reason why diversification is an issue in the EU, but also in Germany. However, it takes time, requires member states' co-operation and consensus and is cost-intensive.

Germany's energy statecraft revisited

From a general perspective it is certainly fair to say, that Germany's role (together with France e.g. in the Minsk process) has risen with the Russia-Ukraine crisis. In energy politics, German statecraft has been moving in the opposite direction: it faces significant constraints by Brussels' regulatory power. For many years, national statecraft has dominated energy policy in Europe (see for the following chapter Westphal and Fischer, 2015). This situation has dramatically changed over the last couple of years. Germany has had to adapt to a shift of competences from the national level to the EU level over recent decades. Thus, German energy policy—and the broader impact on foreign and security policy—cannot be understood without taking the EU context into account.

The EU has pushed for a competitive, well functioning internal market. The political and institutional approach has been influenced by the neoliberal market paradigm. The EU has a rather sceptical view on state-owned and/or vertically integrated energy companies. In addition, environmental policies have gained ground in EU energy policies since the beginning of the 2000's and are an important feature in energy policies. As a consequence, the traditional underlying paradigm of a state or public sector-based approach, relevant in most EU member states, changed to a market-driven system with a decarbonisation agenda (Talus, 2014, 28-34) fiercely pushed by Brussels. Three internal market packages (Directive 98/30/EC and Directive 2003/55/EC and Directive 2009/73/EC) were intended to establish a liberalised, competitive, well-functioning, and integrated EU gas market. The main components of this new order have been third party access, unbundling, and market opening, reinforced by ownership unbundling, antitrust enforcement, the abolishment of destination clauses in long-term contracts, access tariffs, and network codes (Talus, 2014, 28-34).

Regulatory and institutional change accelerated with the Commission's Green Paper in 2006, the internal energy market packages, the Treaty on the Functioning of the European Union (TFEU or Lisbon Treaty), and a new Energy Strategy 2020 (Fischer, 2011). The Lisbon Treaty aimed at clarifying the division of competencies between the EU and the member states; with Article 194, energy policy became a field of shared competencies for the first time in the history of European integration. Although the Lisbon Treaty still grants national sovereignty on the energy mix, it also highlights the spirit of solidarity and the objective of a functioning integrated internal market. However, the greater need for co-ordination creates some tension: member states retain their sovereign rights to decide about their respective energy mixes, but at the same time, co-ordinated action is needed to implement infrastructure projects of common interest, to face security of supply challenges, and to create a functioning and integrated internal market.

The EU has gained more influence on national energy policies, but with different effects in the various member states. In Eastern Europe, the internal market package provided the tool to lessen the close dependencies on Russia and put energy trade on a new institutional basis. In Germany, the outcome was much more mixed as it destabilised the traditional business models. Russia profited in its divide-and-rule strategy from a fragmented EU market and its market dominance in the Eastern Europe.

The Commission started to bring regulatory changes into the market that were intended to increase short-term transactions, spot price signals and gas-to-gas competition. The outcome today is that in the EU, spot market-based transactions are said to make up more than half of trade settlements, while oil price linkages are losing ground. Moreover, in practice, the national and the EU regulatory processes take place in parallel, but not always in harmony. The national regulators act on the basis of the actual situation in their respective national markets, which still differs widely from state to state, and may serve to preserve tendencies of fragmentation in EU markets. Further change is set to take place through harmonisation and co-ordination of network codes and tariffs. The envisaged European Union most likely will speed-up these (incremental) processes.

Moreover, the EU also influenced and will influence gas consumption patterns in the member states by environmental legislation, but also the objective to enhance the share of renewables. Looking to the future, the EU's climate and energy package for 2030 has produced a very ambivalent outcome (Fischer, 2014). The future outlook for gas strongly depends on the structure of the framework and on its further implementation. Natural gas faces a stalemate in Germany and the EU: in the electricity sector it is squeezed out by coal and renewables. Efficiency gains will reduce gas consumption in the heating sector. The geopolitical burden on natural gas prevents natural gas from being a fuel of choice to decarbonise the energy system e.g. in transport. The trade-offs of the current gas conundrum are evident: climate and local pollution and economics are out of sight as diversification seems inevitable.

The German–Russian gas relationship and the wider Baltic gas market

Against this above described background the way how the German Russian gas relationship evolves in the future will have a determining impact on the North-Western and Central European gas market. In the past, Germany has built upon a close relationship, mostly as a legacy of the Gas-Pipe Deals and the Ostpolitik, but also because of corporate business strategies and path-dependencies. It has been reinforced by a strong personal alliance between President Putin and then German Chancellor Gerhard Schröder in the 2000's.

Russia has long been Germany's primary energy supplier. For four decades, the German gas sector was characterised by long-term supply relationships, above all with the Soviet Union, and later with Russia. The Soviet Union first began supplying gas to Germany in 1973 under the 'pipes for gas' deal, which was an important pillar of Chancellor Willy Brandt's Ostpolitik and rapprochement with the Soviet Union. An institutional setting 'bridged' and connected two very different markets, was designed for the long term, and was based on a bilateral political and commercial consensus. The co-operation built on complementary economic structures and on shared interests between an energy-abundant and an energy-consuming country; as well as on corresponding business models between an exporter that delivered gas to the border and an importer that was responsible for selling and marketing (see Westphal, 2014, 35-43). Last but not least, this German policy approach relied on huge (private) corporations, such as Mannesmann and Ruhrgas, to realise the commercial side and secured the financial side with state-backed Hermes credits.

The first generation of long-term contracts has soon been supplemented by new long-term contracts. Because of existing business ties and favourable conditions alternative negotiation e.g. to import Algerian liquefied natural gas through the port of Wilhelmshaven have never materialised.

In the 1990's and 2000's, bilateral German-Russian institutions were dominated by increasing interdependence. Despite Germany's high import dependency, the external dimension has been less predominant in the political discourse. In German foreign energy policies, creating and managing mutual interdependence has always been a paradigm, and not so much energy autonomy and autarchy. Energy is perceived as a commodity and a service, and not as a strategic and external policy tool. As a consequence of this paradigm, and in practical terms, the energy mix is an outcome of economic and corporate decisions: it is the private utilities and companies that are primarily responsible for supply security. In doing so, they pre-shape German energy relations with external partners. This translated into a business model of ever closer transnational alliances along the entire natural gas value chain. Demarcation at the border was blurred. As a result of asset swaps and quid-pro-quo package deals, Germany's BASF Wintershall and E.ON Ruhrgas became involved in gas and gas-condensate production in Western Siberia, while Gazprom expanded its transport, trading, and distribution activities in Germany (see Westphal, 2007; Westphal, 2009). Business ties were very close: Ruhrgas was Gazprom's largest foreign shareholder, with 6.5%. A side effect of the strong symbiotic relationship was little diversification beyond the existing trade. This was rational from the perspective of corporate business interests, but not necessarily from a national economy's point of view. However, Ruhrgas and later E.ON Ruhrgas refused to sell strategic parts of the business to Russia, despite several Russian attempts.

In 2005, the Nord Stream pipeline agreement was signed. A major package deal included the building of the Nord Stream pipeline through the Baltic Sea. Establishing direct pipeline links between Russia and Germany was a priority for the Schröder government with its close (personal) relationship with President Putin, making the German gas market a major hub for Russian gas.

To summarise, the political framing of commercial relations changed from 'change through rapprochement' during the 1970's, Ostpolitik to 'rapprochement through interdependence' in 2006, and to a 'modernisation partnership' in 2009. Managing mutual interdependence became the major paradigm. From a German point of view, it was a remarkable success—Germany has not yet faced an interruption for political reasons. This is the source of the German mantra on Russia's reliability as an energy supplier: it has endured difficult times and has built up trust and close ties between companies and the political elites. However, a break with market structures initiated in the EU changed business interests and commercial patterns.

The integration of Germany in EU energy policies and the effect of EU market regulation resulted in a break of path dependencies: the close commercial ties and corresponding business models no longer exist. As a result, the relationship between Russia and the EU flared with contentious issues (contractual mismatch, OPAL and South Stream exemptions, an anti-trust case against Gazprom, and Russia's WTO suit against the EU) even before the Russian-Ukrainian crisis. This would have required political dialogue in order to hedge the conflicts and find a solution. Yet, the dialogue to solve contentious issues is stalled with the overall deterioration in the Russian-German relationship.

The new market design in the EU had an ambivalent outcome for Germany's political and market power. This limited Germany's room of manoeuvre: final approval of the OPAL exemption, for example, have shifted from Berlin to Brussels as a consequence of institutional change.

As a consequence, energy relations are increasingly combative, destroying the traditional channel of interest-balancing and rapprochement. With the Crimea annexation in March 2014 and continuing military conflict in eastern Ukraine over the course of 2014 and 2015, the level of import dependency on Russia has become a source of concern. This is a clear paradigm shift, as interdependence is no longer seen as a part of a solution, but defined as a problem.

As a consequence, the Russian-Ukrainian crisis is a watershed, as interdependence is increasingly perceived as a problem and no longer as part of the solution—even more so in the EU context. This can be explained by the fact that eastern EU member states face high dependencies on Russia, leading to a perception that natural gas supplies have been used as blackmail and even as an integral part of hybrid warfare in Ukraine (Rühle and Grubliauskas, 2015). This perception is particularly predominant in Eastern European Member States. Under the current circumstances, Germany is devoted to maintain a consensus among EU member states vis-à-vis Russia. Therefore, Russia and natural gas has become a major reference point in the EU-28. Geopolitics are prevailing over economic considerations.

On its side, Russia has also responded to new market conditions and political deterioration, because Gazprom is revisiting its downstream engagement in Europe. It has withdrawn from a number of projects (the OPAL exemption, a 100% take-over of WINGAS, and South Stream).

In the EU, diversification is a primary objective. Yet, this is not easy to achieve and a foregone conclusion. From the German perspective, a number of factors undermine such a strategy. Firstly, Germany is no longer the home country for a large gas company. The EU's market package had an impact on the companies, which are major instruments for supply security. Large exporters like Gazprom are dealing with 'unbundled' companies, with much smaller market capitalisation and less leverage, representing a shift in relative power if aggregation of market power downstream does not really work. To put it very bluntly: the former backbone of the German gas market, Ruhrgas merged with E.ON, later downgraded to E.ON Commodities and Trading, and is now vanishing from E.ON's core business because of the announced split of the company in December 2014. Wintershall will remain the sole German upstream producer, not playing in the league of IOCs. There exist no large companies that have the market capitalisation to realise huge infrastructure projects on their own. Secondly, Russia's break-even costs for gas production and transportation to EU's markets and the surplus of current gas production in Western Siberia make Russia for a significant period of time the lowest-cost supplier to the EU that can underbid alternative suppliers. In fact, Gazprom has already shifted its strategy of defending the price level over to defending its market shares. This has resulted in a situation where market reality mismatches with the geopolitical situation of growing unrest. The economic strategy is evident: the commercial appetite of importers and commodity traders to diversify and open others sources is low.

Conclusions

The room for manoeuver on the side of German energy policy has become more limited, while the role of the Commission as principal negotiator with non-EU suppliers is growing.

At the same time, Germany's role in foreign affairs has grown since the outbreak of Russian-Ukrainian energy crises. At a certain point in time which is depending on the further course of the conflict there will be a need for energy diplomacy, political re-framing, and a new commitment to the energy relationship with Russia; most likely, this will have to be done in consensus among the EU-28. The Energy Union is a project that Germany will have to fill with substance together with the other EU member states. Germany's interest as the country of the Energiewende should be to push for 'one voice' with respect to renewable energy, energy efficiency and energy saving. Yet, the major reference point of EU energy policy is diversification away from its major fossil fuel and nuclear fuel rod supplier, Russia. This major motivation should be translated into the consequent impetus to diversify away from fossils and nuclear power rather that to simply shifting geopolitical risks. Such a strategy, however, implies that Energy Union is referring in a non-discriminatory manner to Russia as to other external suppliers, also in respect to the instrument and tools created. Germany should push for a positive faming of natural gas policy in the EU. Natural gas policies will have to separate natural gas economics from geopolitics. This implies to be aware of potential trade-offs with respect to climate policy and economic competitiveness. Natural gas should become a fuel of choice. This does not necessarily mean that natural gas enlarges its share in the German and EU-28 energy mix, but at least allows to have a predictable gas demand. Diversification, resilience and adaptation of infrastructure needs are a function of demand security as well.

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Germany's Energiewende and the Baltic Sea region: Public opinion and systemic interactions

Thomas Sattich

Executive summary

Germany's energy transition changes the demand for energy on regional and international energy markets. A major share of the country's energy imports comes from, or passes through the Baltic Sea region, making Germany the area's main energy importer. Public discourse does, however, not reflect this situation accurately. Imports of natural gas block the view on the importance of other energy carriers. The latter, especially oil and coal, are, however, equally important both as elements of the regional energy system and with regard to Germany's energy future. This article therefore aims at going beyond the narrow focus on natural gas, and provides a more encompassing assessment of the impact Germany's Energiewende is likely to have on energy flows in the Baltic Sea region.

Introduction

In 2011 Germany started enthusiastically into its Energiewende adventure. Since then it became clear that the goal of a nuclear free and carbon-neutral energy system is not to be achieved easily or cheaply. The international implications of the project have not received much attention in the beginning; yet in the energy sector things are per definition interrelated and not confined to the national level. Soon after the phase-out of the first eight nuclear power stations, the country hence saw itself confronted with the international dimension of the latest of its energy policy u-turns. But to the major surprise of the general German public, the idea of a quick nuclear phase-out and large-scale increase of renewables did not turn out to be an Exportschlager (export success).

On the contrary, the focus of countries, such as Poland, Sweden and Great Britain, remained on coal, gas and nuclear power. Others such as Spain even reduced their subsidies for renewables. But even though Germany's energy transition causes only little enthusiasm in neighbouring countries, the Energiewende still has repercussions in the international energy system: being Europe's largest importer of energy, the transformation of Germany's energy system changes demand on international and regional energy markets. Moreover, electricity flows go through the interconnectors between national power systems, and thus have an impact on the emerging EU electricity market. It is thus very likely that the Baltic Sea region will not remain unaffected by the Energiewende.

The aim of this article is a twofold assessment of 1) the role of the Baltic Sea region for Germany's Energiewende project and 2) the likely impact of this project on energy flows in the region. A short-term and a long-term scenario could serve as the basis for this analysis: according to Germany's national energy strategy the nuclear phase-out is to be completed by 2022. At this point renewables should contribute with at least 18 per cent to meet national net energy demand, and with at least 35 per cent to electricity demand. The renewables are supposed to increase to 60 per cent of national net energy demand and 80 per cent of electricity demand by 2050 (BMWi 2014a). As the Energiewende's history suggests, sudden turns in Germany's energy policy are possible. As a consequence, the article elaborates on the basis of a 2020/2022 short-term scenario.

Germany's energy system and the Baltic Sea region

What role does the Baltic Sea region play in Germany's plans to transform its national energy sector? The following section provides an analysis of public discourse in Germany. Aiming at an assessment of those issues that will affect the region's energy system in the following years, this analysis looks at the Baltic Sea region through the eyes of the country's energy-interested public. Based on this assessment, the energy system of the region and the likely impact of Germany's energy system itself is analysed. The focus of this step lies on import/export flows of different energy carriers.

Germany's energy transition and energy flows in the Baltic Sea region: public opinion in Germany

The significance of a particular region for a country's energy policy should be reflected in the national media coverage: the more important a particular region appears to journalists and experts to be as a source, supply route, and/or location for energy production of a given country, the more prominent its place in the energy-related media coverage should be. Similar patterns should be noticeable in the German case. On the basis of this assumption, the following analysis aims at assessing the relative importance of the Baltic Sea region for Germany's Energiewende. It is based on a sample of 717 articles from five of Germany's leading daily and weekly newspapers, covering the spectrum from centre-right to centre left and a time period from April 2005[1] to October 2014: Die Zeit (76 articles), Der Spiegel (63), Süddeutsche Zeitung (206), Die Tageszeitung (90), and Die Welt (282).[2]

How much attention does the Baltic Sea region receive in German debates around the Energiewende? From the sample of articles, 134 mention the term 'Ostsee' (the Baltic Sea), that is almost 19 per cent. However, this number shrinks drastically if the search term is amended with 'erneuerbare Energie' (renewable energy) or 'Energiewende; only 33 (4.6 per cent), respectively 26 articles (3.6 per cent) discuss the role of the Baltic Sea for the country's energy transition towards more renewables. In order to put these numbers – and hence the relative importance German press attributes to the Baltic Sea – into perspective, it has to be related to the prominence of other areas. Since Germany is not only a littoral state of the Baltic Sea, it seems logical to ask also about the prominence of the North Sea and other neighbouring regions in German energy-related press (Figure 1).

Based on the findings of this analysis, aforementioned search results appear in a different light. Even though other countries and regions rank higher on the echelons of energy-interested public awareness in Germany, a nevertheless considerable percentage of energy-related press articles seems to discuss the threats or benefits of the Baltic Sea for the country's energy policy. It can hence

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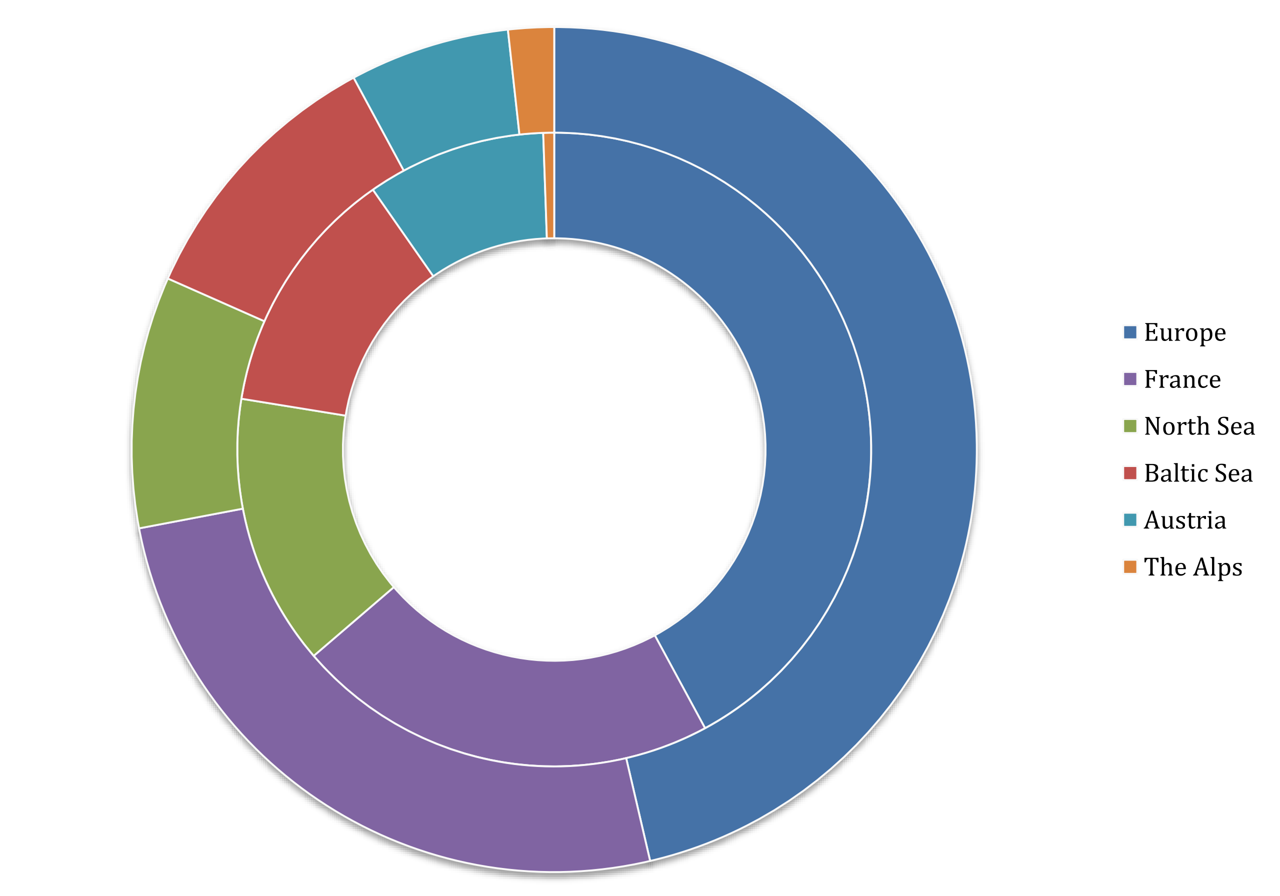
[1] The first Merkel Cabinet was formed in November 2005.

[2] These articles have been retrieved from the Factiva data base, using a number of energy-related search terms in various combinations. The following search terms were used in the Factiva data base: Nord Stream, Energiesicherheit (energy security), Ostseepipeline (Baltic Sea pipeline), Ostsee-pipeline, Nord Stream-pipeline, Nord Stream pipeline, Erneuerbare Energien (renewable energies), Energiewende (energy transition), Regenerative Energien (renewable energies), Alternative Energien (alternative energies), Energieunabhängigkeit (energy independence), Gaslieferung (gas supply), Energieknappheit (energy scarcity), Blackout, Atomenergie (atomic energy), Kernenergie (nuclear energy), Nuklearenergie (nuclear energy), Energiesicherheit (energy security), Grenzüberschreitende Stromflüsse (cross-border power flows), Elektrizität (electricity), Strom (power), Phasenschieber (phase shifter), deutscher Strom (German power), grenzüberschreitende Leitung (cross-border power line), Atomkraftwerk (atomic power station), Atommüll (atomic waste), Atommüllendlager (nuclear waste disposal facility), Atomendlager (nuclear waste repository), Schiefergas (shale gas), Unkonventionelles Gas (unconventional gas), Shale Gas, and Fracking. A full list of word combinations can be obtained from the author.

be assumed that the Baltic Sea is considered an area of significant importance for Germany's Energiewende project by German press (and thus the country's energy-interested public). Moreover, this general interest in the Baltic Sea seems to increase (Figure 2). Yet the results of this analysis are indifferent with regard to the specific role the Baltic Sea plays in energy-related public debates in Germany; the relatively low number of articles in the year 2013, for example, cannot be explained on this basis. In order to provide a better view, a closer look on the specific targets of the Energiewende is necessary.

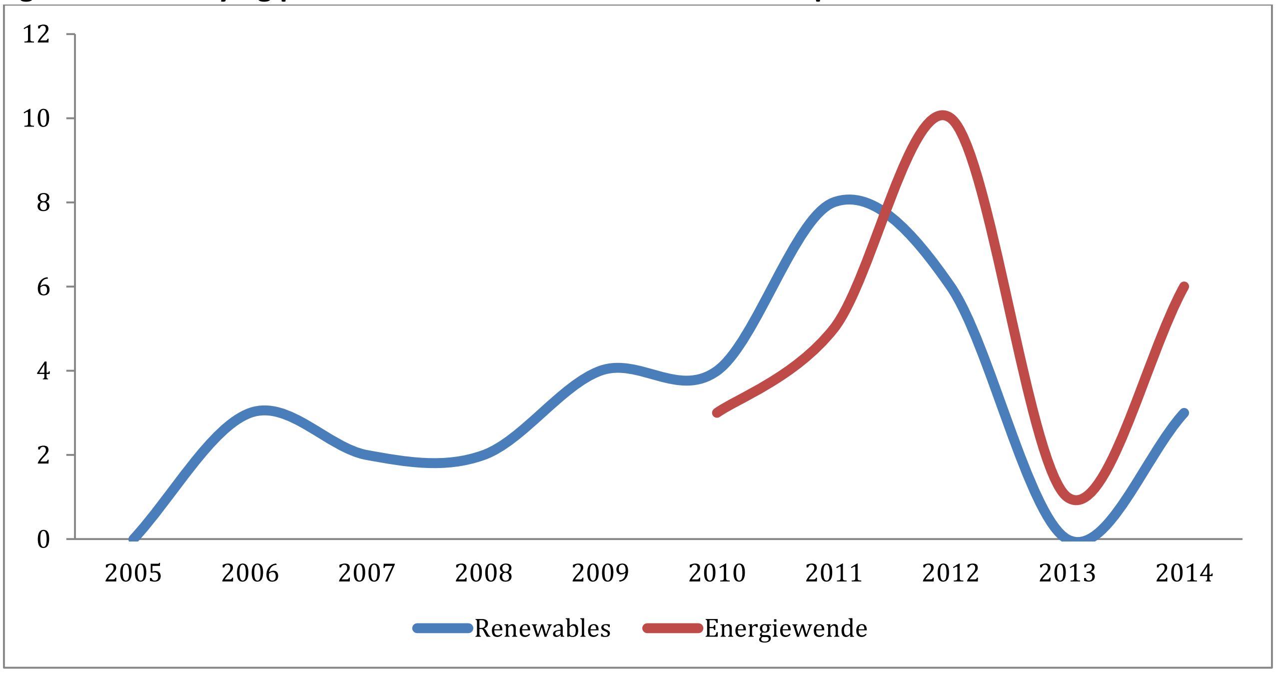
Figure 1. Percentage of press articles mentioning randomly chosen countries/regions in Germany's vicinity and renewable energy / Energiewende



Note: 'Renewable energy' (outer ring) and 'Energiewende' (inner ring).

According to BMWi (2014a, 11), the Energiewende aims at distinctively changing central elements of Germany's energy system: on the one hand, the share of renewables in Germany's gross energy consumption is to be increased to 18 per cent until 2020 (60 per cent by 2050); on the other hand, the use of primary (fossil and nuclear) energy is to be decreased by 20 per cent (50 per cent by 2050). In sum, these and other measures are supposed to decrease green house gas emissions by 40 per cent in the same time period (80 to 95 per cent by 2050). The electricity sector has to play a fundamental role in this programme, with targets even more far reaching: power consumption is to be decreased by 10 per cent until 2020 (25 per cent by 2050), and full nuclear phase-out is to be achieved until 2022. By then (2020) renewables are to increase to a share of 35 per cent in gross final power consumption (80 per cent by 2050).

Figure 2. The varying prominence of the Baltic Sea in German press



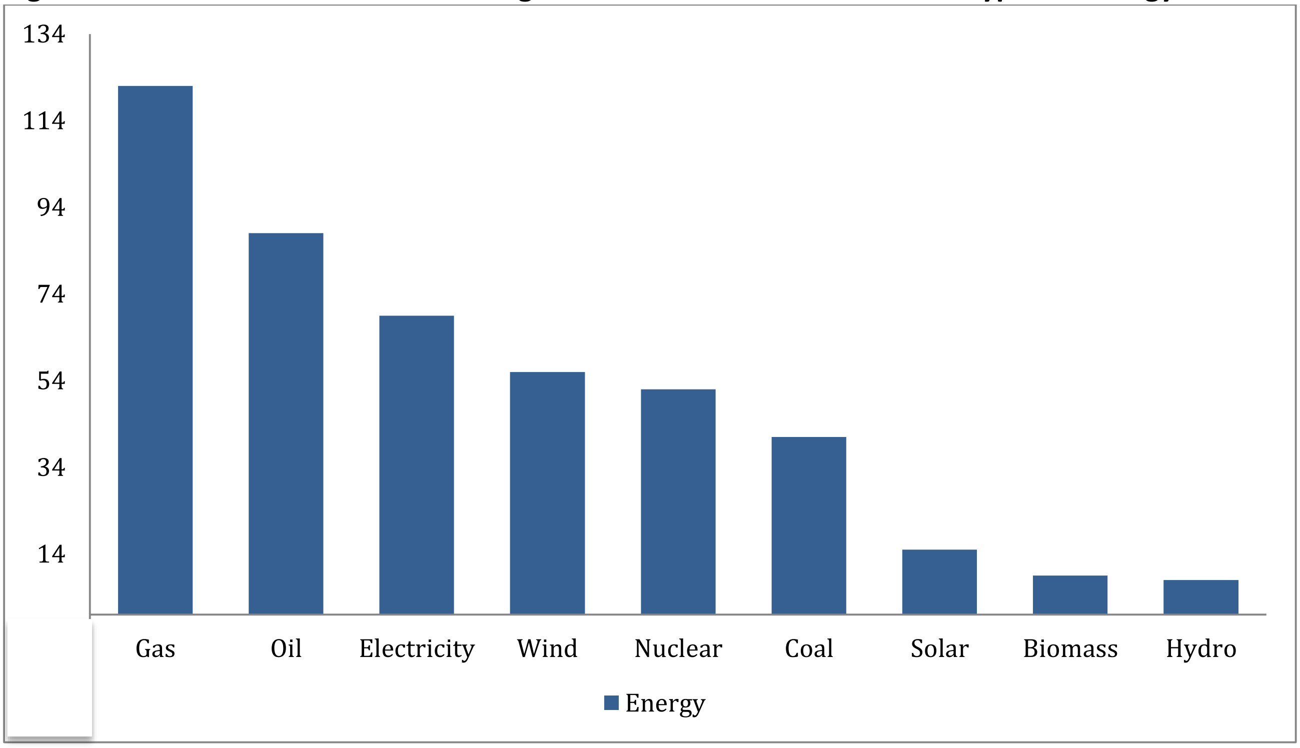
Note: Within a sample of 134 articles mentioning the Baltic Sea, only a fraction deals with the subject of Germany's energy transition: Blue line = number of articles mentioning the Baltic Sea ('Ostsee') and renewables ('erneuerbare Energie'); red line = number of articles mentioning the Baltic Sea ('Ostsee') and the 'Energiewende'.

How does German press reflect these targets with regard to the Baltic Sea? While the percentage of newspaper articles from the sample generally reflect the significance of individual Energiewende targets, the Baltic Sea appears to be a blind spot in this regard: only a small fraction of those articles, which are dealing with Energiewende targets also mentions the Baltic Sea. A look at the different forms of energy explains why: German press mostly reflects on the Baltic Sea region with regard to conventional energies; most important in this context is gas and oil, but nuclear energy and coal also play a significant role. Renewable energy, such as solar, biomass and hydropower, on the other hand hardly appear at all (Figure 3). The exception that proves the rule in this context is wind power, as more than a third of those articles that mention the Baltic Sea deal with this form of power generation.

In a first approximation this analysis has examined the prominence of the Baltic Sea in German energy-related press; yet the search term 'Ostsee' (the Baltic Sea) is too narrow to include the entire region, that is those countries around the Baltic Sea. A deeper assessment therefore has to include the individual littoral states in German Energiewende-related press. There are slight differences between the numbers of articles that mention the search terms 'Energiewende', 'erneuerbare Energie' and individual countries around the Baltic Sea; yet all in all Poland, Russia, and Sweden appear to be at the centre of attention, whereas Denmark, Finland and Norway attain less attention and rank second in German press.[3] Estonia, Latvia and Lithuania attract the smallest share of attention.

[3] Number of articles mentioning 'Energiewende' is as follows: Poland (41), Russia (36), Sweden (9), Norway (9), Denmark (8), Finland (6), Estonia (4), Lithuania (1), and Latvia (0). Number of articles mentioning 'Erneuerbare Energie' (renewable energy) is as follows: Russia (45), Poland (37), Sweden (20), Finland (14), Norway (12), Denmark (6), Estonia (3), Lithuania (1), and Latvia (0).

Figure 3. Number of articles mentioning the Baltic Sea and various other types of energy



Note: Within the sample of 134 articles mentioning the Baltic Sea, the prominence of various types of energy varies considerably.

Thus, a few preliminary conclusions can be drawn: if the prominence of the Baltic Sea in German press is taken as an indicator, it appears that the energy-interested public in Germany attributes only limited attention to this region in terms of the Energiewende targets. The interest is, however, growing. Moreover, by broadening the scope to include the littoral states of the Baltic Sea, the picture changes significantly, with individual countries, such as Poland, Russia, and Sweden attaining considerable attention by German press. Seen through the eyes of the German press, the Baltic Sea region is, however, of limited importance with regard to the primary targets of Germany's energy transition, that is the reduction of (fossil) energy consumption and the increase of renewables. On the contrary, the German press perceives the Baltic Sea region mostly as a supplier for fossil energy, especially gas and oil, or as the location of conventional/nuclear energy based electricity generation capacity.

A closer analysis reinforces this impression: screening the sample of articles mentioning the Baltic Sea for different search terms to appear in the same section as 'Ostsee' (the Baltic Sea), almost two thirds of the results account for the term 'gas', while only 18 per cent account for 'wind'. Hence, not only do most articles in the sample largely cover fossil fuels; the particular sections within the articles that contain the search term 'Ostsee' also mostly cover the issue of natural gas which is mentioned. The conclusion of this analysis must hence be that gas largely predominates where public discussions in Germany mention the Baltic Sea region and the Energiewende. Given the Energiewende targets to decrease the use of carbon based energy carriers[4], the following sections can hence be based on the hypothesis that – with the exception of wind power – the Baltic Sea region will lose some of its importance for Germany's energy system.

[4] Accordingly the need for CO2 neutral prime energy carriers will increase.

Germany's energy transition and energy flows in the Baltic Sea region: statistical facts and trends

Where the Baltic Sea region is mentioned, it is largely portrayed as a supplier or supply route for fossil fuels – namely gas – by the German press. In comparison, other forms of energy, such as nuclear energy or biomass, hold an inferior position. The construction of the Nord Stream pipeline might, however, have resulted in a place of gas imports in German public discourse disproportionate to its actual role. Beyond, renewables pose a serious challenge for gas-fired power plants in Germany. The role of natural gas might therefore decrease in the years ahead. The Energiewende targets to generally decrease the use of fossil fuels until 2020 and beyond. In order to provide a clearer idea of the interactions between Germany's Energiewende and energy flows in the Baltic Sea, this section will therefore analyse the energy system of the Baltic Sea region in more detail. Basis of this analysis is Eurostat data on energy consumption and imports from 2010-2012 (see Annex at the end of this article).

If the territory of the littoral states is included in the analysis, the Baltic Sea region[5] is an area rich in energy resources, with a three years (2010-2012) average surplus of primary energy production of 500.2 mtoe (million tonnes of oil equivalent). Unsurprisingly, the distribution of available energy resources is, however, highly unequal, with only three countries, namely Denmark (2010-2012 average surplus of 1.7 mtoe), Norway (2010-2012 average surplus of 169.6 mtoe) and Russia (2010-2012 average surplus of 602.5 mtoe), showing a positive balance between energy consumption and production. If one compares this (positive or negative) balance with gross energy consumption of individual countries, the seriousness of this situation becomes clearer: with the exception of the three net exporters, the countries of this region do not produce indigenous energy in numbers sufficient to supply the national economies (Figure 4). The energy supply gap of those countries[6] with insufficient access to indigenous energy sources amounts to a (2010-2012) average of -273.7 mtoe.

With an index of -0.613 Germany is to be found amongst those countries that in the region with the smallest basis of indigenous energy. As a result of its internal energy situation and the size of the German economy, the country thus is confronted with a massive (2010-2012 average) energy gap of (-)198.1 mtoe, that is 72.38 per cent of the region's combined energy supply gaps. 95.3 mtoe, or 48 per cent, of the necessary imports to Germany come from the littoral states of the Baltic Sea region.[7] The Baltic Sea region can thus be described as the backbone of Germany's energy supply, and should be of strategic interest for the country. Given that Germany also accounts for some 24 per cent of gross energy consumption in the Baltic Sea region (including entire Russia), any changes in the German system of energy production, imports and consumption can be expected to affect energy flows in the entire region (Figure 5).

Energy imports from the Russian Federation and Norway play a particular role in this regard, as they account for nearly the totality of imports from the Baltic Sea region to Germany, and hence fill almost half of the country's energy gap. Including Norway and Russia in the analysis is, however, based on a very broad understanding of the Baltic Sea in terms of geography, as both countries stretch far beyond the geographical limits of that area. This analysis therefore requires a closer

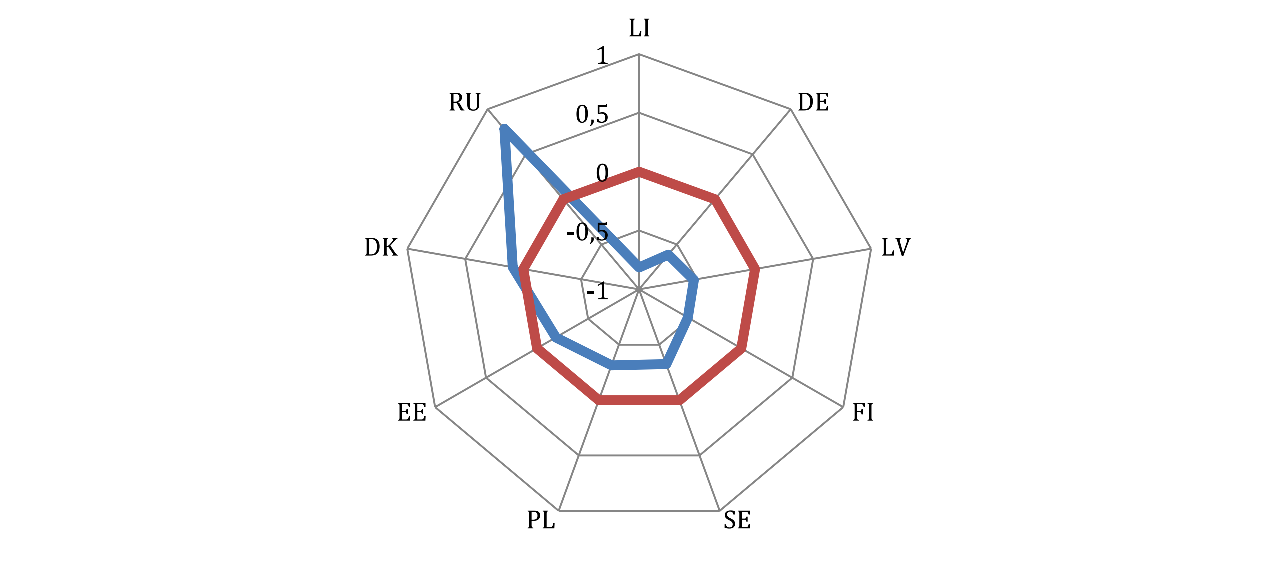
[5] In this analysis the following countries are included: DE (Germany), DK (Denmark), EE (Estonia), FI (Finland), LI (Lithuania), LV (Latvia), NO (Norway), PL (Poland), SE (Sweden), and RU (Russia).

[6] Estonia, Finland, Germany, Latvia, Lithuania, Poland, and Sweden.

[7] German energy imports from the Baltic Sea region (in per cent): RU: 31.33; NO: 15.6; DK: 0.89; FI: 0.03; LI: 0.04; PL: 0.11; and SE: 0.08.

definition of the 'Baltic Sea region'. In this regard, it is important to understand that Germany's national energy system is located at the crossing point of several major Euro-Eurasian energy regions (Högselis, Aberg & Kaijser 2013, 56). German gas and oil imports from Norway, for example, come from fields in the North Sea, and cross that sea through different pipelines (via Europipe I, Europipe II, and Norpipe); from its entry points to the national German system – located at the shores of the North Sea – Norwegian gas then predominantly supplies areas in North-Western Germany (such as the Ruhr), which, in a more narrow sense, cannot be described as being part of the Baltic Sea region.

Figure 4. Indigenous energy supply of countries in the Baltic Sea region

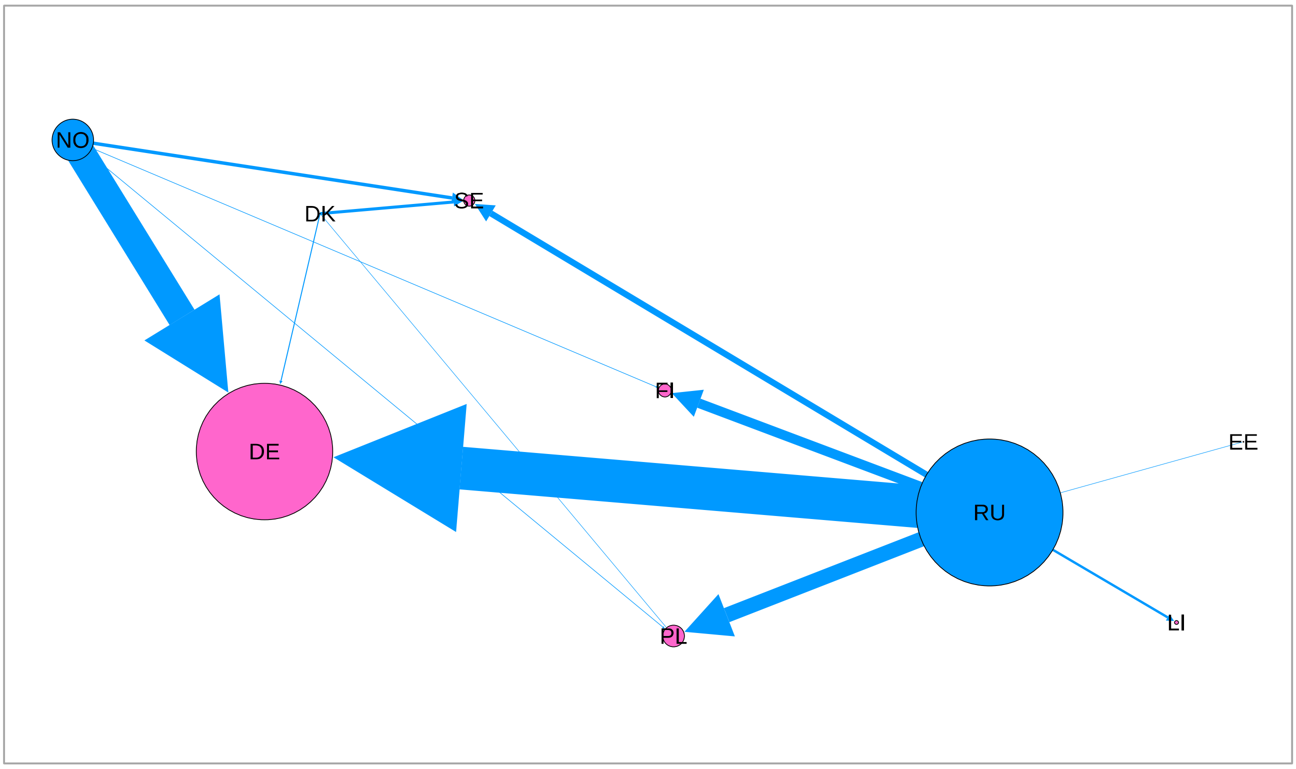


Note: red line = production of indigenous energy equals national energy consumption; blue line = the energy situation of individual countries: negative values = no (use of) indigenous energy (-1) or limited capacity to supply the national economy with indigenous energy; positive values = capacity to fully supply the national economy with indigenous energy plus export capacity (+1 = export equals national consumption)[8].
Source: EUROSTAT online energy statistics (2010-2012), EIA (2010-2012).

In the strict geographical sense, Norwegian gas (2010-2012 average of 25,003 mtoe) and oil (8.5 mtoe) supply to Germany can hence mainly be attributed to the North Sea Europe region (Högselis, Aberg & Kaijser 2013, 56); they are thus to be excluded from the following analysis. With energy from Russia, things are more complicated, as parts of the transit system are part of the Baltic energy system (Nord Stream, Yamal/Europol), whereas others (e.g. Brotherhood) pass through different regions. However, yearly transport capacities of individual pipelines[9], and actual gas flows in these pipelines[10] allow to infer an estimated 50 per cent of Russia's gas and oil supply towards Germany passing through countries in the Baltic Sea region. The following analysis thus includes only those 50 per cent of German oil and gas imports from Russia that can be assumed to pass through the Baltic Sea region.

[8] Norway has an index value of 5.6.
[9] The annual pipeline capacities are as follows: Brotherhood 100 bcm/year; Yamal 33 bcm/year; and Nord Stream 55 bcm/year (Gazprom, 2015).
[10] In 2013, gas flows were as follows: Brotherhood 59 bcm; Yamal 34 bcm; and Nord Stream 23.5 bcm (see CIEP).

Figure 5. Who causes, who fills the regional energy gap?



Note: Energy deficit (pink nodes: regional energy deficit, see Annex, Table 2), energy surplus (blue nodes: regional energy surplus, see Annex, Table 2), and energy flows (blue arrows: energy exchange, see Annex, Table 4[11]).[12].
Source: EUROSTAT online energy statistics (2010-2012).

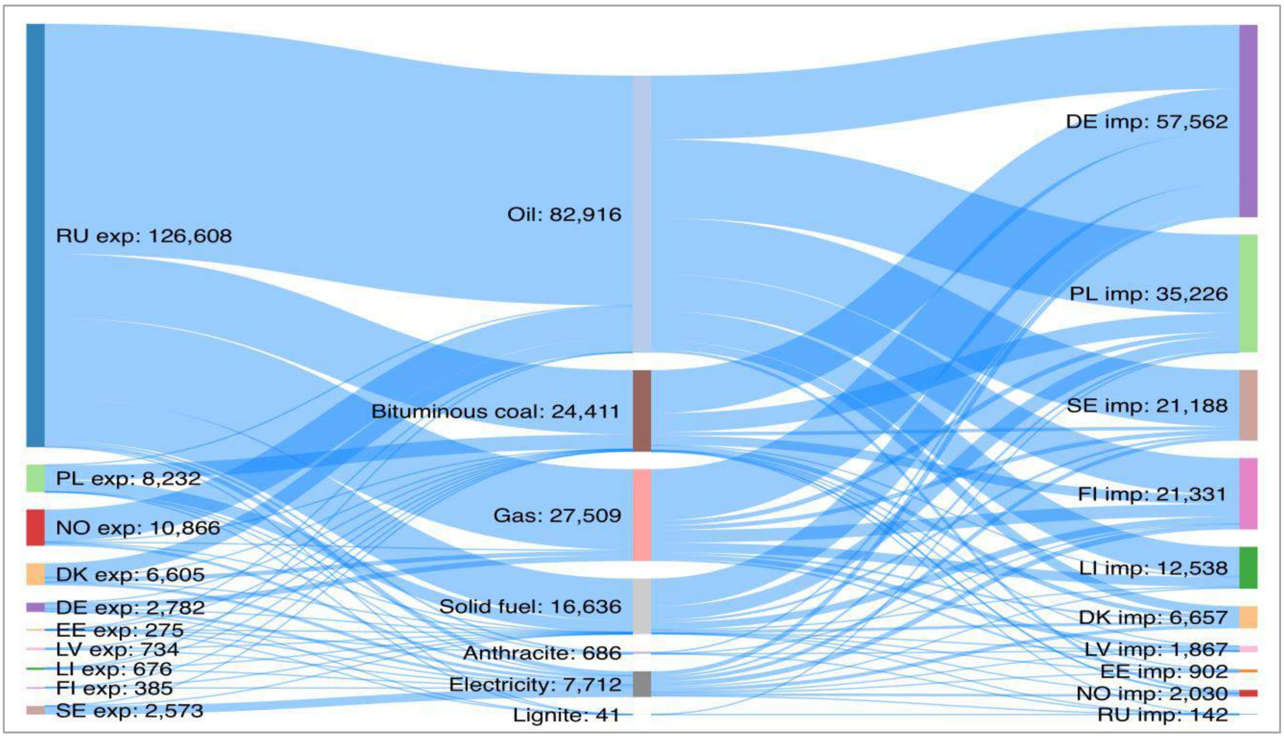
As a result of this, the overall picture of energy flows in the Baltic Sea region changes considerably, and leaves a clearer perspective on the interplay of Germany's Energiewende with the flux of various forms of energy in the area (Figure 6). Accounting for approximately 79 per cent of energy exports, the predominance of Russia amongst the energy exporting countries remains largely unchallenged in this closer definition of the Baltic Sea region, whereas Norway's role as energy exporter becomes far less important. Germany's energy imports from the region reduces largely, to approximately 57.6 mtoe, that is a comparably small 36 per cent share. In other words, the importance of the Baltic Sea region for Germany's energy sector diminishes if the analysis is based on a strictly geographical understanding of the geographic area.

Moreover, the perspective on different energy carriers as a commodity in the Baltic Sea region changes with an exclusion of Norwegian and Russian sources: while gas is most prominent in the German (Energiewende-related) press on the Baltic Sea region, its actual share amongst those energy carriers which are traded and shipped in the region, is small compared to other energy carriers, such as oil and the different forms of coal (see Figure 6). Compared to the flows of oil, gas is only the second most important energy in the energy system of the region, and depending on the share of coal among solid fuels[13] it is likely that gas even ranks third. An analysis of the impact of

[11] According to Eurostat data, Latvia did not import energy from the region's main energy suppliers in the time period 2010-2012, and hence, Latvia has not been included in this figure.
[12] Computed with Gephi, ForceAtlas2.
[13] Eurostat does not provide a clear definition of the term 'solid fuel' (for a definition, see OECD and IEA 2004, 109).

Germany's Energiewende on energy flows in the region has to take this limited role of gas into account. Moreover, the place of electricity imports and exports in the region amongst other forms of energy flows has to be noted, as its relatively small share indicates that electricity generation still has a very strong national basis.

Figure 6. Energy flows in the Baltic Sea region[14]



Note: Energy export and import patterns in the Baltic Sea region (2010-2012 average, in ktoe).
Source: EUROSTAT online energy statistics (2010-2012).

The impact of Germany's energy transition on energy flows in the Baltic Sea region

Its scarcity of indigenous energy resources makes Germany irrelevant as an energy exporter.[15] Regardless of major modifications of Germany's energy system, such as the Energiewende, this is unlikely to change. As an importer Germany plays, however, an important role in different energy markets. With a yearly average of 57.6 mtoe (2010-2012) of energy imports, 25 per cent of Germany's total imports of 176.4 mtoe (2010-2012 average) come from or pass through the Baltic Sea region.[16] To put it differently, 36 per cent of the Baltic Sea region's total energy flows enter Germany's energy system. The Energiewende will affect this pattern (until 2020 and beyond), yet the question is, how and to what extent. Since Germany's exports is unlikely to change significantly[17], the reminder of this section focuses on energy imports.

[14] For the calorific values used for the conversion of Eurostat data on different forms of energy to ktoe; Anthracite 35 MJ/kg; Bituminous coal 29.5 MJ/kg; Lignite 17.5 MJ/kg; and Solid fuel 20.65 MJ/kg (OECD and IEA 2004, 109).

[15] In view of the decision to phase-out economic support for hard coal mining until 2018 (Auer and Anatolitis, 2014, 7), it is even more likely that Germany's limited role as an exporter will not change.

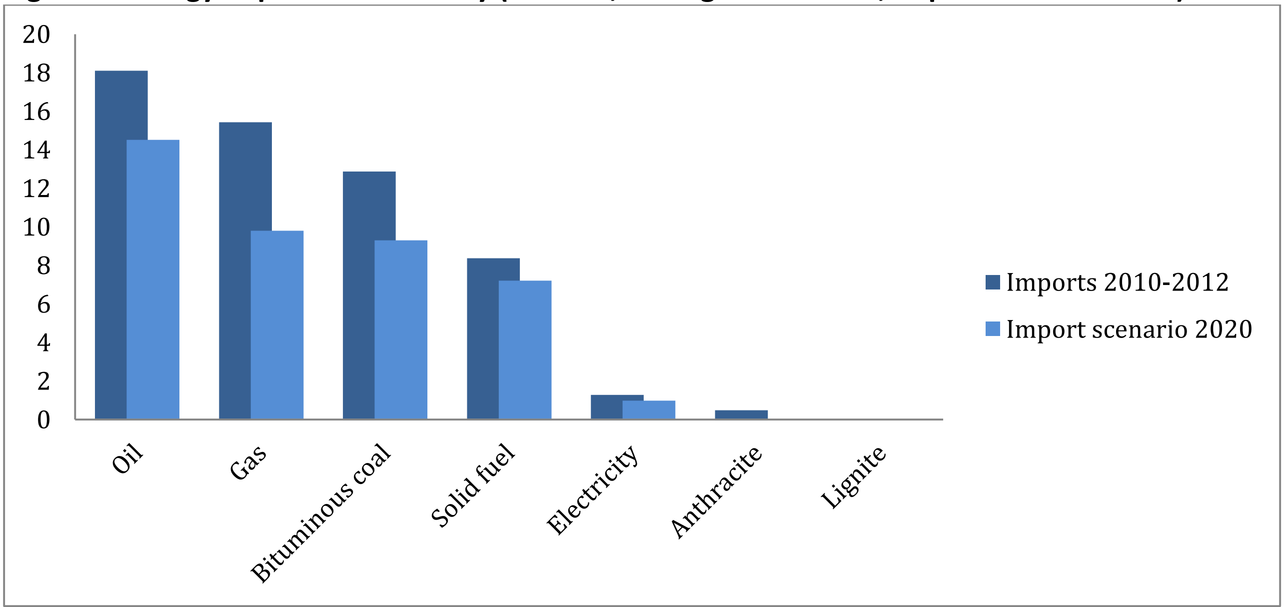
[16] Note that 100 per cent of oil and gas imports from Norway, and 50 per cent of oil and gas imports from Russia have been excluded from this analysis.

[17] Electricity may become the exception to this rule, as the increased recourse on electricity generation from renewable sources might exacerbate network fluctuations (see Sattich 2014).

Based on an energy scenario from 2010 (Prognos, EWI, GWS 2010)[18], it can be assumed that Germany's energy imports from the Baltic Sea region will decrease by 27 per cent to 41.8 mtoe until the year 2020 (Figure 7). In today's numbers, this implies that Germany remains the largest destination for energy flows within the region, but the country's share of imports would reduce from 36 to 26 per cent. As a consequence, the region's combined energy deficit of (-)273.7 mtoe (see Annex, Table 2) would be reduced by about 15 per cent. In other words, energy demand would decrease. Yet in order to infer from Germany's national energy policy on future energy flows in the entire region, several factors need to be taken into account, namely economic growth, national policies of neighbouring countries, and energy prices.

Sound and continuing economic growth of Germany's eastern neighbours, makes it, for example, possible that by 2020 Poland will be the region's main importer of energy from the Baltic Sea region.[19] In view of relatively large share of oil, development of road traffic and transport could be a decisive factor in this regard, both in Germany and other countries. National policies are very different in terms of their approach to road traffic: while Germany implemented programmes to promote the use of electric cars and increase their number from only 12,156 at the beginning of 2014 (Car Sales Statistics, 2014) to one million by 2020 (Bundesregierung), other countries did not. Depending on the success of Germany's policy to convince consumers of the benefits of electric cars, oil demand will develop accordingly.

Figure 7. Energy imports of Germany (in mtoe, average 2010-2012, import scenario 2020)



Sources: EUROSTAT online energy statistics (2010-2012) and Prognos, EWI, GWS (2010).

Other national policies, such as supply diversification programmes in Poland and the Baltic States – that is increased use of LNG from overseas and of indigenous shale gas, as well as the continued use of nuclear power (in Sweden and Finland) and/or the successful construction of new nuclear plants and the necessary grid infrastructure (in Poland and the Baltic States) – might generally reduce demand for gas in the region (largely gas from Russia). Whether Germany will actually retain its role

[18] The following analysis is based on the average of individual scenarios to be found in Prognos, EWI and GWS 2010 (note: the reference scenario is not included).

[19] Based on a hypothetical yearly growth rate of three per cent, Poland's energy imports from the Baltic Sea region could increase to a hypothetical 40.5 mtoe.

as the region's main importer thus depends on the development of German demand for natural gas, bituminous coal, and solid fuels. Their place in Germany's energy system is, however, very much unclear. The reason behind this uncertainty is to be found at the very core of Germany's Energiewende project – namely the phase-out of plants suitable for meeting base load requirements and increasing number of intermittent renewables.

Both technically and economically this combination of decreasing numbers of base-load generators and increasing numbers of peaking units such as solar and wind power is a complex issue, and – despite many scenarios and plans – there is no blueprint for a system where decentralised and intermittent renewables largely replace centralised base load plants. Flexible gas and biomass power plants are seen as the ideal technological link between the two elements; yet as the case of Europe's most recent gas power plant in Irsching (FAZ, 2015)[20], illustrates, investments in state-of-the-art equipment and turbines becomes unprofitable under the economic conditions of the Energiewende: as renewables have priority access to the grid, they are growing in numbers and come with low prices at peak hours, therefore, market for gas and other fossil fuels is shrinking. Moreover, gas faces a double challenge, as coal still outcompetes gas due to lower prices.

The development of Germany's gas imports hence largely depends on the question whether policy makers agree on a capacity market that provides an economic framework suitable to keep gas plants in the system. Such a step is currently under discussion (BMWi, 2014b). Outcomes of this discussion and their implementation will certainly affect Germany's demand for coal and gas imports. Notwithstanding the results of this political process, the demand for biomass is likely to increase in Germany over the following years, because this form of energy – either used in decentralised plants or in form of co-combustion in existing fossil fuel plants.[21] The share of biomass amongst energy imports is thus to until 2020. Depending on the availability of biomass and the outcomes of Germany debates on capacity markets, this energy source is hence – to a larger or smaller extent – to replace either coal or gas in Germany's energy imports from the Baltic Sea region.

Conclusions

Against the backdrop of energy imports and exports patterns in Northeast Europe, this article analyses the place of the Baltic Sea region in Germany's public discussions about the country's energy future; natural gas imports from Norway and Russia largely dominate this public discourse. The construction of the Nord Stream pipeline is likely to be one of the reason for this highly topical nature of gas in German public discourse; it can hence be assumed that the perception of the Baltic Sea region by the German public is largely distorted. This article therefore attempts to broaden the discussion by expanding the focus of the analysis to include other forms of energy such as coal and electricity. On the other hand, this article attempts to focus on the energy system of the Baltic Sea region in the narrower sense. As Norwegian oil and gas exports to Germany come from and through the North Sea, they are hence excluded from this analysis. And as about half of Russia's oil and gas exports to Germany pass through Central Europe, they are equally excluded.

The result of this analysis is, that the importance of the Baltic Sea region for the future of Germany's energy supply is not fully grasped by German public. Individual countries, such as Poland and Russia,

[20] This ultramodern gas-fired power plant, equipped with a most advanced and efficient turbine from Siemens might be forced out of business by heavy price competition from solar power.

[21] EUROSTAT provides no precise definition of the term solid fuel; the data does hence not allow to determine the share of biomass within this category.

obtain varying degrees of attention, and so do the various forms of energy. But all in all the narrow focus on gas largely hides the role of other forms of energy coming to Germany from or through the Baltic Sea region, and thus the true role of the area for Germany's future energy system. Taking the bigger picture of energy flows in the Baltic Sea region into account, the role of gas imports from Russia appears overestimated in German discussions concerning the role of the Baltic Sea region for Germany's energy supply: even though Russia is the region's main supplier of energy, natural gas is not the most important energy carrier. The focus of German media on this topic hence seems to obstruct the view on other important energy carriers, such as coal and – most importantly – oil, which are at least equally important.

As a response to the growing role of renewables, Germany currently discusses a new market design for fossil fuel power stations. Capacity markets for coal and gas-fired plants will be the likely result of these debates, as backup for the notoriously volatile renewables is needed. As Germany is the region's largest importer of gas and coal, the design of these markets will largely determine the impact of Germany's Energiewende on regional flows. The way Germany's Energiewende will affect patterns of energy exports and imports in the region depends, however, on more factors. The future of the German transport sector will at least be equally important, as oil represents the largest share in energy flows in the region. Widespread use of electric cars could serve as a storage battery for intermittent wind and solar power; in 2014 the German government therefore renewed its support with a broad range of incentives for the use of electric cars.

It remains, however, to be seen whether the customers of the German car industry see electric cars as an attractive option. If they do, Germany's role as an importer of energy from the Baltic Sea region could diminish largely. In this case, Germany's place in the energy system of the Baltic Sea region will be determined by the results of current discussions about a capacity market for flexible fossil power stations. Depending on the exact outcomes of these debates, German energy imports could decrease according to official scenarios. In such a case, Germany might lose its role as the region's main importer of energy. For those countries in the region which have only limited access to indigenous energy resources and hence can only play a minor role in supplying Germany's energy system, such a development is not necessarily a bad one, as their bargaining position on the regional energy market would improve, especially if they successfully implement programmes to further diversify their energy supply.

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Annex

Table 1. Yearly energy production and consumption in the Baltic Sea region (2010-2012 average, in ktoe)

Country	Average consumption	Average production	Balance
DE	322773.17	124684.17	-198089
DK	18875.73	20578.53	1702.8
EE	6149.33	5019.9	-1129.43
FI	35892.37	17173.87	-18718.5
LI	6963.77	1306.27	-5657.5
LV	4514.33	2129.7	-2384.63
NO	30346.63	199960.77	169614.13
PL	99841.07	68491.9	-31349.17
RU	772254	1374802.8	602548.8
SE	50100.53	33757.9	-16342.63

Table 2. Yearly energy deficit/surplus in the Baltic Sea region (2010-2012 average, in ktoe)

Country	In per cent of national consumption	In per cent of regional deficit (-273670.87 ktoe)	In per cent of regional surplus (773865.73 ktoe)
DE	-61.37	-72.38	
DK	+9.02		0.2
EE	-18.37	-0.41	
FI	-52.15	-6.84	
LI	-81.24	-2.07	
LV	-52.82	-0.87	
NO	+558.92		21.9
PL	-31.4	-11.45	
RU	+78.02		77.9
SE	-32.62	-5.97	

Annex to be continued

Table 3. Exchange of energy in the Baltic Sea region (2010-2012 average, in ktoe)[22]

	DE	DK	EE	FI	LI	LV	NO	PL	RU	SE
DE	0	539.7	0	0	0	0	0	1764.1	0	90.2
DK	1760.1	0	0	0	0	0	204.8	28.1	0	4421.4
EE	0	0	0	114.4	0	249	0	0	0	0
FI	68.1	0	0	0	0	0	10.7	0	0	218.4
LI	88.7	0	0	0	0	27.8	0	0	0	0
LV	0	0	89.53	0	258.4	0	0	0	0	0
NO	30943.6	3228.1	0	988.3	0	0	0	1114.9	0	5265.5
PL	222.6	0	0	0	0	0	0	0	0	25.8
RU	62056.0	84.1	537.0	14067.2	3542.2[23]	0	828.2	21846.2	0	8959.0
SE	173	489.5	0	611.7	0	0	521.8	141.8	0	0

Table 4. Exchange of energy in the Baltic Sea region (2010-2012 average, in per cent of regional deficit[24])[25]

	DE	DK	EE	FI	LI	LV	NO	PL	RU	SE
DE	0	0.2	0	0	0	0	0	0.64	0	0.03
DK	0.6	0	0	0	0	0	0.07	0.01	0	1.6
EE	0	0	0	0.04	0	0.09	0	0	0	0
FI	0.02	0	0	0	0	0	0.004	0	0	0.08
LI	0.03	0	0	0	0	0.01	0	0	0	0
LV	0	0	0.03	0	0.09	0	0	0	0	0
NO	11.3	1.2	0	0.4	0	0	0	0.4	0	1.9
PL	0.08	0	0	0	0	0	0	0	0	0.009
RU	22.7	0.03	0.2	5.1	1.3	0	0.3	8	0	3.3
SE	0.06	0.2	0	0.2	0	0	1.9	0.05	0	0

Table 5. Exchange of energy in the Baltic Sea region (2010-2012 average, in % of national deficit of importing countries, see Table 1)[26]

	DE	DK	EE	FI	LI	LV	NO	PL	RU	SE
DE	0	n/a	0	0	0	0	n/a	5.63	n/a	0.55
DK	0.89	n/a	0	0	0	0	n/a	0.09	n/a	27.05
EE	0	n/a	0	0.61	0	10.44	n/a	0	n/a	0
FI	0.03	n/a	0	0	0	0	n/a	0	n/a	1.34
LI	0.04	n/a	0	0	0	1.17	n/a	0	n/a	0
LV	0	n/a	7.93	0	4.57	0	n/a	0	n/a	0
NO	15.6	n/a	0	5.28	0	0	n/a	3.56	n/a	32.22
PL	0.11	n/a	0	0	0	0	n/a	0	n/a	0.16
RU	31.33	n/a	47.55	75.15	62.61	0	n/a	69.69	n/a	54.82
SE	0.08	n/a	0	3.27	0	0	n/a	0.45	n/a	0

[22] EUROSTAT online energy statistics (2010-2012); exporters: left column, importers: top line.

[23] According to Eurostat data, Lithuania imported 11,661.9 ktoe of energy from Russia. Given that Lithuania has an average yearly energy consumption of 6,963.77 ktoe, this figure appears to contain energy transfers to Russia's Kaliningrad enclave. According to IEA data, Lithuania exported 8,119.66 ktoe to Russia. It can hence be assumed that net energy export of Russia to Lithuania amounts to 3,542.24 ktoe.

[24] -273,670.87 ktoe

[25] See Footnote 21.

[26] EUROSTAT online energy statistics (2010-2012); exporters: left column, importers: top line (in per cent of national energy supply gap); Table shows energy exports (Table 3)/national energy balance (Table 1).

Polish preparations to embrace global gas revolution: A reality check

Tomasz Dąborowski

Executive summary

In the last five years, Poland has been preparing to introduce its relatively isolated and almost monopolistic gas market into a wider European or even a global gas market scene. This mainly involved a gradual liberalisation of the domestic market, the development of the infrastructure and strengthening of regional co-operation. Furthermore, Poland launched a large-scale unconventional gas development programme and became laboratory for 'shale gas revolution' in Europe. This article briefly assesses the outcome of those preparations and puts some recommendations to streamline the process of the Polish gas market internationalisation.

First and foremost, Poland should speed up gas market liberalisation process. Fundamental market opening reforms were initiated but still complex regulations are slowing down market development. Secondly, Poland should complete its ambitious infrastructure development programme triggered by the 2009 gas crisis. A special focus should be put on projects which guarantee access to entirely new sources of supply: the so-called North-South gas corridor and the Baltic pipe to Denmark. Thirdly, Poland should consolidate regional gas co-operation formats, such as recently launched project to create regional gas market with the Czech Republic, Hungary and Slovakia. Meanwhile, good co-operation with regulatory bodies and transmission system operators from the Baltic States is missing and should be established. Fourthly, Poland should further improve regulatory environment for shale gas exploration and production. Finally, Poland should look for synergies with other LNG projects of the Baltic Sea region, potentially by forming political and commercial alliances aimed at bringing and spreading LNG across the region.

Introduction

For decades, Poland existed on the peripheries of European gas markets. Until recently, the country was almost totally isolated from ongoing market revolution in North-West Europe. This situation was caused by infrastructural conditions and trade arrangements, which preserved almost monopolistic market structure and kept Poland outside of market developments in Western Europe.

This peripheral position, however, is finally coming to an end. The ongoing process of the creation of the common EU energy market is enforcing market liberalisation and is providing an impetus to regional gas co-operation. The 2009 gas crisis started intensive work on cross-border infrastructure development and modernisation. Moreover, Poland was put into global spotlight due to reports about its substantial unconventional gas resources and prompt initiation of large-scale shale development programme.

In this article, I present the main elements of ongoing transformation of the Polish gas market in the last five years. Firstly, I shortly describe the main characteristics of the Polish gas market. Then, I briefly present a complex and delayed liberalisation process as well as the infrastructure development. Furthermore, I briefly present current regional gas co-operation formats, in which Poland is engaged, as well as the Polish shale gas development programme. Finally, I make some recommendations which can be useful in bringing the Polish market closer to regional, European and global gas markets.

Snapshot of the Polish gas market

The Polish natural gas market is the eighth largest market in the EU and one of the largest in Central Europe. It has an aggregated demand of approximately 16 billion cubic metres (bcm) annually with solid fundamentals for future growth. In 2013, consumption amounted to 16.7 bcm, out of which 11.4 bcm came from imports, while 4.2 bcm originated from domestic production (BP, 2014).[1] Russian gas constituted around 85% of Polish gas imports and 58% of overall consumption. This is mainly the result of a long-term supply contract between Poland's state-controlled incumbent, PGNiG, and Russia's gas monopoly, Gazprom. PGNiG holds around 95% of the Polish market. The company's contract with Gazprom assumes that 10.2 bcm of Russian gas will be transported annually to Poland until 2022 (with 85% take-or-pay clause). In 2012, a partial spot-indexation was introduced to the contract price formula. PGNiG has also several smaller supply contracts – one of them with Qatargas which assumes 1.4 bcm annual deliveries from 2015 till 2035 (currently rescheduled because the opening of the Polish LNG terminal has been delayed). PGNiG is also the sole domestic gas producer.

Natural gas is consumed mostly by residential and commercial sector (49%) and industry (38%). At the same time power sector consumes only 9% of used gas, while other users consume remaining 4% (Eurogas, 2013). This situation is the result of relatively cheap local coal, which is the main energy carrier in the Polish economy. In 2013, coal held a 57% share in primary energy consumption and was the most important fuel for the power generation sector. Meanwhile, gas constituted only 14% of gross energy consumption (energy mix) and was almost non-existent in the generation sector (EU, 2014).

A relatively small role of gas in the Polish energy mix makes the Polish gas market one of the most promising for growth. The most recent forecast, prepared by the Polish transmission system operator GAZ-SYSTEM, show that demand in 2023 will reach 18.9 bcm in its "*realistic*" scenario or will skyrocket to 25.5 bcm in its "*optimal*" scenario (GAZ-SYSTEM, 2014). Interestingly, an increase of gas demand will largely depend on the development of investments in the electricity and heat industry. A "*realistic*" scenario assumes that two already commenced gas-fired power plants will come online as scheduled. On the other hand, an "*optimal*" scenario includes a larger number of gas-fired power plants, which are currently being prepared, as well as higher the GDP growth estimations and lower gas prices. The other demand forecasts are mostly in line with GAZ-SYSTEM's "*realistic*" scenario. Energy Strategy for Poland until 2030, the main energy document adopted by the Polish government in 2009, assumes that gas demand will increase to 18.2 bcm in 2023 and then to 20.2 bcm in 2030 (Ministry of Economy, 2009). For a comparison of forecasts see Table 1.

1 Difference between overall consumption on one side and a sum of imports and domestic production on the other seems to be the result of different calorific values of gas used in Poland as well as using storage facilities.

Table 1. Forecasts of domestic demand in Poland (billion cubic meters/year)

	2009	2012	2015	2018	2020	2023	2025	2030
Energy policy 2030	12.9	14.6	15.4	16.4	17.1	18.2	19.0	20.2
GAZ-SYSTEM (“*realistic*” scenario)	-	-	16.1	18.2	18.5	18.9	-	-
GAZ-SYSTEM (“*optimal*” scenario)	-	-	16.7	23.7	25.1	25.5	-	-

Market opening and liberalisation reforms

The ongoing process of building the EU common gas market enforces introduction of several major reforms on the Polish gas market. In 2004, the transmission system operator GAZ-SYSTEM came out of the Polish Oil and Gas Company (PGNiG). After adoption of the third energy package, ownership unbundling was applied and GAZ-SYSTEM became an independent transmission system operator. At the same time, Polish TSO in 2011 became the independent transmission system operator (ISO) on the Polish section of the Yamal-Europe pipeline.[2] To some extent, this move opened up a major transit pipeline and enabled reverse flow from Germany (more detailed description in the next chapter). Other major reforms included: introduction of an entry-exit tariff system with virtual trading point; application of capacity allocation mechanisms on interconnections and balancing rules in line with European Network Codes; pilot projects with bundled capacities on interconnectors with Germany and the Czech Republic and launching a capacity auctioning platform. Also at the beginning of 2013, Polish Power Exchange (POLPX) started to trade gas in variable different contracts (on spot and futures market).

Despite these reforms, the Polish gas market remained almost monopolistic. In 2013, state-controlled natural gas company, PGNIG still held dominant position with more than 95% market share. The company is present in all segments of so-called gas chain: production, imports, wholesale and retail trade, distribution and storing. As a result, gas prices for households and small and medium-sized companies are still regulated. Moreover, Polish authorities have been quite reluctant to liberalise prices in wholesale segment. This became a bone of contention with the European Commission, which in the middle of 2013 launched an infringement procedure over gas price regulation to Court of Justice of the European Union. Shortly before Poland partially phased out wholesale price regulation by introducing derogation in some areas – in February 2013 regulatory authority allowed gas traders to obtain exemptions from price regulation, and in June 2013 lifted wholesale tariffs for gas traded on gas exchange. Nevertheless, the case against Poland in the Court of Justice is still pending (European Commission, 2014).

Gas trading regulations remain highly complex and sometimes they unwittingly hamper competition. The most striking example is so-called diversification requirement. It stipulates that a supplier cannot import more than 59% of its gas from one source. This regulation was introduced in 2001 (initially with a cap of 88%) to stimulate diversification. The term ‘imports’, however, was not

2 The Polish gas transmission system is fully-owned and operated by GAZ-SYSTEM. Nevertheless, the Polish Yamal-Europe pipeline had separate status as it is owned by Polish-Russian consortium EuRoPolGaz. Both, Gazprom and PGNiG hold 48% shares each in EuRoPolGaz. Remaining 4% of EuRoPolGaz shares belongs to Gas Trading, which in turn is controlled by several Polish companies. In 2010, the Polish and Russian governments agreed to oust Gas Trading from EuRoPolGaz, but deal has not materialised so far due to reluctance of some Gas Trading’s shareholders.

clearly defined. Polish regulator seems to execute diversification requirement by looking at the origin of the molecules of gas, rather than at the shipper who exported gas to Poland. For example, gas coming to Poland via virtual reverse flow on Yamal-Europe pipeline is treated as Russian although it is bought from German companies. As the result, regulation which was established to enforce diversification is currently working other way. Moreover, it preserves PGNiG domination on the Polish market. Smaller traders could not effectively compete with incumbent by offering larger volumes of cheaper gas from the EU. Nevertheless, the negative effect of diversification requirement has been recently recognised. In March 2015, the Polish Ministry of Economy launched a consultation process to adjust regulation to current market trends.

Another barrier for market development is so-called storage obligation. It was also introduced due to security of supply considerations. All suppliers importing annually more than 100 million cubic metres are required to keep in Polish storage facilities reserves of their 40 days' average sales. Meanwhile, Polish storages are considered to be highly expensive and their capacities (2.5 billion cubic metres) seems to be inadequate for market needs. As the result, small traders usually just try to avoid importing more than 100 million cubic metres per year.

Extremely high concentration level on the wholesale gas market prompted Poland to introduce an ambitious gas release programme. Compulsory sale of a certain amount of natural gas on the POLPX exchange was introduced in autumn 2013. Initially, a public trading obligation level was set at 30% of gas introduced into network. Starting from 2014, it was raised to 40% and from 2015 settled at the level of 55%. Companies importing gas on a small scale as well as gas sent for transit are excluded from this requirement. As a result this obligation de facto only applies to the PGNiG. This company, however, was so far failing to fulfil the obligation due to lack of sufficient demand. PGNiG's industrial consumers were not interested in buying via gas exchange because prices under their bilateral contracts with PGNiG were lower than on exchange. To meet public trading obligation PGNiG in the middle of 2014 established a retail company out of its six local branches in order to purchase gas for end users on gas exchange. This finally foster trading on gas exchange. In 2014 overall 5.38 terawatt-hours (TWh) was traded on spot market and 105.07 TWh on futures/forward market (jointly around 10.6 bcm/year). This represented over 46-times growth with comparison to the aggregate gas market volume in 2013.[3] Nevertheless, PGNiG still did not fulfil entirely its public trading obligation.

Gearing up infrastructure development

Historically, Poland has been almost entirely detached from the European gas transmission system. The first ever inter-connector with its EU neighbour, Germany, was opened in 2001, and it took another decade to open the second link with the Czech Republic. Poland was supplied with gas mainly via a major transit pipeline Yamal-Europe. This route has 33 bcm/year capacity and was designed entirely to carry Russian gas towards Western Europe. The lack of open access to the Yamal-Europe pipeline together with limited interconnections with other EU member states led to dominance of Russian supplies on the Polish gas market.

After 2009 Poland launched an ambitious infrastructure development programme worth more than € 2 billion so far. This was mainly the result of the January 2009 gas crisis, which had created a strong political momentum for building gas infrastructure. Also growing availability of EU financial support

3 In 2014, the Polish Power Exchange achieved record-breaking volumes on the electricity and natural gas markets, Available online: http://www.tge.pl/en/27/news/554/in-2014-the-polish-power-exchange-achieved-record-breaking-volumes-on-the-electricity-and-natural-gas-markets

played its role. In 2009, the European Council and the European Parliament approved a European Energy Program for Recovery (EEPR) – a €-4-billion fund aimed at boosting economic growth through infrastructure investments (more than a half of which was dedicated to gas and electricity infrastructure). Between 2009-2014, Polish TSOs have built over 1,200 km of domestic pipelines in north-western and central Poland, a small interconnector with the Czech Republic and enhanced interconnector with Germany. Capital expenditures of this infrastructure projects were close to € 1.5 billion and around 30% was covered by EU funds. Additionally, transmission system operator has started construction of LNG terminal in Świnoujście. Terminal should have been finished in the middle of 2014 but is running out schedule. The Polish government informed in March 2015 that terminal was finished in "*97%*" but avoided to give exact date when investment will be finalised. LNG terminal will be probably fully operational in the middle of 2016. All of this investments fits into North-South gas corridor: a broader concept of building many bi-directional interconnectors and domestic gas pipelines, linking the Baltic Sea area with the Adriatic and Aegean Seas. This project emerged after the 2009 gas crisis to break up traditional East-West gas flows in Central and South Eastern Europe and to bring new sources of supply to this region.

Meanwhile, GAZ-SYSTEM managed to gradually open up the Yamal-Europe transit pipeline. In 2011, a virtual reverse flow from was established with import capacity of 2.3 bcm/year. Gradually, this reverse flow was expanded. Currently, approximately 5.5 bcm/year can be imported on a firm basis and 2.7 bcm on an interruptible basis from Germany to Poland. Reverse flow and interconnectors with Germany and the Czech Republic jointly allow Poland to import approximately 10 bcm annually from a western direction. Therefore, around 90% of import needs can be covered from the EU, while in 2009 only 9% of import needs were possible to cover from the EU.[4] Therefore, Poland has significantly improved its security of supply situation and clearly have learned the lesson from 2009 gas crisis.

In addition to the investments already completed, a whole section of further projects is currently being prepared. GAZ SYSTEM is planning to build almost 2,000 km on domestic gas pipelines until 2023. The first stage of investment programme (until 2018) assumes construction of around 800 km of domestic pipelines in central Poland and building interconnections with the Czech Republic and Slovakia. The second stage (until 2023) includes modernisation of gas system in eastern Poland and building pipeline to Lithuania. In general, there is six infrastructure projects, which are of particular importance for security of supply and diversification. These are:
1) interconnection with Denmark (so called Baltic pipe) with bi-directional capacity of 3 bcm/year;
2) interconnection with Lithuania (GIPL) with initial 2.3 bcm/year capacity to Lithuania and 1 bcm/year capacity to Poland;
3) interconnection with the Czech Republic (STORK II) with 6.5 bcm/year capacity to Poland and 5 bcm/year to the Czech Republic;
4) interconnection with Slovakia with initial 4.7 bcm/year capacity to Slovakia and 4.3 bcm/year to Poland;
5) extension from 5 to 7.5 bcm regasification capacities of Świnoujście LNG terminal; and
6) further upgrade of reverse flow on the Yamal-Europe pipeline.

4 New opportunities for importing natural gas to Poland from the West, January 8, 2015. Available online: http://en.gaz-system.pl/en/press-centre/news/information-for-themedia/artykul/202017/

All of these projects are in pre-investment stage. However, they are well-prepared and in 2013 they received EU Project of Common Interest status – a special 'EU label' which paves the way to faster permitting procedures and gives opportunity to receive EU funds under Connecting Europe Facility (€ 5.9 billion in the EU financial framework 2014-2020). European Commission in October 2014 issued a decision on the first tranche under Connecting Europe Facility (CEF). Poland–Lithuania pipeline received support of € 305 million. Preparatory studies on Polish interconnectors with the Czech Republic and Slovakia got support of € 1.5 million and € 4.6 million respectively.[5]

Poland clearly prioritises interconnections with Slovakia and the Czech Republic, which according to the plans should come online at the beginning of 2019. Both projects have strong political backing from the Polish government as they are part of North South Gas corridor concept. According to GAZ-SYSTEM's plans, the pipeline with Lithuania should be commissioned even earlier – in 2018. However, there might be delays as it is much larger and complex project. There were already disputes over the cost allocation of this interconnector. Poland is mostly a cost bearer (due to the length of the pipeline), while Lithuania (as well as Latvia and Estonia) will be net benefiting countries. The impasse over cost allocation was finished by ACER, which in the middle of 2014 decided that the Baltic States will compensate Poland with around € 86 million.[6] The Baltic States are currently advocating for fast construction of GIPL pipeline in Poland and the EU. The construction of the Baltic pipe with Denmark will be also challenging. The pipeline received a Project of Common Interest status and was included by GAZ-SYSTEM into the CEE Gas Regional Investment Plan with the expected commissioning date in 2020 (ENTSOG, 2014). At the same time, GAZ-SYSTEM did not mention pipeline with Denmark in its 10-year development plan.

Poland in regional gas co-operation formats

Starting up so many cross-border infrastructure projects as in last five years and development of the new ones would not be possible without a strong regional co-operation. In fact, the last five years has been a period of strengthening the formats of regional co-operation. Poland is involved in two main gas co-operation initiatives: 1) a High Level Group on Baltic Interconnections (BEMIP) and 2) the Visegrad Group together with the Czech Republic, Hungary and Slovakia.

BEMIP was established in October 2008 by Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden (Norway participates as an observer) under the guidance of the European Commission. The purpose of this initiative is to support development of energy infrastructure and market integration projects, which would finally bring Baltic 'energy islands' closer to the other parts of the EU. The Polish projects promoted via the BEMIP framework included reverse flow on Yamal-Europe, Świnoujście LNG terminal and pipeline with Lithuania (GIPL).

On the other hand, co-operation within the Visegrad Group format is more comprehensive and does not focus purely on infrastructural issues. Visegrad Group (V4) is a broader political framework, which was established already in 1991 to foster integration with the European Union. After the EU accession, the Visegrad Group evolved into a forum for policy co-ordination in different sectoral policies. After the January 2009 gas crisis, it became instrumental in brokering the concept of the

[5] Indicative list of actions selected for receiving financial assistance under CEF-Energy as of 29.10.2014, Available online: https://ec.europa.eu/energy/sites/ener/files/documents/2014_cef_energy_lists.pdf

6 ACER adopts a decision on the allocation of costs for the Gas Interconnection project between Poland and Lithuania, 11/08/2014; Available online: http://www.acer.europa.eu/Media/News/Pages/ACER-adopts-a-decision-on-the-allocation-of-costs-for-the-Gas-Interconnection-project-between-Poland-and-Lithuania.aspx

North-South gas corridor. The concept was first presented during V4 summit in Budapest in 2010. The European Commission eagerly embraced the concept and established a High Level Group for North South Energy Interconnections, which was in fact repeating the BEMIP framework in Central and South Eastern Europe (despite V4 countries Group include Bulgaria, Romania as well as optionally Austria, Croatia, Germany). High Level Group became the focal point for identification and preparation necessary cross-border energy investments.

Meanwhile, gas co-operation within the Visegrad Group began to tighten up and discussions over North South gas corridor gradually evolved into broader debate on deeper market integration. In 2013, during the Polish presidency in V4 four prime ministers signed so-called Roadmap for the regional V4 gas market. This project is an attempt to assemble and co-ordinate different dimension of gas co-operation: not only infrastructure development, but also regulatory harmonisation and discussion of regional market design. The main novelty was institutionalisation of gas co-operation by establishment of a new platform for debates and actions concerning the regional market. The V4 Gas Market Integration Forum, is meeting twice a year, and is comprising representatives from ministries, transmission system operators and regulators. It currently focuses on security of supply agenda. One of the recent decision was to develop regional preventive and emergency plans to deal with possible interruptions. Standardisation of licenses for gas traders is debated as Hungarian regulator is preparing a pilot project in this area. Also V4 regulatory authorities closely collaborate with each other and consider joint implementation of European Network codes (GRI, 2014).

At the same time, there are debates over elaborating an appropriate gas market design for the V4 countries. A trigger for this discussion was Gas Target Model concept – a non-binding vision of European gas market in future, which assumes that small market areas should marge in order to achieve better liquidity, size and diversification levels. The model predicts that most of the national gas markets will disappear in Europe, and in their place will be built larger, transnational market areas, each with its own gas hub. This concept is heavily debated by experts, business and policy makers in Central Europe. Gas region making formula is discussed by Visegrad Group and in the other constellations (Ascari, 2013). However, most countries have rather conservative approach towards the idea of a deep restructuring of the market and have argued that discussions on a gas target model are premature.

The Polish shale gas development

The majority of international media stories covering the Polish gas market are dealing with shale gas development. In fact, Poland unwittingly became the key point of reference in all discussions about possibilities of repeating the American shale gas revolution. This interest was the result of unexpected reports about enormous unconventional gas deposits in Poland. American Energy Information Agency estimated in 2011 the Polish shale gas deposits at 5,300 bcm. In 2013 estimation was lowered to 4,200 bcm (EIA, 2013). The other estimations were, however, less optimistic. The Polish Geological Institute (PIG) released in 2012 its own estimations on the basis of data from the period of 1950–1990. According to PIG estimations, unconventional reserves are 1,920 bcm, but the highest probability is in 346–768 bcm range (PIG, 2012).

The optimistic estimations produced high political expectations and resulted with huge commercial interest. Polish authorities – unlike other EU countries – promptly started a large scale shale gas development programme and welcomed the influx of international companies, such as Chevron, Exxon Mobil and Total. More than one hundred exploration licenses have been granted. Licensing area covers more than 40,000 km^2 or approximately 15% of country's territory. Until the beginning of 2015, 68 exploration wells (including 16 horizontal ones) have been completed.[7] This mean that Poland has the highest number of wells in Europe (the UK, the other member state aiming at shale gas development, has only a couple of wells). Nevertheless, the shale gas exploration results in Poland have been disappointing so far. Production rates and quality of geological reservoirs have been lower than expected. There were several reports that North American drilling techniques and fracking stimulation operations need to be adjusted to the Polish geology.

Meanwhile, Polish authorities started to prepare comprehensive legislative package for unconventional sector. First draft law included a proposal to establish a national investor, so-called NOKE, which would participate in each licence. However, exact competences of NOKE were unclear and general concept was harshly criticised by industry (Osicka, 2015). Additionally, proposal included new royalties and fees which according to the government would double overall tax burden on shale development to 40% of gross income. Those ideas were inspired by the Norwegian model and created an uncertainty about the strategic direction of the Polish policy towards shale gas, namely; does Poland want to quickly pursue quest for shale gas in the sake of security of supply or does it rather take care for future wealth management?

Finally, the idea of creating NOKE and implementing the Norwegian model was dropped. Some compromise on taxation of shale gas business was also hammered out. New legislation (special hydrocarbon taxation act) increases tax burden to 40% of gross income, but postpones tax duty till the year 2020. The government is currently focused on regulations guaranteeing speedy procedures for granting exploration licenses and environmental approvals. Nevertheless, the majority of companies started to withdraw from the market – exploration licences has recently dropped to 51. This was the result of a protracted period of uncertainty, unsatisfactory drillings, bureaucratic obstacles and changing strategies of companies (oil price drop). On the Polish shale gas 'playground' remained only small companies as well as state-owned oil and gas companies (PGNiG, as well as ORLEN and LOTOS).

Conclusions

The Polish gas market is going through a process of profound transformation. The ongoing modernisation and the enhancement of the gas infrastructure have largely increased interconnectivity. Security of supply situation has improved, however, diversification of supply is still missing. It will be difficult to achieve competitive gas market in long run without a direct access to a completely new source of supply. Completing LNG terminal in Świnoujście is of paramount importance but also further infrastructure investments are vital. Poland should continue its ambitious infrastructure development programme and focus on securing necessary funding. Financial support under the EU's Connecting Europe Facility (CEF) should not be taken for granted. Admittedly, the European Commission is aware of infrastructural problems and financial limitations in Central and Eastern European countries, but CEF is highly sophisticated instrument and getting financing might be difficult. Therefore, it is particularly important to ensure co-operation with the Czech Republic and Slovakia to obtain EU funding under CEF financial instrument. Poland should also consider securing funds from other sources, potentially from international financing organisations (EBRD). Additionally, Poland should not focus entirely on currently prepared projects. New market opportunities are emerging due to Russia-Ukraine conflict, as Kiev is trying to decrease

[7] Shale gas exploration status in Poland as of February 2015, Available online: http://infolupki.pgi.gov.pl/en/exploration-status/shale-gas-exploration-status-poland-february-2015

its dependency on Russian gas and might be interested in acquiring larger amounts of gas via the Polish LNG terminal. This will be possible only when the current connection with Ukraine will be enhanced (the current connection allows to send maximum 1.5 bcm/year on interruptible basis) or the Polish–Slovakian interconnector will be quickly build.

Market opening reforms should be continued and speeded up. Recent efforts to introduce competition on the Polish wholesale gas market – introduction of entry-exit tariff system, gas release programme and partial phasing out wholesale price regulation – are just preliminary actions, long delayed steps in good direction. Poland has a lot to catch up with market liberalisation process and should not limit itself only to actions absolutely required by the EU law. Privatisation of some storage facilities might be an interesting idea as it would introduce some competition on this market. Storage obligation regulations should be relaxed. For example, it could be applied only to traders providing gas for vulnerable customers. Poland should also complete process of amending so-called diversification requirement. It should also increase the availability of information in English to facilitate new market entrants.

In recent years, Poland significantly strengthened regional co-operation, which have evolved from the consequences of the 2009 gas crisis and the European Commission commitment to complete the common energy market. Poland is involved in two High Level Groups chaired by the European Commission: for Baltic Energy Interconnection as well as North South Energy Interconnection. At the same time, Polish co-operation with Central European countries (especially with Visegrad Group) is definitely more close and comprehensive than with the Baltic States. This bear the risk that Poland will focus entirely on Central Europe and somehow lose sight of the Baltic States. As the result, it might miss a unique opportunity to become bridge between Central Europe and Baltic States. In particular, it is important to establish strong communication channels with national regulatory authorities from the Baltic States because Lithuanian, Estonian and Latvian regulators are not present in Gas Regional Initiative under ACER umbrella.

The proximity of the two terminals – Polish Świnoujscie and Lithuanian Klaipeda – does not necessarily mean that they are doomed to compete. Synergy effect seems to be also possible. It would, however, require a formation of political and commercial alliance aimed at bringing LNG gas to the region via for example joint purchase. Establishing of a political alliance should be theoretically easy. Poland and Lithuania together and in regional constellations could form a broad coalition advocating for quick LNG supplies from the USA. Forming a commercial alliance, however, will be much more challenging task. This experimental approach is currently tested only in Japan (Genoese, 2014). The predominance of long-term contracts with Gazprom in Central and Eastern Europe as well as LNG price volatility gives a relatively small room for demand aggregation. Nevertheless, it could be still useful to increase negotiating power towards suppliers.

Poland is currently experiencing a difficult wake up from shale gas dream. Poland somehow missed opportunity to fully capitalise ‘fever’ around Polish unconventional reserves. Nevertheless, it is definitely too early to neglect Polish shale gas potential. Poland should still work on creation stable, transparent and business-friendly environment for unconventional gas resources exploration and production.

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The role of the Świnoujście LNG terminal in security of gas supplies

Dariusz Zarzecki

LNG terminals in Poland and the Baltic States

In October 2014, the European Commission carried out stress tests aiming to identify the effects of a possible partial or complete disruption of gas supplies from Russia. The tests showed how EU rules adopted in 2010 have already made Europe better prepared for a possible gas supply disruption. For example, EU countries are now better prepared to co-ordinate their actions in case of a supply crisis and are better protected thanks to bilateral gas flows in cross-border pipelines. However, the stress tests also revealed some areas for improvement, including the need for deeper co-operation and co-ordination between EU countries. This would further lessen the vulnerability of EU countries to a cut in gas supplies[1].

Developing LNG regasification terminals on the Baltic coast as well as maintaining a reduced reliance on piped West Siberian gas gives Poland, Latvia, Lithuania and Estonia the best of both worlds - energy security and a reliable backup in case of shortfall of supply or high global LNG pricing. With all this in mind, the practicalities of selecting the right LNG regasification model for each nation remains a pertinent one. For Poland with its larger demand, access to capital and also the wider European markets fixed onshore regasification has been both selected and executed. The Świnoujście LNG terminal, currently under construction, will consist of some 7.5 billion cubic meters (bcm) per annum of natural gas upon full facility completion – enough to provide 50% of national gas demand. Furthermore, PGNiG has opened its arms to international co-operation and partnership with major global LNG producers and technical partners. Qatar, the USA and others will provide a ready, willing and able to supply option. In addition surplus gas can be traded with neighbouring partners or stored as the operator sees fit granting a degree of system flexibility[2].

For Poland, onshore facilities are a distinct option – for the Baltic States offshore regasification terminals provide just as effective an option for energy independence. Aptly named the 'Independence' – Lithuania has opted for a floating LNG re-gasification facility, based in Klaipeda, with a capacity of 2-4 bcm of natural gas per year, potentially enough to supply some 74-100% of the country's needs. In this case as well surplus LNG can be used as a competitive fuel for regional shipping to both Latvia and Estonia. For the cost of a single ex-South Korean LNG vessel, Lithuania has almost ensured her energy security. In Latvia and Estonia the story is slightly different with no active projects but both are actively seeking to collaborate to build a joint terminal. It is highly commendable that Poland and the Baltic States have actively developed LNG facilities or at the very least are seeking to do so have ensured their energy independence or at least a decreased reliance on piped supplies. It is not only good for the countries in mention on a political level but also offers their domestic energy industries unparalleled international partnership opportunities as well as access to the global gas markets. The move toward LNG for Poland and the Baltic States provides a

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[1] Consultation: boosting the security of gas supplies for Europe, http://ec.europa.eu/energy/en/news/consultation-boosting-security-gas-supplies-europe

[2] N. Cobb: Diversification to Survive - Utilising LNG to Ensure Baltic Security of Supply, https://www.linkedin.com/pulse/diversification-survive-utilising-lng-ensure-baltic-nicholas-cobb

real opportunity to chart their own energy destiny but we must not also forget that Russia can provide a secure backup and strategic partnership should all sides be willing to do so[3].

The LNG terminal in Świnoujście

The LNG Terminal in Świnoujście (also referred as Terminal LNG in Świnoujście, Świnoujście LNG terminal or Polskie LNG) is an under-construction liquefied natural gas import terminal at Świnoujście, Poland. It is developed by Gaz-System – a designated natural gas transmission system operator in Poland[4].

Discussions about the project started in 2006. The project was originally developed by PGNiG. In January 2008, SNC-Lavalin was chosen for the front-end engineering design. The engineering, procurement and construction contract was signed with a consortium of Saipem, Techint, Snamprogetti, and PBG. After establishment of Gaz-System and its separation from PGNiG, the newly created company took over the project.

The terminal will have unloading jetty for large LNG tankers, two storage tanks and regasification train. The terminal's initial regasification capacity will be 5 bcm per annum (180×10^9 cubic feet/annum), and with the construction of the third tank its capacity is due to expand to reach 7.5 bcm per annum (260×10^9 cubic feet/annum) satisfying approximately 50% of Poland's annual gas demand. Liquefied natural gas will be imported from various regions of the world, which is a common practice of Western European countries. By building their own LNG import terminals, these countries ensured freedom of choice of the supplier. Three major importers of LNG in the EU are traditionally Spain, France and the UK[5].

Although the costs for LNG have fallen by approximately 20% in the last 20 years, this technology still requires a considerable initial investment of several billion US dollars, depending on the size of the project, the geographical conditions in the producing and receiving countries and the costs for transportation by sea, which depend on the distance involved. The total cost of the terminal LNG in Świnoujście is expected to be more than € 1 billion. In May 2013, the project was almost 60% complete. Its commissioning was scheduled for 2014 but due to delay the new deadline is the mid of 2015. In February 2015, the project was more than 96% accomplished.

LNG terminals work as safety buffers which is why their capacities may not always be used in full. There is a margin of free capacity which can be used in emergency situations. For instance, in 2011, the UK's LNG import potential was used in 47%, and in France in 58%. Needless to say, the use of LNG terminals also depends on gas prices (importer may expect lower ratings of this commodity and wait for a more favourable economic situation) and on the season. Similar mechanisms will apply in the LNG terminal in Świnoujście. Poland decided to build the LNG terminal in Świnoujście mainly for strategic reasons – the facility will allow diversification of national gas supplies. Therefore, Poland will be able to develop its gas-based energy industry, modernise the chemical

[3] Ibidem.

[4] The company was set up on 16 April 2004 as a wholly owned subsidiary of PGNiG (Polish Petroleum and Gas Mining Co.) under the name PGNiG – Przesył Sp. z o.o. On 28 April 2005, all shares of the company were transferred to the State Treasury of Poland and the current name of the company was adopted on 8 June 2005. Gaz-System owns and operates all gas transmission and distribution pipelines in Poland, except the Yamal-Europe pipeline owned by EuRoPol Gaz SA.

[5] Świnoujście LNG Terminal. http://en.wikipedia.org/wiki/Świnoujście_LNG_terminal

and fertilizer industry as well as expand transport using the advantages of LNG fuel. It will be easier and safer to enhance the development of ambitious economic plans[6].

Owing to the LNG terminal in Świnoujście, will improve energy security of Poland and our region in Europe, which so far has used supplies mainly from one direction. The surplus of gas fuel from the Świnoujście LNG terminal may be transported to the Baltic States.

Interestingly, the longer the distance over which natural gas has to be moved, the more favourable are the economics of LNG over pipelines. Where producers have a choice between the two, the tendency to favour LNG has, in practice, been even stronger than a straight economic calculation might suggest. Price levels and regional market dynamics have been shifting rapidly over the past decade, so the option to switch destination that comes with LNG is increasingly seen as a critical advantage. Meanwhile, the interruptions to Russian supply to Europe since 2006, because of disputes with Ukraine and Belarus, have increased the perception of the risks associated with cross-border pipeline supply, particularly when transit through third countries is involved[7].

Gas revolution in the USA

In the US Department of Energy (the equivalent of the Ministry of Energy) there are currently 53 license applications pending for exports of LNG produced in the United States[8]. The daily export quota for which the US companies apply amount to 86 billion cubic feet per day, which is an equivalent of 2.44 bcm per day or 683.27 million metric tonnes LNG per year. This is the maximum amount which the US companies applying for a permit to export liquefied gas might sell to international buyers. Such a large scale of gas exports does not seem plausible. In 2014, the United States exported nearly 43 bcm of gas, almost entirely using pipelines, to their two neighbours: Canada and Mexico. Shipping of the liquefied gas accounted for a mere 1 per cent of the total LNG exports and it was almost entirely destined for Japan (a major gas importer)[9]. If, however, all the North American LNG terminals shipped to overseas destinations even a half of the quota, their impact on the global market for gas and the entire market for energy would be immense. It is believed that the global prices of gas would change dramatically – even if costs of its liquefaction, transport, and regasification as well as other charges and taxes are taken into account. Export prices, which are at present 2-2.5 times higher than prices paid by US consumers in the domestic market, are still attractive to Asian or European buyers. In June 2008, in the US market, 1 million British thermal units (mmBtu) – a conversion unit of natural gas – cost more than USD 13, whereas on 18 April 2015 its price was significantly lower at USD 2.63. In other words, the current price is a mere 20% of the price reported in June 2008, which shows a huge fall.

In the United States, there are heated discussions now on whether to export liquefied natural gas to buyers from other continents (there is no dispute about exporting it to Canada and Mexico, i.e. countries linked to the US through a free trade agreement). The majority of experts, politicians and

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[6] Energy security for Poland. http://lng.edu.pl/en/Energy-Security/Energy-security--for-Poland

[7] World Energy Investment Outlook 2014. OECD/International Energy Agency 2014, 75.

[8] Long Term Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States (as of March 26, 2015).
http://energy.gov/sites/prod/files/2015/03/f20/Summary%20of%20LNG%20Export%20Applications_0.pdf

[9] U.S. Natural Gas Exports and Re-Exports by Country. Independent Statistics and Analysis, U.S. Energy Information Administration, http://www.eia.gov/dnav/ng/ng_move_expc_s1_a.htm

businesspeople is in favour, emphasising the opportunities for huge profits, creation of new jobs in companies exploring and exporting natural gas, as well as the reinforcement of the role of the United States in the global market for energy. Environmental benefits are also stressed as gas – being cheaper and less harmful to the environment – will tend to replace both coal – a more expensive fuel, criticised by green activists, as well as oil, criticised for similar reasons.

In the 2020 time horizon, the largest potential source of additional supply to Europe is, indeed, US LNG exports, both because of their potential size and because Europe's relative proximity to the US Gulf Coast (compared to the much longer route to the Asian market) offsets, in part, the more attractive price available in Asia-Pacific markets[10].

What long-term effects for the world, Europe, Russia and Poland will have the decisions made currently in the United States? The market for energy will become more open and competitive. The differences in the prices among regions and countries will tend to decrease. Europe, Asia and Africa will benefit from lower prices of gas and energy thus stimulating growth in their economies. They will become less dependent on monopolists who have been exploiting their position of providers of strategic resources through exerting pressure on importers. This weapon will no longer seem so dangerous as before. Russia seems to be the main loser in this game as its entire economy is based basically on exports of natural resources, mostly crude oil and gas.

And what about Poland? On the one hand, the country will benefit from lower gas prices, with its consumption estimated at the moment at approximately 15 bcm (whereas the United States consumes 760 bcm per year). Polish companies using gas in their manufacturing processes will become more competitive (it refers in the first place to producers of fertilisers – Grupa Azoty is a major consumer of gas in Poland). Cheap gas from America may also be very beneficial to the Świnoujście LNG terminal, whose annual import capacity is estimated at as much as 5 bcm in the first stage of operations. On the other hand, the current crisis of the Polish mining industry may become a beginning of the fall of this sector[11]. The point here is not good or bad will of the decision makers but pure economy, which will make mining and quarrying unprofitable thus leading to wide substitution of coal and oil with a recently much cheaper source of energy, i.e. natural gas. Certain global tendencies may be predicted and assessed in advance, and appropriate action can and should be implemented to minimise their negative repercussions and to make the most of the opportunities that will arise. The gas revolution is a fact and it is worth a moment to reflect on an appropriate adaptation strategy for Poland.

New opportunities

By the decision of the International Maritime Organization (IMO), with the beginning of 2015 all the ships in the Baltic Sea are required to use on board low sulphur fuel oil. As a result, the Baltic Sea will become free of many mazut-fuelled ships as they will fail to meet the stricter limits of emissions of Sulphur Oxides. This situation opens up opportunities for LNG-fuelled ships, which offers new opportunities to the LNG terminal in Świnoujście to become a profitable refuelling station for ships using liquefied natural gas as fuel.

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[10] World Energy Investment Outlook 2014. OECD/International Energy Agency 2014, 75.

[11] In Poland, about 60% of energy is produced from coal and 34% from lignite. The Polish energy sector is historically based on fossil fuels, which occur abundantly in Poland (ninth largest deposits in the world). In electricity production, hard coal and lignite produce nearly 90% of Poland's electricity. See: http://enerad.pl/rynek-energii/ and Energy Sector in Poland. Polish Information and Foreign Investment Agency, http://www.paiz.gov.pl/files/?id_plik=19610

The changes related to the protection of the Baltic Sea waters are a result of the precise regulations of the International Convention for the Prevention of Pollution from Ships (MARPOL). According to these new regulations, the upper limit of emissions of Sulphur Oxides (SO_x) for the ships operating in the Baltic Sea, which is one of the ECAs (Emission Control Areas), was reduced from 1% m/m – as introduced on 1 June 2010 – to 0.10% in effect from 1 January 2015[12]. It means that the above-mentioned changes impose modifications of the fuel mix used by ships operating in the Baltic Sea. They impose a wider use of low-emission fuel oils or an alternative fuel, such as LNG.

The Baltic Sea is frequented by approximately 6,000 ships annually, of which 15% do not leave its waters and further 25% leave them for less than half of their operating time. Sea traffic in the major ports of the Baltic Sea in 2013 was well in excess of 200,000 entries in the port, and in the three main ports in Poland alone it was estimated at 15,000. Sea traffic and the demand for LNG offer significant opportunities to the LNG terminal in Świnoujście. There are already 48 ships operating in the world, which use LNG for fuel (as of March 2014) and orders for further 55 have been placed. The Danish Maritime Authority estimates that there will be some 1,000 vessels using LNG for fuel by 2020 operating in the ECA waters, and their annual consumption of liquefied natural gas should reach 4.3 million metric tonnes[13].

The use of LNG as fuel for vessels will require many investments involving replacement of ship engines and provision of refuelling opportunities in the Baltic Sea (so-called bunkering). Bunkering, in turn, will require further construction works in the LNG terminal in Świnoujście (construction of the third LNG tank container and an additional LNG bunkering station). Poland – one of the largest economies in the Baltic Sea Region – naturally needs to react to such challenges posed by the LNG market. This is why the Polskie LNG company, which in responsible for the construction and operation of the LNG terminal in Świnoujście, has become the leader of a project which unites research and business entities operating in the field of fuels, energy economics and the maritime economy. The implementation of the latest technologies to the shipping in the Baltic Sea is to be supervised by the Polish Innovative Maritime Technologies Platform (Polish Maritime Cluster), a consortium established on the initiative of the Maritime Academy in Szczecin which comprises six maritime academies and technical universities from Northern Poland, the Polskie LNG company and PGNiG (Polish Oil and Gas Company), as well as ports in Szczecin, Świnoujście and Gdynia.

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[12] Sulphur content expressed as mass/mass a solution (% m/m). It is the maximum sulphur content of the fuel oils as loaded, bunkered, and subsequently used onboard.
http://www.hapag-lloyd.com/en/about_us/environment_low_sulphur_fuel.html and
http://www.imo.org/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Sulphur-oxides-(SOx)-–-Regulation-14.aspx

[13]Ochrona Bałtyku szansą dla świnoujskiego terminalu LNG. Balticportal.pl,
http://www.balticportal.pl/pl/category/swinemuende/aktuelles/ochrona-ba-tyku-szans-dla-winoujskiego-terminalu-lng.htm

Conclusions

1) A key part of ensuring secure and affordable supplies of energy to Europeans involves diversifying supply routes. This includes identifying and building new routes that decrease the dependence of EU countries on a single supplier of natural gas and other energy resources[14].

2) Liquefied natural gas imported to Europe through LNG terminals is a source of diversification that contributes to competition in the gas market and security of supply.

3) New LNG supplies from North America, Australia, Qatar, and East Africa are likely to increase the size of the global LNG market and some of these volumes should reach the European market.

4) Exports from the USA, in particular, have the potential to encourage movement towards the global gas market and to stimulate some diminution of today's wide regional variations in gas prices (although the high costs of transportation would prevent the emergence of anything approaching a single global gas price).

5) The natural gas market in Poland, and in the whole world, will grow significantly in the coming years. Since the EU itself has small deposits of the resource, it will be forced to rely more on the imports to secure appropriate amounts of natural gas. And even though Russia will remain both the EU's and Poland's major supplier of that resource over the next years, the European countries should be more concerned about the diversification of their supplies[15].

6) Considering that most of the existing capacity is located in Western Europe and the existence of internal bottlenecks from the Atlantic coast to the East, the development of a few new regasification units in Eastern Europe would be justified. This is the case in the Baltics and in South-East Europe where LNG regasification units have been identified as Projects of Common Interest under the Regulation on the guidelines for trans-European energy infrastructure[16].

7) LNG terminals seem to be one of the best solutions. Despite high construction costs and uncertainty as to the profitability of contracts, LNG terminals have one unquestionable advantage – they allow a supply of gas from nearly any place in the world, which in turn secures a stable supply in any crisis. The transportation cost can naturally be higher than that of transporting gas with a traditional pipeline. Nevertheless, it has relatively declined recently, and this trend is likely going to continue.

8) Thanks to the Świnoujście LNG terminal, it will be possible to diversify the directions of natural gas supply, which for Poland shall mean an improvement of the country's energy security. The potential directions of supply of LNG are countries from North Africa and the Scandinavian Peninsula[17].

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[14] Gas and oil supply routes, http://ec.europa.eu/energy/en/topics/imports-and-secure-supplies/gas-and-oil-supply-routes

[15] D. Zarzecki: *LNG terminals as a method of diversification of sources of natural gas supply*, w: Global and Regional Challenges for the 21st Century Economies, Cracow 2009, 427.

[16] Gas and oil supply routes, http://ec.europa.eu/energy/en/topics/imports-and-secure-supplies/gas-and-oil-supply-routes

[17] LNG Terminal in Poland. http://en.polskielng.pl/lng/terminal-lng-w-polsce/

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Norwegian gas in Europe: Part of a solution or part of a problem?

Jakub M. Godzimirski

Executive summary
Conflict between Russia and Ukraine has had several implications. One of its immediate results is the renewed focus on energy security in Europe. Especially thinking about European gas market has undergone deep changes. Russia is no longer perceived as a reliable partner, and other actors, including Norway, may be viewed as more promising future suppliers of gas. However, the conflict in Ukraine is only one of factors impacting on European gas market and Norway has been facing a number of other challenges when designing and implementing its gas policy towards Europe. It seems that Norway may improve its position on the European gas market, but there are also concerns that supplies of Norwegian gas to Europe may be negatively affected by the growing scepticism towards the use of fossil fuels in general and gas, that is perceived as politically risky due to import dependence on Russia, in particular.

Introduction
2014 was a very special year for Europe. For the first time in recent history state borders in Europe were changed by force when Russia decided to use military power to defend what it defined as its vital interests in Ukraine. This momentous event has sent shock waves throughout Europe. One of those waves has also hit European gas market, which is quite understandable in a situation when the conflict involved Russia, the main external supplier of gas to Europe; and Ukraine, the country through which more than 40 percent of Russian gas export to Europe has to be shipped. These developments made the EU pay more attention to its energy security and governance. The two most important developments were the publication of the EU new document on energy security in May 2014 (European Commission 2014a; 2014b) and the launching of the idea of Energy Union in connection with the process of formation of a new Juncker Commission.[1]

The tragic developments in remote areas of Eastern Ukraine and the following reformulation of EU's energy priorities have also paradoxically had impact on the situation of Norway, the second greatest supplier of energy to Europe. This article seeks to examine the impact of the recent crisis – and of other factors – on Norwegian gas sector. It starts with a brief presentation of key features of Norwegian energy policy and trends in general. This is followed by a brief presentation of the current situation in the Norwegian gas sector in a broader European context. To understand how the Norwegian gas sector can adapt to the changing market and geopolitical conditions in Europe it is

[1] The proposal on Energy Union was originally launched by the Polish Prime Minister Donald Tusk in Spring 2014 in connection with conflict in Ukraine. He proposed six measures to be taken to improve energy security: 1) joint negotiation of energy contracts with external suppliers; 2) improved energy solidarity mechanisms; 3) development of adequate energy infrastructure; 4) development of indigenous energy sources in the EU; 5) further diversification of oil and gas suppliers to the EU; and 6) reinforcing of the Energy Community. Most of those ideas were later on adopted by the EU when new commission was formed and Maroš Šefčovič, the former Slovak ambassador to the EU, and graduate of the prestigious Moscow State Institute of International Relations (MGIMO), was appointed new vice-president of the Commission for Energy Union. On the 25th of February 2015, the first comprehensive document on the Energy Union was presented by the Commission – to learn more about this ambitious project see http://ec.europa.eu/priorities/energy-union/index_en.htm

important to examine which factors do influence situation on the European gas market and how Norway can address some of the challenges suppliers of energy to Europe have to face in 2015. This broader picture will be presented in the third part of the article. In the last, fourth part of the article we will present some conclusions on what close and not-so-close future can bring to Norwegian gas producers and how their position on the European gas market can change in years to come.

Norwegian energy policy in a broader context

Norwegian energy policy has a number of specific features. The foundation of this policy was laid down by the Norwegian parliament that in 1971 published the so called ten commandments guiding its development ever since. According to these guidelines there was a need for national supervision and control for all operations on the Norwegian Continental Shelf (NCS); petroleum discoveries had to be exploited in a way which would make Norway independent of others for its supplies of crude oil; new industry was to be developed on the basis of petroleum; the development of an oil industry had to take account of existing industrial activities and the protection of nature and the environment; flaring of exploitable gas should not be accepted; petroleum from the NCS had to be, with some exceptions, landed in Norway; the state had to be involved at all levels and contribute to a co-ordination of Norwegian interests in Norway's petroleum industry; a state oil company was to be established to look after the government's commercial interests and pursue appropriate collaboration with domestic and foreign oil interests; a pattern of activities must be selected north of the 62nd parallel which reflects the special socio-political conditions prevailing in that part of the country; and Norwegian foreign policy could face new tasks due to the development of Norway's petroleum sector (OED, 2011).

A good overview of the historical development of this policy and framework conditions within which this policy was shaped until 2005 was provided by Willy H. Olsen in his contribution on the North Sea to one of the most important volumes on relationship between energy and security (Olsen, 2005). Also Austvik (2012) and Godzimirski (2014a) discussed in more detail recent developments in this field paying special attention to the role of the state in its implementation and Norwegian debate on energy security.

Since the very beginning of Norwegian petroleum's adventure, the Norwegian state has played a major part in the development of the country's energy resources and even today, the state has 67 percent stake in the main actor in the Norwegian petroleum sector Statoil. Energy resources play an important part in the realisation of the long-term strategy of the Norwegian state, in which the welfare of its citizens is at the very core. In that sense Norway's energy resources could be viewed as a means through which the Norwegian political class seeks to achieve other, non-energy related goals. An interesting discussion on the general link between energy and strategic interests is provided by Meghan O'Sullivan (2013). She argues that energy plays a key part in most state strategies as all states need it in order to function. In addition to an objective to be achieved by realisation of a state strategy, energy can also be used as a foreign and security policy tool and instrument, and as a means providing for realisation of other strategic goals. In the case of Norway, a country that has embarked on a very ambitious programme of saving energy revenues in order to secure welfare of future generations energy should be definitely viewed as a strategic means of achieving other goals.

After more than four decades of petroleum production in Norway, Norwegian energy sector has generated huge revenues that secure not only high level of welfare today but are also to help the state meet its future commitments.[2] The value of production of this sector in the period between 1971 and 2011 reached NOK 9,000 billion (USD 1,500 billion), its exports NOK 8,600 billion (USD 1,433 billion), investments in this sector reached NOK 2,700 billion (USD 450 billion), and the state budget received NOK 4,000 billion (USD 666 billion) in form of taxes and the state's share of revenue generated by this sector. What is even more amazing is the fact that most of the revenue generated by this sector has not been spent on current needs but placed in the Government Pension Fund of Norway that has at the time of writing market value of NOK 6,524 billion (or USD 893 billion).[3]

When it comes to strategic link between energy and foreign policy the official mantra in the public debate on energy policy in Norway is that Norway treats its energy resources in a purely commercial manner and not as a political instrument. It is right that Norway as a large market player on the European energy market has what Susan Strange labelled "*structural power*" (Strange, 1988, 24-25) to influence energy developments in Europe, but the official Norway has consistently denied that Norway is interested in using its energy resources as a foreign, or security policy tool. Even after the outbreak of the Ukrainian crisis, that was in the opinion of Norwegian Minister of Foreign Affairs Borge Brende "*far from irrelevant to the geopolitics of energy*" (Brende and MFA Norway, 2014) Norwegian authorities continued to treat energy co-operation as a purely economic and not a political issue. In his speech in Washington on 9 April 2014, the very same Borge Brende presented what could be understood as an official understanding of this issue when he said that "*The Norwegian approach to energy security is quite simple. We are a reliable and predictable provider of energy – and we will remain so. Making politics out of the energy markets will profit neither consumers – nor producers*" (Brende and MFA Norway, 2014).

Notwithstanding this and many similar statements on de-politicisation of Norway's energy resources, there is a growing realisation that the country's energy resources play indeed a political role, or are at least viewed by others as not only an economic but also a political asset. Even in Norway the link between energy and foreign policy has been established. In order to illustrate this it suffices to examine three key documents on Norwegian foreign policy published recently and scrutinise how they treat energy. The three documents in question are:

- 2009 St.meld. nr. 15, Interesser, ansvar og muligheter. Hovedlinjer i norsk utenrikspolitikk (Interests, responsibility and possibilities. Main lines in Norwegian foreign policy) (UD/MFA Norway, 2009);
- 2012 NOU 2012:2 Utenfor og innenfor. Norges avtaler med EU (Outside and inside. Norway's agreements with the EU (UD, 2012); and
- 2013 St. meld. Nr 5 (2012–2013) The EEA Agreement and Norway's other agreements with the EU (UD/MFA Norway, 2013).

A quick quantitative analysis of the content of the three above listed official statements on Norway's relations with the outside world reveals the centrality of energy in the official Norwegian discourse on foreign policy. St. meld. 15 (UD/MFA Norway, 2009) contains 365 direct references to energy-related issues, including 25 to energy security and 7 to security of supply. In addition, the document mentions oil 217 times, gas 135 times, petroleum 69 times and coal 7 times. Electricity and

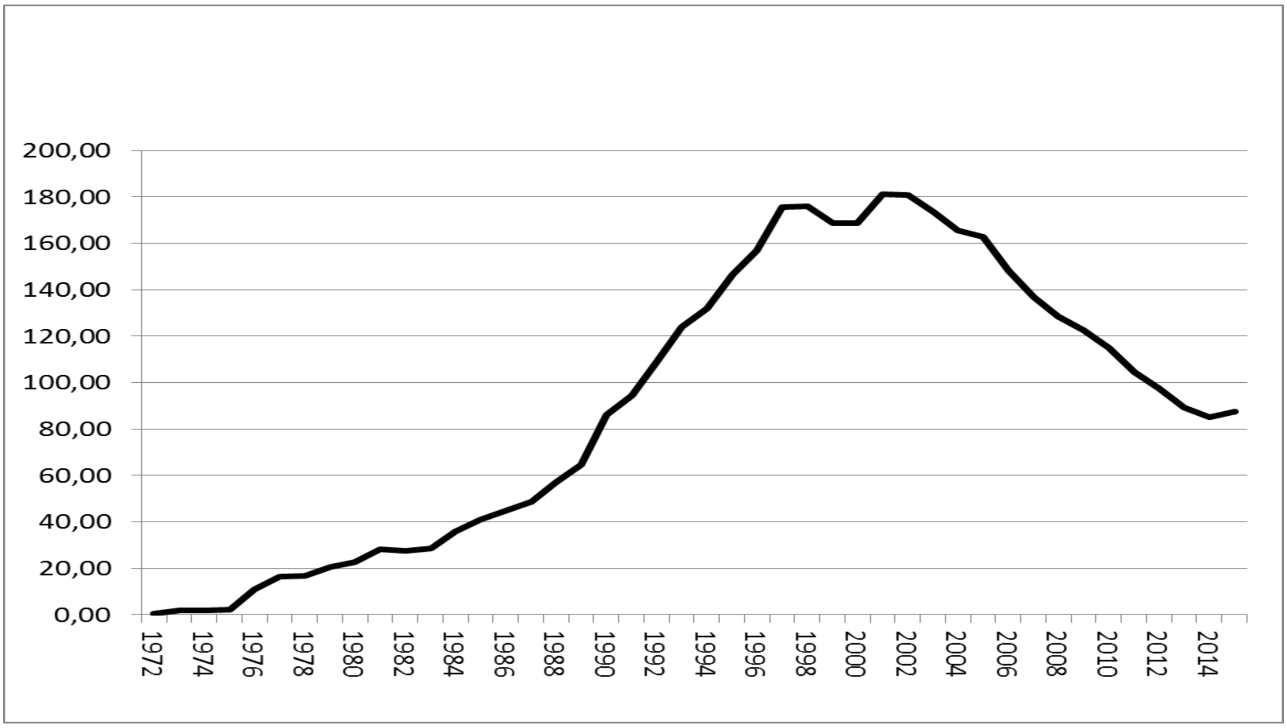
[2] http://www.regjeringen.no/upload/OED/Petroleumsmeldingen_2011/Petroleumsmelding.pdf

[3] http://www.nbim.no/en/the-fund/. It is worth mentioning that Russia was inspired by the Norwegian example, but petroleum revenues represent today almost 50 percent of Russia's current state budget revenues and the size of the Russian sovereign wealth fund is much smaller – USD 181 billion – and shrinking. What is even more impressive is the size of the fund per capita – USD 178,600 in the case of Norway and USD 1,200 in Russia.

electricity related matters are mentioned 14 times, and there is also a certain focus on renewable energy that is mentioned 34 times, on hydropower (43 mentions) and wind-power (10) and solar power (5). NOU 2012:2 (UD, 2012) is also seemingly preoccupied with energy – the energy related issues are dealt with in Chapter 19, but energy is present also in other parts of the text. The whole document mentions energy 449 times, including 3 mentions of energy security, 15 mentions of security of energy supply and 1 mention of el-security. Oil is mentioned 170 times, gas 219, petroleum 78 times, and coal 3 times. There are also 76 references being made to electricity and power generation sector and market, 81 mentions of renewable, 68 references to hydropower, 4 to wind-power and only 1 to solar power. St.meld. nr 5 (UD/MFA Norway, 2013) is much shorter than the two other documents, but it also contains many references to energy related matters. Energy is mentioned 80 times, oil 7 times, gas 12 times, and petroleum twice. There is no mention of coal, but renewable energy and hydropower are referred to 8 and 5 times respectively while electricity is mentioned 11 times.

Due to the fact that production of oil in Norway reached peak more than ten years ago – as shown in figure below – and the future of energy sector is increasingly influenced by the developments in gas sector that already today generates more export revenue than oil sector (Ytreberg, 2014) the main focus in the next section will be on the current situation in gas sector and its role on the European energy market.

Figure 1. Oil production in Norway 1972-2014 in million of standard cubic meters (Sm^3) of oil equivalents (o.e.)



Source: NPD Norwegian Petroleum Directorate, 2015.

Norwegian energy sector today

In order to understand why Norwegian political class and general public in Norway are so preoccupied with the situation in the country's energy sector, it is important to present some current data showing its central role.

According to most recent IEA data (IEA, 2014), Norway consumed 29.19 million tonnes of oil equivalent (mtoe) of energy, produced 198.89 mtoe of energy and exported 168.75 mtoe of energy. WTO estimated that in 2008 alone Norway had a 4 percent share in global exports of energy, earning USD 113.7 billion from sales of fuels, or USD 23,204 per capita (World Trade Organization WTO, 2010). According to BP (BP, 2014), Norway had one billion tonnes of oil in reserves (0.5 percent of global reserves) and could maintain production at the current level for next 13 years. In 2013, Norway produced two percent of oil produced globally, or 83.2 mtoe of oil. In 2011, it exported 72 mtoe of oil, most to Europe. According to the same source, Norway had 2,000 billion cubic meters of gas reserves, which was 1.1 percent of global reserves. In 2013, Norway produced 108.7 billion cubic meters (bcm) of natural gas (3.2 percent of global production) and exported 102.4 bcm through pipelines and 3.8 bcm as LNG. Production/reserves ratio shows that gas production in Norway can be maintained at the current level for next 18.8 years.

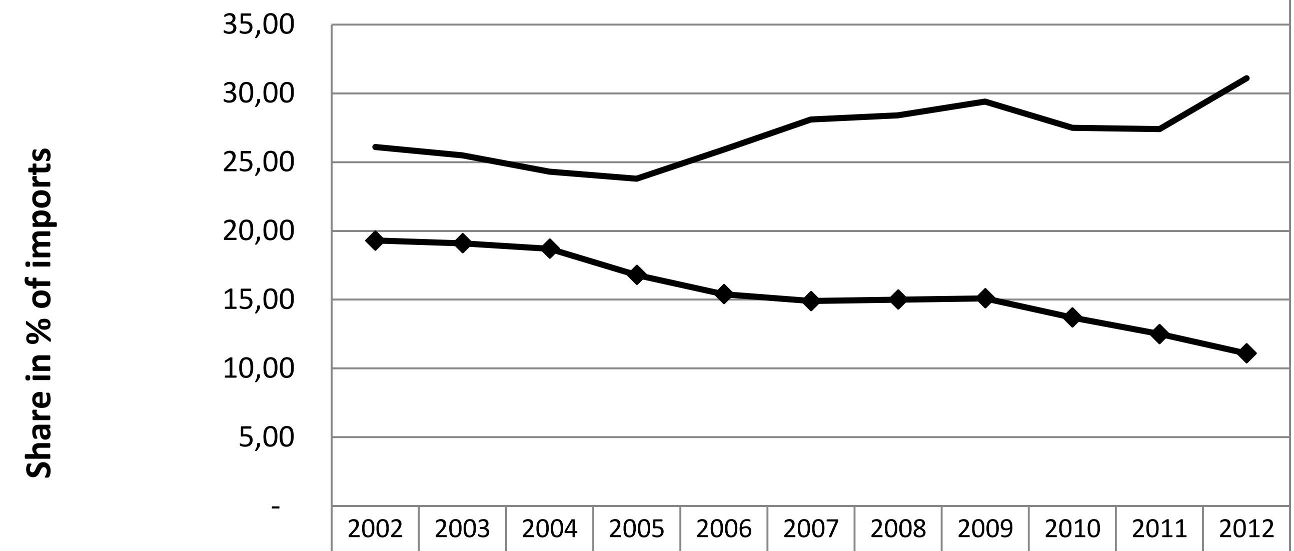
According to the NPD (NPD Norwegian Petroleum Directorate, 2015) resource accounts estimate, the total recoverable petroleum resources to be 14.1 billion standard cubic meters (Sm^3) of oil equivalents (o.e.) which represents a slight decline (0.15 percent) from 2013. 6.4 billion Sm^3, or 45 per cent of the total resources, have been sold and delivered. The same source estimates reserves – which means the part of the remaining, proven, recoverable and saleable volumes for which development decisions have been made or which are already in production – to grew by 13 million Sm^3 o.e., 219 million Sm^3 o. e. were sold and delivered in 2014, and due to the fact the reserve grew by 13 million Sm^3 o.e. in 2014, reserves declined by 206 million Sm^3 o.e. Since most of energy resources that have already been produced have been exported to the European market and this market will also take a lion's share of energy to be produced in Norway in the coming years it is of utmost importance to understand how the developments on this market will influence Norwegian energy producers.

European gas market and Norway

The EU is Norway's main energy customer, buying more than 95 percent of Norwegian gas and almost 80 percent of Norway's oil production. As Figure 2 shows Norway has been supplying more gas and less oil to the EU over the last decade. Norway's share in oil imports to the EU fell from almost 20 percent in 2002 to slightly more than 10 percent in 2012. In gas, Norway has managed to retain a relatively high share on the EU market, supplying between some 25 and 31 percent of gas imports to the EU in the same period (2002-2012).

The EU energy market is thus the most important market for Norwegian energy supplies and Norway is often viewed as a quasi-EU member as its energy policy is strongly influenced by EU regulation due to Norway's membership in the European Economic Area (EEA) (Austvik and Claes, 2011; UD, 2012). The EU's energy policy has however a number of specific features. Two of these features are specially important – the first one is the division of 'energy' labour between the EU and member states as stipulated in Article 194 of the Lisbon Treaty; the second one is the specific type of governance shaping EU's energy policy in a process of permanent negotiation and renegotiation of goals and means, known as experimentalist governance (Eberlein and Kerwer, 2004; Eberlein, 2010).

Figure 2. Norway's shares in imports of oil and gas to the EU



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Oil import share	19,30	19,10	18,70	16,80	15,40	14,90	15,00	15,10	13,70	12,50	11,10
Gas import share	26,10	25,50	24,30	23,80	25,90	28,10	28,40	29,40	27,50	27,40	31,10

Source: Eurostat, 2014.

To understand how Norway can operate on the European gas market the country's gas strategy towards Europe has to be examined in a proper geographical, historical and market context. In 2011 Norway was the second largest external supplier of energy to Europe, supplying 9.16 per cent of EU's gross inland energy consumption (GIC) and 10.8 per cent of all energy imports reaching the EU. The 92 mtoe of Norwegian gas reaching the EU gas market in 2011 made gas the most important Norwegian energy commodity. Germany, the United Kingdom, France and the Netherlands which all received more than 10 mtoe of Norwegian gas could be dubbed Norway's strategic gas partners. Belgium that imported more than five but less than 10 mtoe of Norwegian gas belonged to the category of important gas partners while Italy, the Czech Republic, Spain and Austria importing more than one but less than five mtoe of Norwegian gas were less important gas partners, together with Luxemburg that imported less than one mtoe of gas from Norway

Oil is the second most important energy commodity exported by Norway to Europe. In 2011, Norway exported 63.6 mtoe of oil to the European market. The United Kingdom was the sole country receiving more than 10 mtoe of Norwegian oil and was followed by a group of three important oil partner countries – Germany, France and the Netherlands – each receiving more than five mtoe and by seven less important oil partners – Sweden, Belgium, Denmark, Ireland, Poland, Finland and Italy importing more than one but less than five mtoe of oil from Norway; and by three countries Spain, Portugal and Austria which imported less than one mtoe each (for more detail, see Godzimirski, 2014b).

The table below presents data on the situation on national European gas markets in 2012, showing not only Norway's role but also the role played on those national markets by Norway's key extra-EU competitors. This set of data can be a good point of departure for a brief analysis of the current situation and for predictions on the future of European gas market and Norway's role on it.

Table 1. European gas market 2012: Norway's customers and extra-EU competitors

Country	Volumes (bcm) supplied by					Share in gas imports to specific country			
	Norway	Russia	Algeria	Libya	Gas imports, total	Norway	Russia	Algeria	Libya
Austria	1.3	4.7	-	-	**7.6**	17.16%	61.88%	0%	0.00%
Belgium	9.0	7.3	-	-	**26.2**	34.38%	28.00%	0%	0.00%
Czech R.	3.4	6.6	-	-	**10.0**	33.84%	66.16%	0%	0.00%
Finland	-	3.1	-	-	**3.1**	0.00%	100.00%	0%	0.00%
France	17.9	7.3	-	-	**35.0**	51.21%	20.81%	0%	0.00%
Germany	30.8	30.0	-	-	**86.8**	35.44%	34.56%	0%	0.00%
Greece	-	2.3	-	-	**2.9**	0.00%	78.44%	0%	0.00%
Hungary	-	4.8	-	-	**5.9**	0.00%	81.32%	0%	0.00%
Ireland	-	-	-	-	**5.3**	0.00%	0.00%	0%	0.00%
Italy	6.3	13.6	20.6	6.5	**59.7**	10.62%	22.85%	35%	10.83%
Netherlands	8.0	2.1	-	-	**14.5**	55.37%	14.40%	0%	0.00%
Poland	-	9.0	-	-	**10.9**	0.00%	82.18%	0%	0.00%
Slovakia	-	3.8	-	-	**4.1**	0.00%	92.67%	0%	0.00%
Spain	2.3	-	10.2	-	**13.3**	17.57%	0.00%	77%	0.00%
Turkey	-	24.5	-	-	**34.9**	0.00%	70.11%	0%	0.00%
UK	26.8	-	-	-	**35.4**	75.69%	0.00%	0%	0.00%
Rest of Europe	0.8	10.9	1.9	-	**21.5**	3.53%	50.42%	9%	0.00%

Source: BP, 2013.

Although Russia, that is undoubtedly Norway's main competitor on the European gas market, supplies approximately 30 percent of gas imported by the EU, and its shares are much higher on some of the national markets, Russia's space for 'gas manoeuver' is constrained by gas strategies of other actors, by the EU's ability to project its regulatory power (Goldthau and Sitter, 2014) and more recently by the growing scepticism towards energy co-operation with Russia displayed by many European energy buyers in the wake of the recent crisis in Ukraine.

Although Norway – and other actors supplying gas to the EU – face similar structural challenges as Russia, Norway has in the opinion of Godzimirski (2014a) a number of competitive advantages. Firstly, Norway shares norms and values with all members of the European Union and is *de facto* a European insider through its 'membership' in the EEA. Secondly, Norway is a predictable democracy and co-operation with Norway is therefore not bound with any strategic and political risks, not least due to the fact that Norwegian policy-makers have been consistently pursuing the policy of non-politicising their energy supplies. Thirdly, supplies of gas from Norway to Europe do not run the risk of disruption by transit countries as Norwegian gas reaches Europe directly. Fourthly, being a member of the transatlantic alliance Norway shares a strategic vision and concerns with all its European gas customers and is often viewed as a source of politically safe energy. All those strategic gas factors make Norway a much more attractive gas partner than Russia that in 2014 challenged the European security order by its actions in Ukraine undermining its credibility as Europe's strategic partner, also in the field of energy (Pirani et al., 2014).

In addition Norway, or to be more precise Statoil, has adopted a much more flexible approach to market related and regulatory challenges that have emerged recently in Europe. According to many observers (Arneson, 2012; Yafimava, 2015), Norway, the Netherlands and most other sellers of gas to Europe – but not Gazprom – have adapted to hub pricing in north-west European markets, opened for reduction of long-term contracts to maximum 10 years and agreed to reduction of take or pay clauses. Contrary to Gazprom and Russia that accuse the EU of using the Third Energy Package to undermine Gazprom's position in Europe, Norway has also been much more willing to accept the new legal and regulatory provisions proposed by the EU (for more detail, see Simonov, 2011; Gorevalov, 2012; Melnikova, 2012; Riley, 2013; Yafimava, 2013).

A number of actors in Norway fear, however, that Russian actions in Ukraine, combined with Gazprom's perception as a Russian state instrument which makes many wonder whether it is safe to buy gas from Russia, and the EU's increased focus on sustainability of the European – and global – energy system may undermine the position of gas as a fuel for Europe, which could indeed have negative long-term consequences for Norwegian gas supplies.

The situation in Ukraine has indeed influenced European debate on gas dependence on Russia. One of the most interesting reactions to the events in Ukraine was the publication by one of the most renowned European think tanks of a brief report assessing the possibility of Europe freeing itself from gas dependence on Russia (Peruzzi et al., 2014). According to this report, the EU could take a number of steps to decrease its gas dependence on Russia and Norway could play its part in making it happen. According to this report, Norway could contribute by increasing its gas production by 20 bcm and supplying those additional volumes to the EU. This would, however, require both increased production capacity and a reconsideration of Norway's policy towards energy co-operation with Russia. Increasing production capacity is an industrial and technological question, but reconsidering relations with Russia is indeed a political matter.

To understand how the Ukrainian crisis has changed Norwegian understanding of Russia as a partner in energy field it is important to compare official statements from period before the Ukrainian crisis with those made in its aftermath. In his speech made on 21 January 2014, State Secretary Pedersen from the Norwegian Ministry of Foreign Affairs described Russia as the most important Arctic state in terms of territory, resources and activities, an important neighbour in the north with which Norway enjoys close co-operation, including in the development of petroleum resources in the Barents Sea, a process that had been facilitated by signing in 2010 of the agreement on maritime delimitation. He referred also to the presence of two Russian companies – Lukoil and Rosneft – on the Norwegian continental shelf as well as to co-operation between Rosneft and Statoil as two positive examples of how energy co-operation between the two countries could be shaped. He also added that the two countries had an open dialogue on issues where they disagreed (Pedersen and MFA Norway, 2014).

However having this dialogue on issues they disagreed on, did not prevent a substantial worsening of bilateral relations in the wake of the Ukrainian crisis. In 2015, Russia is no longer viewed in Norway as a reliable energy partner but rather as a source of strategic concern. This change in the attitude towards co-operation with Russia may also explain – at least partly – why the state-owned Statoil decided in 2014 to embark on two gas related projects that could be viewed as posing a challenge to Gazprom's hegemonic position in Eastern Europe. Statoil is to supply approximately 0.54 bcm gas worth between NOK 5.7 and 7.4 billion to the newly opened floating LNG terminal in Klaipeda, Lithuania (NTB, 2014) and, what is even more interesting, some gas to the Ukrainian Naftohaz (NTB and Ekeseth, 2014).

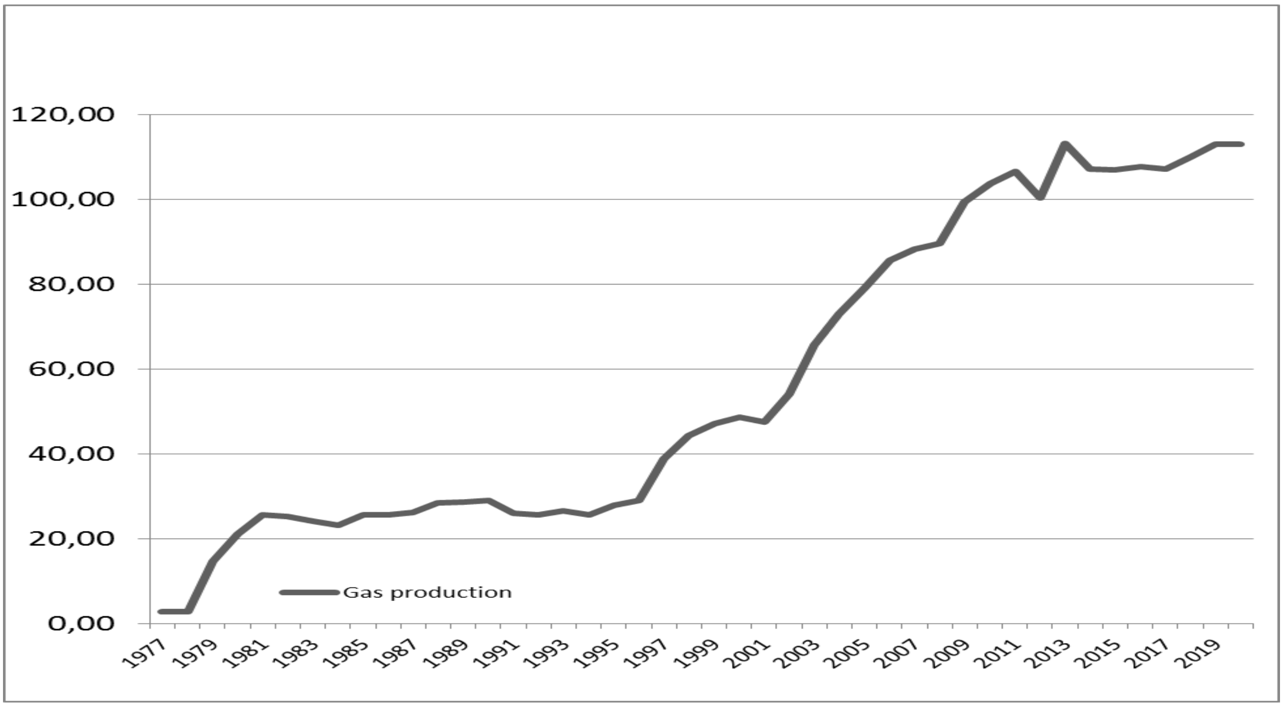
Although the official line is that these contracts with Lithuania and Ukraine are purely commercial, supplying Norwegian gas to countries that until recently had to rely exclusively on Gazprom is indeed viewed also as a political handling (Sverdrup, 2014). Does it mean that Norway is about to change its approach to its energy resources and to add a political element to its energy equation, or can this be explained within the commercial paradigm? It is in fact not the first time that Statoil has decided to take market shares from Gazprom – it happened almost a decade ago on the Czech market where Statoil managed to take some 30 percent share in the market in the aftermath of a Russian-Czech gas argument, and Norway has been also previously accused of playing against Gazprom (RT, 2013).

There is most probably a combination of political and market factors that have made Norwegian policymakers reconsider the importance of energy co-operation with Russia. As to the political ones, the two countries managed to resolve the most burning political question in their political relations, the issue of delimitation of sea border in the Barents Sea that was solved in 2010 when an agreement on this question was reached. Another political elements changing this equation were Putin's return to power as Russia's president in 2012 and the results of parliamentary elections in Norway in 2013 won by a conservative-liberal coalition that put relations with Russia and focus on the High North further down on their political agenda than the previous Labour government. Finally, Russia's actions in Ukraine resulted also in stronger focus on trans-Atlantic and European security co-operation and solidarity and damaged Russia's reputation as a reliable economic and political partner.

There were also several market related factors that contributed to this change of approach. After many years of negotiations and preparations in 2012 a decision was made to shelve the most prestigious energy co-operation project, the joint development of huge Shtokman gas field in the Russian part of the Barents Sea. The failure of Gazprom, Statoil and Total to agree on how to approach this complicated gas project was a huge disappointment to all those who advocated closer energy co-operation with Russia. The decision on the fate of this project was to a large extent a result of the increasing market uncertainty, caused by a number of market related factors. The most decisive ones were the 2008 economic crisis and its consequences in the West and in Russia resulting in an economic slowdown and lower demand for energy on the European energy market; the emergence of a new gas technology that made available huge non-conventional, shale gas deposits in the USA and is about to change global gas market; dynamic development of global and regional LNG market, influenced partly by shale gas and oil revolution in the USA; and finally more global and European focus on the question of energy sustainability that has also influenced position of natural gas in the market (Deutch, 2011; Khegay, 2011; Clemente, 2012; Grätz, 2012; Bierbaum and Matson, 2013; Brooks et al., 2013; Deloitte, 2013).

All those market related factors influence also position of Norwegian gas on the European gas market. One of the issues that is viewed as important is the pace of implementation of EU's climate and de-carbonisation goals. There are voices that gas – including gas from Norway – will have to give place to other sources of energy (Endresen and Ånestad, 2013). However, according to Statoil's chief economist, the EU that is to cut its CO_2 emissions by 40 percent and increase the share of renewable sources of energy in its energy mix to 27 percent to reach its climate goals by 2030 will need rather more than less gas, and gas from Norway will be delivered in huge volumes in many decades to come (Wærness, 2014), not least due to the fact that the EU itself plans that by 2030 fossil fuels will still represent 65 percent of its energy mix and gas is the least problematic of fossil fuels available. In his brief article, Wærness lists several uncertainties that will influence developments on the EU energy market in the next 14 years. The future rates of economic growth in the EU is one factor, future prices of energy is another one, but the most important uncertainty is the EU's ability or inability to agree on certain measures and the way those agreed upon measures will be implemented by the EU and by its members. Also other Norwegian observers of the situation on the European gas market share this rather positive assessment of the future of Norwegian gas in Europe, both in short- and mid-term perspective (Kaspersen, 2014).

Figure 3. Gas production in Norway: past and future in million Sm^3 of oil equivalents (o.e.)



Source: NPD Norwegian Petroleum Directorate, 2015.

Conclusions

As mentioned earlier, 2014 can be considered a watershed year in recent history of Europe, both in political and in energy terms. It is still too early to assess the long-term impact of the crisis on European, Russian and Norwegian energy policy, but it seems that the recent crisis will strengthen Norway's position on the European gas market and weaken the position of Norway's main competitor, Russia. There are, however, many political and economic uncertainties that will influence the situation on the European gas market in years to come.

The major global gas question with implications also for the European gas market is whether we will see the emergence of one global gas market, similar to the already existing oil market, or whether the global gas market will continue to be divided into three main regional gas markets: the almost self-sufficient North American gas market: the European gas market still dominated by piped gas coming from Russia, Norway and North Africa; and a mostly LNG-based Asian market. Developments on all three existing markets will be influenced by the mid- and long-term results of shale gas revolution in the USA, the ability of commercial actors to export shale gas technology to other parts of the world, the ability of other parts of the world to absorb this new technology in both technical and governance term, and finally the result of the ongoing rebalancing of the energy priorities on the main regional energy market, the EU and the EU's ability to project its approach to energy-sustainability nexus to other players on the regional and global energy markets. The key question is whether the whole EU is going to embark on an Energiewende and increase the share and the role of renewable sources of energy in its energy mix and limit the role of fossil fuels, including natural gas, or whether the EU will strike a new balance between the three pillars of its energy policy: 1) sustainability, 2) competitiveness and 3) security of supply (Bressand, 2012).

Given the fact that the EU will have to rely on fossil fuels in many decades to come to meet its energy needs, that various forms of natural gas will remain the best fossil option, that Russia will in many years to come be viewed as a risky option, and Norwegian gas production is expected to reach a plateau at the level of less than 120 bcm, Norway should not have serious problems with exporting its gas to the EU that will remain its most important gas customer. A successful development of an internal EU gas market with increased number of gas interconnectors and reverse capacity combined with possible extension of Norway's LNG capacity will make Norwegian gas physically available all over Europe, which should increase interest in this gas also with those customers who today buy gas from other sources. In order to make Norwegian gas available and attractive Norway should work closely with the EU on development of those infrastructural projects that will facilitate this gas' access to new and old customers without making it too expensive. In that way Norwegian gas can be a part of the solution of EU's energy security dilemma easing EU's transition to an energy system with lower CO_2 footprint and limiting the EU's exposure to external suppliers who may pursue policy goals that are not always compatible with the EU's norms and values.

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The Finnish energy market needs LNG

Hannu Hernesniemi [1]

Executive summary

The sulphur directive affecting the Baltic and North Seas that came into effect at the outset of 2015 was the starting point for the landing of LNG in Finland. In order to facilitate its integration, the State reserved subsidies to the total of € 123 million for LNG-based infrastructure construction. This encouraged investors to get involved. Subsidies have already been granted to four terminals, of which two are under construction.

The Finnish shipping companies regard LNG as the fuel solution of the future, because it comes within all emission norms. New ships are to be equipped with dual engines capable of using both LNG and oil as fuel. The new terminals also bring gas for the use of industry and energy production external to the gasoline network. In industry, LNG can be utilised as a substitute for propane and butane, for example, which saves on costs. In energy production, LNG is well-suited for the production of peak force.

Currently, pipeline gas comes 100% from Gazprom in Russia. Finland is an island detached from Europe's gas markets. For the time being, only Hamina's rather small LNG terminal is planned for connection to the pipeline gas network. A large regional import terminal intended for connection to the gas network is currently awaiting an investment decision. The current plans are to have the terminal in Inkoo, near Helsinki, or in Tolkkinen, a little further to the east in Porvoo. There are also plans to build a connecting pipeline – Balticconnector – from the terminal to Estonia's gas network. When the gas pipe connection is built between Lithuania and Poland, Finland would thereby join via and alongside the Baltic nations to the European gas network.

The LNG terminal constructed in connection with the network would bring competition to Finland's pipeline gas market, which would reduce the price of gas to users. Balticconnector would further increase competition. Competition would mean that Gasum Oy, which is in a monopoly position, would be required to split into a transfer company and separate gas sales company, in accordance with the European Union's gas market directive. Increase in the number of bidders would in principle also improve the security of gas supply. In spite of the monopoly, Gasum and Gazprom have been very reliable suppliers of gas throughout the 40-year-long operating period of the pipeline network.

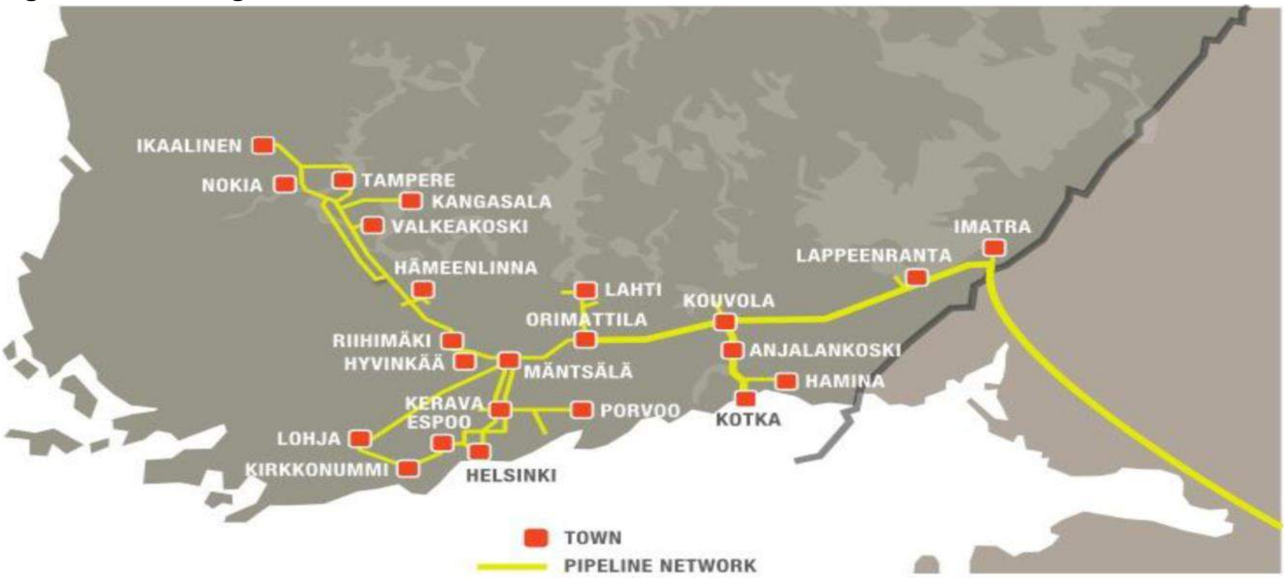
The generation of competition and improvement in security of supply will inevitably be on the work list for Finland's new Government. There are three options: 1) to retain the current situation with security of supply ensured by means of reserve fuels; 2) to build, in connection with the network, the LNG terminal and ensure profitable operations for a competing operator; and 3) to link Finland's gas market by means of Balticconnector via the Baltic States to the European gas network, by which stage the Finnish gas markets must be made open to competition at the latest.

[1] Author is a Chief Analyst at the National Emergency Supply Agency of Finland. The views expressed in this article are those of the author and do not necessarily reflect the views of the National Emergency Supply Agency.

Introduction

A natural gas pipeline from what was at the time the Soviet Union to East Finland was opened in 1974. The network of the Helsinki region and Pirkanmaa was expanded in 1986. Helsinki transferred from town gas to natural gas during the years 1991–1994. The natural gas network is situated in South Finland from Imatra to Lohja. The northernmost consumption point is in Ikaalinen.

Figure 1. Natural gas transmission network in Finland



Source: Gasum Oy.

In 2014, gas was consumed to the amount of 2,897 million m^3, which is 29.3 TWh of energy content. The energy plants and energy companies consume slightly over half, and industry slightly less than half. Local distribution occurring via energy companies was only 5.8% of gas consumption. The share of residential real estate was only 1 percentage point. The supply of residential heat and hot water is not dependent on gas, unlike the majority of European nations. Heat and hot water are generated for the most part by energy plants, which distribute it via the district heating network.

During the initial stage, distribution of gas was handled by Neste Oy, which subsequently became a part of Fortum Oyj. In 1994, Fortum's natural gas operations were transferred to a separate company, Gasum Oyj. The owners became Fortum, E.ON Ruhrgas and Gazprom as well as the State of Finland directly and via the National Emergency Supply Agency. In November 2014, E.ON and Fortum sold their shares to the State of Finland and National Emergency Supply Agency. At the moment, ownership is distributed in such a way that the State of Finland has 75% ownership, of which the National Emergency Supply Agency has 26.5%, and Gazprom 25%[2].

Gasum has innovatively developed biogas as well as waste gas production, and markets gas for traffic use. Their share is nevertheless still relatively modest in Finland's gas production and consumption. Large biogas investments, e.g. the Joutseno refinery route, mean high production costs compared to the price for natural gas, and are not launched without considerable subsidies.

[2] On 7 May 2015, the National Emergency Supply Agency exchanged its Gasum shares for Fingrid shares. This enables the organization to act impartially in matters concerning the security of gas supply and in its functions as the official gas authority in Finland.

Gasum has expanded to the Nordic countries by purchasing the majority shares from Skangass. The Norwegian Lyse Group remained minority shareholder and supplier of LNG. By means of corporate acquisition, Gasum has obtained a firm foothold in Sweden's LNG business operations. It has a gas terminal in Göteborg and another one planned for Gävle. In Finland, Gasum is building a terminal in Pori and is part-owner of the Magna LNG terminal being constructed in Tornio. By building a terminal network step by step, the company is accessing larger departmental totals and financial transport sizes; consequently, LNG acquisition costs are declining. Gasum's business operations are explained in more detail in David Dusseault's article, Connecting the dots: Gasum's evolving role in Nordic gas markets.

Many contradictory tendencies impact the development of Finland's gas market:

- Demand for LNG is being increased by the need to obtain environmentally friendly fuels for ships, industry and energy plants. In particular, the market for ship fuels is growing. Conversely, in industry it is possible to achieve cost savings when, for example, the use of propane and butane can be replaced to a considerable extent with more economical gas.
- LNG investments are being supported with State funds totalling € 123 million. It is possible to obtain support to a maximum of 30% of implemented investment costs. The subsidy has clearly encouraged more investment.
- Pipeline gas markets have declined over the entire decade. Consumption was at its peak in 2003, when it was over 4,500 million m^3. In 2014, consumption had dropped from the above to 2,897 million m^3. Pipeline gas demand is expected to stay the same or even fall if its price with tax remains high compared to competing fuels.
- There are many reasons for the fall in consumption. The operation of plants using forest industry gas has been suspended. Gas is the more expensive of competing fuels, for which reason it has been substituted with, for instance, biomass and economical carbon in energy production and industry. In addition, taxation on gas has been more stringently applied.
- In any case, in Finland the tax rate of gas is not yet as high as that of coal and oil fuels, but it is high compared to most EU countries. The price of gas without tax is on the mid-level in Europe for industrial customers. The price of gas subject to tax without value added tax transferred to consumers is the most expensive amongst the EU countries after Sweden and Greece.
- Pipeline gas markets are monopolies, although gas competes heavily with other fuels. Gasum is the only importer, and Russia's Gazprom is the only source of gas. At the same time, there is political pressure to open up the market to competition. By linking LNG terminals, competition for the gas pipe network could be realised. Obtaining newcomers to the market is difficult, because Gazprom and Gasum can, if required, reduce gas prices. The pressure to reduce gas prices would be, of course, an advantage brought by competition to Finland's national economy.
- Competition could be enabled if an input tariff for newcomers could be ensured – a certain sort of price guarantee by which operations could be made profitable. On the other hand, the changing subsidies for varying fuels and taxes in accordance with the various and, added to this, political cycles disturb healthy competition and increase the risks of investment, which are tantamount to reducing investments.
- Gasum has signed a 'take-or-pay' contract with Gazprom. The quantities to be delivered according to the contract are larger than current gas consumption. The parties have agreed that

Gasum will pay for the amount agreed, but unused gas is to be delivered towards the end of the contract period. This is tantamount to disturbing healthy price mechanisms in the gas market.[3]

- Although Gasum invested in the construction of the LNG infrastructure, it does not necessarily wish under these circumstances to build the terminals that will be linked to the network. They would incur significant costs but at the same time reduce the consumption of gas purchased from Gazprom. On the other hand, it would be better from the perspective of the development of competitive markets if the other importers and importers bringing in gas from elsewhere build the terminals. The largest gas users would also be optimal investors.
- The pressure on Finland to free energy market competition coming via the European Union is severe. Gasum should split into a transfer company and separate enterprise that engages in gas-based business operations. The gas pipe would form a transfer channel equally to all gas suppliers. At the same time, there are pressures via the EU's Energy Union to combine Finland and the Baltic countries in the EU's energy networks and achieve common policies in relation to the significant gas importer, Russia.

In this article, we will look initially at the LNG markets: for instance, current prospects for ship fuels. What terminal investments are on the way? How do investors justify their projects? What is the amount of State support?

After this, we will examine the pipeline gas market. Finland's dependence on Russian gas deserves special examination, and in the same connection the significance of gas in the energy pallet, as well as the measures by which the possible detrimental impacts from gas dependence can be reduced.

Finally, we will look at which possibilities Finland has to implement gas market competition, and which options are available, if and when, there is a desire to increase the security of supply of gas. Alternatives to examine include adherence to the current system, the construction of an LNG import terminal linked with the gas pipe, and the third possibility – the building of Balticconnector to Estonia, whereupon Finland could join via the Baltic States to the European gas network, by which stage at the latest the market should be opened for competition.

Landing of LNG in Finland

In the background, LNG's price and environmental issues

The general trends in global gas markets are, of course, behind the landing of LNG in Finland. The second significant factor rests in the stringent environmental regulations that are creating new markets for growth. The third element is improvement in security of supply, which we will return to later.

The global gas markets were regional for a long period. When large gas sources were opened, massive transmission pipelines had to be built at the same time. Investments in sources and transmission networks are so substantial that the investors demand long-term contracts from the buyers, which were normally attached to a competitive energy source, oil. Indeed, the gas pipes are in the best instances regional – at best, almost continental in scope in Europe. Nevertheless, there are transfer connections between Africa and Europe as well as between the areas skirting Russian Asia and Europe. The Chinese invest in connections from Central Asia to China.

[3] The contracts between Gasum and Gazprom are business secrets and the author has not become acquainted with them.

LNG is changing the gas market from regional to global. Gas production has increased considerably as unconventional gas sources have been deployed. The United States and Canada have grown into significant producers and exporters on world markets. At the same time, gas is being produced to an increasing extent in Arctic areas and on the sea, where it has no demand. East Asia and Japan in particular have been substantial purchasers. LNG concentrates the capacity of gas to 600 parts and enables the export of gas in an economically profitable manner. The total number of LNG production plants is growing, the LNG terminal network is gaining in density, and LNG transport by ship is becoming a significant field in global maritime shipping. The same applies to overland transport by container lorries and trains.

LNG has become a commodity subject to the formation of various spot and future prices alongside index-bound prices on the market. LNG is being offered for sale to an increasing extent on the spot market. Concurrently, its prices have converged closely with regional pipeline gas prices. In Europe's leading markets – Great Britain, Spain, Belgium and Italy – LNG is already capable of competing, depending on the import country, with the prices of pipeline gas[4].

LNG has been most expensive in Japan and for the most part in East Asia, where production has been considerably less than consumption. Gas has been the most economical in the United States and Canada. In Europe, prices have been intermediate between these two markets, because the area has its own gas production and, moreover, it has been possible to bring gas along pipelines from Russia and North Africa. In 2014, the price ratio for LNG compared to US markets has declined to the extent that the price is at this point about double, whilst in previous years it was almost triple. The price in Europe is being lowered by the reduction in South Asian prices, particularly Japan's. Part of this derives from the increased LNG reserves and part from the mild winters. The main reason, however, is the fact that after the nuclear accident in Fukushima, the nuclear power stations were closed and now, after their evaluation, they are again being deployed. Japan's declining prices are increasing imports to the European markets. China on its part has signed economical contracts with Russia for gas and LNG imports and is building import infrastructure from East Siberia and Central Asia.

The United States has also changed its policies and is granting more export permits and to the Gulf of Mexico, from where transport to Europe is shorter. This is generating new LNG production capacity and export ports. The amended policies in the USA are already visible in, for example, the fact that Lithuania has been able to enter into MOI agreements for gas import from the United States.

LNG drivers in Finland

How do LNG price mechanisms and the prices of the world and European markets affect the price of LNG in Finland? A pivotal factor is naturally the small size of the Finnish market. Even when the terminals have been completed, the market will still be quite small in size, compared to the markets in Western European nations. Relatively small quantities will be possible in terms of purchases. The size of the terminals will also not allow large transport vessels, and cargos will require ships that are reinforced against ice. Moreover, the Finnish market is peripheral: i.e. transport journeys are long.

[4] Quarterly Report on European Gas Markets, Market Observatory for Energy, DG Energy Volume 7, Issue 3, third quarter of 2014, Figure 19.

Despite this, the market price amendments – the relative cheapening of LNG – is also being felt in Finland.

The author is unable to assess what the overall potential of the LNG market in Finland will be. The most significant customer groups will become clear on the basis of the information provided by investors. The basic structure of clientele is made up of metal refining, the chemical industry, energy production and maritime shipping.

The basic clientele are situated in areas where the current gas pipeline network does not extend. The production plants will get suitable fuel for new environmentally friendly purposes for their fuel palette and for the special requirements of their processes. A good example of this is Outokumpu's steel factory in Tornio, which can profitably replace propane in its processes. This is indeed the company's motive in investing in the Manga LNG terminal being constructed in Tornio. By means of LNG, it will be possible to further process and pelletize iron ore in an energy-effective manner, or smelt iron ingots for rolling.

Special examination: LNG potential with regard to Finland's foreign trade-based ship traffic
Finland's foreign trade uses fossil fuels to the total of approximately 2.2 million tonnes a year. Converted to cubic metres, this comes to 2.55 million m^3. The capacity of fossil oil is 0.45% that of LNG. The absolute maximum of the bunkering market is therefore 5.67 million m^3. The amount in gas form exceeds the use of current pipeline gas. This can of course rise owing to the bunkering of traffic directed towards Russia and Swedish traffic in the Gulf of Bothnia. In addition to merchant ships, the new State-owned vessels are primarily built for LNG use.

In actual fact, the fleet of new ships equipped with LNG engines or dual-engine capability using LNG or Marine Gas Oil (MGO) and Marine Diesel Oil (MDO) is still relatively small, but the majority of new vessels serving foreign trade are built for dual operation, so the market is growing all the time. The reason for this is LNG emissions, which will also come under the coming environmental restrictions.

At the moment, vessels that use LNG are the ferry serving passenger traffic to Sweden, Viking Grace, and the patrol ship, Turva. Of the vessels on the way, an icebreaker (Finnish Transport Agency) and six container ships (Containerships Ltd Oy together with Langh Ship Oy Ab) that use LNG are under construction. The Tallink passenger ship currently ordered for scheduled service to Helsinki also uses LNG, in like manner to the coming Skangass LNG tanker under the Swedish flag.

How much in reality our foreign trade will be served by dual-operation vessels bunkering in Finland will largely depend on the price for LNG here compared to other route-point bunkering possibilities and alternative fuels, i.e. MGO, or at the low-sulphur (0.1%) HFO price. It is fair to assume that LNG will be cheaper in Hamburg, the Danish straits and at the eastern end of the Gulf of Finland in Russia if an LNG production plant is built there. LNG's energy content is smaller than in fossil fuels, by reason of which tanking up must be carried out more frequently, i.e. in accordance with need, also at more route points.

The object in the future will be to minimise the amount of space required by the fuel tanks. This being the case, it must be assumed that initially dual operation must be built-in but, over the longer term when the LNG bunkering infrastructure is extended, investments will be made exclusively towards LNG use.

The construction of energy plants linked with LNG terminals is profitable and necessary, since LNG gasified therein can be incinerated for sale as electricity and heating. For peak power production, costly LNG is excellently suited, because the plants are quickly deployed and the high price of electricity makes production profitable.

With respect to gas for ships, LNG is a suitable fuel because it saves space, and only when it is used does it gasify. The new fuel is environmentally friendlier than fuels processed from fossil oils. In ship traffic in the SECA area on the Baltic and North Seas and in the English channel, it has no longer been possible since January 2015 to use ship fuels containing more that 0.1% sulphur. LNG comes under that limit. The same also applies to the minimising of greenhouse gas emissions that contain carbon dioxide, methane and nitrous oxide.

Finland's coming terminal infrastructure

Construction work on two LNG terminals, one in Tornio and the other in Pori, has begun. With regard to two other terminal projects announced – one in Rauma and the other in Hamina – an investment decision has not yet been made. All four terminals have obtained decisions for conditional subsidies. They will receive at maximum 30% support against implemented construction costs. Support has been sought for three other terminals as well, but their plans are still under development.

The new terminals will serve area needs, but with tank trucks and train transport as well as bunkering vessels, they will be able to serve industry, energy plants and ships within a 300–500 kilometre radius. This means that a significant proportion of potential customers will be able to receive competitive LNG tenders. In addition, the terminals receiving State support will have access permitted to companies practising gas-related business operations, which may also increase competition.

Tornio terminal

Manga LNG Oy is building a 50,000-m^3 LNG import terminal at Tornio's Port of Röyttä at the base of the Gulf of Bothnia. The cost estimate for the terminal is approximately € 100 million, of which the share of State support comes to € 33.2 million. The terminal is being supplied by Wärtsilä Oyj, i.e. the terminal will at the same time provide an opportunity for domestic industry to acquire valuable experience in the new technology area. The completion period for the terminal in accordance with the plans is the outset of 2018. The construction project is estimated to have an employment impact of 260 person-years. An effective logistics chain is being built round the terminal. The completed terminal will thereby directly employ only seven persons, and provide indirect employment for some 30 people.

Manga LNG Oy's partners are Outokumpu Oyj, SSAB Oy, Skangass Oy and EPV Energia Oy. The use of LNG will improve, according to the companies' announcement, their competitiveness. From the perspective of alternative fossil fuels, the use of liquefied natural gas achieves significant reductions in carbon dioxide-, nitrogen oxide- and particulate-based emissions. In addition, LNG is sold as ship fuel.

Pori terminal

Pori's 30,000-m^3 terminal is already at the topping-out stage. The terminal is scheduled for completion in 2016 and as such will be Finland's first LNG terminal. Gasum's subsidiary Skangass Oy is having the terminal built. Its cost estimate is € 88 million, of which the Finnish State has granted a subsidy totalling € 23 million. During the construction phase, 250 persons are being employed by the terminal, and afterwards there will be 50 employees including leveraging effects.

The location of the Pori terminal is the Tahkoluoto Harbour area. Gas will be used primarily by vessels visiting Pori's Mäntyluoto Harbour as well as other harbours in towns within the vicinity in addition to Sachtleben's nearby factory, which produces titanium oxide. The area also has 60 hectares of zoned space for new production plants. All in all, it is estimated that approximately 360,000 m^3 of LNG – which in gas form totals 216 million m^3 – will pass through the terminal yearly.

Rauma terminal
AGA is planning to build a 10,000-m^3 LNG container terminal in Rauma's harbour and industrial park area. By this means, gas would be delivered directly to the vessels and by tanker trucks for the use of industry and traffic. The project is currently in the hearing stage that is part of the permit-granting process. If customer contracts are sufficiently obtained for the terminal and no appeal processes prevent it, the first general investment decision will be made. The LNG deliveries would already start before the completion of the terminal from AGA's Nynäs terminal from the south side of Stockholm, Sweden. From there, AGA has already supplied fuel since 2012 to the first Baltic cruise ship to run on natural gas, Viking Grace. The cost estimate for building the Rauma terminal is € 28 million, of which the State has granted a subsidy of € 8.6 million[5].

Hamina terminal
The size of Hamina's LNG terminal is planned to be 30,000 m^3. The owner of the project is Haminan Energia Oy, which has signed a co-operation agreement with Estonian Alexela Varahalduse AS for development of the terminal as a joint venture undertaking. Infrastructure exists at the oil- and chemical-specialised Port of HaminaKotka which is especially suitable for an LNG terminal. It should be possible to deploy the terminal in 2018.

The project deviates from the previous ones in the sense that there is a gas pipeline network linked with the national network. In this manner, the terminal would have its own clientele and it can vaporise gas for Finland's pipeline network. In addition, the purpose is to tank-up directly to the vessels and deliver gas by tanker trucks for the use of industry and traffic. The Port of HaminaKotka is, in terms of vessel visits, Finland's second busiest after the Port of Helsinki.

The cost estimate for the Hamina terminal is slightly less than € 100 million, for which the State has granted a subsidy of € 27.7 million. In fact, the investment might be larger because a 50 MW power plant is planned to be connected with the LNG terminal. It would even out the price peaks in the electrical market and act as a power reserve if there are disturbances in the acquisition of electricity. All in all, the investments required for the construction of these four terminals total over € 300 million. Through their combined influence, a bunkering infrastructure would be formed for the Gulf of Bothnia and Gulf of Finland ship traffic. In addition to these, the ports of Helsinki would need their own bunkering infrastructure.

As a result of LNG, production plants outside the network would obtain a fuel alternative for their use that saves on costs. It would be a fuel of its own also in energy plants producing peak power.

[5] Sources: http://lng.aga.fi/lng-suomessa/ and telephone interview with Project Manager Pasi Moisio, 7 April 2015.

Plans for BEDIM terminal

A question of its own is posed by whether or not Gasum's large import terminal planned possibly for Inkoo near Helsinki or Tolkkinen in Porvoo will actually be implemented. When the planning for these alternative terminals was initially started, the growth markets for pipeline gas were bright and promising. They would have been able to gasify LNG into the pipeline network and simultaneously function as feed stations for Balticconnector. Currently, however, the market conditions for pipeline gas no longer create incentives for terminal investments. Furthermore, it would be advisable for the purpose of achieving competition that investments were realised by a competing gas supplier.

National support is not being granted for a large import terminal, if it is part of the BEMIP (Baltic Energy Market Interconnection Plan) project, whose objectives include the merging of gas networks of the Baltic nations and Finland into one interconnected European gas network, as well as the construction of an LNG terminal / LNG terminals to the coast of the Gulf of Finland. For these Projects of Common Interest (PCI), the European Commission can grant support. Finland's goal is to obtain such financial support for a large-class regional LNG terminal.

Development of pipeline gas markets in Finland

The problem with the natural gas market in Finland is that it is monopolised and dependent on a single supplier which, owing to geographic reasons, is Russia. There problems relate specifically to gas delivered through a pipeline network. Competition can be increased by adding LNG terminals to the network, thus enabling import from elsewhere and/or combining the Finnish gas network to that of Baltic countries and via the future Lithuanian and Polish connecting pipeline to those of Central Europe. In spite of the monopoly, Gasum and Gazprom have been very reliable suppliers of gas throughout the 40-year-long operating period of the pipeline network.

It is difficult to achieve competitive markets because the number of customers connected to the pipeline seems to be falling or remaining at the current level at best. Another difficulty is that the current gas supplier, Gazprom, is able to push down gas prices so low that it is difficult for competitors to deliver gas to Finland profitably. New gas suppliers must invest in LNG transfer and terminals. Balticconnector and gas transfer along the pipeline network into distant Finland will also cause additional costs. It remains to be seen whether investors are prepared to shoulder these expenses if demand does not increase or even declines.

Size of Finland's gas pipeline market and changes in demand

In 2014, gas was consumed to an amount of 2,897 million m^3, which is equivalent to 29.3 TWh in energy content. At its highest, in 2003, gas consumption exceeded 4,500 million m^3. In 2013, energy plants and energy companies consumed a little over half, or 51.9%, of the gas, while industry 48.1%. Local distribution occurring via energy companies was only 5.8% of gas consumption, of which residential real estate accounted for just 1 percentage point.[6]

Use of gas has declined considerably from the peak years between 2003 and 2005, and at a particularly steep rate in the 2010s (see Figure 2). This has been caused by the following: The forest industry has adapted to a fall in printing paper demand by shutting down production plants that use gas as their main source of energy. Cheaper fuels, wood biomass and coal have replaced gas in energy production. The price of emissions allowance for carbon dioxide has fallen, which means

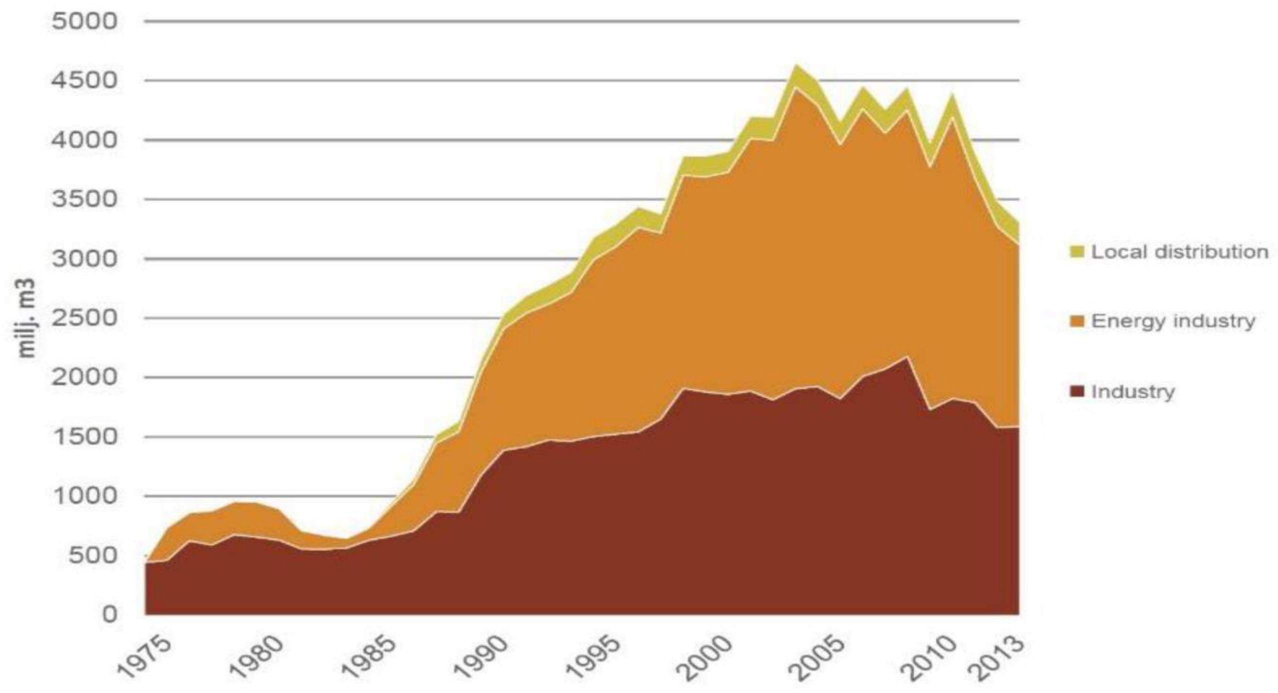
[6] The 2014 figures were not available when this text was being written.

that the use of polluting fuels, especially coal, has become cheaper. Resent tax solutions have also increased the relative price of gas compared to coal and biomass.

The Finnish pipeline gas markets have been almost as large as those of the Baltic countries, that is, Latvian, Lithuanian and Estonian markets put together. According to some expert views, Finnish pipeline gas markets will not be increased, rather the opposite, unless the relative prices of fuels and taxation and subvention policies are changed to favour gas.[7]

Use of LNG in targets outside the pipeline will, on the other hand, increase thanks to cost savings and more stringent environmental regulations. Such environmental regulation may also increase gas consumption to a certain degree in power plants.

Figure 2. Natural gas consumption in Finland 1974–2013



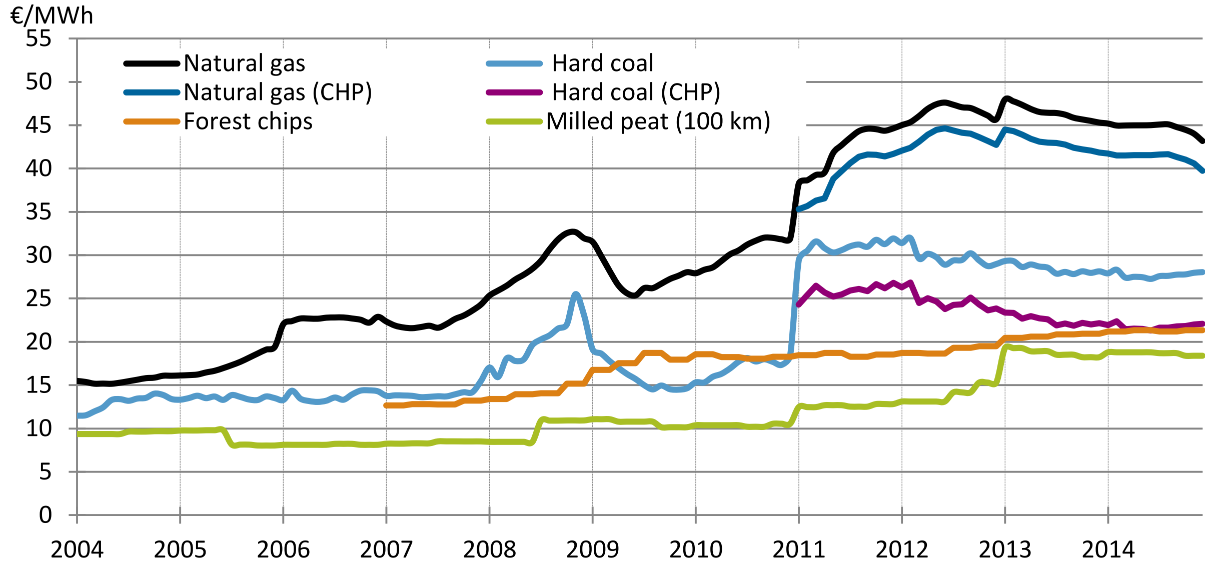
Source: Finnish Gas Association.

Gas is, after oil, currently the most expensive fuel used in energy plants. Figures 3 and 4 describe various fuel prices in heat and electricity production per megawatt hour. The price of fuels at plants producing both electricity and heat per megawatt hour obtained is lower than those that only produce heat, because such cogeneration plants have a higher operating efficiency. Varying taxation and biofuel subvention levels also affect the price structures.

Depending on the location of plants and fuel transportation costs, plants may have major differences in terms of fuel prices. Coal is very cheap to use if transportation can be arranged by sea to coastal power plants. If inland transportation is required by road or rail, the price goes up of course. Peat and woodchips are cheap if locally available. Transportation in excess of 100 km raise fuel prices quite considerably. Plants in a gas pipeline networks do not have such variation.

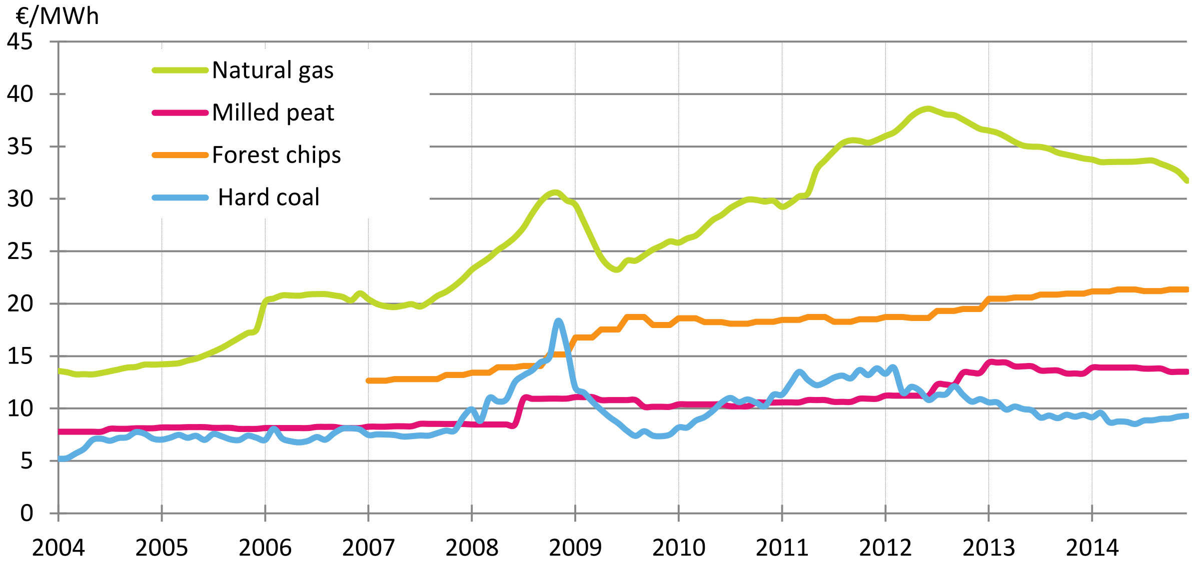
[7] On the other hand, during summer time the use of gas is only half of that during winter time. Those who could utilise lower summer prices could make nice profits.

Figure 3. Fuel prices in heat production



Sources: Statistics Finland, Energy prices

Figure 4. Fuel prices in electricity production

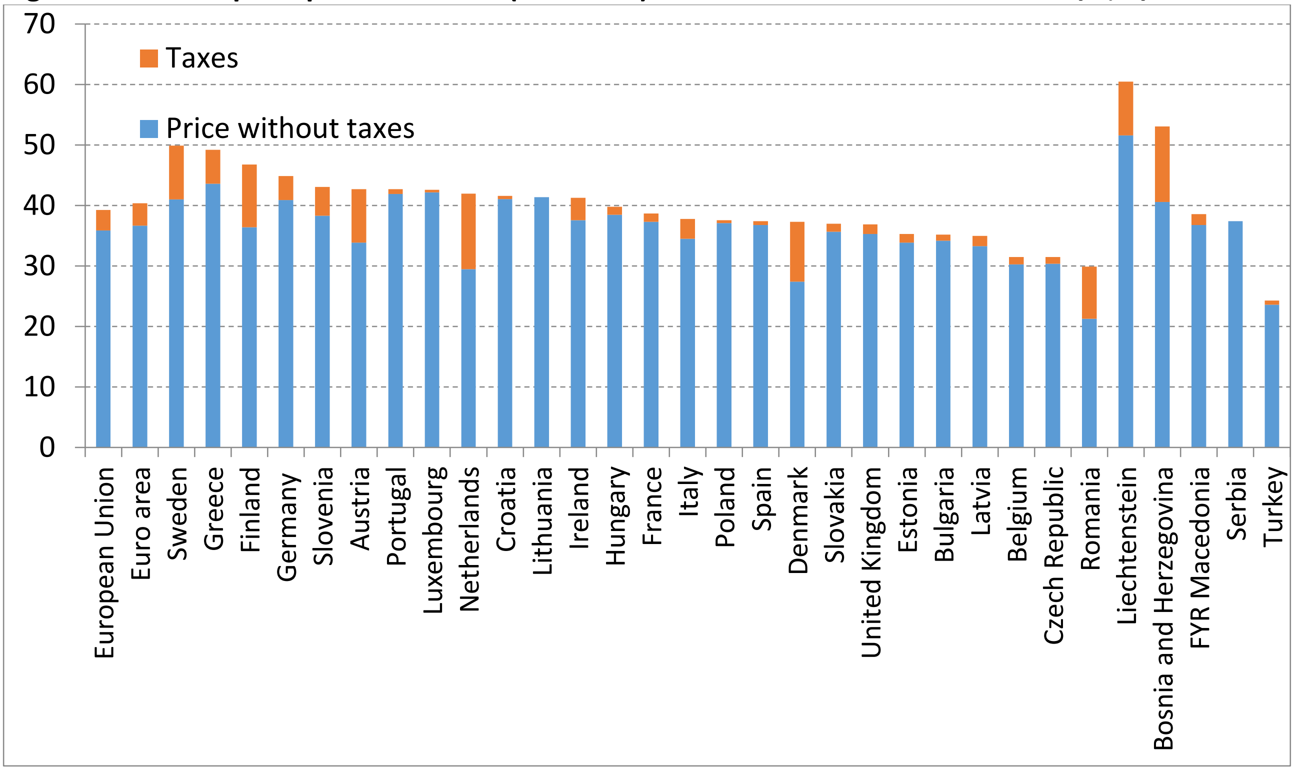


Sources: Statistics Finland, Energy prices

The price level in Finland for energy plants and industrial customers stood at EU average in the first quarter of 2014. The price without tax was higher than in Estonia and Latvia, but lower than in Lithuania.[8] After tax, the price of natural gas in Finland was the third highest in the EU after Sweden and Greece. Natural gas tax has been raised three times in the 2010's.

[8] The price of gas imported to Lithuania from Russia has fallen after gas was fed from the Independence gas terminal into the Lithuanian pipeline network in December 2014.

Figure 5. Natural price prices with tax (excl. VAT) for industrial customers in 2014/1, €/MWh



Source: Eurostat

According to Eurostat, the price of natural gas after tax for industrial customers has been higher in Finland than in the Baltic countries between 2009 and 2014. The prices with tax are exclusive of VAT, which the gas users may transfer to their customers. Price without tax in Finland was during the review period lower in Finland than in Lithuania but higher than in Latvia and Estonia.

Natural gas import prices to Finland are business secrets, but some estimates can be made on the basis of customs statistics and gas use. Import prices for 2014 were near Finnish gas wholesale prices published by the EU. The wholesale price (without transfer price) in Finland was € 27.97/MWh in September and October 2014. At the same time, prices were € 31.71 in Estonia, € 29.72 in Latvia and € 34.76 in Lithuania. This leads us to the conclusion that Finland's gas import prices were probably lower than those into the Baltic countries. The situation well be changing, however, because competition for LNG imports with Russian natural gas will probably reduce prices in the Baltic States.

Table 1. Gas imports, use and import price in Finland 2010–2014

Year	Gas imports million €	Gas use MWh	Import price €/MWh
2010	988.3	44,600,000	22.16
2011	1,060.9	39,070,000	27.15
2012	1,104.2	35,000,000	31.55
2013	976.9	33,200,000	29.42
2014	802.4	29,300,000	27.39

Source: Finnish Customs, Stat.fi

Finland's dependence of gas

Finland is, in terms of pipeline gas, almost 100% dependent on natural gas imported from Russia, delivered by the gas giant Gazprom. About 2% of gas originates from domestic biogas plants and plants that create gas from waste. Gasum Oy is so far the only gas wholesaler on the market. Since the system is based on a single gas supplier, Finland has been allowed to deviate from the EU gas directive, according to which gas transfer and gas sales must be separate from each other and that the system should allow for free competition.

A replacement system has been built in case of problems with the gas supply. Plants supplying communities with electricity and heat must have a replacement system to last three months. Industry, however, does not have such an obligation. State owned reserve stockpiles contain various fuels for five months' consumption for Finland.

In surveys referred to and commissioned by the EU, among others, it is exactly Finland that will suffer before any other country should Russia decide to close the gas taps. This conclusion has been reached by means of a simulation model that shows from how many countries gas is imported, whether the country has its own gas storages and whether the country can fall back on gas produced by LNG terminals. So far, Finland only imports gas from Russia, Finland's granite bedrock is so fragmented so as not to allow the construction of underground storage of gas, and no LNG import terminals have been connected to the gas pipeline. The model does not take into account all factors that affect the availability of emergency supplies.

The situation is not actually as gloomy as this. Gas only accounts for about 8% of Finland's energy raw materials, whereas the EU average is 20%. In the long run, gas can be permanently replaced with other fuels.

Protected customers, such as residential houses in which gas is used for heating and cooking, will be supplied with propane through the pipeline network should natural gas not be available. Gas is only used to heat about 4,000 detached houses and 800 terraced houses and blocks of flats. Gas is used for cooking in 25,000 households, which can change over to electricity. Gas used by homes only accounts for about 1% of overall gas use.

The crisis is Ukraine has increased concerns that Russia may cut off gas exports to the EU. One objective of the EU's energy union is to unify the member countries' energy policies with Russia. Finland can, in terms of dependence on gas and emergency supplies, be compared to other countries located near Russia. However, Finland's position is different in many respects:

- Finland imports almost all of its gas from Russia. Countries in the eastern part of Central Europe import most of their gas from Russia, but also increasingly through western connections. So they have multiple suppliers, which makes them less dependent on Russia.
- Finland imports gas straight from Russia. Gas is imported to the eastern part of Central Europe through Belarus and Ukraine. If Russia has conflicts with the transfer countries, such as Ukraine, the risk of cuts in gas supply for countries in the eastern part of Central Europe is much greater than it is in Finland. Finland has received any amount of gas it has needed from Russia without interruption for four decades. Countries in the eastern part of Central Europe suffered under a major cut in gas supply in 2009 when Ukraine and Russia were in disagreement about gas payments and amounts used. This acted as the impetus for the Energy Union.

- A considerable part of homes in just such areas are completely dependent on heating and warm water created with gas, and use gas for cooking as well. The countries will quickly end up in an emergency supply crisis if no Russian imports are cut off. Finland has replacement arrangements to manage a similar scenario.

The EU's energy union can also contribute to Finland's emergency supply of gas.

Introducing competition to the Finnish gas market

When this is being written, Finland has just held a parliamentary election, with changes in political leadership. There may be some changes in energy policies, but the basic principles will probably remain the same. The document prepared by officials in the Ministry of Employment and the Economy as the basis for government negotiations raises the construction of the Balticconnector, improvement of gas networks in the Baltic States, and the connecting pipeline between Lithuania and Poland as the key points in terms of Finland's gas solutions. These would connect Finland genuinely to European gas networks. This would mean that Finland could open up the gas markets for competition and could rely on the new connection in terms of security of supply.

There is no lack of political will in the EU to create an internal energy market and to combine isolated areas. The area covered by the Baltic Energy Market Interconnection Plan (BEMIP) has been named as one of the priority gas corridors in the EU's energy infrastructure regulation (347/2013). The EU is prepared to support the construction of the Balticconector pipeline and any LNG terminals connected to it.

Finland's former Prime Minister Aleksander Stubb and Estonia's Prime Minister Rõivas issued a communique on 17 November 2014 stating that the Balticconnector project would start without delay. The objective is to have it available in 2019 if technically possible and if there is enough EU backing to enable the project to be commercially profitable. A regional LNG terminal would be primarily located in Finland and be developed alongside the Balticconnector project. The projects must be commercially viable with EU subsidies.

Alternatives for developing the gas market

Finland has in principle three ways of reducing dependence on gas:

1) The gas market will not be opened up for competition, because the monopoly continues. We will maintain tight regulation.
2) Connecting LNG terminals to the pipeline gas network: we will support LNG terminals built in connection with the gas pipeline. The Finnish Government is prepared to support the Hamina terminal, and to pay for 30% of the construction costs of another terminal to be connected to the pipeline network. There would be a need for an LNG terminal in the Helsinki region as it could also cater for the bunkering of ships in the heavily trafficked area. New gas suppliers will be given the opportunity, at a feed-in tariff, for example, to supply at a maximum of 25% of the annual consumption of pipeline gas at a fixed price.
3) Baltic Energy Market Interconnection Plan: we will promote the implementation of the BEMIP by obtaining sufficient EU support for it in addition to support nationally in Finland, the Baltic countries and Poland. It is possible to join the system if the Baltic gas network is connected through Poland to the Central European gas network and sufficient funds are invested in the Baltic transfer networks and the gas storage facility in Inčukalns in Latvia. This model would require that the planned import terminal in Finland goes ahead. The current plan is to build it in

Inkoo with a capacity of about 300,000 m^3. The Balticconnector pipeline would run from Inkoo (Finland) to Paldiski (Estonia).

BEMIP implementation is crucial for Finland in terms of opening up the gas markets. If it is completed, the gas markets can be opened for competition completely. Gas transfer and gas business will be separated from each other. It would make sense for the transfer network and import terminal in this case to be in state ownership, with the gas business (imports and exports) run by private companies. The new Natural Gas Market Act, probably to be enacted in 2016, will take into account the freeing of markets.

A gas pipeline connection to Central Europe and LNG terminals in Finland and the Baltic countries would also be an optimal solution in terms of gas supply in case of emergency. Industry and energy plants could continue operating using fuels from various sources, and no fuel switches would be necessary.

If the LNG import terminal, Balticconnector and all the planned LNG terminals and their distribution infrastructure will be built (trains, tanker trucks, bunkering stations and ships and gas distribution stations), the investments would run up to about € 1 billion.

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Connecting the dots: Gasum's evolving role in Nordic gas markets

David Dusseault

Introduction

With the most recent collapse in the world price for oil, global energy markets have once again come full circle. Over the past six months, the markets themselves have reacted more to fundamental structural factors than to the fancies and whims of investor driven speculation.

Presently, the supply and demand relationship for energy indicates that markets are awash in basic commodities, such as oil and natural gas, while major centres of consumer demand are either atrophying (Europe), stagnating (the USA and Japan) or have failed to meet up with lofty expectations for sustained exponential growth (China and India).

The ramifications of a continuing supply glut are manifold. From a production perspective, it becomes harder for upstream companies to turn a profit and meet shareholders' demands for dividends. Even though supplies remain ample, failing to make the financial numbers work now complicates the strategic planning process for increasingly expensive investments in exploration to ensure continued flow of energy to the markets of the future.

At the other end of the spectrum, consumers who ultimately depend upon their purchasing power and preferences have a wealth of alternatives to choose from when it comes to energy. With oil prices remaining stubbornly low and economic growth sluggish, cash strapped companies are making final decisions based on bottom line numbers. Hence, the message to all energy companies is clear: the cheapest fuel, whether it be renewables, oil, natural gas, or nuclear wins market share.

However, as the globe's resource base under current production matures, more technically and physically complex production projects will challenge the downstream's expectations for and reliance upon cheap energy. What is missing from this well-established narrative is how under such demanding structural conditions energy will get to end consumers.

Midstream companies, those traditionally involved in purchasing, wholesale and distribution of energy to consumers, are now being charged with cutting today's equivalent of the Gordian knot: how to procure, transport, and sell a particular product under extremely competitive and volatile end market conditions.

For a prototypical midstream firm such as Gasum, balancing out the upstream's need for end markets with consumers' preference for competitively priced, environmentally sustainable and reliably sourced natural gas has always been and will continue to be the key to business success. Yet, despite natural gas' inherent competitive advantages in established markets, such as Finland, the learning curve associated with the industry's evolving business model serves to complicate an already daunting assignment.

As interfuel competition for consumer demand has intensified, unconventional production techniques have increased world supplies of natural gas exponentially. Meanwhile, developing pricing formulas and contractual formats are contributing to more transparent and flexible trading of gas volumes on a regional basis. All of which only raise the expectations on the part of consumers for natural gas to become a more commercially attractive commodity to satisfy their energy demand.

So bridging the demand and supply gap, fulfilling end-consumers' developing preferences for competitively priced energy while accessing a diversified set of sourcing options according to tightening price constraints, is now the top priority on the midstream agenda.

Hence, this short article will focus on how the world's energy markets are changing, what these changes mean for the Nordic region and the measures Gasum is undertaking to satisfy our customers' preference for natural gas into the foreseeable future.

The way we were: How things have changed?

It has become a well-worn cliché to state that the energy sector has undergone substantial structural change over the past decade. How to quantify the myriad of modifications that have changed the complexion of the global energy trade is another matter which cannot be fully addressed in this article. However, by conducting an abbreviated risk analysis of the energy sector's economic value chains, a new perspective may be gained concerning just what are the major issues to be observed within the emerging business environment.

Risk within any specific set of circumstances, whether in terms of supply disruptions, price spikes, lag in demand or logistical complexities, has always been a factor which needs to be identified, properly understood and mitigated through various mechanisms at the disposal of energy companies and consumers along the value chain.

In the mid-20th century, energy majors bent on cornering their respective markets structured their business model in such a way that any element of risk (and conversely, the benefits) associated with developing the world's energy markets was primarily in corporate hands. From financing exploration and production operations, to providing logistics for point to point transportation refining and distribution of value added products which ultimately fostered burgeoning end-consumer demand, 'big energy' essentially oversaw the creation of the world's hydrocarbon economy from massive fields in the Middle East to an individual driver in the American Midwest.

By the late 20th century, the risk of providing for the world's mounting demand for energy increasingly was felt by producing countries. This risk however was not defined in any substantive manner. Instead the producing states that would go on to form OPEC defined their risk as those associated with expectations of a more egalitarian split of the financial, economic and social benefits to be accrued from their own resources which heretofore were under control of international energy majors.

A rebalancing of the books of sorts took place when production and price controls were ceded to state run energy companies of the producing states. While the business model remained essentially unchanged, the resulting revenue increases which benefitted state coffers, placed the resulting price risk directly at the feet of western consumers. The subsequent market panic caused western economies to sink into prolonged recession right up to the last decade of the 20th century.

Seen through this prism of shifting risk, today's energy markets differ quite substantially from their historical precedents primarily in terms of diversification and complexity of today's structural environment, emerging business models and evolving value chains. As touched upon in the introduction, very few upstream firms can continue to bear the capital burden of cradle to grave energy trade. For their part consumers, owing to economic downturn and an expanded choice of products at their disposal, have the ability to fulfil their preferences based on individual calculus, rooted in price competitiveness and availability of reliable supplies both of which do not bode well for capital intensive producers.

Particular challenges in the North

To varying degrees business risk has shifted away from the extreme poles toward the midstream of the energy value chain and manifests itself on a case by case basis. For reference, markets are judged to be well-developed when characterised by diversified supplies of gas, interconnected transmission infrastructure, transparent pricing and knowledgeable consumers. As a result, the liquidity of volumes consumed and traded rises. The converse is also true; single supplied, low yield markets demonstrate more fixed pricing mechanisms, less flexibility in contractual terms thus resulting in apathetic demand for natural gas.

The Nordic region falls closer to the latter characterisation of gas markets than the former, with some notable caveats. The most important of these is how the role of traditional midstream companies like Gasum are evolving away from a top-down purchase and sales model, to a multi-faceted natural gas service provider / portfolio manager. While ample supplies of gas are accessible to the region's consumer base, existing logistics and long-standing contractual forms no longer correspond to the growing consumer-dominated market environment.

From the consumer perspective, demand patterns are continuingly evolving. Owing to the prevalence of inexpensive coal, subsidised renewables, growing supplies of domestic biomass, and cheap imports of electricity, natural gas' competitive edge has been lost in core markets, particularly in heat and power generation. Industrial demand is also lackluster owing to the economic challenges faced by companies comprising the region's post-war industrial base.

From the supply point of view, energy needs consumer markets. Many firms involved in upstream operations now have too much product on their hands to justify continuing production at a significant loss. What is at risk here is the ability to shift away from older generation fuels such as coal, heavy fuel oil, diesel and petrol for use in power generation and transportation. To avoid further regression, glut conditions must be reduced, prices need to return to sustainable levels and thus earnings garnered to support the necessary investment projects to foster demand recovery and introduce technology to replace less sustainable fuels with cleaner, more efficient alternatives including natural gas.

The lesson for the region's energy firms is simple: business models need to correspond to the changing environment. It is becoming harder for companies to make the numbers add up by relying on the tried and true point to point delivery model for energy sales. To remain viable, energy companies must invest themselves in market development by providing a good that satisfies the customer's energy needs sustainably, flexibly and at a competitive price. In order to do so, energy sector executives' mind set are gradually reflecting new realities by realising that a sole product or company is no longer the only game in town.

Marching orders

To an alarming degree gas' inherent competitive advantage has been eroded in core wholesale markets due to economic changes largely beyond many firms' immediate control. However, alternative market opportunities do exist particularly those lying outside the reach of pipeline networks. Off grid industry and transportation (both maritime and ground) provide excellent market sectors where gas' competitive edge still exists and will increase against less sustainable forms of energy, such as oil, propane, and those already mentioned above.

Correspondingly, the traditional business model for midstream companies such as Gasum is morphing from the role of a purchasing and sales entity to a moderator of significant commercial risk in order to provide the product consumers demand while guaranteeing revenue flow to sustain our operations and markets for producers.

Connecting the dots

The challenge of market development then centres on the continuous calibration of related working parts (supply, demand, logistics, contractual conditions, and costs associated with the business environment) in order to increase the relative competitive advantage of our products versus those of our competitors. It is not only a question of increasing sales' volumes, but under what terms and conditions is our product sold, at what price relative to viable alternatives, and with what vision for natural gas' future use.

To fulfil these ends, Gasum's development strategy is based on three basic pillars, the first of which is diversifying the way in which Gasum is able to source our supplies. With Gasum's recent acquisition of the Norwegian based Skangass, our investment grants us access to not only regionally produced and traded LNG, but in combination with our own receiving terminals in Finland allows Gasum to reach a growing group of consumers throughout the Nordic countries.

Being linked to LNG infrastructure, purchasing firms and consumers no longer need to be solely bound to pipelines for their natural gas. The development of hub-based pricing and spot markets allows for smaller volumes to move from supplier to end consumer in a commercially transparent and logistically efficient and timely manner. In the long run, Gasum will build a diversified sourcing portfolio comprised of varying contracts with an ever growing set of suppliers whether be they aggregators or producers, providing pipeline or LNG, on a long-term contractual or spot market basis as consumer demand dictates.

Finally, as has been mentioned throughout this article, consumer preferences for energy are increasingly important when it comes to the evolving structure of the energy trade and emerging business models. For Gasum's part, we are committed to providing what we feel is a very competitive product not only to our longstanding wholesale markets, but also look forward to extending our services to off grid industries and maritime transportation with LNG.

In addition, Gasum is actively pursuing biogas production for an increasingly environmentally conscious market. Connected to our existing transmission grid, current supply of bio-methane obtained from locally recycled waste totals 80 gigawatt/hour per year. However, we see a market potential over ten times today's production. Our commitment to biogas has been recently demonstrated in construction of the new Kujala biogas plant in Lahti (50 gigawatt/hour per year). Hence, we see biogas as a specific solution particularly for public and long distance transportation, in heat and power sectors as well as for industrial use all in reach of our growing network of production sites.

From this perspective we at Gasum see that constructing the future energy market in the Nordic region is not drawing a line from A to B, but connecting a constellation of points which results in a more sustainable picture of the future.

Natural gas revolution and small gas-consumer country: The example of Sweden

Lovisa Källmark and Chloé Le Coq

Executive summary

This chapter analyses the impacts of shale gas revolution for countries that do not consume large amounts of gas. It takes Sweden as an example, to illustrate the different impacts more closely.

It is well-known that shale gas has had strong impacts on the development of the gas market, and in particular on gas prices all around the world. However, a country that consumes very little gas will not be affected by gas price variations. This is indeed the case for Sweden. We first conclude that the direct effect of the shale gas revolution may be of less significance for small gas consumers.

However, we also argue that the shale gas revolution may have some significant indirect effects for small gas-consumer countries. First, these countries may have some incentives to change their energy profile. If shale gas leads to sufficiently low gas prices, it may be beneficial to substitute other fuels for gas and hence become a larger gas consumer. On the other hand, if gas prices are high enough to make it economically viable, it may be worth exploring domestic shale gas fields. A third alternative would be to develop liquefied natural gas (LNG) terminals and become a gas hub, i.e. a major 'gas transit' country with landing facilities for LNG that will allow natural gas to be exported to other countries. In the case of Sweden, becoming an energy hub seems to be the most likely alternative.

An additional important indirect effect is related to energy security. Natural gas can be transported by ship in the form of LNG or by pipeline. Because shale gas is mostly transported on ships, large gas-consumer countries will be able to diversify their gas supply and not only import gas from existing (or future) pipelines. If this occurs, large gas-consumer countries would improve their energy security by accessing a larger number of gas producers. Furthermore, a small gas consumer may indirectly benefit from this improvement. Like in the case of Sweden where the country is required, according to the solidarity rule in European Energy Union, to help neighbouring countries (or countries with connected energy infrastructure) in case of a gas supply disruption. With the development of shale gas, this event becomes less likely, since importing countries can choose to import gas from several countries instead of relying on one single gas provider.

Introduction

The gas market has dramatically changed since the discovery of shale gas in the 2000's. In the case of the United States, the production of shale gas has significantly increased, and the US Henry Hub price has significantly decreased (BP, 2014, 27). There is still some uncertainty about the effects of the shale gas revolution. Essentially, it has become even harder to make projections about the evolution of the market, the supply and demand balance for different regions, and the domestic conventional and unconventional resources (Rouilloux, Perniceni and Asch, 2014).

Furthermore, other factors are also contributing to an uncertain environment: institutional factors (e.g. the legal authorisation in the USA), technical factors (e.g. the need to develop LNG terminals in consumer countries or cross-border interconnections), and absence of convergence between different gas markets (e.g. the different gas price of the hubs in Europe, or the substitutability of different energies). All mentioned factors are important when analysing the impact of the shale gas revolution. However, one of the key elements to make a quantitative assessment of shale gas in a specific country or region is to assess how important gas is for the total energy supply in this particular country or region.

In the Baltic Sea region considered in this report, different countries have different energy consumption levels and different energy sources. Gas represents a significant share of the energy consumption of Denmark (18%), Germany (22%), Latvia (27%), Lithuania (32%) and Poland (14%). While for the other countries, gas represents a much smaller share of their energy consumption, Estonia (8%), Finland (8%) and Sweden (2%) (Eurostat, 2015).

In the following, we provide a general discussion on the direct and indirect effects of shale gas revolution for small gas-consumer countries. Taking Sweden as an example, one of the least gas dependent countries in the EU, we are able to discuss these direct and indirect effects. The first section discusses the relatively small expected direct effect of the shale gas revolution for a small gas consumer country. It looks closely at the Swedish case, presenting its energy profile and discussing the future trends in Sweden. The second section goes beyond the fact that a country is not consuming a lot of gas and analyses how the shale gas revolution may still have an impact on this country. In particular, we discuss how a country can change its energy profile to adjust to the shale gas revolution. We suggest that Sweden may indirectly benefit from an increased energy security of its neighbouring countries due to the shale gas revolution.

The direct effects of the shale gas revolution on small gas-consumer country

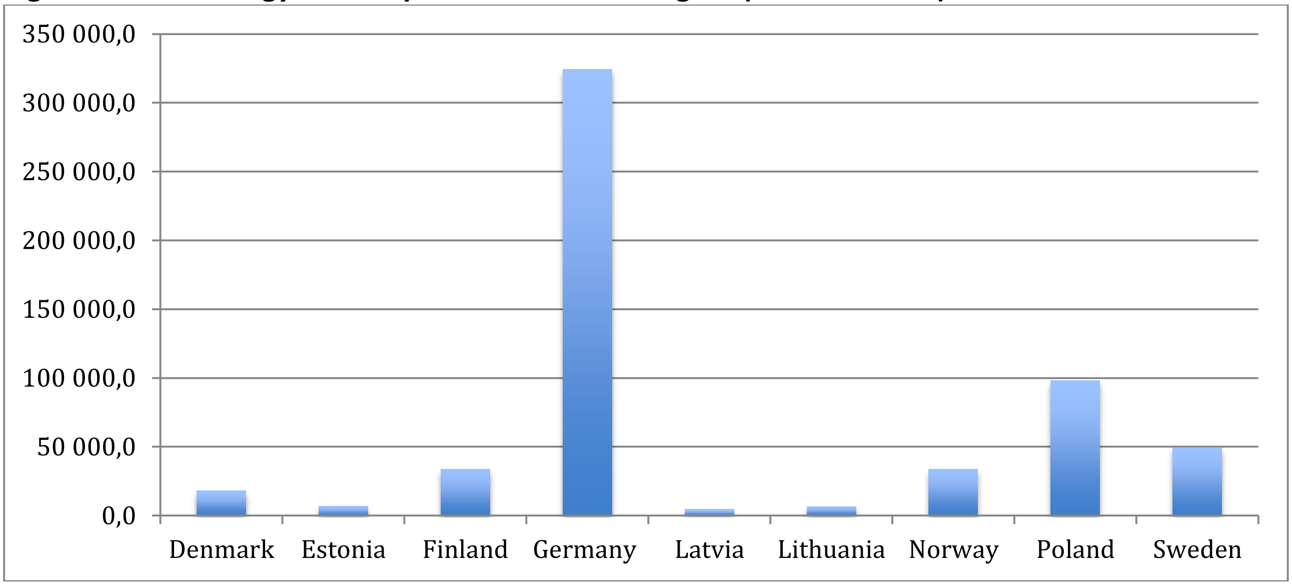
One way to assess the impact of shale gas revolution is to consider how important natural gas is for a country or a region. It is also necessary to consider the energy profile of a country. Only then we will discuss the different effects of the shale gas revolution. In all these parts, we look more carefully at the case of Sweden.

The meaning of 'small gas-consumer' country

In the Baltic Sea region, countries have different energy consumption (see Figure 1). More importantly, the share of gas in tonnes of oil equivalent (TOE) varies across the countries. Gas represents a significant share of their TOE like in Denmark (18%), Germany (22%), Latvia (27%), Lithuania (32%), and Poland (14%). While for others countries gas consumption represents a small part of their total energy consumption like in Estonia (8%), Finland (8%). For Sweden, gas represents only 2%.[1]

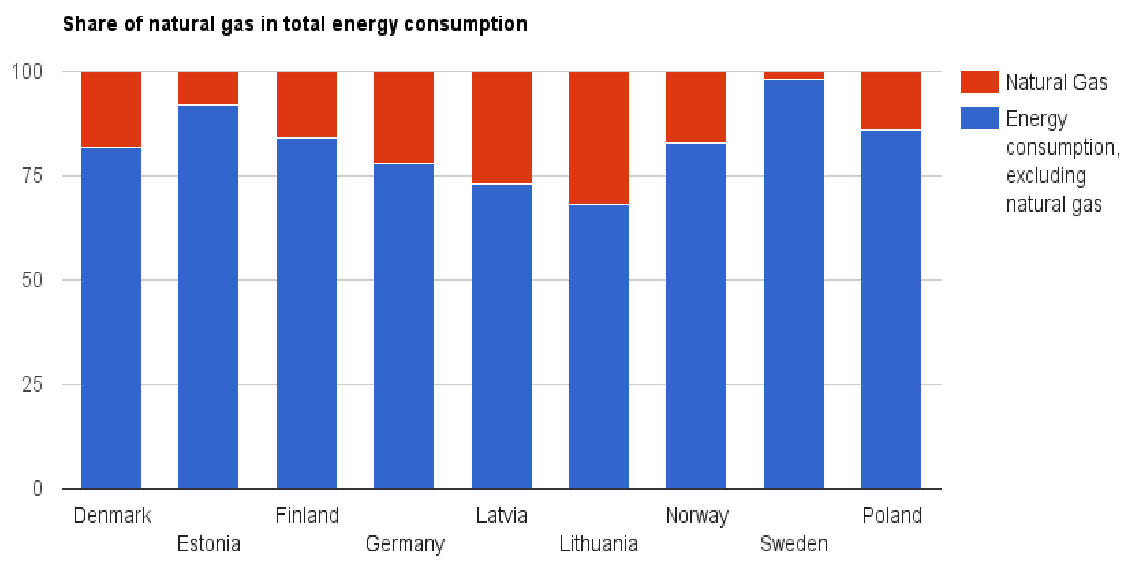
[1] Russia has been excluded from the discussion since Russia is considered a large gas producer.

Figure 1. Total energy consumption in Baltic Sea region (thousand TOE)



Data: Eurostat, 2015.

Figure 2. Share of natural gas in total energy consumption



Data: Eurostat, 2015.

The case of Sweden

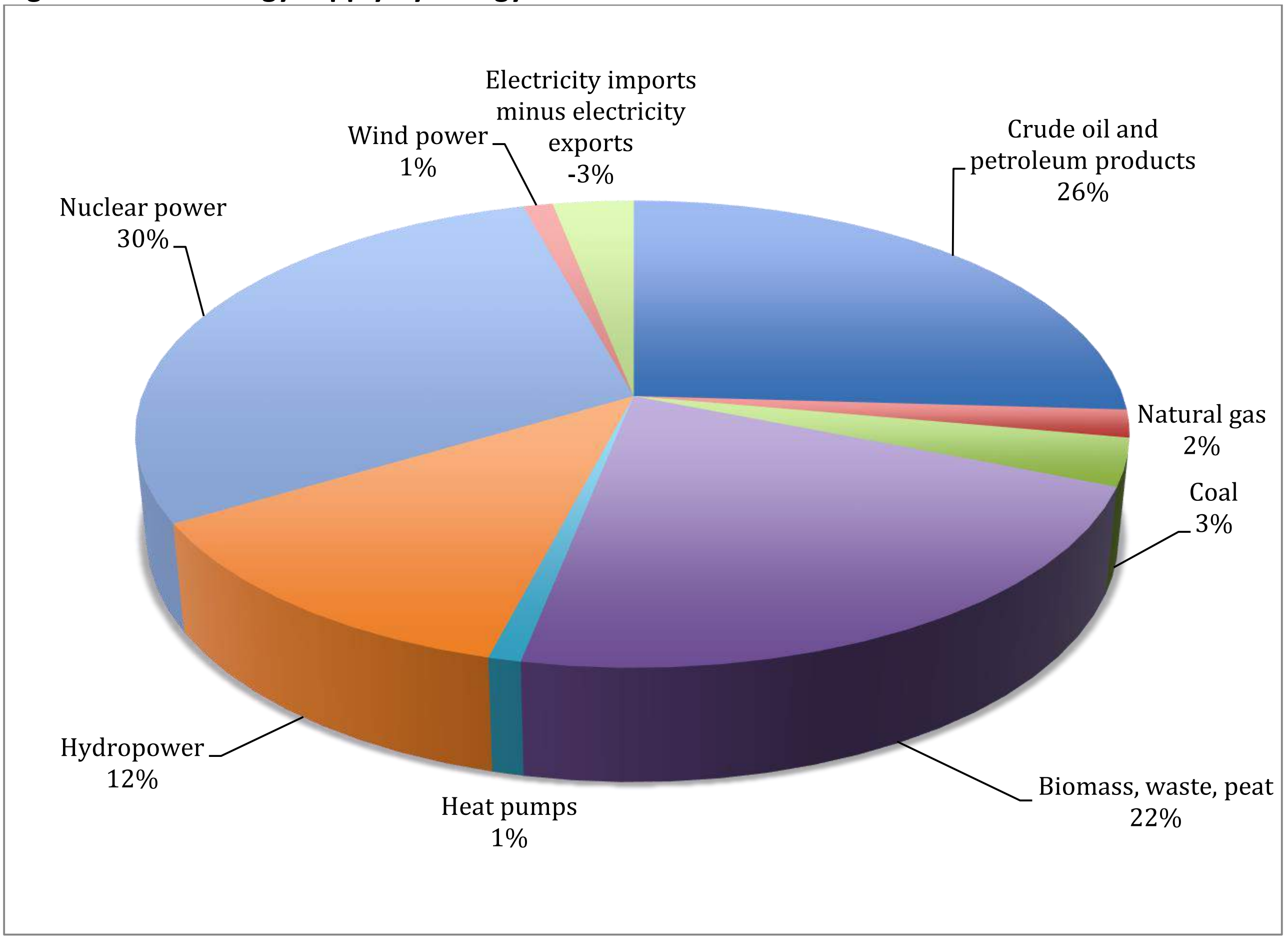
Figure 2 shows that the countries in the Baltic Sea region vary in their gas consumption and that Sweden have the smallest share of gas in its energy balance. Therefore, we consider the Swedish case as a good example for the small gas-consumer case. We describe the energy profile of Sweden and explain how little gas seems to matter to the Swedish economy.

Sweden uses about as much energy today as in the 1980's, despite the fact that the relative energy consumption has almost halved since then. Sweden has undergone several major structural changes during this time period. New technologies have been applied, the number of jobs in the service sector has increased and many of the old industries have shut down. The economy along with the population has grown, the society has become much more efficient and modern, yet we have not seen a decrease in energy demand.

Increased efficiency and better climate performance has been made possible thanks to the transition to electricity. If Sweden will continue to grow as an industrial country, electricity supply will be a crucial issue. Nothing suggests that the electricity demand will be reduced if the industry continues to increase its production, despite an increase in industry energy efficiency by 36% from 1993 to 2010. The electricity demand was largely unchanged during the same period (Svenskt Näringsliv, 2014), and the electricity demand has been rather stable since 2010 according to the Swedish Energy Agency.

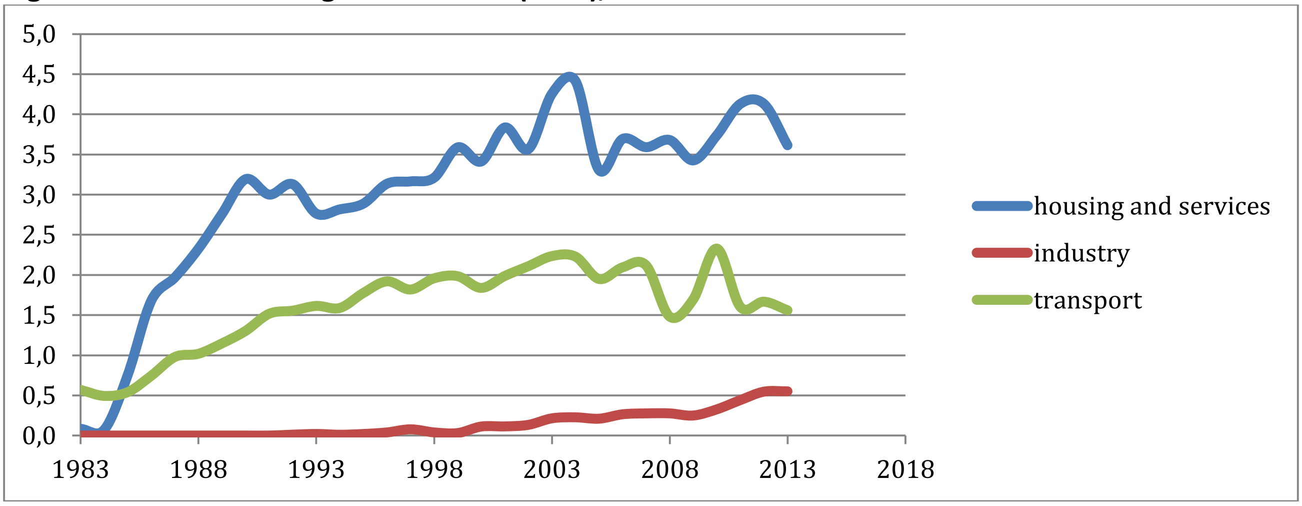
The main sources of energy in Sweden are oil, biofuels, hydroelectric and nuclear power (see Figure 3). The energy supply in the Swedish system is around 600 terawatt hours, TWh. In addition to this, the net export of electricity was 19.6 TWh in 2014. The need for electricity varies greatly by year in Sweden. However, the Swedish Energy Agency predicts that the net exports of electricity is likely to increase in the near future. Most imports and exports takes place between the Nordic countries, but the Nordic electricity system is also connected to Germany, Estonia, Russia, the Netherlands and Poland.

Figure 3. Total energy supply by energy source in Sweden



Source: Swedish Energy Agency, 2014.

Figure 4. Use of natural gas in Sweden (TWh), 1983-2013



Source: Swedish Energy Agency, 2014.

Consequences of not being exposed to gas

A country with small gas consumption should not, almost by definition, be affected directly by the world gas-market development. This logic also applies when discussing the consequences of the shale gas revolution.

Consider for example the case of gas prices fluctuations. By consuming very little gas, a country is not exposed to high and volatile prices. On the other hand, this country cannot benefit when the market price decreases. Indeed with the shale gas revolution, the world gas-market price has been dramatically reduced. This has led to increased competitiveness for firms in some countries. The discovery of cheap shale gas in the United States has undermined the competitiveness of European companies given that the EU´s energy costs are comparatively high (European Commission, 2014).

Moreover, being a small gas-consumer country also means that the country is not dependent on external gas suppliers. Indeed in the case of Sweden, this implies that energy security is not a problem for Sweden currently. This last point will have some consequences when we discuss the indirect effects of the shale gas revolution.

The indirect effects of the shale gas revolution on small gas-consumer country

This part of the chapter looks at the (potential) indirect effects of shale gas revolution for a small gas-consumer country. We consider three effects:

1) If shale gas is available and relatively cheap, it may be beneficial to become a large gas consumer.

2) Shale gas is produced in different parts of the globe (e.g. in the USA, Canada, Mexico or China) and transported via tankers. Hence, any country with sea border (even small gas-consumer) could become an energy hub by investing in country with LNG terminals. This will imply that all shale gas producers could use this country as a hub to deliver their gas to other large consumer countries.

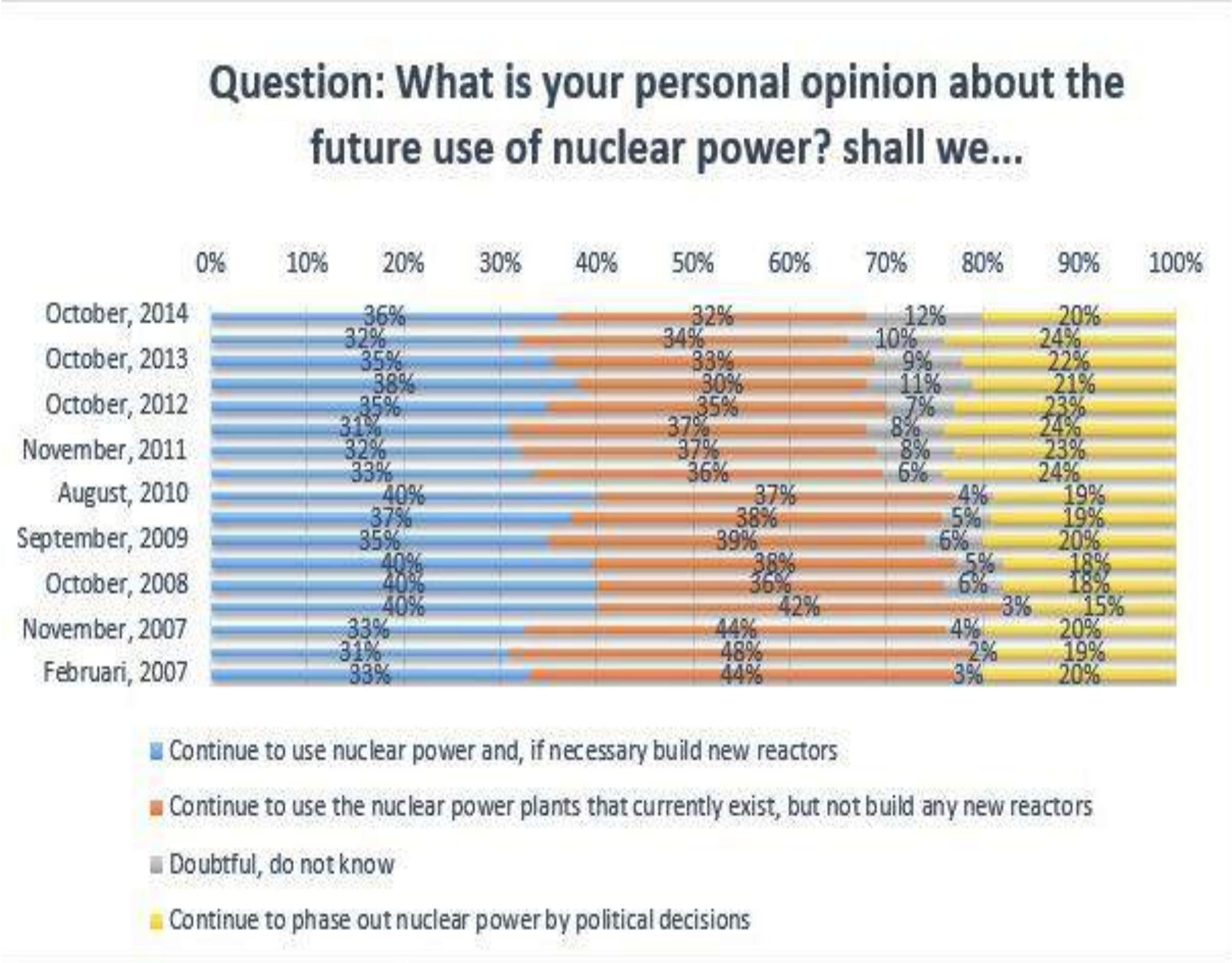
3) Finally, a small gas-consumer country is not, by definition, exposed to gas market fluctuations but its large gas-consumer neighbour countries are. We argue that there is then an indirect effect related to the issue of energy security.

Becoming a large gas-consumer country

To benefit directly from the low price and abundant shale gas, a country could change its energy profile and increase its gas consumption.

One option for Sweden would be to follow Germany's example and give up its nuclear energy production instead. However, this scenario would imply some energy sector restructuration and would involve significant costs. Moreover, it is unlikely that the Swedish people would support this decision. In a survey conducted by Novus, it was found that 68% of Swedes believe that Sweden should continue with nuclear energy. Furthermore, 36% are not against replacing existing Swedish nuclear reactors with new ones, if necessary (see Figure 5).

Figure 5. Opinion poll about nuclear energy in Sweden



Source: Novus, 2014.

Hence giving up nuclear and replacing it by gas does not seem to be realistic for Sweden. Sweden could also use gas-fired power plants as backup technologies for the increasing development of renewable energies. However, this seems unlikely. The hydropower is much more suitable in Sweden (Svenskt Näringsliv, 2014).

To conclude even if Sweden does change its energy profile (e.g. abandons nuclear, increases renewables), it is unlikely that Sweden will become a large natural gas consumer.

Becoming a key gas market player

There are at least two options for Sweden to be part of the world's gas trade; 1) investing in LNG terminals or 2) producing shale gas.

Becoming an energy hub

Because of its location, Sweden could become an energy hub by developing more LNG terminals. The first import terminal for LNG in Sweden was launched in Nynäshamn in 2011, followed by a second terminal in Lysekil in 2014. Several other Swedish cities are planning their own terminals, where the largest development will be in Gothenburg. This terminal will have a capacity of 30,000 cubic meters when fully developed. The harbour in Gothenburg is a hub for shipping industry and transportation in the Nordic region and is therefore a good strategic position for an LNG terminal. Swedegas, Dutch Vopak and the Port of Gothenburg are in charge of the project and the terminal should be in use in 2015. The terminal will be the first in Sweden based on an 'open access' principle (LNG-terminal Göteborg, 2014).

Becoming a shale gas producer

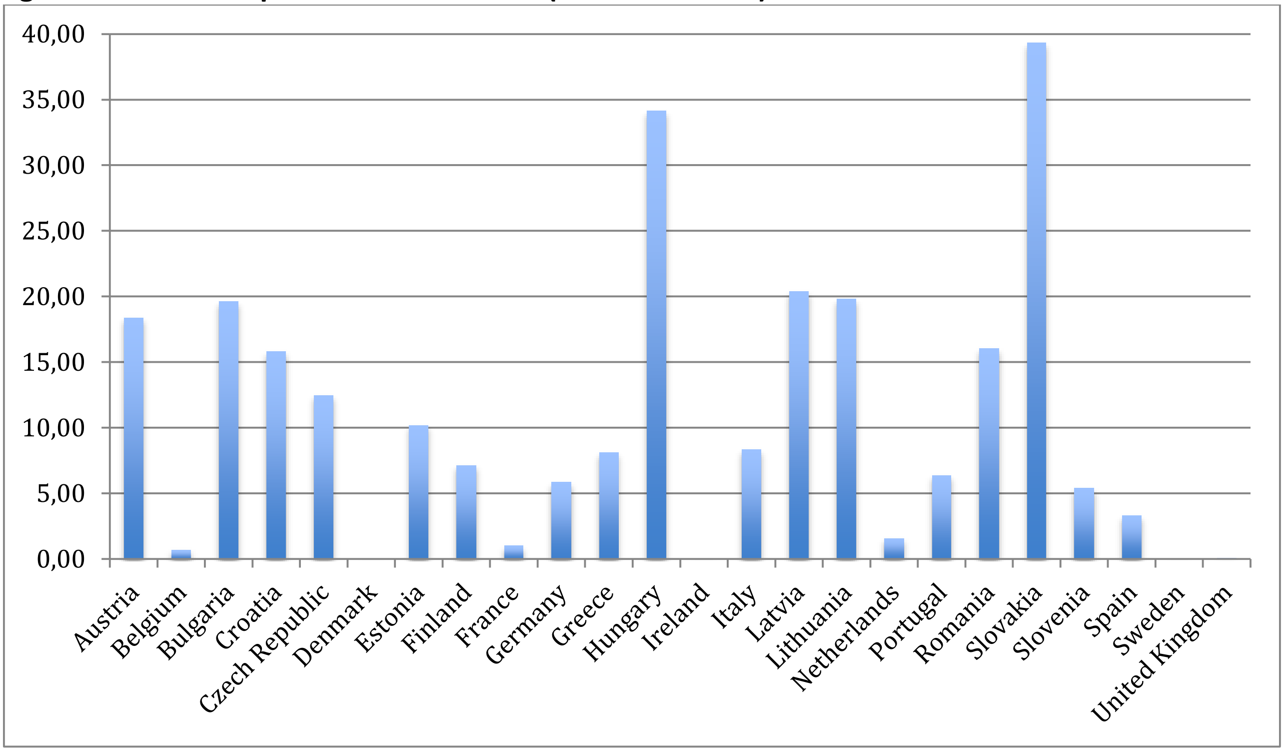
Sweden has nearly 300 billion cubic meters technically recoverable shale gas resource in the southern parts of the country. However, there is currently no significant production. For example, in 2011 Shell stopped their drilling, since the production was not commercially viable. Swedish companies have licenses to explore shale gas recourses, but the expected returns seem very small. The regulatory framework is very general and follows from the Swedish mineral legislation and the Swedish Environmental Code. In any case, shale gas production seems unlikely in Sweden as it is quite controversial and faces public resistance.

Positive externality of neighbouring countries increasing their energy security

Another indirect effect of the shale gas revolution is related to the energy security of the neighbouring countries. Shale gas may be an alternative to pipeline gas supply and can allow large gas-consumer countries to diversify their gas supply. If this occurs, large gas-consumer countries would improve their energy security by accessing a larger number of gas producers. We argue that a small gas consumer may indirectly benefit from this improvement.

Consider the case of Sweden. Sweden is surrounded by countries, and is part of different unions (e.g. Nordpool, the Baltic Sea region or the European Union). Interestingly, the countries belonging to these unions have different energy profiles. This is the case of the European Union, where some member states are not only significantly dependent on gas, but are also heavily dependent on gas imports. Le Coq and Paltseva (2009) have measured the risks associated to non-EU gas trade using an index approach. This index includes an import dependency ratio, share of gas in the energy portfolio, as well as elements related to the gas suppliers such as the associated political risk, or the geographical location (the exact formula can be found in Le Coq and Paltseva, 2009). Figure 5 gives the REES (Risky External Energy Security) index to most of the EU member states, where a higher index implies a higher gas risk exposure. Note that the estimates were calculated using Eurostat data from 2006 and that it was not possible to calculate for all member states due to a lack of available data. The numbers provided in Figure 5 should not be considered in absolute terms but more in relative terms. Clearly, different countries face different gas risk exposure, and therefore have different gas security issues.

Figure 5. Gas risk exposure within the EU (REES Gas Index)



Source: Le Coq and Paltseva, 2009.

According to this index approach, Sweden faces no risk related to gas trade. Nevertheless, any gas supply disruption may indirectly affect Sweden. Sweden is required, according to the solidarity rule in European Energy Union (rule specified by the European Commission on February 25th of 2015), to help neighbouring countries (or countries with connected energy infrastructure) in case of an energy disruption.

The discovery of shale gas has had and will have a positive effect on the energy security of some European gas-consumer countries. This may help large gas-consumer countries to improve their energy security and reduce their probability of a gas supply disruption. In turn, the solidarity rule would then be less likely to be used and Sweden less likely to have to intervene.

Conclusion

In this chapter, we argue that the shale gas revolution affects all gas consumer countries, and not only large gas-consumer countries.

A priori one may expect very small effects of shale gas revolution for small gas-consumer countries. However, we argue that shale gas revolution could push a country to change its energy profile at least in three directions. If shale gas leads to sufficiently low gas prices, it may be beneficial to substitute other fuels for gas and hence become a large gas consumer. A country may decide to become a gas producer and explore its domestic shale gas fields, if gas prices are high enough to make it economically viable and if there is no strong public objection to fracking. Indeed, the shale gas exploration in Poland is currently stopped due to strong public opposition (Nelsen, 2015). A third way to change its energy profile is to invest in landing facilities for LNG and become a major 'gas hub' country.

Additionally, we argue that shale gas revolution will have some impact related to the energy security issue. Shale gas may be an alternative to pipeline gas supply and can allow big gas-consumer countries to diversify their gas supply. If this occurs, large gas-consumer countries would improve their energy security by accessing a larger number of gas producers.

Furthermore, a small gas consumer may indirectly benefit from this improvement – like in the case of Sweden that is required, according to the solidarity rule in European Energy Union, to help out neighbouring countries (or countries with connected energy infrastructure) in case of an energy disruption. With the development of shale gas, this event becomes less likely, since importing countries can choose to import gas from several countries instead of relying on one single gas provider.

Obviously, more indirect effects could be mentioned. Shale gas revolution has impacted other energy markets (such as coal or oil markets). For example, the discovery of shale gas has led to a decrease of coal prices and an increase of US coal exports. That, in turn, led some countries to invest in more coal power stations (Miller, 2014). There are also some environmental effects of the shale gas revolution that may matter for all countries, irrespective of their gas consumption levels.

Finally, the shale gas revolution may have more impacts if the consumption of LNG is increased. In the case of the European Union, LNG only represents 14% of EU's net gas imports in 2013 (Eurogas, 2014) and the construction of LNG import terminals with increased of regasification seems to be necessary to fully benefit from the shale gas revolution.

To conclude, it seems likely that shale gas will not be the game-changer in terms of energy policy that it has been in the USA (Buchan, 2013). It may however have some specific effects on different part of Europe, even for small gas consumers.

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Natural gas in the Baltic States: The dividing factor

Reinis Āboltiņš

Executive summary

Although often perceived as one integrated market, the Baltic States represent three very different situations when it comes to energy sector and natural gas market in particular. Economies of all three countries have certain level of dependence on natural gas supplies varying from high dependence in Latvia and Lithuania and low dependence in Estonia. Lithuania has played the role of pioneer in gas market liberalisation in the Baltic States with Estonia pragmatically following and Latvia lagging behind significantly.

Lithuania decided to go ahead with gas market liberalisation in 2012 both in terms of unbundling and ensuring third party access (TPA) to transmission infrastructure. It finalised unbundling in 2013 by establishing an independent transmission system operator (TSO) Amber Grid. Estonia completed gas market liberalisation in January 2015 with full ownership unbundling when Estonian electricity TSO Elering obtaining gas TSO shares from the Finnish utility Fortum Heat and Gas OY. Latvia postponed liberalisation till April 2017 on the Parliamentary level in March 2014 and on the Government level in March 2015 continuing to cast doubt about exact time of actually implementing the requirements of the EU Gas Directive: by March 2015 unbundling has not happened and TPA principle has been implemented only partially allowing only bilateral deals between the TSO and / or storage system operator (SSO) and market participants.

To achieve a situation where natural gas market in the Baltic States is fully and effectively functioning in the understanding of the EU Gas Directive, Latvia has to do its homework and implement the 3rd Energy Package by unbundling currently vertically integrated natural gas monopoly and adopting rules that ensure transparent, equal and non-discriminating access to transmission and storage systems. Until that has happened natural gas remains the dividing factor among the Baltic States.

Introduction

The European Union's energy consumption habits imply only partial self-sufficiency in energy. Significant part of energy has to be imported. Situation among member states differs and some EU members are more energy dependent than others.

The debate on the European Energy Union (EEU) that unfolded in 2014 and experiences institutionalisation in 2015 seems to encompass all those energy policy aspects and goals that were discussed prior to this recent. The difference between then and now is that the new marketing will pull together all energy policy areas and aspects under one roof and further emphasise the importance of looking at the energy sector in a broader context.

Energy security is still one of the key concepts and itself encompasses a number of well-known issues that require not only policy, but also decision-making and implementation.

References to indigenous resources that cover also fossil primary resources[1] is probably the only relatively new invention aiming at utilising to full scale fairly vast domestic resources that a number member states possess.

It is misleading to think that the European Union can, at least for a few decades to come, live without gas. It is quite clear that natural gas has had a role, it still has a role and it is going to have a role in the energy portfolio of the EU in the future, too. The EU has pointed out itself, that the gas market needs more integration, more liquidity, more diversity of supply sources and more storage capacity, for gas to maintain its competitive advantages as a fuel for electricity generation.[2] Further, with growing deployment of renewable resources and technologies natural gas will continue to play a key role in the EU's energy mix in the coming years and gas can gain importance as the back-up fuel for variable electricity generation, that is – provided the supply is stable.[3]

So, the question is, where does natural gas come from and what can be done to ensure that risks associated with gas supply are reduced to minimum? Free and integrated internal EU energy market is the part of the answer, which should be easy to implement – EU member states have to accept the rules and implement policies agreed upon among them. The more difficult part is the one where member states and the EU altogether have to negotiate about terms and conditions of energy supplies with third countries. More recently, a possibility to have a common EU natural gas purchase has been debated, but opinions about such an approach vary from favourable to opposing.

Be it part of the European Energy Union (EEU) or not, an integrated market is at the core of energy policy. One can say that same rules for everybody infringes on member states' decision-making autonomy when it comes to energy sector, however, only harmonisation through establishing a level playing field for all market participants in the EU can ensure equal, non-discriminating, open and transparent access to critical energy infrastructure like power and gas transmission systems and gas storage systems. The EU's Third Energy Package (TEP) is the main instrument to achieve the EU's energy market goals. When it comes to gas, market is paramount to establishing independent transmission system and storage system operators and ensuring that third party access principle is implemented fully and effectively. Proper implementation of TEP is the key to increasing energy security of the EU and member states.

This article browses through the most essential sources and elements of the EU energy policy, analyses key aspects of gas market liberalisation in the Baltic States and aims at highlighting the most problematic issues of gas market liberalisation with emphasis on the role of decision-making in Latvia that has led to a situation when natural gas has become the dividing factor when it comes to co-operation between the three Baltic States of Estonia, Latvia and Lithuania. Although it is difficult to be innovative when it comes to producing recommendations for further action to improve gas market in the Baltic States, the author nevertheless highlights a number of things to do and the role of various stakeholders in the process of establishing a fully functional gas market.

The EU policy and law on integrated internal natural gas market

When it comes to energy policy in the EU one has to look at it through a number of prisms that represent both hardware and software – infrastructure, network capacity, environmental concerns, policy framework and market conditions to mention some of the main titles. The EU imports 53% of the energy it consumes, and energy import dependency to a large extent relates specifically to natural gas (66%)[4] – the EU's dependence on external energy supplies does not leave much space for comfort.

Energy sector is one of the most if not the most important sector in any economy. For a society to function effectively there has to be energy, which has to be produced and supplied. There have to be energy resources available to produce energy and the more options to choose from, the better. Scarce energy resources have implications in terms of ability to produce energy. Availability of resources influences dependence on external energy supplies both in terms of primary energy and electricity. Choice or lack of choice of energy resources determines country's energy portfolio – what resources and what technologies are used to satisfy energy demand, be it electricity or heat. Energy portfolios of the EU member states are as diverse as the EU itself and so far it has been commonly accepted that energy portfolios remain a prerogative of individual member states.

Full control of energy portfolio though does not necessarily mean complete autonomy in terms of functioning of the energy sector and domestic energy markets: energy sector in no member state and no energy market can function secluded and independently from energy sector and energy markets in neighbouring countries – cross-border trade of electricity and transport of natural gas takes place on a daily basis, neighbours have to co-operate to manage energy flows effectively. Single integrated energy market in natural gas and in electricity has long been one of the key economic and political goals of the EU. The more integrated the energy market, the more efficiently can it function and the more gains for the consumers.

Politically the relevance of tackling gas supply issues has been highlighted in a number of documents that serve as points of reference for future deliberation. Energy 2020: a strategy for competitive, sustainable and secure energy speaks about the European Union's ability to avoid gas supply crisis or to act with determination if such a crisis occurs in relations with third-country suppliers quite directly.[5] Three out of five priorities of the Energy 2020 strategy reflect on the role of natural gas quite directly while one explicitly shows that consuming less energy and being more energy efficient is the philosophy to follow.[6] Energy Roadmap 2050 speaks of the importance of natural gas in the EU for at least a few more decades to come as gas will serve as a key resource during transition from fossil energy to a much more widespread use of renewable energy resources and technologies.[7] Particular attention to natural gas and effective functioning of gas market is paid in the European Energy Security Strategy:[8] temporary gas supply disruptions in the winters of 2006 and 2009 prompted the EU response to some of the continuing challenges like too few sources of supply in a number of EU member states, too high dependence on one single energy resource, lack of interconnectivity between some of the member states to name but a few.

However, it is the EU Third Energy Package that encompasses the most pronounced legal measures to align effective functioning of power and natural gas markets in the EU member states.[9] The EU directive 2009/73/EC, commonly referred to as the Gas Directive, sets out clear framework for what conditions do member states have to implement to ensure effective functioning of gas market. Unbundling of monopolistic enterprises and ensuring third-party access are two key cornerstones of free gas market. Exemptions and regulatory framework are also important elements setting guidelines for smooth transition from monopoly to competition and establishing clear rules on the exchange of market data vital to guarantee functioning of gas market in a transparent and non-discriminatory way.

The purpose of gas market liberalisation

Ultimately, the essence of philosophy behind all policies, legislation and activities is – provide the most for the consumer, be it citizen of the EU or an enterprise. Promoting fair competition and easy access for different suppliers should be of the utmost importance for Member States in order to allow consumers to take full advantage of the opportunities of a liberalised internal market in natural gas.[10] Thus, again, the goal of TEP is to make the energy market fully effective, create a single EU gas and electricity market, keep prices as low as possible, increase standards of service and increase security of supply. Implementing the TEP requirements improves energy security and leads to the fulfilment of the core of EU's energy policy – consumer is in the centre.

Similarly, given the high level of dependency of a number of member states on natural gas in their energy portfolio combined with a limited number of suppliers, market conditions that TEP has the purpose of putting in place will definitely lead to alternative sources and routes of supply. Dependency on one (key) supplier might seemingly not be harmful, that is while the only or the main supplier does not manipulate prices based on a situation where the consumer has no negotiating leverage due to a lack of alternative or additional supply options. In other words, effectively and fully functioning gas market creates negotiating leverage to consumers and increases and strengthens energy independence and adds to energy security.

Unbundling

One of the primary purposes of the Gas Directive is to eliminate and prevent situations where the same company owns and is involved in managing simultaneously supply and transmission or storage. Unbundling transmission and storage does not allow former monopoly using their privileged position as operators of a transmission network and preventing or obstructing access of their competitors to this network. Effectiveness is the keyword here, as the Preamble of the Gas Directive quite directly states that without effective separation of networks from activities of production and supply (effective unbundling), there is a risk of discrimination not only in the operation of the network but also in the incentives for vertically integrated undertakings to invest adequately in their networks.[11] The Gas Directive elaborates on three possible models of unbundling[12] to allow member states flexibility to decide on the model of unbundling that would also be balanced and fair towards the existing vertically integrated undertakings once they have to embrace the market.

Third party access and the role of regulatory authority

For the market to function properly certain market conditions have to be present: equal conditions for all market participants, access to infrastructure and an independent TSO are essential elements. Providing and ensuring third party access to transmission and storage system is essential to be able to say that gas market is fully functional. Last but not least – TPA principle is about certain level and quality of service that is provided by respective system operator. This is where national regulatory authority in every member state has an important role[13] to take that is further strengthened by the European Agency for the Cooperation of Energy Regulators (ACER) established by the EU regulation 713/2009 as part of TEP.[14] ACER has been empowered with the function of providing framework guidelines on conditions for access to the natural gas transmission networks and network codes[15].
To finalise the regulatory framework that would ensure confidence in the market two key pieces of legislation have been adopted besides the ones in the TEP. Regulation on wholesale energy market integrity and transparency or so called REMIT regulation (1227/2011)[16] shall take care of open and fair competition for the benefit of consumers via establishing a set of rules, among other things,

against market manipulation and insider trading and, probably even more importantly, elaborating on provisions that oblige stakeholders in the energy markets to provide market data and allow effective data collection by the regulatory authority.

Last, but not least, Energy market data regulation (1348/2014)[17] was adopted laying down rules for the provision of data to ACER and implementing data collection provisions set out in Article 8 Paragraphs (2) and (6) of the REMIT regulation. Building on the REMIT requirements it goes into further detail and defines the particularities of reportable wholesale energy products and fundamental data that has to be reported. It also establishes appropriate channels for data reporting including defining timing and regularity of data reports.

This set of rules is not there by coincidence – preambles of legal acts that are part of TEP and also the REMIT and energy market data regulations speak of confidence of market participants in the market, the notion of trust is used multiple times. After all, free, fair, open and competitive energy market shall be there for the benefit of final consumers of energy. TPA principle and regulatory framework is there to guarantee that consumers get the best out of free energy market, which itself is one of the key paradigms of EU policy.

Derogations in emergent and isolated markets

EU Gas Directive 2009/73/EC allows member states to apply temporary derogation[18] in terms of implementation of requirements of unbundling and full access to transmission and storage infrastructure by all qualified market participants. However, the derogation should be temporary and should cease automatically when certain conditions come into existence. Derogations are there to protect the consumers and provide opportunity for enterprises to adapt to the Directive's requirements, and definitely not to secure monopoly of the national gas incumbent. The Directive contains a special clause on derogation related to the Baltic gas market, by allowing special conditions to be in place while certain criteria related to infrastructure do not come into existence:[19] infrastructure allowing alternative supplies of natural gas have to be in place.

A role of natural gas in the Baltic States

The Baltic States are often perceived as a single integrated territory having not many differences despite it comprises three independent countries. Developments in the energy sector, however, illustrate that there would some difficulty finding more different countries packed together on a fairly small territory and being together from so many other perspectives. Estonia, Latvia and Lithuania have very different energy portfolios composition of which stems back from the time when the three countries were part of the larger North-West energy system of the former USSR, which linked together their energy systems with the transmission grids of the Leningrad and Moscow regions of Russia as well as Belarus. This energy system encompassed a set of power production capacities that could comfortably compensate for each other if for whatever reason some of the capacities were not available.

Energy production and fuel switch

There are a number of factors to consider when looking at the role of natural gas in energy production and consumption in the Baltic States. The Baltic natural gas market is fairly small with all three Baltic States consuming just slightly over 5.5 billion cubic meters (bcm) of natural gas annually[20]. The largest consumers are natural gas powered combined heat and power plants (CHPs) near Riga, Liepaja and Jelgava in Latvia, Vilnius and Kaunas in Lithuania and Tallinn in Estonia that service the local district heating companies, so there is very little potential for large-scale consumption, especially in the light of the requirements of the new EU Energy Efficiency Directive[21], which obliges member states to invest significantly in energy efficiency. Further, an increasing number of boiler-houses are switching over from natural gas to biomass because of the higher cost of district heating in those municipalities, which use natural gas as the main fuel.

Estonia: among the most energy independent EU member states

Estonia has traditionally been and it continues to be among the most energy independent countries (according to Eurostat, it has been ranked the most energy independent EU member state in 2013)[22] in the EU thanks to its vast oil shale reserves and share of oil shale in energy production in its Eesti and Balti power plants near Narva in the very North-Eastern part of Estonia next to the border with Russia.[23] Apart from improving the industrial energy efficiency of its power plants Estonia has deployed comparatively large renewable energy capacities over the recent years with wind turbines being the main technology helping to increase the share of renewable energy (RES) to 13% up from just 0.6% in 2004.[24] Still with the carbon price at a very low level Estonia has fairly little incentive to diversify significantly away from fossil fuel while the main risk for its current energy portfolio is a higher price on CO_2 emissions. Natural gas is used primarily for district heating in Estonia's capital Tallinn and a few other smaller towns.

Latvia: gas for heating

Latvia's energy dependency amounts to fairly high 56%, which puts it just slightly above the EU-28 average.[25] Latvia's energy portfolio consists of three large hydro power plants on the Daugava River, two large capacity CHPs near the capital city of Riga and a number of small capacity natural gas and RES power plants including natural gas, biomass, biogas, and equally small shares of small hydro and wind. Thus, roughly a third of power production is covered by large hydro power plants (PPs), one third by natural gas CHPs, a small share of RES excluding large hydro and the rest is electricity imports. The proportion of natural gas and large hydro may vary depending on hydrological conditions in the Daugava river basin and the outside temperature during the heating season, which determines the intensity with which the two large scale CHPs work. On one hand, the role of natural gas in the energy sector in Latvia can be illustrated by the structure of fuel consumption in CHPs and boiler houses where the share of natural gas is 93% and just over 53% respectively.[26] On the other hand, consumption of natural gas shrank as one of the main natural gas consumers in Latvia, metallurgical enterprise Liepājas metalurgs, retooled its smelting process switching from gas-fuelled equipment to electric-operated equipment in 2009.[27] Share of renewables for power production has not grown significantly since 2004 when RES (dominated by large hydro) were used to produce 46% of electricity adding a small increment of 2.8% to reach 48.8% in 2013[28].

Lithuania: an imposed fuel dependency

Lithuania imports 60% of its electricity and 70% of domestic production of electricity is from natural gas. The closure of the Ignalina Nuclear Power Plant (NPP) was part of the accession agreement between the EU and Lithuania and served as a precondition for accession. Closing down of the 2nd and the final reactor significantly altered Lithuanian national energy supply: share of natural gas in the balance of supply increased from 30% in 2007 to 47% in 2010.[29] Phasing out of nuclear power that supplied approximately 70% of electricity meant that 29% of primary energy sources had to be replaced with something else.[30] Natural gas served as the main agent for replacement. From one of the largest net electricity exporters among EU countries before the closure of Ignalina NPP Lithuania became one of the most energy import dependent countries in the EU with estimated 78.3%

dependence rate in 2013.[31] Nevertheless, the share of renewable energy in electricity production has grown significantly – from 3.6% in 2004 to 13.1% in 2013[32]. In addition, despite natural gas still playing the key role in district heating, use of biomass in boiler houses has become increasingly popular over the last few years.

General trends and energy efficiency

It can be foreseen that consumption of natural gas will be gradually decreasing in the Baltic States except for Lithuania, which had to find replacement for nuclear power after closing the Ignalina NPP. As Estonia uses natural gas predominantly for district heating in Tallinn and Latvia uses gas mainly to provide district heating in Riga, and there is huge potential for energy efficiency in residential buildings in both Tallinn and Riga, it can be expected that gas consumption for heating apartment buildings is going to decrease significantly over the coming years the dynamics depending on how successful the energy efficiency measures will be. Refurbishing of district heating systems will add to efficient consumption and transportation of heat further decreasing the role of natural gas. Thus investing in energy efficiency in apartment buildings and public buildings and increasing also industrial energy efficiency in energy production and transportation as well as other industrial processes will all contribute to the general trend of decreasing natural gas consumption in the Baltic States.

Liberalisation of natural gas market in the Baltic States: a range of approaches

Looking at how the Baltic States, and Latvia and Lithuania in particular, have been dealing with the challenge of high energy import dependence on one supplier of one single most important primary energy resource, it becomes quite obvious that these seemingly closely co-operative countries sharing a relatively small territory on the cost of the Baltic Sea have endeavoured completely different approaches. To put in short – Lithuania chose fast track, Estonia exercised a traditionally pragmatic policy and Latvia refused to make any significant steps to embrace the opportunities that free market can offer. German energy giant E.ON pulling out of energy sector in Finland and the Baltic States created and interesting opportunity for the three countries to move ahead with gas market liberalisation combined with government-owned companies obtaining shares in their respective gas enterprises (Eesti Gaas in Estonia, Latvijas Gāze in Latvia and Lietuvos Dujos in Lithuania).

Furthermore, debate unfolded about the future role of LNG in the region and therefore also about the Baltic States agreeing on building an LNG terminal of regional significance. Agreement was never reached despite research carried out.[33] Inability to negotiate a solution that all three countries would equally benefit from led to a situation when somebody had to make the decision if LNG supplies to the Baltic States were to be considered as a realistic alternative to pipeline gas from the Russian Federation any time soon. In this situation a logical step was made by Lithuania, the most energy dependent of the Baltic States.

Lithuania: fast track

After closure of the Ignalina NPP at the end of 2009 Lithuania had to experience some extreme changes in energy supply: from electricity exporter it turned into electricity importer. In addition, it became heavily dependent on natural gas, since natural gas technologies substituted nuclear power. In this situation decision was made to implement the EU Gas Directive and to build an LNG terminal to be able to gain as much as possible from a free natural gas market. Thus Lithuania became the first of the three Baltic States to unbundle and establish an independent TSO (Amber

Grid) and adopted transmission network rules for all market participants to follow on equal footing – in line with the requirements of the Third Energy Package in natural gas sector. Klaipeda was chosen to be the hub for gasification of LNG primarily because of two important reasons: first, it is the largest sea port in Lithuania and, second, there is natural gas pipeline connecting Klaipeda with the rest of the Lithuanian natural gas transmission system, which, in turn, is interconnected with the Latvian gas transmission system physically allowing to access and make use of Inčukalns underground gas storage facility (UGSF).

Estonia: a pragmatic approach

Owing to significant oil shale resources Estonia does not need much natural gas with district heating in the capital city Tallinn being the most strategic consumer. Thus Estonia consumes small volumes compared with Latvia and Lithuania. Furthermore, the EU's energy policy gives some credit also to indigenous fossil energy resources[34] that can provide a valuable addition to energy portfolio with the purpose of increasing and strengthening energy security. With little reliance on natural gas for energy production Estonia has followed in the footsteps of Lithuania by putting in place gas network rules and finalising unbundling of gas TSO in January 2015, with the state-owned electricity transmission system operator Elering AS buying 51.4% stake from the Finnish utility Fortum Heat and Gas OY in AS Vorguteenus Valdus, which owns 100% of the Estonian gas transmission system operator AS EG Võrguteenus.

Latvia: a cautious stagnation

Latvia, among the three Baltic States, has been the most enthusiastic in maintaining the monopoly in natural gas sector thus creating a number of issues for the liberalisation and effective functioning of the Baltic natural gas market. Both the Parliament and the Government have adopted decisions over the last year, which reflect very weak willingness to implement TEP requirements in gas sector.[35]

When privatising the national gas incumbent Latvijas Gāze the Government put itself in a slightly less favourable situation than Estonia and Lithuania: TPA theoretically works in Latvia, too. However, gas TSO AS Latvijas Gāze has done only minimum for the TPA to function: market participants can indeed access transmission and storage system, but only and exclusively on the basis of bilateral agreements between the TSO / SSO and the respective market participant. Needless to say that such a situation does not live up to the transparency and non-discrimination requirements of the Gas Directive.

Furthermore, network and storage rules have not been approved although have been drafted already for the third time since August 2014, however, have never met any acceptable standard of quality despite Latvijas Gāze being a professional gas company. Considering particular interests of Latvijas Gāze and some of its shareholders it can be presumed with high probability that the quality of the draft rules has been deliberately kept sub-standard to obstruct the process of adoption in 2015 and especially before the beginning of the season of pumping natural gas under transparent conditions into the Inčukalns UGSF.

Conclusions

The ultimate goal of gas market liberalisation is to ensure that consumers are in a position to negotiate supplies and prices. Failing to achieve a well-functioning European energy market will only increase the costs for consumers and put the European Union's competitiveness at risk[36]. It is up to the member-states to implement the requirements and ensure non-discriminatory use of strategically important natural gas infrastructure – transmission system and storage system.

Two (Estonia and Lithuania) out of three Baltic States have implemented requirements of the EU Gas Directive (2009/73/EC) by unbundling the TSOs and elaborating and adopting rules regulating access to and use of natural gas transmission system thus ensuring that the TPA principle functions effectively. Latvian decision-makers have given in to the lobby of national gas monopoly and have adopted decisions over the last year that obstruct liberalisation of natural gas market and effective functioning of the market in the understanding of the EU Gas Directive. First, the Parliament voted in March 2014 to postpone opening of the natural gas market no later than 3 April 2017 and, second, the Government voted on March 4, 2015 to unbundle no sooner than 3 April 2017 thus strengthening the position of the national gas incumbent[37]. The deliberations have been based on a particular reading of the EU Gas Directive and interpretation of the derogation under Article 49 (Emergent and isolated markets). Unlike Lithuanian and Estonian experts, Latvian policy-makers believe that the derogation in Latvia is still applicable despite the fact that Klaipeda LNG terminal started functioning in December 2014 and provides for alternative supplies of natural gas to the Baltic energy market.

Furthermore and unlike Estonian and Lithuanian TSOs, Latvian gas TSO Latvijas Gāze had not submitted draft network and storage rules of acceptable quality to the Regulator (Public Utilities Commission or PUC) by end of 2014. It did submit the necessary draft rules, but those received many comments from a number of stakeholders and had to be substantially redone, thus jeopardising approval of the rules by PUC and possibility to secure that the new rules can be used already in Spring 2015 when it comes to pumping natural gas into the Inčukalns UGSF in preparation for the next season of consumption.

Latvia remains the only country among the Baltic States that has not liberalised gas market by not having unbundled gas TSO and SSO from the supply and trade and by not having ensured that the third party access principle functions fully and effectively. The situation is contrary to the spirit and the letter of the EU Third Energy Package in gas sector. With two decision-making bodies – the Parliament and the Government – having cast their vote that does not support going ahead with full implementation of the EU Gas Directive, political will to act in line with the EU legislation has been exhausted on the national level. The situation as it is requires external consultation to be applied. The paradox is that Latvia is carrying out the functions of the Presidency of the EU Council during the first half of 2015 and has repeatedly pronounced its strong support to European Energy Union by the Prime Minister and the Minister of Economy alike. The European Energy Union is a forward-looking initiative aimed at bringing the importance of previously discussed issues to a new and unprecedented level. It is the way forward, as it says, with two out of its five dimensions setting the stage for further gas market integration very directly: energy security, solidarity and trust being the first and a fully integrated European energy market being the second one[38].

From the Latvian Government's perspective one could say that April 2017 is not a long time from March 2015 when the last decision on gas market was adopted and the time passes quickly and further details of gas market liberalisation and unbundling will have to be further elaborated anyway, so why hurry. On the other hand, the neighbouring countries of Estonia and Lithuania have done their homework and consumers in these two countries would like to enjoy the benefits of the free and integrated natural gas market. With further analysis and competence becoming available

Latvian decision-makers shall amend the respective legislation and other relevant decisions to allow integrated European gas market principles to take full effect to the benefit of consumers and other market participants. Considering that natural gas can be a fairly expensive energy resource[39] in some countries, which have to import it, a lack of competition in supply and trade has a price, and Latvia, whose legislation and regulations is the remaining obstacle to a fully functional common Baltic natural gas market, shall avoid failing to do its homework. The need to be more active in applying EU rules to energy markets was clearly highlighted by the European Commission, which carried out an investigation on the abuse by Gazprom of its dominant position in the natural gas market leading to higher gas prices in a number of EU member states[40]. As it says in the first lines of the Energy 2020 strategy – the price of failure is too high[41].

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Impact of LNG on the energy market of Estonia

Alari Purju

Executive summary

Natural gas has a relatively minor role to play in Estonia's primary energy balance. The introduction of LNG capacities will create additional possibilities of the use of natural gas and will diversify several risks arising from the single-source situation of Estonia's gas supplies. The LNG capacities are expensive however, with the economies of scale being important for keeping costs and benefits in balance. That suggests an imperative need for a very thorough analysis of different options available.

On the demand side, there are several primary energy resources competing with natural gas. Heating plants use natural gas quite extensively, but in several cases it has been substituted for by local energy sources like the wood-fuel based combined heat and power (CHP) plants. The price trends, on the one hand, and the supply security related arguments on the other hand, compound the readiness for investments needed to make consumption of a given energy source possible. Additional demand, especially for LNG, is dependent on new technical solutions in shipping and road haulage. Here, too readiness for new solutions is influenced by the existence of necessary infrastructure, the cost-benefit analysis of which reflects the hopeful willingness of consumers to adopt themselves to new technical solutions.

On the supply side, there is an important question concerning the role of Gazprom OAO in the region. Secondly, we have to deal with new sources of gas supply, other than LNG. Here, too in evidence is some overlapping of issues because Gazprom OAO could be one provider of LNG, though the main arguments concerning LNG refer to alternative sources of supply. As long as political tensions between the EU and Russia exist, the economic, but first of all political agents will treat Gazprom option with deep mistrust, which makes the increase of the share of natural gas in the energy balance of Estonia and other Baltic States unlikely. The LNG market is very limited in 2015, in comparison with natural gas in its traditional form; the wider use of LNG would probably depend on general use of natural gas as a primary source of energy. Important also is the security-of-supply argument. There is a part of consumption of natural gas which could be substituted, also in the short run, with other sources of energy. The balance, not replaceable in this way, could be covered by LNG; for that purpose, necessary infrastructure is required. The problem from the economic point of view is that overestimating the potential demand due to political risk argument will result in the overcapacity of expensive infrastructure. The increase of access to regional and European level gas networks is one important way to diversify gas supply and increase the share of natural gas in the energy balance of Estonia. That is also a cost efficient way to provide a reasonable solution to Estonia's gas supply security problems. The EU level funding and regulative support is very important to achieve that end.

Introduction

Estonia's primary energy balance is characterised by high importance of domestically produced energy. Out of 252 PJ[1], the primary energy supply (production + imports - exports) of 2013, the

[1] PJ, Peta Joul is an energy unit of 10^{15} Joules.

imports of natural gas constituted 9% and imports of LNG 0.2%. The proportion of imported gas has been decreasing during several years; in the pre-financial crisis year of 2007 that proportion was 14.5%. Oil shale provided the dominating 72.5% of primary energy supply of Estonia (Energy balance, 2013).[2] The investments into SO_2 and CO_2 emission decreasing equipment made the production of electricity from oil shale more environmentally friendly.

The intra-company pricing (with the mines belonging to the electricity and shale oil producing companies) kept the price of oil share relatively low while prices of electricity and especially those of shale oil increased substantially.[3] The oil shale is a primary energy source with low energy content (8.3-8.5 MJ/kg), being only 20-25% of the energy content of natural gas. The price dynamics of different energy sources and a general increase of oil and natural gas prices before summer 2014 made the use of low energy content sources economically attractive.[4] That created a boom of shale oil production in Estonia.

At the same time, the natural gas was found to be more expensive in Estonia in comparison with other energy resources. That was one of the reasons why the demand for natural gas decreased. Other reasons were the lower total energy demand during the years of economic crisis 2009-2010 and the looming political risks in Russia because Russia had been a single provider of natural gas to the Baltic States. Situation changed in 2014 when LNG capacities in Lithuania created additional supply channel for the other Baltic States.

The article examines the role and conditions of demand and supply for natural gas. Discussed is the wider use of LNG as an additional source of natural gas, as well as the demand and supply factors of LNG. The article also provides an overview of the governance issues related to introduction of LNG. In conclusion, the article highlights the pertinence of LNG to the energy security of Estonia.

Natural gas market, infrastructure and corporate governance

Estonia's primary energy supply was relatively stable and growing during the period 2000-2013. The only steep decline was evidenced in 2009 when the energy supply decreased by 10.8%, the Estonian GDP decreasing by 14%. The share of energy imports was 38-42% of the energy supply during the whole aforementioned period. The main imported energy sources were light fuel oil and diesel oil accounting for 30%, natural gas accounting for 23%, heavy diesel oil accounting for 18% and gasoline accounting for 15% of the energy imports in 2013. The share of natural gas was relatively stable in imports during the whole period.

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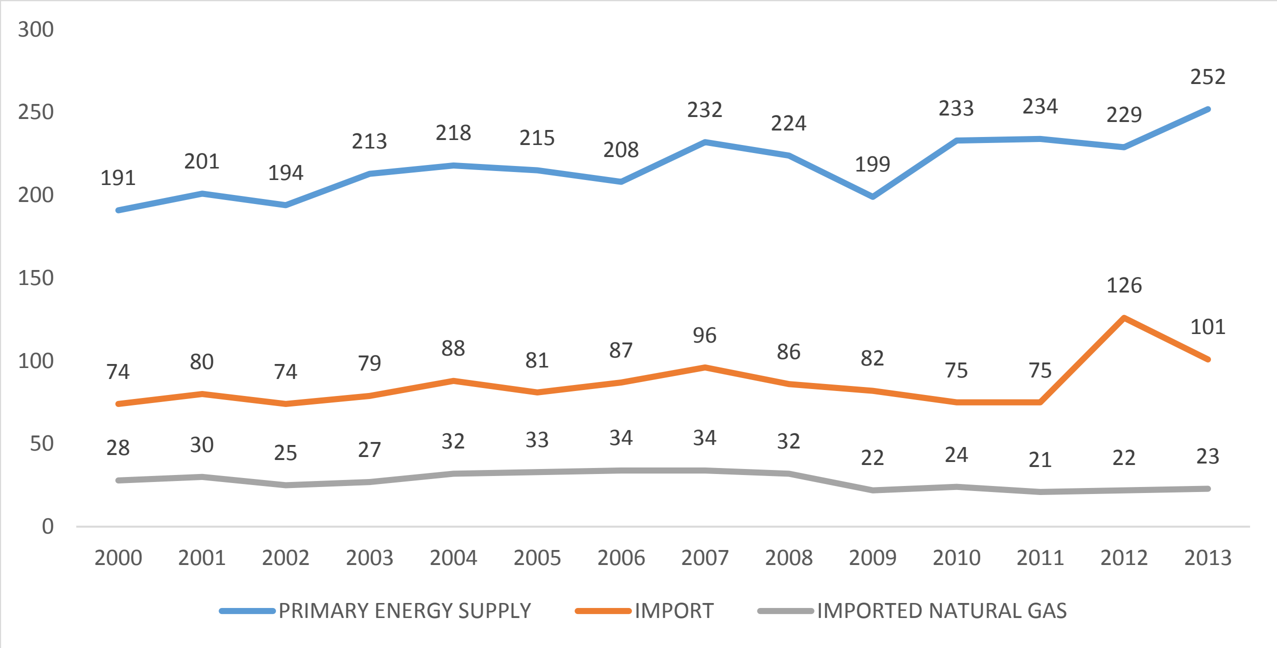
[2] Oil shale has been a major source of primary energy after the Second World War in Estonia. Its share has diminished during last years from 91% in 2000 to 72.5% of supply of primary energy, first of all due to wider use of renewable energy sources. The main use of oil shale is for production of electricity in power stations. Oil shale is used also for production of shale oil, which is a source for fuel oil. Gasification of oil shale is also used. One technology uses oil shale for production of shale oil and one side product is oil shale gas, what is burned for production of electricity. Estonia mines annually 17-18 million tonnes of oil shale (e.g. Raukas, Siirde, 2012; Siirde 2015).

3 During the period 2001-2012, the price of oil shale increased by 1.6 times in Estonia, the average price of electricity by 1.9 times, the price of heavy oil by 4.1 times, the price of oil shale by 4.5 times and natural gas by 5.4 times (Purju, 2014).

4 The shale oil production capacities were developed by the main Estonian state-owned energy company Eesti Energia AS, but also by private companies Viru Keemia Grupp AS (VKG AS) and Alexela Grupp AS, vigorously renovating old and developing new technologies in producing shale oil from oil shale.

Figure 1. Estonia's primary energy supply, imports of energy and natural gas, 2000-2013, PJ



Source: Energy Balance, 2013 (http://pub.stat.ee/px-web.2001/Dialog/Saveshow.asp KE03).

The natural gas imports to Estonia amounted to 33.7 PJ, or 678 million cubic metres, whereas in 2013 the quantity of imported LNG was 0.3 PJ or 8 million cubic metres.[5] In 2014, the volume of imported gas decreased to 530 million cubic metres (Balance of Energy Supply, 2013; Ministry of Economic Affairs and Communications, 2015).

The main users of natural gas were the heating plants with 39% and the manufacturing companies with 33% of total gas consumption in 2015 (Ministry of Economic Affairs and Communications, 2015).[6]

Up to 2014, the single source of natural gas was Russia. An important place in gas supply of all three Baltic States was held by the Inčukalns natural gas storage facility in Latvia. The facility is filled with Russian gas mainly in summer and is used to supply the local gas market mainly in winter. The LNG terminal in Klaipeda (Lithuania), launched in December 2014 introduced another source of natural gas supply for the region.

The single importer for retail sale was Eesti Gaas AS, which in 2013 possessed 89.2% of retail market. The remaining 10.8% was distributed by other operators but was bought from Eesti Gaas AS for resale. The required import permit was also held by Nitrofert AS, but said company delivered gas for manufacturing. The Baltic Energy Group and Reola Gaas AS of Alexela Group[7] started imports

[5] Industry used a small amount of LNG also before the LNG terminal in Lithuania opened in 2014.

[6] Natural gas was a relatively important source of primary energy for Estonian heating plants with 55% of the total primary energy use of these plants (Purju, 2014).

[7] Alexela Group AS is a private company with Estonian ownership in 2015, Heiti Hääl being the Chairman of the Board of the Group. Alexela Group AS is active in three areas: 1) energy, 2) metal manufacturing and 3) real estate. Alexela Energia AS is Alexela Group's holding company in the area of energy, which comprises motor fuel retailer Alexela Oil AS, oil products logistics company Alexela Logistics AS, LNG terminal developer Balti Gaas AS, fuel trade company Energia

from the Lithuanian LNG terminal in 2015 (Ministry of Economic Affairs and Communications, 2015). In March 2015, 18.1% of total imports came from Lithuania; additionally, two new companies Eesti Energia AS and Litgas UAB imported natural gas from Lithuania (Natural gas imports, 2015).

Alexela Energy AS purchased Gasum Eesti AS in September 2014 and became the single owner of the company. The new name of the company Gaasienergia AS was introduced; the company sells natural gas to retail consumers in two counties of Estonia, namely Harju and Rapla (Alexela Group, 2015).

Estonia's gas network has three outside connections: 1) Karksi-Latvia (capacity: 7 million cubic metres per day), 2) Värska-Russia (4 million cubic metres per day), and 3) Narva-Russia (3 million cubic metres per day). From May to October, Estonia gets its gas supplies directly from Russia through connections in Värska and/or Karksi. From November to April, gas is mainly supplied from gas storage facility in Inčukalns, Latvia, through gas metering stations in Karksi and Värska (Ministry of Economic Affairs and Communications, 2015). Gas infrastructure is designed to satisfy a much larger demand than the volume of natural gas distributed in the past years.[8]

The Natural Gas Act regulates the gas market in Estonia. The Act lays down the requirements for gas importing and transmitting undertakings, sellers, distributors and the role of Estonian Competition Authority that conducts market surveillance. The Estonian Competition Authority approves network service process for distribution network operators, the sales margins, imposed on sales to consumers for gas undertakings in a dominant position, guidelines and methodologies for subscription charges, standard network and sales contract terms and conditions (Ministry of Economic Affairs and Communications, 2015). The Estonian gas market opened in 2007, but the sole importer was Eesti Gaas AS up to end of 2014.

Since 2006 Eesti Gaas AS had been a Group, with subsidiaries EG Ehitus AS, dealing with maintenance of the gas systems, organising the construction of the new gas pipe systems and development of the gas network, and EG Võrguteenus AS, functioning as a system operator and provider of distribution services to consumers. In August 2013, a spinoff of a new company Gaasivõrgud AS occurred. The new company took over all business activities related to the natural gas distribution and all respective assets, contracts, rights and obligations (Eesti Gaas, 2015).

To guarantee a separate independent owner of the gas transmission network, the EG Võrguteenus AS retained the system operator functions and passed over the distribution operations to Gaasivõrgud AS. The ownership of gas supply infrastructure was also transferred to the new company. It should be mentioned that in addition to Gaasivõrgud AS there are 25 natural gas distribution network operators in Estonia, owning 650 kilometres of natural gas pipeline, which is 22% of the total pipeline network in Estonia. Gaasivõrgud AS owns approximately 1,500 kilometres of the network (Ministry of Economic Affairs and Communications, 2015).

Nord AS, shale oil manufacturer Kiviõli Keemiatööstus AS, liquefied gas company Reola Gaas AS, electricity seller Elektrimüügi AS and waste treatment company Eesti Keskkonnateenused AS (Alexela Group, 2015).

[8] The total possible transmission capacity is ca. 14 million cubic metres per day. In February 2012, gas consumption rates reached a five year high, i.e. 6.7 million cubic metres (Ministry of Economic Affairs and Communications, 2015).

The shareholding of the group Eesti Gaas AS was distributed between Fortum Heat and Gas OY, E.ON Ruhrgas International GmbH, Gazprom OAO, ITERA Latvija SIA[9] and small shareholders (first of all management of Eesti Gaas AS[10]). E.ON Ruhrgas International GmbH decided to leave the Baltic natural gas market in 2014 and in September 2014 Fortum OY purchased the shares of E.ON Ruhrgas International GmbH's shareholding of 33.66% in the Estonian natural gas imports, sales and distribution company Eesti Gaas AS and a similar share holding in the gas transmission service company Võrguteenus AS. The share capital of Eesti Gaas AS belonged, up to September 2014 to the following shareholders: Fortum Heat and Gas OY owned 51.38%, Gazprom OAO owned 37.03%, ITERA Latvija SIA 10.02% and small shareholders held 1.57% (Eesti Gaas, 2015). In the beginning of 2015, Fortum OY was on lookout for a purchaser of its part of shares, but no ownership change occurred during the first quarter of 2015.

The ownership structure of EG Võrguteenus AS was the same as for the whole Eesti Gaas AS. In January 2015, Fortum OY sold for € 21.5 million 51.38% shares of EG Võrguteenus AS to Elering AS. Elering AS made a similar offer to buy their shares to other owners of EG Võrguteenus AS (Taavi Veskimägi…, 2015)[11].[12] The aim of these transactions with shares of EG Võrguteenus AS was concentration of ownership of the system operator into hands of Elering AS, which is a state owned holding company for energy sector infrastructure.[13] Prior to closing the transaction, Elering AS received the merger approval from the Estonian Competition Authority. In addition, Estonia's Ministry of Interior Affairs confirmed Elering's compliance with the conditions required from the gas transmission system operator according to the Natural Gas Act (Elering Closed the Deal, 2015). The business name of the gas transmission system operator EG Võrguteenus AS, which is controlled by Elering, will be Elering Gaas AS, and the company will use Elering's trademark; the name change came into effect with an entry into business register on April 10, 2015 (Gas Transmission System Operator, 2015). At the same time, Fortum OY started to look for a new owner of its shareholding in Eesti Gaas AS, as was mentioned above.

Potential demand and supply of LNG

The LNG started to be an interesting additional option for energy supply as a result of wide use of the shale gas, first of all in North America. The development of the liquefaction technologies made it more widely available and changed the pricing models, which used to be based on oil prices. In the Baltic States that increased also the supply opportunities and security because Russia and its state owned company Gazprom had been the single source of gas supplies. The possibility to use

[9] ITERA Latvia SIA is a regionally affiliated company within the Baltic States of the ITERA International Group of Companies of Russia. The major business of the Group on its corporate level centres is natural gas transactions. ITERA Latvia SIA is ensuring about a quarter of the demand for natural gas supplies to Latvia. In 2013, Russian state-controlled oil company Rosneft acquired ITERA´s Group subsidiary ITERA Oil & Gas Company (Rosneft, 2013; SIA ITERA Latvia, 2015).

[10] See Andres Reimer: ärge laske Rosnefti Eestisse, 2015.

[11] The acquired shares increased Fortum's holding in both companies to 51.38%. In November 2014, Fortum OY agreed to sell its shareholding in the associated company Võrguteenus AS. Fortum OY finalised the transaction in early January of 2015 (Fortum Financials 2014, 2015, 20).

[12] The Third Gas Directive of the EU came into force in July 2009. The rationale of the Third Directive is related to ownership unbundling of dominant supply companies. The full ownership unbundling and creation of an independent transmission operator in Estonia was suggested as the preferred outcome (Pöyry, 2011).

[13] Estonia created a state owned company Elering AS in 2010 to solve a similar issue of independent operator of the main electricity grid. Natural gas transmission and system operator's functions were also planned to be handed over to Elering AS and the sale of shares of EG Võrguteenus AS to Elering AS is part of that process.

new energy sources and new opportunities to diversify natural gas supplies initiated also active debate of potential use of LNG, though the importance of natural gas in domestic energy balance has been relatively small.

Demand: variety of energy resources

Estonia's natural gas market is small and there have been doubts about potential demand of LNG. Removing the single-supplier risk has been one important reason for investments into different infrastructure projects in the area. Nevertheless, there are also other potential demand areas. The legal framework for vessel traffic has been tightening, and the sulphur emission regulation was introduced in 2015, as the most recent example.[14] The shipping companies have in principle three ways of adjustment to the new regulation: 1) purification of emission with scrubbers, 2) using better and more expensive fuel, and 3) designing the engines using LNG. The fast adjustment was the use of more expensive fuel, but introduction of the engines using LNG is another solution for longer perspective. This is the largest demand potential but it also calls for heavy investments into infrastructure and diversified supply channels. Price trends of different fuels also have their impact on developments in the area.

Several private initiatives have been related to introduction of LNG. Reola AS belonging to a private company Alexela Group AS started an LNG station in Tallinn and first test with the LNG using bus of the Poland's company Solbus on city lines started in the first quarter of 2015 in co-operation with Tallinn City Transport AS and a private company MRP City Lines AS. Before that, Reola Gaas AS examined in co-operation with Tarbus AS and MRP City Lines AS a CNG using bus of the same company Solbus S.A.[15] (LNG station, 2015).

Supply: sources, networks and governance

The political background of the issue of LNG terminal is related to EU guidelines and possible financial support. EU Parliament approved New Guidelines for Alternative Refuelling Infrastructure in April 2014 (Clean fuel infrastructure, 2014).[16] The EU guidelines created also a possibility to

[14] Shipping is regulated to a large extent by global provisions accepted within the framework of the International Maritime Organization (IMO). IMO is the United Nations specialised agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships. The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention concerning prevention of pollution of the marine environment by ships from operational or accidental causes. MARPOL (Annex VI) introduces conditions for SO_x in the Baltic Sea. The sulphur content of any fuel oil used on board ships within the Baltic Sea, which is a SO_x Emission Control Area (SECA), which was up to 2014 set at the level of 1.00% by mass (from 1 July 2010), could not exceed 0.10% by mass from 1 January 2015. Global sulphur limits (including EU countries not in the SECA) are 3.5% from 2012 and 0.5% from 2020, if feasible otherwise from 2025 (IMO, 2010).

[15] Solbus S.A. is a Polish bus manufacturer specialising in production and development of environmentally friendly city buses powered with natural gas. Solbus produces innovative buses powered with LNG. The company is a member of Natural &bio Gas Vehicle Association Europa (NGVA). Solbus S.A., its distribution partner Lider Trading S.A. and Gazprom Germania GmbH won a public tender issued by the city of Warsaw and were able to convince the municipal transport company of Warsaw of the environmental and cost benefits of using natural gas as a motor fuel (Gazprom Germania and Solbus launch LNG market in Poland, 2015; Gazprom Germania Press Release, 2015).

[16] According to the new directive, EU member states will have to build a minimum infrastructure for alternative fuels, including natural gas, in conformity with the common EU-wide standards for equipment. The member states will be obliged to provide users with information on the new refuelling stations, as well as on comparative prices for the conventional and alternative fuels. A special place in the new EU strategy on alternative transport fuels is foreseen to natural gas. Europe is planning to encourage consumption of compressed natural gas (CNG) and liquefied natural gas (LNG) as motor fuel in the private and commercial sectors and in marine transportation as well. According to the

receive support from EU Structural Funds for construction of the LNG regional terminal. That created a dispute between Estonia and Finland about the possible location of the regional terminal.

The issue was, at least in Estonia, very political. The economic and political relationships with Finland gained importance because construction of the LNG related infrastructure was treated on the EU level as a regional project and there were possible different options giving smaller or large roles to one or another partner. One option was to build a large terminal in one of the two countries and a gas pipeline between the countries. In negotiations between Estonia, Finland and the European Commission, it was evident that the two countries had to propose a joint project with an economically viable outcome, though it was evident that representatives of the countries tried to force the EU respective structures into decision making position. In the beginning of 2014, Juhan Parts, Minister of Economic Affairs and Communications of Estonia, came out with a proposal supporting construction of two LNG terminals, one in Finland, Inkoo as a possible location, and another in Estonia in South Paldiski Harbour. South Paldiski Harbour's advantage is geographical, simple access from ice-free sea, Inkoo's advantage is closeness to the much larger Finnish natural gas market.

That position was different from the terminal plus pipeline option agreed in the Government (Parts peab homme seisukohti selgitama, 2014). Parts' plan was realised in proposal presented to the European Commission and was rejected in June 2014. In August 2014, Alexela AS and Finnish Gasum OY presented to the European Commission a new proposal with ten different possible solutions (Alexela ja Gasum jõudsid enne kella kukkumist, 2014). That proposal did not receive support from the EU Commission either.

In September 2014, Juhan Parts and his party IRL (a political party called Fatherland) left the Government, replaced by Social Democratic Party. The position of Minister of Economic Affairs and Communications was divided between two ministers, one for Minister of Infrastructure and another for Minister of Foreign Trade. Ms. Urve Palo from Social Democratic Party took the office of Minister of Infrastructure and became responsible for the LNG terminal related issues. Though the Reform Party retained the leading position in a new coalition, the Parliament appointed the new Prime Minister - Taavi Rõivas. The former Prime Minister Andrus Ansip was posted to the European Commission.

Prime Minister Taavi Rõivas achieved the agreement with Finland's Prime Minister Alexander Stubb and a joint letter with communiqué was sent to Brussels. The communiqué about the common approach for developing regional gas infrastructure in Estonia and Finland proposed that the regionally dimensioned LNG terminal will be built in Finland. The Balticconnector pipeline will be constructed that connects the Baltic and Finnish gas markets to create economies of scale necessary for the effectively liberalised market functioning and it will improve security of supply. A small-scale LNG terminal can be built in Estonia to provide bunkering services and for security of supply stocks

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European Commission, currently about 1 million CNG cars (0.5% of the total fleet) drive along the roads of Europe and the industry is planning to increase the number tenfold by 2020. In compliance with the plans of European regulators, by 2020 LNG fuelling terminals are to be installed in all 139 maritime and inland ports of Europe and LNG refuelling stations to be built every 400 km along the main European roads (Clean fuel infrastructure, 2014).

and the necessary infrastructure and regulation will be introduced to grant access to the Latvian underground gas storage facility to the Baltic States and Finland (Communiqué, 2014).[17]

Active role of a Government Agency, the Ministry of Economic Affairs and Communications existed simultaneously to the initiatives of business groups. Three potential locations for LNG terminal were being considered: 1) Muuga Harbour in Tallinn, 2) Paldiski South Harbour and 3) Sillamäe Harbour in North-East Estonia. Muuga Harbour and Paldiski South Harbour belong to Tallinna Sadam AS, which is a state owned company. Sillamäe Harbour belongs to the private company Silmet Group AS.[18]

Private companies as Alexela Group AS and Vopak E.O.S. saw the LNG terminal as an option for serving cargo vessels and other transport equipment, which are serving cargo transportation. Alexela Group AS favoured construction of LNG terminal into South Paldiski Harbour (Parts peab homme seisukohti selgitama, 2014). Vopak E.O.S. supported the idea to construct a regional terminal supported by EU funding into Muuga Harbour, but considered construction of small LNG terminal for bunkering of LNG ships in Muuga Harbour also beneficial if regional terminal would be constructed somewhere else (Vopak ehitab Muugale sõltumatu terminali, 2014). Tallinna Sadam AS saw the LNG terminal as a security issue and was interested to have it in one of its ports. It was possible to see also political will of the Estonian Government. At the same time, concept of the Tallinn Sadam AS is to provide infrastructure for different business companies and not to operate particular terminals (Tallinna Sadam, 2014). Elering AS as a state owned company for energy infrastructure participated also in discussions about the possible location of the LNG terminal and was seemingly favouring terminal in Muuga Harbour.

LNG and energy security of Estonia

All facilities of natural gas infrastructure in Estonia have been built to supply natural gas only from a single supplier. Several risks are tackled in Estonia in terms of improving the security of supply – physical infrastructure risks and the regulatory gap. The systematic analysis of technical issues of security was presented in article (Leppiman, Kõrbe Kaare and Koppel, 2013).

One argument favouring additional option provided by LNG terminal is that additional supply would support country's position in political and commercial disputes on volumes, prices and other conditions of agreements regarding gas supply. The other side of the problem is that the perceived risks of a single-supplier issue have already diminished relative and absolute importance of natural

[17] There was a safeguard included into the Communiqué specifying that in case the application for grants for the regional LNG terminal has not been submitted by the end of 2016 and the responsibility lies solely with Finland or is due to Finnish deliberate activities, Estonia can construct the regional LNG terminal in Estonia. Estonia and Finland assume that, not disclosing other potential financial consideration for the Balticconnector, a TEN-E application for grant for Works will be submitted assuming co-financing from The Connecting Europe Facility (CEF). The regionally dimensioned LNG terminal project is assumed to be part of Designated European Commission President Juncker´s € 300 billion public-private investment programme to simulate growth over the next three years and receive co-financing from CEF/TEN-E to make it commercially viable and the small-scale LNG terminal Project will apply for TEN-T financing (Communique 2014). The CEF finances projects, which fill the missing links in Europe's energy, transport and digital backbone (CEF, 2014).

[18] Silmet Grupp AS is a holding company whose major shareowner and Chairman of the Board is former Prime Minister of Estonia Tiit Vähi. Silmet Group AS comprises AS Silmet, AS Sillamäe SEJ (power station), Sillamäe Port AS, Silmet Kinnisvara AS, and Ökosil AS (Silmet Group, 2015).

gas consumption in Estonia. Wood fuels have substituted some natural gas in heating plants. The increase of excise tax on natural gas, while for other fuels a similar tax was not applied, and the subsidies distributed to local sustainable resources diminished competitiveness of natural gas in comparison with other fuels.

Natural gas is, however, a relatively environmentally friendly fuel with limited emission of polluting gases and has been considered as a possible substitute to Estonia's main source of primary energy oil shale, as seen from the environmental point of view in energy forecasts (Energy Strategy for Estonia, 1997; Purju, 1999). The Pöyry Ltd analysis of Estonia's gas market considers in two scenarios out of three, the increase of natural gas consumption in Estonia (Pöyry, 2011, 8). The political risk diminished attractiveness of natural gas in the medium and long run, but recently started to be a possible immediate risk. The interesting question is what changes would the new market situation, partly due to wider use of shale gas, introduce into old discussion of advantages of different fuels?

The LNG terminal will be probably a necessary element in the formula. The Klaipeda LNG terminal in Lithuania gives some information about benefits and costs of such kind of project. The terminal consists of three major parts: a floating storage with a re-gasification unit, a jetty for mooring, and a high pressure gas pipeline connected to the main pipeline. The capacity of the terminal is 4 billion cubic metres of gas, what could satisfy most of the demand of all three Baltic States. For comparison, the discussed Estonian terminal capacity is 1.2 billion cubic metres, what is 2.5 times larger than Estonia's annual consumption now. The Lithuanian LNG terminal and a small size of Estonia's natural gas market suggest the strategic assets are network connections, which would satisfy Estonia's demand in different circumstances.[19]

In 2013, the European Commission adopted a list of 248 key energy infrastructure projects. They were selected by twelve regional groups, which were established by the new guidelines for trans-European energy infrastructure. These projects may have access to financial support from the Connecting Europe Facility (CEF), under which a € 5.85 billion budget has been allocated to trans-European energy infrastructure for the period 2014-2020 (Long term infrastructure vision.., 2013).
One way to widen the use of LNG is to apply these resources in a beneficial way for regional infrastructure projects at the same evaluating costs and benefits of different solutions, estimating properly different risks and giving reliable long-term signals to private economic agents active on the LNG market.

Conclusions

The natural gas has a relatively minor role in Estonia's primary energy balance. The introduction of LNG capacities will create additional possibilities of the use of natural gas and balance several risks related to the single-source situation of Estonia's gas supplies. At the same time, the LNG capacities

[19] According to newspaper sources, the Lithuanian Parliament adopted a law that introduces for all Lithuanian consumers an obligation to purchase at least 25% of natural gas from LNG terminal. To cover costs related to construction and operating costs of the terminal the extra fee of € 21.5 per 1000 cubic metres has been introduced. Additionally, all companies purchasing and selling LNG have obligation to purchase LNG. The fee for consumption of LNG is € 63.8 per 1000 cubic metres, which is added to the price of LNG. According to figures at end 2014, the price of imported LNG is 10% higher than the price of pipeline natural gas (Almost finished, 2014; Let there be a gas!, 2014; Veskimägi, 2014).

are expensive and the economies of scale have an important role in balancing costs and benefits. That suggests a need for a very thorough analysis of different options.

Regarding developments of the gas market in Estonia and other Baltic States, there are demand and supply side issues, which are interrelated. On demand side there are several primary energy resources competing with natural gas. Heating plants use natural gas relatively widely, but it has been, in several cases substituted by local energy sources like wood-fuel based combined heat and power (CHP) plants. The price trends on the one hand and the supply-security related arguments on the other hand compound readiness for investments needed to make consumption of a given energy source possible. Additional demand, especially for LNG, is dependent on new technical solutions in shipping and car transportation. Readiness for new solutions is influenced by the existence of necessary infrastructure, the cost-benefit analysis of which reflects the anticipated readiness of consumers to adopt themselves to new technical solutions.

On the supply side, there are two different groups of issues. One important question concerns the role of Gazprom OAO in the region and the second deals with the new sources of gas supply like LNG. In evidence is some overlapping of issues because Gazprom OAO could be one provider of LNG, though the main arguments for LNG deal with alternative sources of supply. As long as political tensions between EU and Russia exist, the economic, but first of all political agents will treat Gazprom option with deep suspicion, which makes increase of natural gas share in energy balance of Estonia and other Baltic States unlikely. The LNG market is very limited in 2015 in comparison with natural gas in traditional form and wider use of LNG would probably depend on general use of natural gas as a primary source of energy.

The security argument comes into formula in different ways. There is part of consumption of natural gas, which could be substituted, also in a short run, with other sources of energy. The part not to be substituted in this way could be covered by LNG and for that purpose, necessary infrastructure is required. The danger from the economic point of view is that overestimating potential demand due to political risk argument will result in overcapacity of expensive infrastructure.

The increase of access to regional and European level gas networks is one important way to diversify gas supply and increase the share of natural gas in energy balance of Estonia. That is also a cost efficient way to provide a reasonable solution to Estonia's gas supply security problems. The EU level funding and regulative support is very important in this development.

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The recent developments in the Lithuanian gas market

Vidmantas Jankauskas

Executive summary

Restructuring and liberalisation of the national gas monopoly in Lithuania started at the beginning of the current century with the separation of non-core activities from transmission, distribution and supply, and opening of the market for large industrial consumers. The major change was introduced when implementing the Third Energy Package (adopted in 2009) as the Government of Lithuania has decided to use the ownership unbundling approach for the natural gas vertically integrated company Lietuvos dujos. After the full unbundling of transmission from other activities, a separate gas transmission company Amber grid was established and Lietuvos dujos was left with distribution and supply functions. At the same time, all shares were bought back from the two largest owners: Gazprom and E.ON. The reform concluded with creation of a fully liberalised gas market where transmission and other activities were unbundled but both belonged to the state.

Ownership unbundling for the gas market fully dependent on one external supplier, Gazprom, was highly debated by experts and politicians. Some experts claimed that ownership unbundling would not change anything because Lithuania did not have alternative natural gas sources and nationalisation of transmission networks might raise the price of natural gas to the final consumers as main shareholders' losses will have to be compensated. The official view of the Government of Lithuania was that the implementation of model of ownership unbundling in long run should have positive effects, provided that a liquefied natural gas (LNG) terminal is built in Lithuania.

The Lithuanian Government claiming that the country due to significant gas share in the national energy balance and implementation of the stringent version of the Third Energy Package is less secure than two other Baltic States and having in mind presumably limited interests of the neighbours for construction of the regional LNG terminal has decided to build its own. The LNG import terminal was built at the port of Klaipeda during a short time period, it became functional in December 2014. The terminal's full regasification capacity of 4 billion cubic meters (bcm) could be a key game changer in the completely monopolistic gas market of three Baltic States, which in total consume 5.5 bcm of natural gas per year. Although the primary goal of the Lithuanian LNG terminal is to satisfy the national needs, the terminal will operate under the so-called 'third party access' regime, which means that the Baltic neighbours and partners will also have the possibility to use terminal's capacity for their own needs on the regulated and non-discriminatory basis.

Introduction

Natural gas is an important fuel in Lithuania, covering a significant part of energy needs in industry, electric power production and district heating, commercial sector as also in the residential heating and hot water preparation. After closure of the Ignalina Nuclear Power Plant, the main electricity producer in the country in 2009, natural gas has become the main fuel in domestic electricity production, it still remains the main fuel in district heating though due to high gas prices and increasing support for renewables its share is shrinking. On the other hand, gas fired electricity generation has not become a dominant source in electricity supplied to the domestic market as it hardly competes with the imported electricity, therefore the gas share in the power generation market did not increase and may increase if only gas prices will drop significantly. Therefore, the future natural gas consumption volumes are rather uncertain and depend on many factors, such as gas prices vis-à-vis competitive fuels' (including renewables) prices, EU emission trading policy, and so on (National Energy Independency Strategy, 2012).

Institutional structure of the Lithuanian gas sector has overcome drastic changes during the past 10-12 years. Lithuanian gas company Lietuvos dujos in 2002 was restructured separating non-core activities and privatised by selling majority its shares to the Russian Gazprom and German E.ON companies. After ten years, in 2013, the Government of Lithuania has further restructured the company by separating transmission from other activities and bought back all shares from those foreign companies. The latest restructuring was backed by the need to implement the EU Third Energy Package and its most stringent measure – ownership unbundling (OU). This topic was broadly discussed in mass media as well as in academic publications (ICIS Heren, 2010; Kanapinskas, Urmonas, 2011; Noel, Findlater, Chyong, 2012; Grigas, 2013).

This article will deal with the detailed analysis of the latest developments in the natural gas market, analysing pros and cons of this political decision (application of the most stringent measure of separation of monopolistic and competitive activities – OU) for a small Lithuanian market with only one external gas supplier.

But the most harshly discussed issue in Lithuania during the last several years was the security of energy supply. Energy supply security for any country or region involves ensuring the supply of affordable, reliable, and diverse sources of energy necessary to sustain national economic prosperity. In the Baltic States achieving this security is critical, as the existing market relationships and infrastructure are incompatible with today's requirements. Security of gas supply is a common issue for the three Baltic States – they all have only one external supplier, Russian Gazprom. This leaves the countries with the political and technical risks. Having in mind rather tense political relations between the Baltic States and Russia, security of gas supply when there are no alternatives is under serious threat. This vulnerable position of the Baltic States was discussed and analysed in many articles, studies and policy papers (Findlater, Noel, 2010; Grigas, 2011; Noel, Findlater, Chyong, 2012; Leppiman, Kaare, Koppel, 2014).

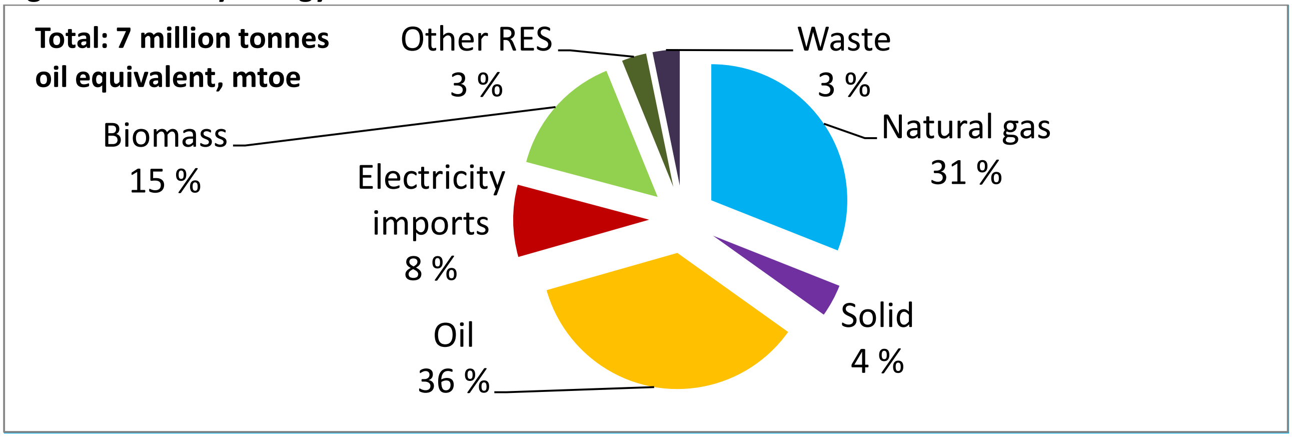
Therefore, Lithuania has decided to strive in long run to decrease gas consumption by replacing it with renewable energy sources, while ensuring gas supply alternatives in short run. The first task in ensuring security of supply was a construction of a liquefied natural gas terminal in Klaipėda with undertaking all efforts to build an underground gas storage facility and a Lithuania-Poland gas pipeline linking the country to the EU's gas pipeline networks and markets (National Energy Independency Strategy, 2012).

This article will discuss in detail the problems with the energy security and more concrete with the security of gas supply to Lithuania as also with the decisions to diversify the supply routes and sources. The main objective of the current article is to analyse the recent developments in the Lithuanian gas market, to discuss the Government decisions in liberalising the gas market and improving security of supply.

Gas demand and supply

Lithuania has almost no fossil fuel resources (except of some oil resources with an annual production of about 0.1 million tonnes oil equivalent, mtoe, only). Therefore, oil, natural gas and coal are imported. Besides oil, natural gas is most widely used in Lithuania. Natural gas share has reached about a third of the total primary energy use of Lithuania (Figure 1).

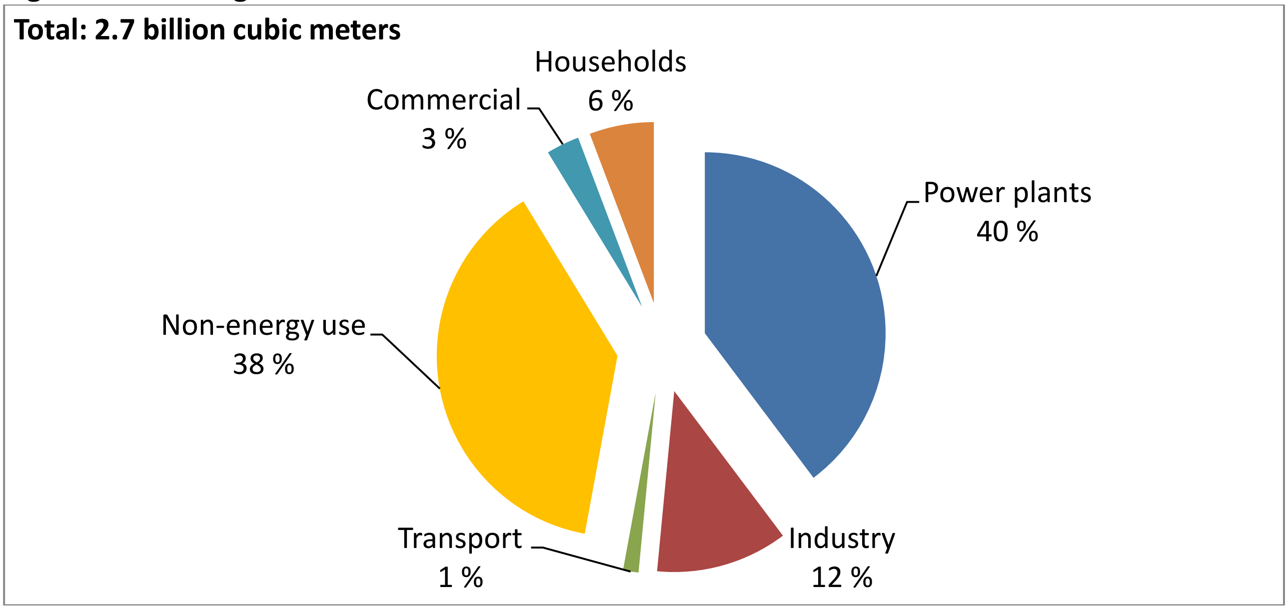
Figure 1. Primary energy mix in Lithuania in 2013



RES = Renewable energy sources
Source: Energy in Lithuania, 2013.

Natural gas as less polluting and technologically flexible fuel has gradually replaced oil products in electricity and heat generation and has become the main fuel in this sector. Natural gas consumption in power plants and district heating plants takes the largest share of its consumption in Lithuania. The second largest consumer is a huge factory Achema producing mineral fertilizers and using natural gas not only as a fuel but mainly as a raw material for the production of fertilizers. Only about a tenth of natural gas is consumed by industry, the households using gas for heating, hot water preparation and cooking are responsible for 6% of the total gas consumption only (Figure 2).

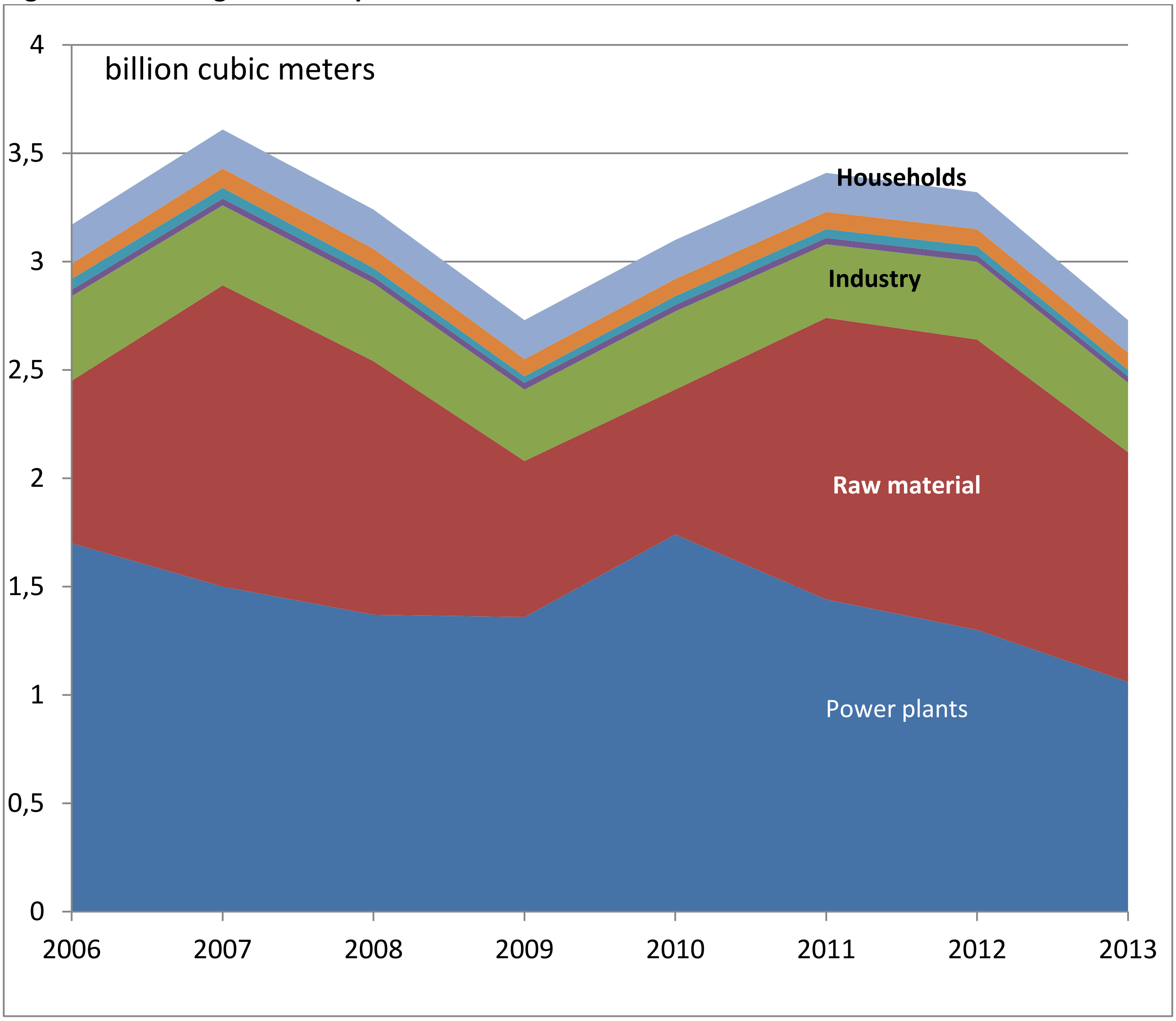
Figure 2. Natural gas use in Lithuania in 2013



Source: Energy in Lithuania, 2013.

After the closure of the Ignalina Nuclear Power Plant in 2009, the main electricity producer in the country until that, natural gas has become the main fuel in the domestic electricity production, natural gas still remains the main fuel in district heating though due to high gas prices and increasing support for renewables its share is shrinking. On the other hand, gas fired electricity generation has not become a dominant source in electricity supplied to the domestic market as it hardly competes with the imported electricity, therefore the gas share in the power generation market did not increase, except for the first year after the closure of the nuclear power plant, and may increase if only gas prices will drop significantly and electricity produced using gas becomes competitive. Decreasing share of natural gas in the power sector have been seen since 2010 and the share of gas as a raw material was fluctuating depending not on the level of gas prices but on the situation in the international mineral fertilizers market also.

Figure 3. Natural gas consumption trends



Source: Energy in Lithuania, 2007, …, 2013.

The Lithuanian gas system is interconnected with the gas systems of the neighbouring Latvia, Belarus and Russia’s Kaliningrad region (Figure 4), but there is the only one source of natural gas to Lithuania i.e. Russia. Russian gas is supplied to Lithuania by the gas pipeline from Minsk (Belarus) to Vilnius. There is another pipeline from Ivacevici (Belarus) to Lithuania, but has not been used for many years and could be hardly operational nowadays.

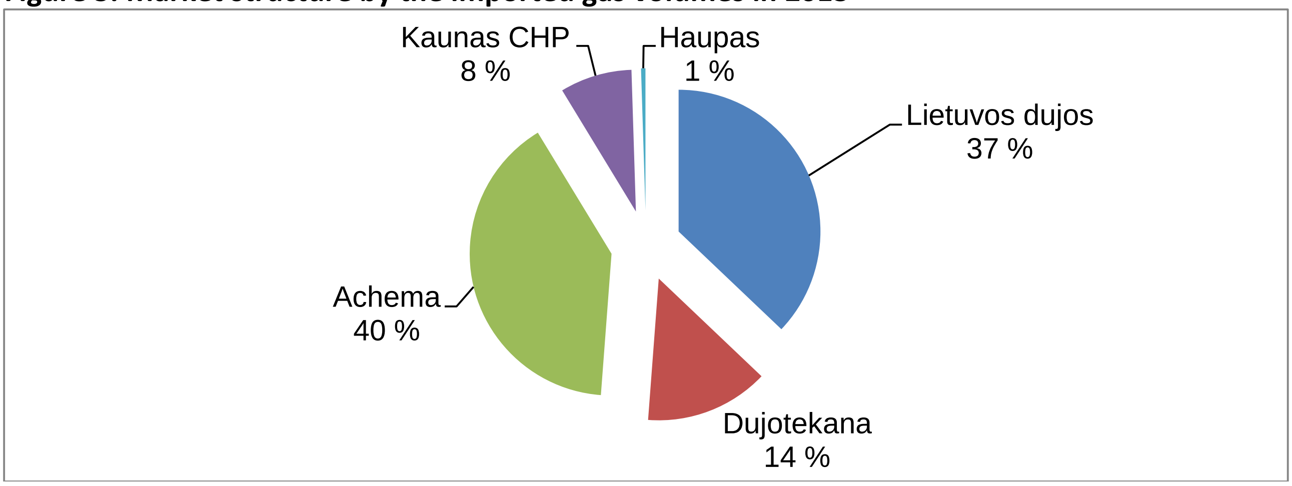
Figure 4. Natural gas transmission system

Source: Ambergrid, 2015.

Lithuania is a gas transit country as natural gas is transported from Russia through the Lithuanian gas grid to the Russian exclave – the Kaliningrad region. 2.1 billion cubic meters of gas was transported to the Kaliningrad region in 2013 (Ambergrid, 2015). Interconnection with Latvia gives an additional security of supply allowing the Lithuanians to keep some emergency gas reserves in the Latvian Incukalns underground gas storage. We will discuss the security of supply issues in the next section.

In Lithuania, there were two main gas suppliers to the final users: Lietuvos dujos and Dujotekana. The largest industrial consumer Achema had its own contract with Gazprom. Similarly, the Kaunas cogeneration plant had a direct contract with Gazprom. Lithuanian gas importers purchase natural gas under long-term gas supply contracts. Besides these, there was a very modest supplier Haupas supplying Russian natural gas to an isolated area (not connected to the main gas grid) in the South-Eastern part of Lithuania (Figure 5).

Figure 5. Market structure by the imported gas volumes in 2013



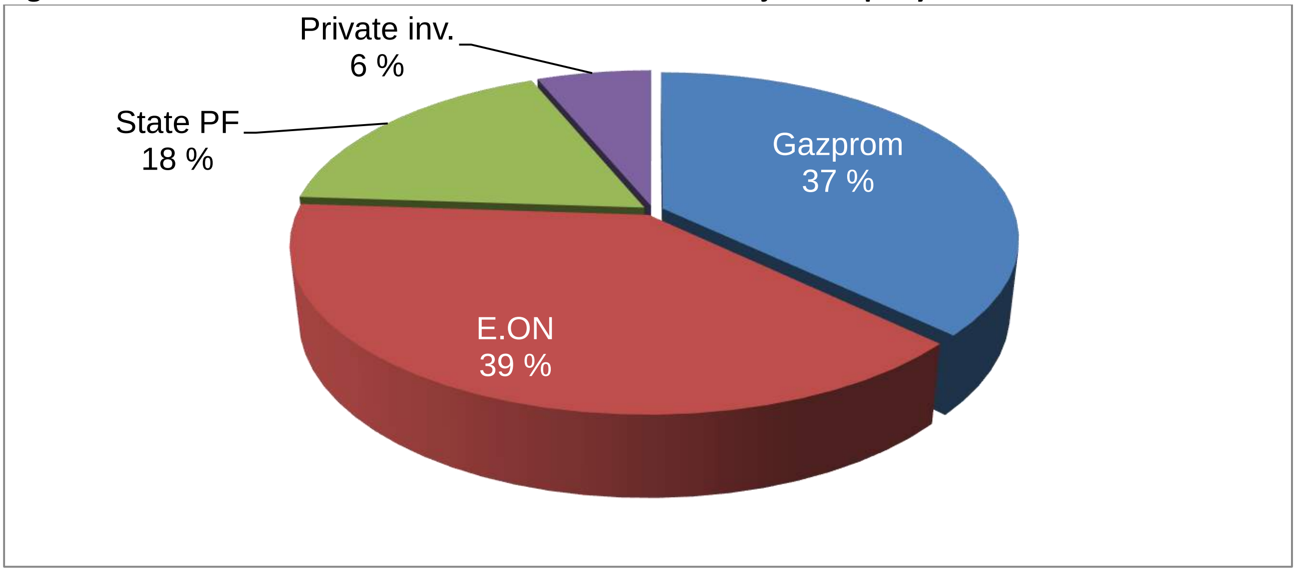
Source: National Control Commission, 2014.

Restructuring and liberalisation of the gas market

Restructuring and liberalisation of the national gas monopoly started at the beginning of the current century with the separation of non-core activities from transmission, distribution and supply, and opening of the market for large industrial consumers. The largest gas consumer – mineral fertilizers factory Achema even before the restructuring of the national gas company was legally granted the right of the third party access and was able to make a separate contract for gas imports paying the Lithuanian gas company Lietuvos dujos for the gas transportation only.

The next step taken by the Government of Lithuania was privatisation of the company called Lietuvos dujos – it was sold to the gas supplier Gazprom and strategic investor E.ON Ruhrgas. Finally, the shares of the company were distributed among the two investors and the Government of Lithuania represented by the State Property Fund (PF). In 2013 the structure of shareholders was as shown in the following graph (Figure 6).

Figure 6. Structure of the shareholders of the Lietuvos dujos company in 2013



Source: National Control Commission, 2014.

With implementation of the Second Gas Directive (Directive concerning common rules for the internal market in natural gas, 2003/55/EC), the natural gas market was formally liberalised in Lithuania, but the major changes happened with the implementation of the Third Gas Directive (Directive concerning common rules for the internal market in natural gas, 2009/73/EC), together with the Regulation 715/2009 (Regulation on conditions for access to the natural gas transmission networks).

An important requirement of the last Directive is structural separation between transmission and other activities (unbundling). The unbundling provisions of the Directive prevent owners of transmission networks from exercising control or any other relevant rights over, or cross-subsidising, energy, supply, electricity generation or gas production activities and vice versa. If the transmission system operator was a part of a vertically integrated company on March 3, 2009, unbundling, according to the Directive, can be achieved in one of the following three ways (Energy Newsletter, 2009):

1) Full ownership unbundling (OU): transmission networks cannot be owned or controlled by energy production or supply companies;
2) Independent System Operator (ISO): ownership of the transmission network remains with the vertically integrated companies, but operation of the network is transferred to a separate company, i.e. the ISO; or
3) Independent Transmission Operator (ITO): ownership and operation of the transmission networks remains with the vertically integrated companies, subject to specific ring-fencing rules to ensure independency of the ITO from the vertically integrated company.

If a transmission system operator was a separate company before the 3rd September 2009, only the first unbundling option (full ownership unbundling) is legally acceptable by the Directives.

Complete ownership unbundling of gas transmission system operators means that ownership of transmission assets must be transferred to completely independent third parties, who would exclusively operate these networks. In other words, this is about the separation of all network functions from the other activities of the vertically integrated company; any influence whatsoever of the previously integrated company on the operation of the networks is prohibited. Supply and generation companies would no longer be allowed to exercise any direct or indirect control over the independent network operators.

In general, there are two main benefits of ownership unbundling (Pollitt, 2007):
1) A decrease in the network operator's incentive to discriminate between (otherwise) affiliated and independent generators and/or retail companies; and
2) An increase in the network operator's incentive to invest in cross-border transmission capacities (the 'interconnection capacity').

Estonia, Finland and Latvia chose to ask for derogation from this Directive, and it was granted to them because these countries "*are not directly connected to the interconnected system of any other Member State and having only one main external supplier*" (Directive 2009/73/EC, 129). Lithuania which gas pipelines also are not directly connected to the gas pipelines of any other Member State (except of Latvia) and has only one external supplier did not opt for derogation.

There is one important aspect related with the derogations from the Directive in the Baltic States. An exemption from the Directive would automatically expire even if Estonia, Latvia or Finland did not choose so. It may happen in two cases: first, if Lithuania connects its natural gas system to Poland, second, if any of Baltic States builds a liquefied natural gas (LNG) terminal which covers more than 25% of the demand. Firstly, it is stated in the Directive that "*the articles concerning unbundling in the gas sector do not apply to Estonia, Latvia and/or Finland until any of those Member States are directly connected to the interconnected system of any Member State other than Estonia, Latvia, Lithuania and Finland*" (Directive 2009/73/EC, 36). As wording of the Directive shows, it is enough that **any** of these four countries connects to the interconnected system of any Member State, other than Estonia, Latvia, Lithuania and Finland, for the derogation of all three above mentioned countries to become invalid. To put this in other words, it is enough for Lithuania to build a pipeline to Poland, and, as long as the Lithuanian system is connected with Latvia and subsequently Estonia, derogation would expire for them.

Secondly, Article 49 of the EU Gas Directive 2009/73/EC stipulates that "*a supply undertaking having a market share of more than 75% shall be considered to be a main supplier*", which means that in the case an LNG terminal is built in any of those four countries which diversifies the supplies so that there is no longer a main external supplier and the market share 75% no longer applies, any derogation shall automatically expire (Directive 2009/73/EC). The various infrastructure projects that are undertaken in the Baltic States described in the next section show that implementation of any of them will affect the derogation and force the derogated Member States to implement the Directive even if they are unwilling to do so (Pakalkaite, 2013).

The Government of Lithuania has decided to use the ownership unbundling approach for the natural gas vertically integrated company Lietuvos dujos, which is privatised and owned by two international giants Gazprom and E.ON with a small part of the shares (17%) belonging to the state. The Government proposed amendments to the Natural Gas Law, the goals of the amendments were (National Control Commission, 2012):

- To ensure the sufficient level of gas supply reliability;
- Effectively unbundle the transmission activities and supply activities, ensure security of supply and solidarity in the gas sector;
- Strengthen protection of consumer rights and legitimate interests;
- Expand the functions of regulatory institutions of national energy sector, guarantee their independency, harmonise activities, and facilitate co-operation with the European energy sector‘s regulatory institutions at the regional and EU level; and
- Promote the co-operation of the EU transmission system's operators at the regional and EU level.

The proposed gas sector‘s model requires the full ownership unbundling of the gas transmission networks from production and supply. The same person cannot be a member of a board, administrative council, or any other body legally representing the undertaking carrying out any function of production or supply, or transmission system operator, or transmission system. The implementation of the Law should be supervised by the national regulatory authority, it has the right to apply fines to the Law infringing subjects (up to 10% of the company's annual turnover), and (or) to appoint an independent system operator which would carry out its functions until the infringing company complies with the requirements set by the Law.

Management of the vertically integrated company Lietuvos dujos and its shareholders Gazprom and E.ON Ruhrgas International GmbH criticised the above mentioned provisions of the Law stressing that the model of implementation of the Directive 2009/73/EC will have negative effects on a stable operation of the company, it will have a negative impact on security and reliability of the gas supply, on financial capacity of company to undertake new infrastructure projects and market development. It will lower the investors' interests and will increase administrative costs and natural gas prices. The key shareholders of Lietuvos dujos claimed that during the last five years they have invested almost € 200 million (development of new infrastructure, increase in capacity of international links, and projects' implementation according to the National Energy Strategy). Moreover, international corporate management standards and structural changes have been introduced in the company, and accounting and operational unbundling of various activities have been implemented (Open letter, 2010).

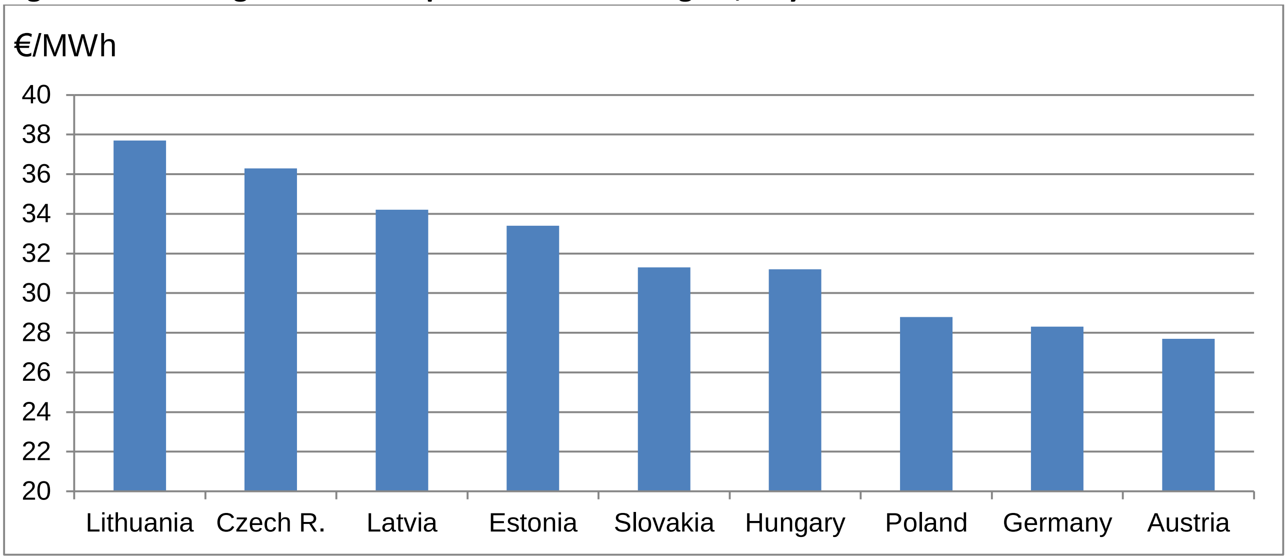
The main two shareholders of the Lietuvos dujos (LD) company, E.ON and Gazprom, owning 76% of the company's shares in their letter to the Lithuanian Government have stressed that "*Lithuania did not properly review and assess the impact of all 3 alternative solutions available under the Third EU Gas Directive plus the derogation option. Lithuania has not considered the proportionality of its policy choices, in the light of the adverse impact they may have on LD and its shareholders, nor has it consulted with affected parties. Article 49 of the Directive enables Lithuania as an isolated market to derogate from the provisions of OU as long as it is an isolated market with only one gas supplier. This solution would be an appropriate way for Lithuania to implement the Directive, and at the same time fulfil its obligations towards the shareholders of LD in view of their protected investments. Moreover, it would give LD, a still fully integrated company, enough time to prepare for later unbundling steps. An overhasty implementation of OU which deeply affects all processes and structures of LD through fully separating the transmission business from the rest of the company could cause disruption of gas supply. This derogation solution was chosen by other countries, such as Latvia and Finland*" (Open letter, 2010).

Similar view was expressed by Jonathan Stern, Director of Gas Research of the Oxford Institute for Energy Studies, who claimed that ownership unbundling will not change anything because Lithuania does not have alternative natural gas sources and nationalisation of transmission networks might raise the price of natural gas to the final consumers because main shareholders' losses will have to be compensated. Such actions of the Government, according to Stern, might raise dissatisfaction of the only current supplier Gazprom (European Gas Market, 2010).

On the other hand, the Lithuanian Ministry of Energy, proposing the changes in the gas sector legislation, claimed that the implementation of the model of ownership unbundling in long run should have positive effects, provided that an LNG terminal is built in Lithuania. It would increase the energy security of the Republic of Lithuania and would lessen the dependence on the sole supplier of natural gas. The Ministry declared, that if the ownership unbundling model is not implemented, the state could not transport the gas brought to the Klaipėda LNG terminal to consumers because it does not control the main pipelines for transmission of natural gas, thus ownership unbundling and construction of the LNG terminal are related and supplementary measures. Besides the LNG terminal and ownership unbundling, other steps for liberalising the natural gas market have to be taken, such as development of natural gas market, construction of pipeline Klaipeda-Jurbarkas (thus creating the circle of the main pipelines for natural gas transmission in Lithuania), and building natural gas network links with Poland (Kanapinskas, Urmonas, 2011).

The costs of ownership unbundling have already increased the natural gas prices to final consumers in Lithuania. First of all, the increase was caused by the Gazprom's position to reduce in 2011 gas export's prices to most of the importers in Europe, including Latvia and Estonia but not to Lithuania. The reason was the Lithuania's declaration to apply the strongest measure defined by the Third Energy Package – the ownership unbundling in the gas sector. Therefore, natural gas wholesale prices since then were the highest in the region (Figure 7).

Figure 7. Natural gas wholesale prices in the CEE region, July 2013



Source: Quarterly Report on European Gas Prices, 2013.

Even more, Gazprom has complained that unbundling requirement to leave the gas transportation business violates the terms of the 2004 privatisation deal for Lietuvos dujos. In 2012, it launched arbitration proceedings against Lithuania's plans to strip the Russian gas giant of its pipeline ownership.

In 2013, the gas transmission assets were separated from the mother company Lietuvos dujos and a new company called Amber grid was created. Amber grid acts as a transmission system operator. In order to follow requirements of the ownership unbundling as they are formulated in the Gas Directive, owners of the supplier and distributor Lietuvos dujos and the TSO Amber grid are different ministries: Ministry of Finance and Ministry of Energy. Nevertheless, due to the separation gas transmission prices since January 1, 2014 were increased by 13% and gas distribution prices were raised for different consumer groups from 20 to 30 per cent! (National Control Commission, 2014). But due to decreasing oil and oil products prices (determining the gas import price by the set formula) gas prices to the final consumers did not increase.

After the restructuring of the national gas monopoly both foreign shareholders decided to sell all their shares in LD and Amber grid and leave the country. E.ON explained its exit by its strategy to sell its assets in Eastern and Central Europe and optimise its activities when Gazprom was unhappy with the implementation of the most stringent unbundling option. The Gas Directive does not allow for the same company to take part in both: transmission and supply businesses, so Gazprom was forced to sell shares at least in one of the companies (transmission company Amber grid or supply company LD).

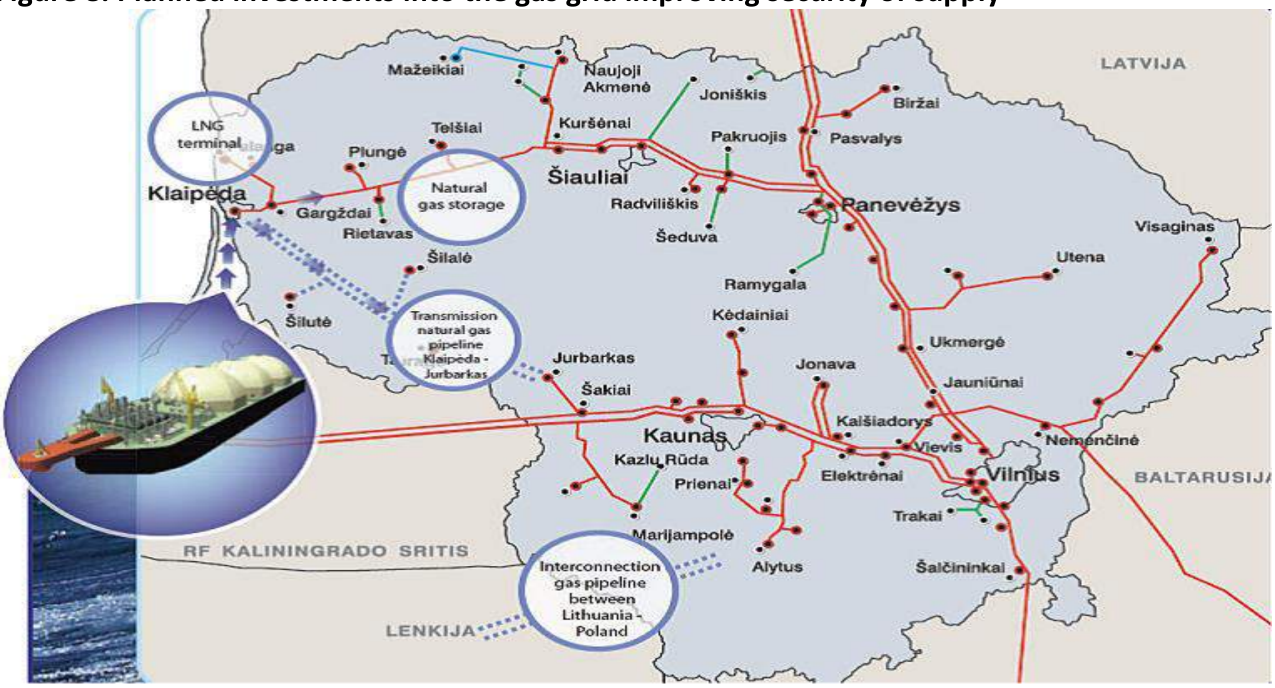
Improving security of supply

The recent developments in the energy markets have heightened concerns about the feasibility of supply security, usually defined as a continuous availability of energy at affordable prices. EU countries buy more than half of their energy from non-EU sources. Lithuania imports almost all fossil fuels, including 100% of natural gas. As all gas is imported from one source – Russia – and through one pipeline connection, it causes a possible risk of interruption of gas supply due to technical or political reasons.

As Lithuania's gas grid is used for the gas transit to the Russian Kaliningrad region, it was treated as a sort of guarantee of gas supply for Lithuania. The Kaliningrad region is a Russian exclave and it may import gas using the Lithuanian grid only, therefore it would be vulnerable for any disruptions in energy supply. But during the recent years the Kaliningrad region started implementation of some measures improving its security of supply. Currently, some small gas storage facility has been built, it may store gas covering the region's short term needs (up to one month). With the further development of this storage and/or construction of an LNG terminal there (planned by Gazprom) the Kaliningrad region becomes less vulnerable for possible disruptions of supply through Lithuania, and Lithuania becomes correspondingly more vulnerable (Grigas, 2014).

Having this in mind, the main goal of the National Energy Independency Strategy (2012) is to ensure Lithuania's energy independency before the year 2020 by strengthening country's energy security and competitiveness. According to the National Energy Independency Strategy, Lithuania in the nearest possible future will strive for alternatives in gas supply. There were very ambitious short term (until 2020) targets defined in the National Energy Independency Strategy (2012, 9): "*Lithuania will construct a Liquefied Natural Gas (henceforth – LNG) terminal in Klaipėda, undertake all efforts to build an underground gas storage facility and a Lithuania-Poland gas pipeline linking the country to the EU's gas pipeline networks and markets*" (Figure 8).

Figure 8. Planned investments into the gas grid improving security of supply



Source: National Energy Independency Strategy, 2012.

But one should remember, that implementation of those targets would require huge investments into the gas infrastructure which would significantly increase the gas transportation costs to the final users. Consequently, it may stimulate consumers to switch to other competitive fuels than gas.

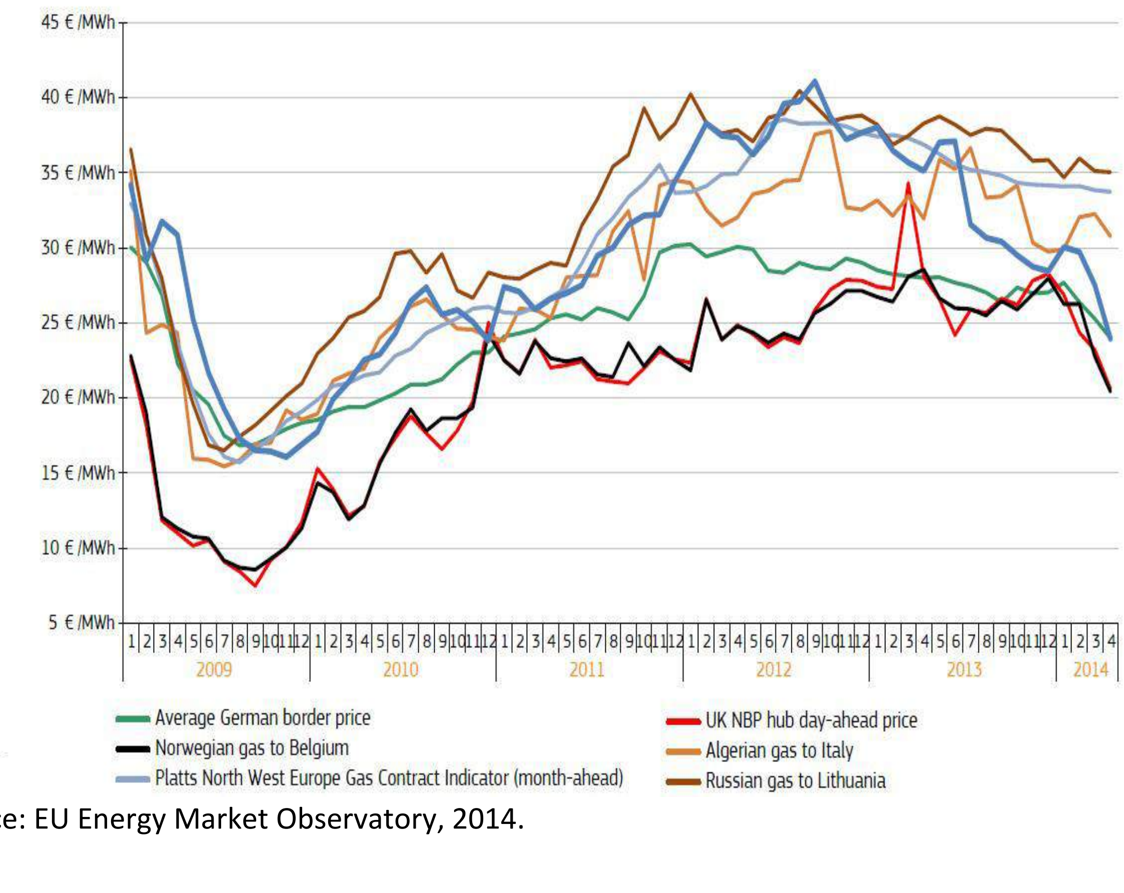
There were different options for the improved security of gas supply proposed for Lithuania and for the Baltic States as for the interconnected region. The region faces the same issue – full dependence on one external supplier, Gazprom. Among them were: 1) upgrades of the existing interconnections;

2) new interconnections between Lithuania and Poland and Estonia and Finland; and 3) a regional LNG terminal. To expand supply options and achieve security of supply, an LNG terminal of 4 bcm/year was considered – with potential for future its extension. According to the study prepared for the European Commission (Booz, 2012, 5) , "*in a base case demand this terminal will be probably utilised at 50% of its capacity and Russian contracts might be utilised at minimum quantity intake. The remaining LNG capacity could provide flexibility for peak shaving. This could help to diversify further the Baltic supply mix (ca. 60% of Russian gas, 20 % LNG, 20% gas imported from European network). A larger terminal would be almost unutilised in the base case demand*".

According to the same study, the best location for the regional terminal is Estonia as with it "*each Baltic country would have to achieve the same diversification target and equally comply with N-1 rule*" (Booz, 2012, 5).

It is clear that only one LNG terminal is feasible in the region due to limited annual gas consumption and it could be done most effectively on a least-cost basis if planned and implemented in a co-ordinated manner by the Baltic States rather than by each state individually. But Lithuania has the tensest political relations with Russia and it is reflected in the relations with the Russian gas supplier Gazprom. The apparent willingness of the Russian authorities to use energy supply and energy security as an informal tool of foreign policy is a serious threat for the security of supply. This could be illustrated by the development of natural gas import prices to Lithuania as compared to the other European countries and regions. One may see that Lithuania mostly because its strong commitment to implement the most stringent option of the Third Gas Directive – ownership unbundling – since the end of 2009 was paying the highest price for imported gas (Figure 9).

Figure 9. Development of gas import prices in selected EU countries



Source: EU Energy Market Observatory, 2014.

As Lithuania is more severely and more immediately at risk compared with either Latvia or Estonia, it would be common sense for Lithuania to take the lead in organising a common approach to the energy supply and energy security risks from the increasing single-source dependency on natural gas. But Lithuania felt less secure than two other Baltic countries and presumably limited interests of the neighbours (especially of Latvia, which feels rather safe having a huge underground gas storage in Incukalns, on the other hand, it has a legal obligation to keep the national gas company un-restructured until 2016, this was committed during the privatisation of the gas company). Therefore, not waiting for an agreement on the regional LNG terminal Lithuania decided to build its own terminal.

It is interesting to notice that a recent study by Noel, Findlater and Chyong (2012) has shown that another security of supply option - strategic gas storage in Lithuania is much more expensive than a strategic LNG terminal, for all disruption scenarios analysed in that study.

Lithuania's LNG import terminal project is based on the FSRU (Floating Storage and Regasification Unit) technology at the port of Klaipeda. The terminal was commissioned in December 2014, and during the first year of operation it may give about 1 bcm gas to the market. Later, it may increase its regasification capacity to 4 bcm and that could be a key game changer in the completely monopolistic gas market of three Baltic States, which in total consumes 5.5 bcm of natural gas per year. Although the primary goal of the Lithuanian LNG terminal is to satisfy the national needs, the terminal will operate under the so-called 'third party access' regime, which means that the Baltic neighbours and partners will also have the possibility to use terminal's capacity for their own needs on the regulated and non-discriminatory basis.

Floating Storage and Regasification Unit (170,000 cubic meter volume with regasification equipment) was contracted on the 2nd of March 2012 from the Norwegian company Höegh LNG, signing 10-year lease agreement with the purchase option. The ten-year-lease cost is $ 689 million. The FSRU type was chosen since it is more competitive than the onshore terminal (LNG Terminal Business Plan, 2013 February):

- 50% lower capital investment;
- 2 year-shorter period of the project implementation; and
- more flexible technology (FSRU can be moved to another location).

Construction cost of the terminal (not including the vessel) according to various estimates is about € 200 million.

The Klaipeda LNG terminal was advocated by the Lithuanian politicians mostly as not a measure to enhance security of supply, but as a guarantee for lower gas prices. This was based on very high Gazprom's import prices and low LNG prices at the National Balancing Point (NBP) terminal in the United Kingdom in 2012. When Lithuania re-negotiated with Gazprom a 20%-discount for the Gazprom's import price and even a compensation for the overpriced gas in 2013 and the beginning of 2014, the Gazprom's import prices have become significantly lower than those of imported through the Klaipeda terminal under the contract with Statoil. The gas import prices in the contract with Statoil are based on the NBP prices and do not necessarily follow the oil fluctuations as the Gazprom's gas import prices. Some experts relate Gazprom's discount with the construction of the Klaipeda LNG terminal: it has strengthened Lithuania's bargaining position vis-à-vis Gazprom for long-term contracts (Grigas, 2014).

In order to support effective operation of the Klaipeda LNG terminal, Lithuania has already adopted main legislative acts which will allow to effectively ensure diversification of gas supply, including regulation which ensures that not less than 0.54 bcm of natural gas (around 20% of the total annual gas consumption) must be supplied annually via LNG terminal for a period of 5 years (this is a minimal volume needed for operation of the terminal). These volumes of natural gas should be purchased by the electricity and district heat producers, consequently, Lithuanian electricity and district heat consumers are paying for the improved security of supply. A special 'security of supply component' at 2.73 €/MWh was set by the National Control Commission. Component of the security of supply for the LNG terminal is the minimum to cover the necessary operational costs, including the lease cost and depreciation

Lithuania still hopes that the Klaipeda LNG terminal may become a regional terminal. Operating on a full load this terminal is capable to fulfil 75% of the whole gas market of Baltic States (LNG terminal business plan, 2013):

- The largest gas consumption is in Lithuania – up to 61% of the whole gas market in the Baltic States;
- Klaipeda is a non-freezing port, operating all year round, which is different from other ports in the Baltic States;
- Underground gas storage in Incukalns (Latvia) could serve as a balancing point; and
- Working pressure of the gas pipeline in Lithuania is higher than in Latvia and Estonia, which is an advantage to supply gas to neighbouring countries.

Among other projects in improving security of gas supply, the most important is interconnection between Poland and Lithuania. The gas interconnector Poland – Lithuania (GIPL) is a 562 km pipeline with a capacity of 2.3 bcm per year (expandable to 4.5 bcm per year) connecting Warsaw (Poland) to Vilnius (Lithuania): its estimated cost is € 537 million (costs are intended for 2.3 bcm capacity and do not include additional CAPEX to implement reverse flow). The infrastructure aims to diversify the gas supply sources and routes, therefore increasing competition. It would also improve gas security in Lithuania, integrate the Baltic States in the western European gas system and therefore provide them an access to the global LNG market. 73% of the investment would be based in Poland. It is expected that the Lithuanian–Polish gas interconnection will be built between 2018 and 2020. Among the priorities in the investment of EU funds in the EU financial framework for 2014–2020 it is foreseen the projects included in the Baltic Energy Markets Interconnection Plan (BEMIP) will be financed; thus it is expected that EU funds will be contributed during the implementation of the Lithuanian–Polish gas interconnection (GIPL).

With the growing demand for the security of the gas supply, the construction of an underground storage facility has also become a priority for Lithuania. In light of this, Lithuania is carrying out preparatory works to carry this out. In July 2010, a consortium of Lithuanian and international companies began an evaluation of the feasibility of a potential site for the underground gas storage facility in Syderiai, located in the Western part of Lithuania. However, the capacity of the Syderiai structure has not been finally defined. The new storage facility would also reduce the loading of the gas pipeline system and contribute to the formation of both national and regional gas markets. In addition, the gas reserve would help Lithuania to avoid seasonal fluctuations: the gas purchased in summer could be used in winter when the demand is greater due to the heating season (Ministry of Energy, 2015).

Conclusions

1) After the closure of the Ignalina Nuclear Power Plant in 2009, the main electricity producer in the country until that, natural gas has become the main fuel in the domestic electricity generation market. But the gas fired electricity generation has not become a dominant source in electricity supplied to the domestic market as it hardly competes with the imported electricity. The gas share in the power generation market is decreasing with increasing share of electricity and heat produced using renewable energy sources. Even with the significant drop in natural gas prices the gas fired electricity is not competitive.

2) Lithuanian gas company Lietuvos dujos was a vertically integrated monopoly responsible for gas imports, transmission, distribution and supply until the Government of Lithuania started implementation of the Third Energy Package. By implementing the Third Energy Package (adopted in 2009), the Government of Lithuania has decided to use the ownership unbundling approach for the natural gas vertically integrated company Lietuvos dujos, which was earlier privatised and owned by two international giants Gazprom and E.ON, with a small part of the shares (17%) belonging to the state. After the full unbundling a separate company Amber grid for the gas transmission was established, and Lietuvos dujos was left with distribution and supply functions. At the same time, all shares were bought back by the state from the two largest owners: Gazprom and E.ON. The reform concluded with the creation of a fully liberalised gas market where transmission and other activities (distribution and supply) were unbundled but both belong to the state.

3) International and local experts highly debated the ownership unbundling option for the gas market fully dependent on one external supplier, as it was in Lithuania. Some experts claimed that ownership unbundling would not change anything because Lithuania did not have alternative natural gas sources and nationalisation of transmission networks might raise the price of natural gas to the final consumers because main shareholders' losses will have to be compensated. Nevertheless, the Government of Lithuania was convinced that the implementation of the ownership unbundling model in long run should have positive effects, provided that a liquefied natural gas terminal is built in Lithuania, and initiated the process of unbundling.

4) As Lithuania is fully dependant on one external supplier, Russia, and imports all gas through one pipeline connection, it causes a possible risk of interruption of gas supply due to technical or political reasons. Having this in mind, the main goal of the National Energy Independency Strategy (2012) is to ensure Lithuania's energy independency before the year 2020 by strengthening country's energy security and competitiveness. Among the different gas security improvement options (underground gas storage, interconnection of the Polish and Lithuanian gas systems, construction of an LNG terminal), the best option proposed by international experts was a regional (one for all three Baltic States plus Finland) liquefied gas import terminal.

5) Lithuania felt less secure than two other Baltic countries and due to presumably limited interests of the neighbours decided to build an LNG terminal in Klaipeda, not waiting for an agreement on construction of a regional LNG terminal. The LNG import terminal was commissioned in December 2014. Its full regasification capacity of 4 bcm could be a key game changer in the completely monopolistic gas market of three Baltic States, which in total consumes 5.5 bcm of natural gas per year. Although the primary goal of the Lithuanian LNG terminal is to satisfy national needs, the terminal operates under the so-called third party access regime, which means that the Baltic

neighbours and partners will also have the possibility to use terminal's capacity for their own needs on the regulated and non-discriminatory basis.

6) Additional cost of operation of the Klaipeda LNG terminal was included into the gas transmission tariff as a separate security of supply component, it should be paid by all consumers. This is a significant burden to the consumers which could be reduced if the terminal was utilised as a regional one.

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LNG icebreaker named Independence

Klaipedos Nafta

To have an alternative source of gas supply once seemed to be an unreachable goal for a Baltic State, totally-dependent on Russian gas imports, but it took less than four years from the first step till the commissioning of the unique LNG terminal in Lithuania with ambitious future plans.

Europe has currently 23 liquefied natural gas (LNG) terminals and the majority of them are onshore terminals. All of these LNG terminals have been carried out to diversify the gas supply.

The Lithuanian LNG terminal, based on floating storage and regasification unit (FSRU), opened a new page in regional gas supply history on the 1st of January 2015 – a successful commercial start of the first LNG terminal in the Baltic States, located at the port of Klaipeda, became a flagman of energy security. The terminal is now seen as a gateway to a new market of LNG, which is a clean fuel and it can be used in heating, the marine sector and onshore transportation in the whole Baltic Sea region. This regional makeover can be called nothing less than energy independence.

'Fast-track' project management

The LNG terminal in Klaipeda was implemented in time and its cost turned to be lower than planned. State-controlled joint stock company Klaipedos Nafta, the implementer of the construction project and the operator of the terminal, is just starting the development of the terminal's activities and is planning to offer a wide range of LNG services for the Baltic Sea region in the near future.

At the beginning of the project implementation, the Lithuanian Government adopted a resolution, according to which Lithuania had to complete the implementation of the Regulation of the European Union concerning the ensuring of the security of gas supply and to diversify gas supply sources of the country not later than by the 3rd December 2014. By the aforementioned date, the LNG terminal needed to be operational. With enormous effort, Klaipedos Nafta hand-in-hand with the Lithuanian Government and some other organisations achieved the ambitious goal with a tight schedule.

Probably, the most important day in Lithuania's energy history was the 27th of October 2014, when the FSRU symbolically named Independence entered the Klaipeda port and moored to a jetty. Despite the fact that the management of a project required extreme attention to details in order to be ready for the timely start-up of the terminal, the goal set-up by the State was achieved on time.

One of the most crucial decisions was to choose a technology, i.e. the implementer needed to choose whether to build a terminal onshore or to have a floating technology. Klaipedos Nafta in co-operation with the help of international and local consultants came up with an optimal decision. The company decided to build the FSRU with a capacity of 170,000 cubic meters. The capacity nearly corresponds to the total annual gas demand of Lithuania, Latvia and Estonia, which is around 4 billion cubic meters (bcm) of natural gas per year. Therefore, the terminal was foreseen as a regional unit since the beginning of its existence.

The physical implementation of the project, i.e. the construction of the FSRU, the jetty and the pipeline, took altogether around two and half years. There were indications of misbelieve that the project will not be finished on time, but Lithuania has proven to be able to make strategic decisions and implement significant energy projects for the entire region.

Open for global access

The LNG terminal is important not only to the energy security of Lithuania but also to other Baltic States as well. If necessary, the Klaipeda LNG terminal can meet up to 90 percent of the entire annual gas demand of Lithuania, Latvia and Estonia. There is no doubt, that the Lithuanian LNG terminal can have a huge impact on all three Baltic States, but there are also some drawbacks, such as gas market liberalisation in Latvia, that is expected to take place in 2017.

Experts suggest that the rudiments of an LNG market currently exist. For example, several Estonian companies already buy gas from Lithuania through the LNG terminal. In reality, however, the gas from the LNG terminal in Klaipeda will finally be available for unobstructed use when Latvia will simplify third-party access to its networks. The Lithuanian LNG terminal has allowed the third-party access since the very beginning of its operation.

Before the LNG terminal in Klaipeda was established, Lithuania and other Baltic States purchased gas from a single gas supplier, i.e. Russia’s gas export monopoly Gazprom. The LNG terminal allows the purchase of gas from different suppliers and it is open for the worldwide market. The terminal not only guarantees energy independence of the Baltic States, but also evaluates the importance of the European Union. In May 2014, the European Commission included the Klaipeda LNG terminal in the first issue of the European Union's security of supply.

Well before the completion and commissioning of the terminal, Klaipedos Nafta started market consultations regarding the terminal usage. Terminal rules and regulation have been arranged on the basis of the third party access in order to make the terminal open for all global users. Therefore, Lithuania has chosen a designated gas supplier state-controlled company Litgas, which entered into the first agreement with Norwegian company Statoil for supplying at least 0.540 bcm (540 million cubic meters) of natural gas annually, necessary for the uninterrupted activity of the Klaipeda LNG terminal at any time.

If necessary, Lithuania has an opportunity to purchase gas from other suppliers since Litgas has 16 non-binding agreements with other gas suppliers. For instance, Litgas has concluded a non-binding agreement with Delfin LNG from the United States. Moreover, Litgas will receive its first LNG fuel from the Houston-based Chenier Energy company in the beginning of 2016. Furthermore, Cheniere Energy Inc's Sabine Pass, the first LNG export terminal in North America, is expected to send its first LNG shipment by late 2015. Lithuania considers the US LNG market as a major breakthrough to reduce natural gas prices in the Baltic States.

‘Sailing’ to wide waters

The Lithuanian LNG terminal is ready for a gas revolution since its infrastructure is very flexible and the terminal has a major potential. The terminal consists of three main parts: (1) FSRU; (2) a special embankment in the middle of the Curonian Lagoon, required for mooring the ship; and (3) a high pressure gas pipeline connected to the main pipeline, a part of which lies under the water. Therefore, the Lithuanian LNG terminal has a very flexible technology in comparison with an onshore terminal.

The FSRU is chartered for 10 years from Norwegian company Höegh LNG with an option to buy the FSRU at a market price after the end of the lease period.

By implementing this project, Lithuania has created an alternative for Russian gas imports for the first time in its history and the country has opened a gate to a new market at the same time.

Discussions with market participants have opened up a new perspective of the LNG usage and a picture of regional scale activities. By removing the physical isolation of the Baltic States, Lithuania is already open for another services, such as LNG reloading from FSRU to smaller LNG carriers (already operational since January 2015) and it will be open for LNG transportation service – further downstream into the region (Poland and the Baltics States).

Since the beginning of the project implementation, Klaipedos Nafta has received interest for the provision of LNG reloading into LNG trailers and LNG rail-cars in the port of Klaipeda. It is planned that by the end of 2016 the company will have an onshore LNG reloading station and will start activities, such as regasify LNG in remote industrial complexes, regasify and compress or use as LNG fuel for trucks and buses and bunker ships in Klaipeda, Ventspils (Latvia) or other Baltic Sea ports.

Klaipedos Nafta has already realised the possibilities of small scale activities and in co-operation with French Sofregaz it has conducted a study and is working on building a small onshore terminal, which could reload LNG into tankers and trucks. The capacity of this 'little brother', or more specifically the ground terminal, will be between 5,000 to 10,000 cubic meters of LNG storage. It is likely that the construction of this terminal will start in 2015.

Ready for sprint

As of 1st January 2015, the LNG terminal has successfully started commercial operations providing LNG regasification and reloading services. In addition, Klaipedos Nafta intends to construct an onshore small-scale LNG reloading station.

Germany-based Bomin Linde LNG, a globally-known LNG supplier, intends to become a user of the Klaipeda LNG terminal and it intends to book regulated LNG reloading capacities in order to use the facility as the regional break-bulking hub for the Baltic Sea. Both the companies have also agreed to explore jointly the possibilities of developing a bunkering vessel. Such a vessel could provide LNG bunkering services in the region and feed the LNG reloading station in Klaipeda, in Bomin Linde's LNG bunkering terminals (incl. the planned terminal in Hamburg) and in other bunkering terminals of the Baltic Sea. Therefore, it is clear that within the successful start of LNG terminal operations LNG market leaders are starting to work on new LNG business cases in the Baltic Sea.

Furthermore, Klaipedos Nafta has entered into co-operation with JSC AGA, an industrial leader in trading gas in Lithuania. JSC AGA and Klaipedos Nafta have already signed a memorandum of understanding in order to develop jointly the LNG infrastructure. Therefore, the achievement of the LNG terminal project is a guarantee not only for the energy independence of Lithuania, but also for the development of gas business in the country as a whole.

In summary, it can be emphasised that Klaipedos Nafta's main goals now are to maintain successful LNG terminal operations and to work on introducing new activities at the same time. Market participants believe that the LNG terminal in Klaipeda is a geographically-convenient place from which LNG can be supplied to other smaller-making points in the Baltic Sea. The LNG market is growing and it will be moving forward actively in the near future, for this reason the development of the first LNG terminal in the Klaipeda port is inevitable and prosperous.

Klaipeda LNG terminal and FSRU Independence

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