Analyzing the Geopolitics of Natural Gas with the Global Gas Model: Subsidized LNG Exports from the U.S. to Eastern Europe

By Fabian Stähr and Reinhard Madlener

In the course of the crisis in Ukraine, most leading politicians in the Eastern European countries, such as Poland, the Baltic States and Ukraine itself, identified the high dependency on natural gas imports from Russia as a threat to the security of the energy supply. Following the U.S. "shale gas revolution" and the substantial resource estimates for Polish shale gas, hopes began to rise of reducing the energy import dependency through the extraction of domestic gas resources.

However, several important factors are now dimming any hopes of copying the U.S. shale gas revolution in Eastern Europe. First, international companies, such as Shell, ExxonMobil, or Chevron, have withdrawn from Poland and Ukraine due to poor exploration results. Additionally, because of more restrictive environmental legislation and higher population density, the obstacles (including public acceptance) to commercial shale gas production within Europe are, compared with those in the U.S., very high.

In Eastern Europe, the importance of natural gas in the energy mix varies from country to country. Figure 1 shows the primary energy consumption mix of Poland, Ukraine, the Baltic States (Lithuania, Latvia, and Estonia), and Germany for comparison. The natural gas consumption values are based on EIA (2015). In Poland, similarly to Estonia, natural gas plays only a minor role due to the overarching importance of coal, accounting for more than half of the domestic energy consumption, whereas the share of natural gas was only 12.8% of the current energy mix (or 18 bcm in absolute values) in 2012. In Ukraine, natural gas represents the main energy source (in 2012, demand summed up to about 52 bcm); some 40% of the primary energy consumption comes from natural gas, which is mainly used as a heating fuel in private households and for electricity generation. In Lithuania and Latvia, the share of natural gas in the primary energy mix is about one third, with 2012 consumption levels of 3.3 bcm in Lithuania and 1.5 bcm in Latvia. Furthermore, it is conspicuous that almost no coal is used and that the category "other" represents one third of the energy mix. This is partly due to the heavy use of firewood for heating, which is still a very common phenomenon in Latvia and Lithuania. In Estonia, in contrast, the share of coal accounted for almost two thirds of primary energy consumption, at a natural gas consumption level of 0.6 bcm (or a share of only 11.1%) in 2012.

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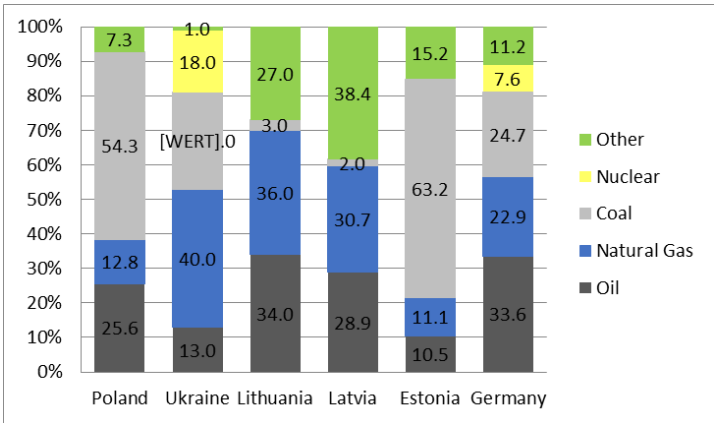

Figure 1. Primary energy consumption by energy resource in Poland, Ukraine, Lithuania, Latvia, Estonia and Germany as of 2012, in % (Data source: IEA, 2013a).

In our study, we use the Global Gas Model (GGM) (Egging, 2013) to simulate possible future patterns of the Eastern European gas supply. Two reference scenarios are contrasted with U.S. LNG subsidy scenarios: in the Base Case Scenario, the GGM is calibrated to the New Policies Scenario of the World Energy Outlook 2013 (IEA, 2013b), whereas the so-called Disruption Scenario is based on assumptions made in Richter and Holz (2015), presuming the total disruption of the natural gas trade from Russia to Europe, which would cause major repercussions on the natural gas supply to Eastern Europe. A geopolitically motivated LNG subsidy on transportation costs granted by the U.S. government to U.S. LNG supplied to Eastern Europe is imposed that ranges from 5-100%. The results obtained are discussed with a particular focus on natural gas supply diversification. In parallel, we also conduct some scenario analysis of possible shale gas production in Eastern Europe. We find that Poland and the Baltic States, by ramping up annual domestic shale gas production to 8 billion cubic meters (bcm) (Poland) and 2 bcm (Baltic States), would be able to reduce their import dependency by about 40%. Conversely, this means that failure to produce shale gas domestically would lead to continued high dependency on

natural gas imports. In Ukraine, at annual gas consumption levels of up to 60 bcm, the potential shale gas production of 5 bcm per year would not have any major consequences. In our Base Case Scenario, U.S. LNG exports barely reach the Eastern European gas market. Only during the projected period between 2035 and 2040 does Poland receive some 4.9 bcm of U.S. LNG. However, the Polish natural gas market turns out to be very sensitive to the subsidies provided: A 30% subsidy on transportation costs increases the total amount of U.S.-exported LNG to Poland by up to 8 bcm. In contrast, the Ukrainian and Baltic natural gas markets barely react to LNG subsidies from the U.S. A minimum subsidy level of 60% is needed to export U.S. natural gas under economically rational conditions to both regions. The modeling results show that, in order to meet the increasing natural gas demand, the interest in LNG-based imports rises in light of the low probability of a significant shale gas production in Eastern Europe. Due to the rising demand for natural gas, the Polish market shows the highest sensitivity to LNG subsidies from the U.S.

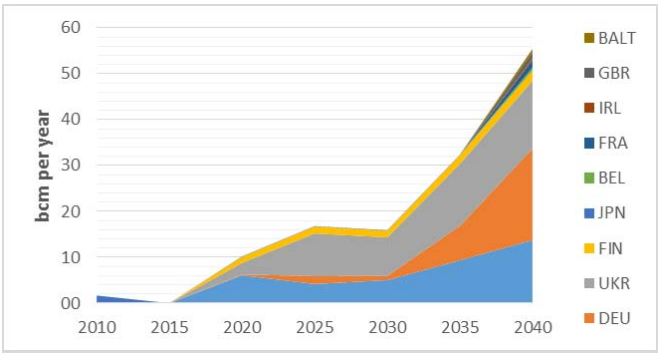

Figure 2. Global U.S. natural gas exports, 2010-2040, including a transportation subsidy rate of 100% to Poland, Ukraine, and the Baltic States.

Additionally, the model results demonstrate a possible problem concerning politically motivated subsidies on natural gas exports. As Figure 2 shows, in the 100% Subsidy Scenario, natural gas is also exported to Germany (20 bcm in 2040). This is not the case in the Base Case Scenario. Hence, subsidized natural gas exports to Poland are resold to Germany. This happens due to Germany's higher willingness-to-pay compared to other gas imports to Poland, the latter country then optimizing its own profits and satisfying its domestic demand from other sources.

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