



Epilogue

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As the editor of this book, I have taken it upon myself to pick out some of the observations found in the articles. I want to emphasise, however, that the research results highlighted in this chapter do not necessarily represent the views of all the contributors of this book. Secondly, it is good to underline that all the significant observations of the book cannot be presented here. Thirdly, the collection of observations presented in the epilogue is in an extremely condensed form without source references, which is why the reader should read those chapters which discuss the said matters more broadly and in more detail.

Natural gas production and consumption: the Baltic Sea presents a selection of countries that are very interesting as to the production and consumption of natural gas. First of all, the easternmost country in the Baltic Sea region, Russia, is the world's second largest producer of natural gas after the United States. This naturally means that Russia is the largest gas producer in Europe. Secondly, Europe's second largest natural gas producer, Norway, is also found within the Baltic Sea region. Thirdly, the EU's only net exporter of natural gas, Denmark, is situated in the region.

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Fourthly, the EU's largest natural gas consumer, Germany, is among the coastal states of the Baltic Sea. Germany consumes nearly 100 billion cubic metres of natural gas each year, i.e. a quarter of all natural gas consumed in the EU. Although Germany does produce natural gas, its own gas production covers only five percent of its consumption. Poland, on the other hand, is able to cover one-fifth of its gas consumption with its own production. The Baltic States, Finland and Sweden are the only countries in the Baltic Sea region, which do not produce natural gas. On the other hand, neither do they consume much of it. In 2019, the five countries listed above consumed only a total of seven billion cubic metres of natural gas.

In this millennium, the consumption of natural gas has increased by approximately ten percent in the Baltic Sea region, excluding natural gas exporters Denmark, Norway and Russia. When Germany shuts down its nuclear power plants in 2022, its natural gas consumption will increase further. If Germany chooses to use only natural gas to fill the energy gap left by closing the nuclear power plants, it should consume nearly 20 billion cubic metres more than it does today. Among the Baltic Sea region countries, Germany is an exception, because most of the other countries in the region will continue to decrease their natural gas consumption.

Examining the future development of the region's natural gas production, we see that Russian natural gas production is prognosed to increase by 10–25 percent in the next 15 years. While Russia increases its gas production, the situation is reversed in the other natural gas producing countries of the region. Their gas production has already started to decline. The decrease in Norway's natural gas production has a significant impact not only on the Baltic Sea region, but also the entire European Union.

The significance of natural gas: currently, 23 percent of the EU's primary energy consumption is satisfied with natural gas. In the ten coastal states of the Baltic Sea region, the share of natural gas of the primary energy consumption is 20 percent, i.e. slightly smaller than the EU average. However, there are considerable differences between the Baltic Sea countries. Natural gas is most important to Russia, where more than half of its primary energy consumption is met with natural gas. Sweden represents the other extreme; only a couple of percent of the country's total consumption is satisfied with gas. In addition to Sweden, the share of natural gas of the country's primary energy consumption is under ten percent also in Estonia, Finland and Norway, of which the

last-mentioned focuses on exporting the natural gas it produces. In other words, Norway does not use large amounts of natural gas, the country exports its gas. Norway primarily uses hydroelectric power to cover its domestic energy needs. In Denmark and Poland, slightly less than one-fifth of the primary energy consumption consists of natural gas, whereas in Germany the share of gas is one-fourth. Of the Baltic Sea countries, which import natural gas, Latvia and Lithuania are the ones most dependent on it. Natural gas covers more than 30 percent of the primary energy consumption of these two Baltic States.

Natural gas infrastructure: numerous natural gas pipelines have been built from both Norway and Russia to the European Union. Several underwater natural gas pipelines go from the Norwegian gas fields to Germany, the Netherlands and Great Britain. Correspondingly, gas pipelines from Russia to the European Union go through Belarus, Ukraine and under the Baltic Sea and the Black Sea.

Even before December 2019, when the United States imposed sanctions on Nord Stream 2, this pipeline has attracted a lot of media attention. Nord Stream 2 has eclipsed Balticconnector between Estonia and Finland, which started operation at the same time as the United States imposed its first sanctions on Nord Stream 2. The completion of Balticconnector connected the EU's two northern energy islands, the Baltic States and Finland. However, connecting these two islands isolated from the EU pipeline network does not solve the whole problem. Terminating their isolation requires the interconnection of Polish and Lithuanian gas networks, i.e. building the GIPL gas pipeline. Only when GIPL is completed are the Baltic States and Finland connected to the pan-European natural gas network. Fortunately, more than 60 percent of the GIPL pipeline is built when this is being written. The pipeline is expected to start its operations in 2022. In addition to the pipeline between Lithuania and Poland, a new gas pipeline, Baltic Pipe, is being built from Norway to Poland; it will be completed in the next few years.

In addition to the above gas pipelines, we must remember that several Baltic Sea region countries have underground gas storages, which enhance the security of energy supply of the entire Baltic Sea region. Besides gas storages, LNG import terminals have been built. In the past decade, Finland and Sweden have built on their shores a handful of small-scale LNG receiving ports, whereas Lithuania, Poland and Russia (the Kaliningrad region) have established LNG import terminals that are significant to their energy supply. Apart from these LNG import ports, the region's

natural gas exporters Norway and Russia also have LNG sending ports. Although Denmark is a net exporter of natural gas, it focuses on deliveries through pipelines.

Despite the global LNG boom, of the Baltic Sea countries importing natural gas, Estonia, Latvia and Germany have not yet built any LNG import terminals on their soil. Germany does plan to build a few LNG ports of import, but the total capacity of these ports will be marginal considering Germany's total natural gas imports. In practice this means that Germany's dependence on pipeline gas supply continues in the future. It is also possible that none of the German LNG ports currently being planned become reality if Nord Stream 2 starts operating and annually more than 50 billion cubic metres of affordable Russian natural gas starts flowing into Germany and elsewhere in the European Union and even Great Britain. If Nord Stream 2 can stop the German LNG plans, the EU's Green Deal may do the same to Estonian and Latvian LNG terminal plans.

One of the central findings of this book is that the security of energy supply of the Baltic Sea region requires that the Baltic Sea countries build more natural gas import infrastructure than they need for their daily use. Furthermore, the gas import sources must be sufficiently well diversified so that no single supplier's share is so large that the importing countries are not able to replace it with other suppliers or with other alternative sources of energy.

LNG imports: seven countries in the Baltic Sea region import natural gas, and five of them, namely Estonia, Finland, Sweden, Lithuania and Poland, imported LNG. In other words, of the region's countries dependent on the gas imports, Germany and Latvia did not import any LNG.¹

Even if Estonia, Finland and Sweden do import liquefied natural gas, LNG does not have a strategic role in their energy supply, because LNG forms less than ten percent of the natural gas imports of Estonia and Finland. Although LNG forms nearly 30 percent of Sweden's natural gas imports, LNG is not a strategic fuel for Sweden, because natural gas covers only a couple of percent of Sweden's primary energy consumption.

Lithuania and Poland have a different situation. LNG forms nearly 60 percent of Lithuanian natural gas imports, and over 30 percent of the

¹ To be precise, also Latvia imported a small amount of LNG in 2019, but the share of LNG was only 0.2 percent of its total imports of natural gas.

country's energy consumption relies on natural gas. Although the share of LNG is only 20 percent of Poland's natural gas imports, it is good to note that, by volume, Poland's LNG imports are the largest in the Baltic Sea region. In fact, Poland imported in 2019 more than twice as much as Lithuania, which is the second largest LNG importer in the Baltic Sea region.

In proportion to the overall import of natural gas, the Baltic Sea region's overall LNG imports are less than the average of the European Union. In 2020, a quarter of the EU's overall natural gas import consisted of LNG. In the EU countries of the Baltic Sea region, the average was 15 percent. The average would drop to below five percent if it was weighted by the amount of consumption, because Germany, the region's largest natural gas importer, does not import any LNG.

In 2019, two-thirds of Poland's LNG came from Qatar. The US share was approximately a quarter. In turn, Norway was Lithuania's largest LNG supplier with a share of over 70 percent. Lithuania's second largest LNG supplier Russia covered one-fifth. The US share was five percent. Sweden's largest LNG supplier was Norway, and Russia was Finland's leading supplier with an 80-percent share. The significant share of Russia in the LNG imports of many Baltic Sea region countries underlines the fact that LNG imports do not automatically lessen the dependence on natural gas imports from Russia. Here, it is good to remember that in 2020, Russia was the EU's third largest LNG supplier after the United States and Qatar. Russia's position is unlikely to weaken in Europe because Russia has extremely ambitious plans to increase its LNG exports. Namely, by 2035, Russia intends to be at least the second largest LNG exporter in the world. At the moment, Russia is on the fourth place after Qatar, Australia and the United States in the globe.

The Baltic Sea region's dependence on Russian energy imports: nearly half of the EU's gas imports came from Russia in 2020. Due to both geographic and historic reasons, the EU countries in the Baltic Sea region are on the average more dependent on natural gas import from Russia than is the rest of the EU. In the Baltic Sea region, only Denmark, Lithuania, Norway and Sweden have lower dependence on natural gas imports from Russia than the EU average.

If Nord Stream 2 is completed, Germany's dependence on Russian natural gas increases further from the current level of over 50 percent. Dependence of Lithuania and Poland on Russia has decreased thanks to their LNG terminals. Once the expansion of Świnoujście is completed,

and the Gdańsk LNG terminal and Baltic Pipe are operational, Poland could in theory terminate all its natural gas imports from Russia. On the other hand, Estonia, Finland and Latvia continue to remain highly dependent on Russia natural gas, unless at least one more large-scale LNG import terminal is built in the Baltic States or Finland.

The decision to locate a new large-scale terminal in Latvia is supported by the country's large underground natural gas storage in Inčukalns. On the other hand, locating the terminal in Estonia is supported by earlier EU expert assessments that Paldiski in Estonia would be the best location for the common LNG terminal of the three Baltic States. Correspondingly, locating the terminal in southern Finland is justified, because it would increase the security of energy supply of the north-eastern corner of the European Union. From Finland, natural gas could be delivered through Balticconnector to Estonia and to the rest of the Baltic States. However, the EU's Green Deal may prevent or considerably reduce European Union's financing of new LNG terminal plans and therefore the Green Deal may mean a black future for these LNG terminal plans.

Although dependence of the Baltic States and Finland on Russia remains high also in the future, we must remember that the Inčukalns natural gas storage in Latvia is able to meet the natural gas needs of all Baltic States and Finland for an entire winter season. It is also good to remember that the nominal capacity of Lithuania's LNG terminal corresponds to more than a half of the total annual gas consumption of the Baltic States and Finland. It means that, in an emergency situation, Lithuania's LNG terminal is able to meet the winter-time gas needs of all the Baltic States and Finland. Thirdly, the security of energy supply of the Baltic States and Finland improves considerably when the GIPL gas pipeline between Poland and Lithuania is completed, finally ending the isolation of the Baltic States and Finland from the EU gas pipe network.

Even though connecting the gas networks of the Baltic Sea region countries enhances the region's security of energy supply, dependence on Russian gas supplies does not decrease until gas import sources are diversified as well. However, it is futile to expect a significant geographic diversification of natural gas imports in the near future, because the EU's largest natural gas producer the Netherlands is forced to stop regular production in the European Union's largest natural gas field in Groningen due to tremors, further decreasing the EU's indigenous gas production. Both closing the gas field in Groningen and Germany's nuclear power

plants in 2022 are likely to increase further the already excessive share of Russia in the EU's natural gas imports.

Although this book focuses on natural gas, we must not forget that along with natural gas, Russia is also a strategic supplier of other energy forms to the European Union. Russia's share of the Union's coal imports is approximately 40 percent, of crude oil imports 30 percent and of uranium imports 20 percent. Lessening the EU's dependence on Russian energy will only be successful if the Union increases its LNG imports considerably and succeeds in implementing the ambitious Green Deal. In 2020, the EU's LNG imports, excluding Russia, was around less than 70 bcm, i.e. approximately 17 percent of the EU's overall gas consumption. The non-Russian LNG supplies should exceed 100 bcm, thus covering at least a quarter of the EU's gas demand.

It is necessary to decrease the dependence on Russian energy because Russia is ever further from the democratic principles and has started to practice aggressive foreign policy (the Russo-Georgian War in 2008 and the Ukraine War in 2014 onwards). Hopefully, Russia's operation mode changes before Russia drifts too far from the point, in which restoring the co-operation between Russia and the West is still possible. However, it is possible that Russia's distancing from the West continues until Russia realises that the West offers it a more stable and more reliable foundation for co-operation and future development than China.

The role of Norway: in 2020, with a share of 24 percent, Norway was the second most important natural gas supplier to the EU after Russia. Most of Norwegian gas deliveries are transported through pipelines to the UK, Germany, the Netherlands to be further distributed through a pipeline network to other EU countries. LNG exports cover only a few percent of Norway's total gas exports to the European Union, and this is not going to change in the future.

Norway's natural gas deliveries are not shadowed by a risk of geopolitical game as it is the case with Russia. Although there is no geopolitical risk in Norway's energy deliveries, the risk linked with Norway is in its limited natural gas reserves. Norway's proved natural gas reserves are less than five percent of those in Russia. Although theoretically, Norway will be able to maintain the current volume of natural gas production until the 2050s, it is more than likely that Norway's natural gas production will decrease significantly already within the next decade.

While Norway is concerned about the decrease in the EU's gas consumption, i.e. the disappearance of its main client due to the Green

Deal, the fears in the EU are that Norway's natural gas deliveries decline too rapidly. In my opinion, both fears will turn out to be unjustified. I believe that the European Union will consume enough natural gas to meet Norway's export needs for several decades to come, and when Norway's gas deliveries begin to end, the European Union is ready to move to the era of renewable energy and hydrogen.

The role of the United States: in 2020, the United States was the EU's largest LNG supplier. The United States delivered to the European Union 19 billion cubic metres of natural gas, covering some six percent of the EU's total natural gas imports. Although the EU brings much more natural gas from Russia and Norway than from the United States, there is no reason to underestimate the US role because its production and export potential is enormous. Moreover, one should carefully follow the LNG export terminal development in the East Coast of Canada. North American natural gas is a welcome addition to the European Union because it pushes down the price of Russian natural gas while enhancing the EU's security of energy supply. American LNG is an important addition also to the Baltic Sea region countries even though the US share of the natural gas imports of Baltic Sea countries is still at this point marginal.

It is possible that the golden era of North American LNG in Europe and the Baltic Sea region is still to come if the Americans and Canadians manage to lower their LNG production costs and compete with Russian pipe gas. To be sure, the future role of North American LNG is overshadowed by the EU's Green Deal. In this context, we must not forget the environmental policy decisions of individual EU countries. Take the Irish Government, for example, which recently decided not to grant building permits to two LNG import terminals for reasons of environmental protection. Ireland's decision demonstrated that it considers North American gas fracking environmentally harmful and did not want to support production methods that destroy the environment because most likely the Irish LNG terminals would have obtained most of their LNG from the United States. On the other hand, the LNG imports of Ireland's neighbour Great Britain show that geographic location would not have automatically made Ireland too dependent on American liquefied natural gas. Here, it is good to remember that the share of the United States was 15 percent of British LNG imports in 2019.

Because US gas fracking is considered generally harmful to the environment and US Nord Stream 2 sanctions show that, like Russia, also the

United States plays geopolitics with natural gas, it is more than understandable that the writers of this book have strongly differing views on the future role of American LNG in Europe and the Baltic Sea region. However, the writers may agree that the US LNG exports to the European Union are more about protecting European NATO countries from Russian energy leverage than mere business because LNG formed less than one percent of the total US commodity exports to the European Union in 2019.

Poland's role as a gas hub: the expansion of Poland's LNG terminal in Świnoujście, building the LNG terminal in Gdańsk and Baltic Pipe will diversify Poland's natural gas imports. It is very likely that, once these projects are completed, Russia no longer is Poland's largest supplier of natural gas. In order to avoid the Poland gas hub hype, we must remember that with the 50-percent capacity utilisation, Poland's two LNG terminals will increase Poland's LNG imports to approximately six billion cubic metres and the annual capacity of Baltic Pipe will be about ten billion cubic metres. Combining this with the fact that Poland consumes approximately 20 billion cubic metres and produces four billion cubic metres of the gas it consumes, we see that the aforementioned infrastructure projects are sufficient only to cover Poland's own needs if it intends to abandon Russian natural gas altogether. In other words, Poland's Świnoujście and Gdańsk LNG terminals and Baltic Pipe are not enough to make Poland a regional gas hub if it intends to completely stop importing Russian natural gas. However, it is hard to see that the Polish Government would completely abandon the Russian gas imports because it would be economically irrational and unjustified even from the point of view of Poland's security of energy supply once the aforementioned LNG import terminals and Baltic Pipe are operational.

The transit roles of Ukraine and Belarus: before the completion of Nord Stream and TurkStream, Russian natural gas was delivered to Western Europe solely through Ukraine and Belarus. Before the first Nord Stream started to operate approximately ten years ago, 80 percent of Russian natural gas was transported through Ukraine to the EU and the remainder went via Belarus. This all changed radically when the first pipeline pair of Nord Stream became operational. The change in Russian gas export logistics is shown by the fact that in 2020, only 30 percent of Russian pipe gas reached the European Union through Ukraine. With 40 percent, the first Nord Stream pipe became the main transport channel of Russian gas to the European Union in 2020.

When Nord Stream 2 pipeline is completed, the geopolitical position of Ukraine and Belarus will change further because then, Russia needs these countries to a very limited extent for natural gas transit, unless there is a significant increase in the EU's gas imports from Russia. Since there is not yet enough evidence of the latter, it is possible that the significance of Ukraine and Belarus as transit countries lessens radically, possibly resulting in Russia's hardening foreign policy towards Ukraine and Belarus once Nord Stream 2 has been completed. In fact, the geopolitical position of Belarus weakened already after the completion of the FSRU in the Kaliningrad region in January 2019, as Russia may already at this point stop natural gas transit through Belarus and Poland to Germany without relevant impediment to the energy supply of the Kaliningrad region.

It is not easy to forecast the future consumption of natural gas in the European Union, but several experts estimate that the Union's natural gas consumption will remain fairly even until 2030. After that, natural gas consumption begins to decrease. What the EU's natural gas consumption will be in 2050 depends largely on how common the other gaseous fuels, such as biogas, biomethane and hydrogen, will become. I believe that the Baltic Sea region, perhaps excluding Russia, will not essentially differ from the general development in the European Union.

Although the EU's Green Deal and the hydrogen revolution linked with it make predicting the future exceptionally difficult, it is clear that we all should be interested in future energy solutions at least for three reasons: (1) thanks to the Green Deal, the change in the structure of the EU's energy consumption will be revolutionary in the next few decades, (2) in the Baltic Sea region we find Europe's two largest natural gas exporters, Norway and Russia, and the EU's largest energy consumer, Germany, and finally (3) we should all be concerned about the future because we will have to spend the rest of our lives there, as an American industrialist Charles F. Kettering humorously uttered already nearly a century ago.