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Energy from Russia and the alternatives

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Russia is Europe's most important energy supplier by far. In particular, imports of gas from Russia cannot be replaced in the short term. A suspension of supplies would impact different European countries and business sectors to varying degrees. Economic and political costs would vary, depending on which areas have to manage without gas – gas-fired power stations (for electricity generation), industry, or private households (for heat generation).

In the long term, there are options available to diversify the supply of gas to Europe. The most realistic alternative is to import natural gas liquids (liquefied natural gas – LNG). Furthermore, raising energy efficiency and expanding the use of renewable energies reduces the demand for gas.

With regard to Russian oil supplies, alternative international sources would probably be available more quickly.

Russia is Europe and Germany's most important energy supplier (see figure 1) and, this being the case, no short-term substitute is available. Compared with other regions of the world, the European Union is poor in fossil fuels, especially oil and gas. As a result, the EU has a high level of energy dependency; in 2012 it stood at 53 %.[1] Energy dependency in Germany is even higher (61 %).[2] Each year Germany spends over EUR 1,100 per capita on fossil fuel imports – with most of it by far going on oil and gas.[3]

No precedent exists for Russia suspending supplies or for a European embargo on imports of Russian oil and gas. Russia's economy is highly dependent on revenues from its energy exports:[4]

(i) In total, energy supplies constitute 70 % of Russian exports, and amount to roughly. USD 372 billion (2012). This represents approx. 18 % of Russia's GDP.[5]

(ii) If energy exports are excluded, the trade balance is in deficit, and stands at 7 %[6] of GDP. This is significantly beyond the usual international threshold, and provides an early indicator of crises ahead for the balance of payments and for the currency.

(iii) Russia has invested heavily in the European energy infrastructure (e. g. some EUR 8 billion in the Nord Stream Pipeline under the Baltic Sea, plus a further planned investment of around EUR 20 billion in the South Stream Pipeline across the Balkans).

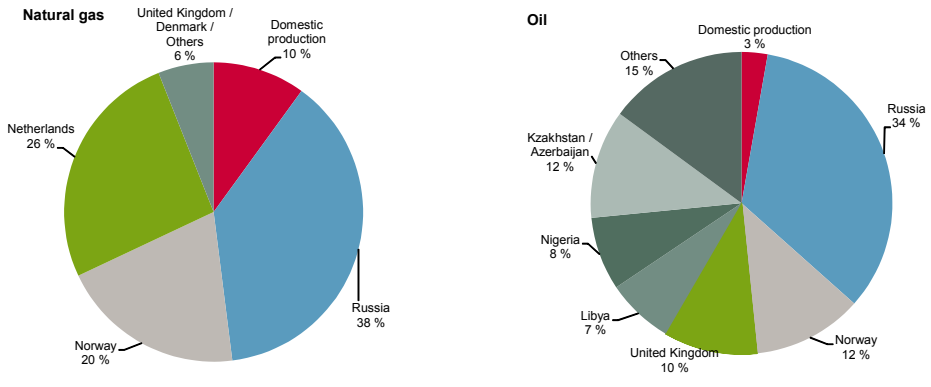
(iv) Some 30 % of Russian public revenue comes *directly* from the sale of oil and gas. The financing this provides is needed for state social benefits and subsidies, which amount to some 60 % of government spending.[7]

The political stability of Ukraine is equally important for the security of Europe's energy supplies. In 2013, roughly half the Russian gas supplied to Europe transited through Ukraine – although a proportion of gas supplies could be diverted via the Nord Stream Pipeline.[8] In the past this has been a means of applying pressure in political and economic disputes between Kiev and Moscow. Of course, this behaviour was always directed against Moscow; but it was also at Europe's expense. However, at that time Ukraine's dependency on international economic and financial aid was significantly lower than it is today.

Oil easier to replace than gas

There are several reasons why it would be easier for Europe to contend with Russian oil wells drying up than with gas supplies being suspended. The oil market is a global market. As a result, the price of oil in different regions of the world varies far less than the price of gas, and shortage situations are reflected differently on the oil market (with its two reference prices, Brent and WTI), than on the various gas markets. Furthermore:

Figure 1: German oil and gas supplies in 2013 (by percentage)



Source: AG Energiebilanzen

(i) Russia has a somewhat smaller share of European oil imports than it has of European gas imports. The number of countries supplying Europe – and hence the number of potential substitutes – is higher in the case of oil imports. Furthermore, producer regions outside Europe, such as Africa and the Middle East, play a much more significant role for Europe in oil than in natural gas.

(ii) There is a functioning, liquid spot market for oil, where oil is traded on a short-term basis.[9]

(iii) Oil can also be transported – by ship or rail – more easily then gas. Only 20 % of European oil imports arrive through pipelines.

(iv) The most important oil pipeline between Russia and Europe has already been closed several times in the past, with no impact on our energy supply or on the oil price.

Against this backdrop, it seems easier (long-term supply contracts aside) to make alternative procurement arrangements for oil than for gas. Moreover, the USA in particular has substantial strategic reserves of oil. Washington has deployed these in the past, most recently in March 2014 (in the – admittedly small – amount of 5 million barrels).

European natural gas production is declining

Russia provides a fifth of Europe's **gas supply** – roughly the same as the UK, the Netherlands and Norway. The problems are:

(i) European gas production is falling rapidly – down by about a third since 2002 (figure 2).[10] However, production cannot be increased arbitrarily in the short term.

ii) Even at full utilization, pipeline capacities – especially from Norway to Western Europe, but also from Western to Eastern Europe – are not adequate to completely replace Russian supplies.

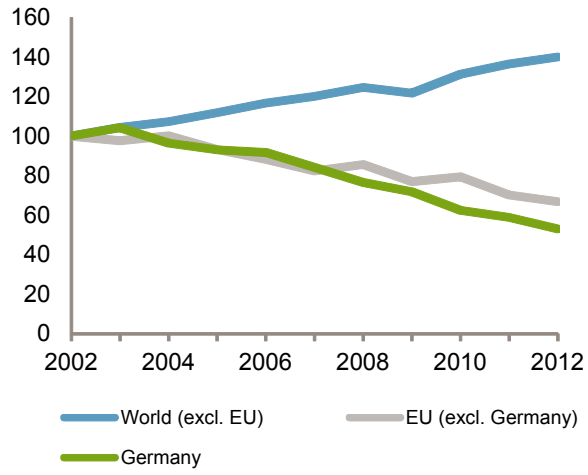
East-West variation in gas dependency

Over the same period (i. e. since 2002), **demand for gas** in Europe (which constitutes 13 % of global gas demand) has remained constant. In 2013 it amounted to roughly 460 billion cubic metres.[11] Germany, the UK and Italy are by far the largest customers for gas. With a share of roughly 17 % each, their total consumption adds up to 50 % of European gas demand.

However, it is in Eastern Europe that Russian gas has the greatest economic significance. Finland and the Baltic States cover almost 100 % of their natural gas supply requirements by importing from Russia; and in the Czech Republic, Slovakia and Bulgaria, this figure is still above 80 %. If supplies were suspended for a lengthy period, shortages would gradually spread from East to West.

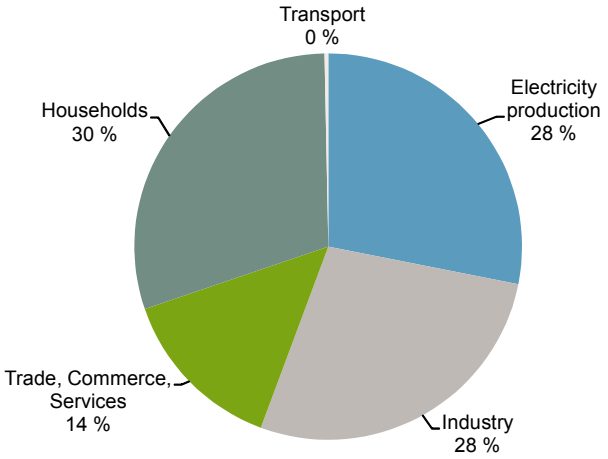
Import demand is set to remain high. According to the International Energy Agency (IEA), European demand for imported gas will climb by almost 20 % by 2035 (compared with approx. 50 % in the rest of the world).

Figure 2: Natural gas production (2002=100)



Source: BP Statistical Review, authors' own calculations.

Figure 3: German natural gas demand structure in 2012 (by percentage)



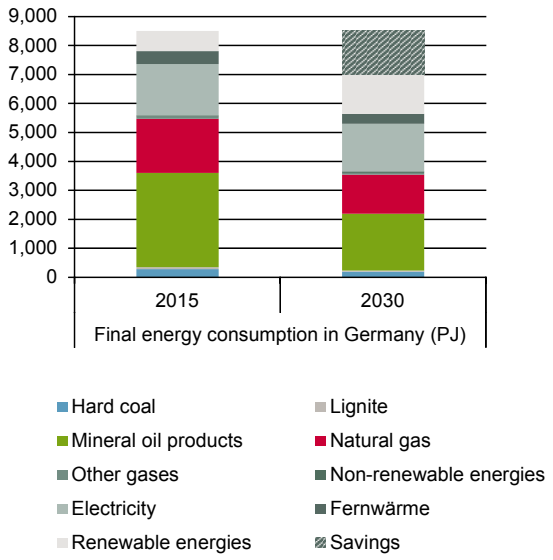
Source: AG Energiebilanzen

Which branches of the economy would a suspension of supplies hit?

In Germany, gas is used in roughly equal volumes for electricity generation, industrial applications (principally for generating process heat) and for heating homes (figure 3). More than half of Germany's private households are heated with gas.

Electricity generation is the most readily adaptable of these. Gas-fired power stations can be used flexibly. They cover peak loads, not base loads. The contribution of gas to gross electricity production in Germany has declined in recent

Figure 4: Final energy consumption in Germany (in PJ)



Source: EWI/GWS/Prognos

years; in 2012 it amounted to 11 %. This is due to an unfavourable ratio in coal and gas prices and the increasing proportion generated from renewable sources. That said, flexible gas-fired power stations are still needed to cover electricity demand in peak periods.

However, the fact remains that dispensing with gas for electricity generation will not, in itself, fully offset Germany's gas imports from Russia.[12] There would still remain a shortfall of around 10 % against Germany's demand for natural gas.

Developing other sources of gas

The mild winter has certainly had a beneficial effect on current **storage levels**. German storage facilities are 60 % full. However, present-day storage capacity in Germany equates to only around 25 % of Germany's demand for natural gas. Facilities are planned for a further 18 %.[13] But in any case, storage facilities always need to be filled.

In the short term, replacing Russian gas supplies with increased imports of **liquefied natural gas (LNG)** is only feasible to a very limited extent. The majority of the world's LNG supplies are sold to Asia, where they are subject to fixed contracts. In Asia (especially in Japan, Taiwan and South Korea), national energy suppliers are frequently involved in LNG import infrastructure and use fixed supply volumes to safeguard domestic energy provision.

However, the gas deposits needed to increase LNG imports are available worldwide. The largest gas-producing nations are the USA and Russia, each accounting for around 20 % of global production volumes. Next, but trailing by a considerable distance, come Iran, Qatar and Canada, each with a share of around 4.5 %. According to the IEA, worldwide technically recoverable resources (TRR) of natural gas amounted to 810 billion cubic metres at the end of 2012, equivalent to 235 times the amount used that year. In order to tap into this supply, Europe must enter into negotiations with potential producers as soon as possible. At present, producers in North Africa and the Middle East would be the first to consider. According to forecasts from the US energy authorities (the EIA), the USA will, in the long term, become an important net exporter.

Adapting Europe's gas infrastructure

The number of LNG import terminals in Europe has increased in recent years; more are currently under construction and others are in planning.[14] At the moment, LNG amounts to just 15 % of total natural gas imports into Europe.[15], and so existing terminal capacities have never been fully utilized. Consequently, the planned expansion will allow a significant increase in EU imports of LNG over the medium term.

By opening up the southern corridor, the EU could also gain access to other sources of natural gas in Azerbaijan, Turkmenistan and Iraq. Other pipeline projects could play a role here. One example is the Trans Adriatic Pipeline (TAP), which is scheduled to transport natural gas from Azerbaijan and link Greece with Southern Italy, by crossing Albania and passing under the Adriatic. A functioning internal market for energy within the EU, or an efficient natural gas infrastructure, would further increase flexibility in the supply of natural gas.

Improving energy efficiency and expanding the use of renewable energy sources

Increased energy efficiency reduces energy demand. In the German government's new energy era scenarios, by the year 2030 demand for gas imports will fall by some 10 % (figure 4).[16] Expanding the use of renewable energies will also play a part here.

Conclusion

In the event of a suspension of supplies by Russia, the use of oil and gas in Europe and Germany would probably have to be rationed. However, oil could be replaced more swiftly than gas. In the long term there are certainly alternatives to Russian gas supplies. This will require a new European energy policy and investment in European gas infrastructure. ■

[1] This is the ratio of the EU's net energy imports to its gross energy consumption.

[2] Eurostat (2014): Energy dependency data for 2012.

[3] See: EnergyComment Bukold (2014), Data sources: Bafa, Destatis, MWW, BDEW, VDKi.

[4] Russia's annual export revenues from oil (approx. USD 283 billion) are four times as high as its gas export revenues (approx USD 73 billion). See: Bank of Russia (2014): Oil and Gas Statistics according to Customs Statistics Rosstat.

[5] See: Rosstat (2013): Database.

[6] See: Bank of Russia (2014): Balance of Payments of the Russian Federation for 2012.

[7] See: IMF (2013) Article IV Consultation – Russian Federation.

[8] See: Barclays (2014): The Russia-Ukraine conflict. Assessing the potential damage, p. 4

[9] On the oil market, the ratio of volumes traded to volumes physically available (known as the churn rate) is many times higher than it is on the gas markets. Ultimately, the churn rate provides an indication of how quickly and how flexibly market participants can get into the market and trade there. The concept originally comes from customer relationship management, where it expresses the ratio of lost customers (or units, or products) within a population. In 2010, the churn rate for oil was around 100; on the various gas markets it ranged from 1 to 15. See: Stream Energy, http://www.oil-gas-energy-conferences.com/gas/html/speakers2010/Stream_LNG&Gas-Hubs_101004.pdf (last downloaded 1 April .2014). Although the churn rate figures for gas may well be higher now, they have still not reached the values seen on the crude oil market.

[10] Gas production in the rest of the world rose by 40 % over the same period.

[11] See: Eurogas (2014).

[12] However, this would not only jeopardize supply security in electricity and heat generation. It would also counteract the objectives of the new energy era. Lignite-fired stations would then have to be used instead of gas-fired power stations, or decommissioned nuclear power plants would have to be returned to service.

[13] See: IEA (2013): Energy policies in IEA countries – Germany – 2013 audit.

[14] See: Gas Infrastructure Europe, GLE-LNG Map. LNG terminals can also be built to serve as export terminals, i.e. gas liquefaction facilities. This type of LNG terminal has little relevance for Europe. For that reason, at the present time there is only one such terminal in Europe, at Skangass in Norway.

[15] See: BP Statistical Review of World Energy, June 2013.

[16] See: EWI/GWS/Prognos (2011): Energieszenarien 2011, S.25 ff. http://www.prognos.com/fileadmin/pdf/publikationsdatenbank/11_08_12_Energieszenarien_2011.pdf