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Fuelling the future with natural gas

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Natural gas prices in Europe have risen more strongly than in the USA in recent years, particularly as a result of increased shale gas supply in the USA. Energy-intensive industries in Europe are faced with the major challenge of compensating this effect by increasing their energy efficiency. However, the improved integration of the European natural gas market, the expanded supply of imports and, most

of all, the strong decline in demand for natural gas in the context of the Energy Union are counteracting further price rises in Europe.

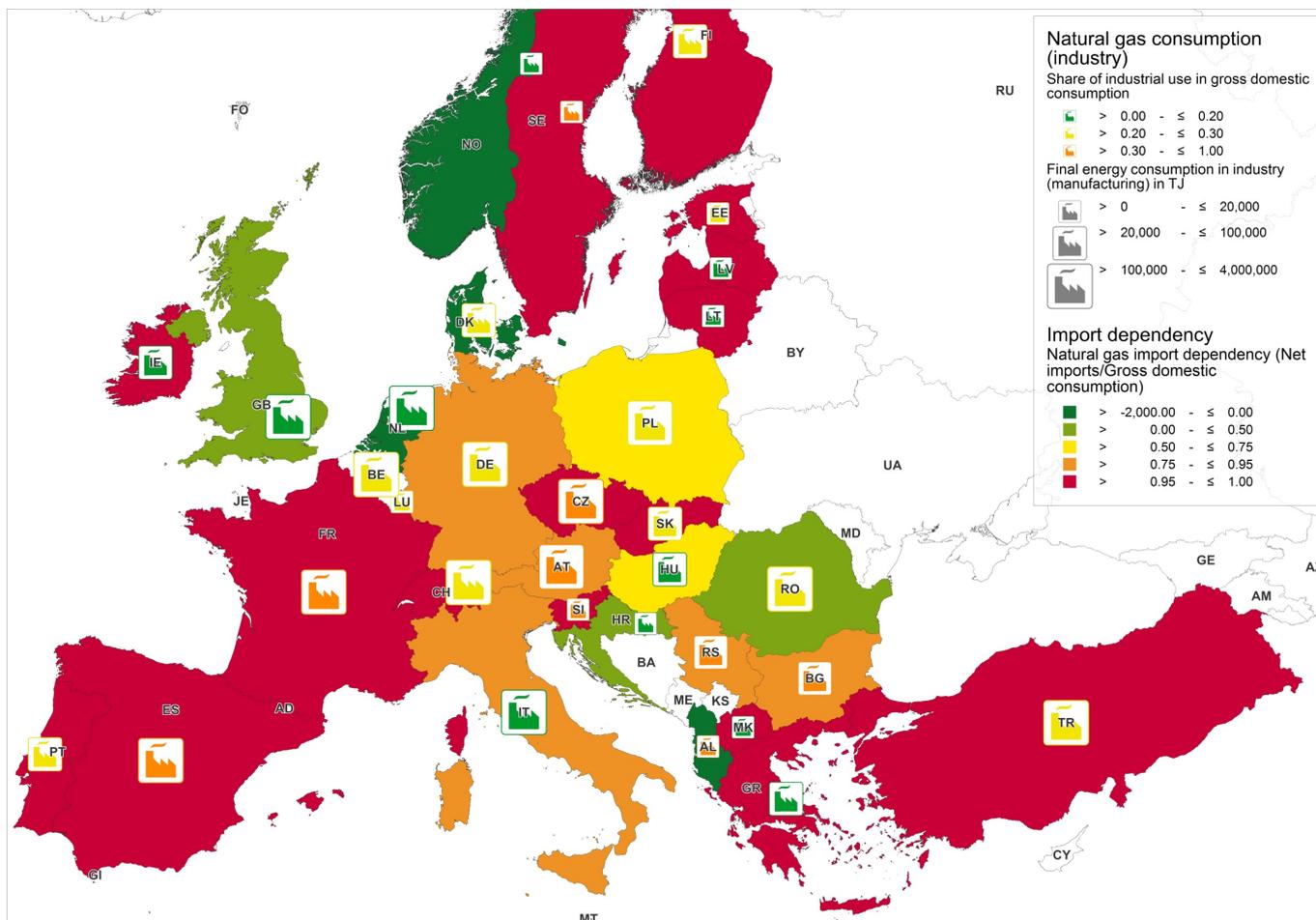
Europe is the third-largest energy market after the USA and China. But with an energy import share of 54%, its dependence on imports is high in comparison with China and the USA, where the proportion is below 20%. This has implica-

tions for energy prices and the competitiveness of the manufacturing sector. Europe imports more than 65% of the natural gas it consumes and local gas production is on the decline. The planned Energy Union is intended to further strengthen the European internal energy market. For the gas market the priority is to guarantee and improve supply security through further optimisation and integration of the gas networks.¹

European industry's dependence on natural gas

Natural gas is primarily used to generate electricity and heat, for process heat in industry and as a raw material, for example in the chemical industry, and to

Figure 1: European industry's dependence on natural gas



Source: Eurostat.

heat private, public and industrial buildings.

The manufacturing sector accounts for just under 30% of Europe's natural gas consumption. Apart from the upstream oil and gas industry and refineries, iron and steel, chemical and petrochemical, non-ferrous metals and non-metallic minerals are the most gas-intensive industries in Europe.²

Figure 1 shows the EU member states' dependence on imports, the manufacturing sector's natural gas consumption and the manufacturing sector's shares in the member states' gas consumption. Some Central and Western European countries are heavily dependent on imports but have large gas-dependent industries at the same time. Germany, Austria and Italy each import more than one third of their domestic requirements, France and Spain even more than 95%. Germany, France, Spain, Italy and the United Kingdom are the states with the highest industrial natural gas consumption in absolute terms.

The share of manufacturing in gross domestic natural gas consumption is between 6 and 57%. Only Serbia, Slovenia, Austria and Sweden have an industrial share of 40% and more, as these countries do not consume much gas for electricity or heating. With the exception of Austria, however, the absolute gas consumption of these countries' industries is rather low.

Supply security thus plays a crucial role on the European gas market, with high import dependence and low import diversification significantly driving the development of gas prices for final consumers. The European Commission intends to improve supply security and, thus, reduce prices and costs through the Energy Union and by strengthening the European internal energy market.³

Price trends on the gas market

Fossil fuels such as natural gas continue to be the main drivers of energy price developments and costs⁴ on the German and European energy market. Analyses by the European Commission demonstrate that energy prices have risen strongly in the past few years but so has the energy efficiency of

enterprises. Nevertheless, cost increases often outpace energy efficiency improvements, with corresponding pressure on international competitiveness.

The price differential between European and US natural gas widened continuously up to 2008 as a result of the shale gas revolution in the USA. Since 2009 the mean price differential has remained relatively constant at between EUR 25 and EUR 40. For European and German industry, relative gas prices have thus increased steadily and substantially (Figure 2).

Given the great distance between the US and the European market and the correspondingly high transport costs between the regions, proximity to the respective sales market is often a more relevant criterion for site selection than relative gas prices. Nonetheless, the price differential could influence future investments by energy-intensive industries in the medium term.

Expanded natural gas supply

Europe's natural gas reserves are limited and production is declining sharply. Import requirements will continue to increase. Further major import routes via pipelines are in planning to increase Europe's supply security, particularly through what is known as the Southern Gas Corridor to Romania, Bulgaria or Greece. Gas supplies are to be sourced from different regions such as Russia, Azerbaijan, Turkmenistan or even Iraq.

The planned infrastructure projects will diversify supply options, develop new production regions and increase

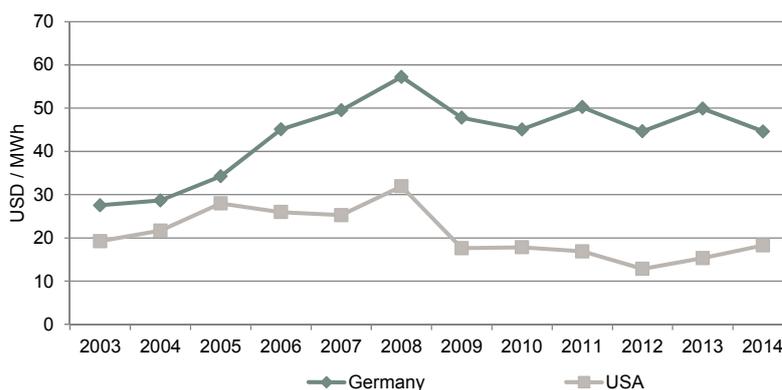
European market integration. The expanded natural gas supply will thus improve Europe's supply security in the decades ahead.

Additionally, further liquefied natural gas (LNG) terminals and expansions to existing facilities are in planning so that natural gas can be imported by ship over long distances. However, due to long-term contractual conditions and high transport costs worldwide, only limited LNG volumes are available to Europe. In 2013 only around 10% of demand was imported in the form of LNG, which means that only around one quarter of Europe's total terminal capacity was being utilised. In other words, terminal capacity for additional LNG imports is already abundant. It is unclear, however, when LNG can be exported from the USA as the necessary LNG export infrastructure is still lacking in the USA. Additional LNG volumes on the world market would also enable higher quantities of more affordable LNG imports to Europe.⁵ LNG will continue to become increasingly important to Europe's natural gas supply. That will bring greater flexibility to the European gas market.

Energy efficiency reduces demand

Economic growth, political conditions, availability of natural gas and its competitiveness in comparison with other sources of energy will remain the decisive drivers of Europe's demand for natural gas up to 2030. The World Energy Outlook 2014 describes various scenarios with either a strong increase or a strong decline in natural gas demand depending on the corresponding assumptions on climate policy.⁶ Particularly

Figure 2: Industrial gas prices



Source: IEA, OECD.

if the climate targets are achieved (450 Scenario), natural gas demand will fall.

The EU, on the other hand, expects demand to stagnate or drop slightly, even up to 2050 (see Figure 3).⁷ Under the current EU Reference Scenario natural gas demand would decrease by some 7% between 2015 and 2020. Demand for gas in the EU has been declining sharply since 2010, dropping last year to a level not seen since 1995. Moreover, 75% of demand comes from six EU member states (Germany, the UK, Italy, France, Spain, the Netherlands) which are implementing ambitious energy efficiency and renewable energy expansion programmes. That will further reduce demand for natural gas.

More energy efficiency reduces dependence on Russia

The heads of state and government of the EU have agreed on a non-binding energy efficiency target, a 27% reduction in the EU's primary energy consumption up to 2030.⁸ On the basis of calculations by the European Commission on the correlation between fossil fuel imports and energy reductions, it can be estimated that a 25% reduction in energy consumption can reduce imports from Russia by around one quarter by 2030, and the ambitious target of 40% would even reduce energy consumption by nearly 80%.⁹

An area that still offers particularly high energy efficiency potential is process heat, where natural gas is extensively used. Process heat accounts for roughly

two thirds of total industrial final energy consumption and is the most energy-intensive field of application in the industrial sector. Gas is used in various industrial production processes, e.g. to generate steam and hot water or to operate kilns and drying systems.¹⁰

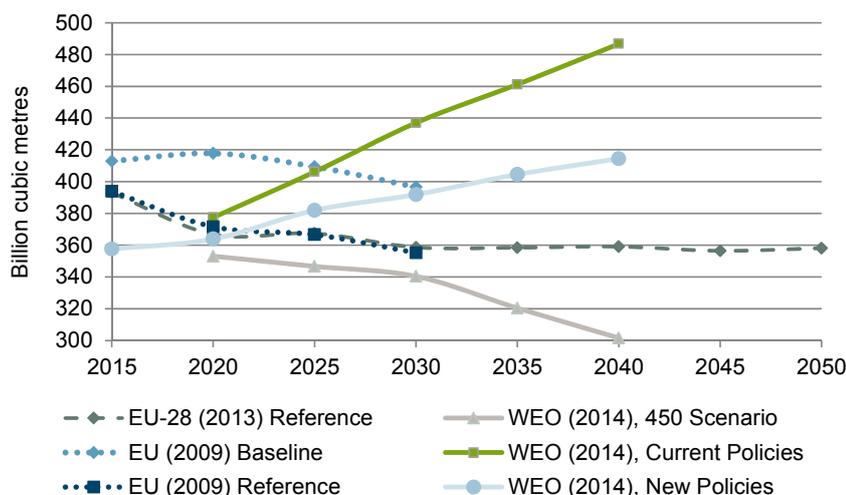
Conclusion

With a view to the future, on the one hand Europe's relatively high natural gas prices do indeed put European and German manufacturers at a disadvantage in international competition.

On the other hand, the availability of gas is steadily increasing, with the growing supply through diversification and the rising significance of LNG putting downward pressure on prices. Energy efficiency measures are reducing demand and price pressure further.

Energy-intensive industries in particular are thus facing further challenges. Improving energy productivity would provide crucial competitive advantages particularly for this sector. That would require high investments but so would site relocation. ■

Figure 3: EU natural gas demand scenarios



Source: IEA (2013), EU (2009, 2013). Own graph.

¹ Cf. Dieckhöner, C.: *More Europe! On the road to Energy Union*, Economics in Brief No. 80, KfW Research.

² Cf. Jones, D. et al (2015): *Europe's Declining Gas Demand Trends and Facts on European Gas Consumption*, E3G Report, June 2015, http://e3g.org/docs/E3G_Trends_EU_Gas_Demand_June2015_Final_110615.pdf.

³ Cf. Dieckhöner, C.: *More Europe! On the road to Energy Union*, Economics in Brief No. 80, KfW Research

⁴ Cf. European Commission (2014a): *Energy Economic Developments in Europe*, DG Economic and Financial Affairs, European Economic Series No.1, and Dieckhöner, C.: *Energy cost drivers: It's not just about electricity!* Focus on Economics, No. 97, KfW Research.

⁵ Cf. Bloomberg (2014): *U.S. Gas Boom Turns Global as LNG Exports to Shake Up Market*.

⁶ Cf. IEA (2014): *World Energy Outlook 2014*.

⁷ Cf. European Union (2014): *EU Energy, Transport and GHG Emissions, Trends to 2050, Reference Scenario 2013*.

⁸ Cf. German Federal Government (2014): *Agreement on climate policy framework up to 2030*, <http://www.bundesregierung.de>, 24 October 2014.

⁹ Own calculations. Cf. European Commission (2014): *Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy*, Communication from the Commission to the European Parliament and the Council, COM (2014) 520 final.

¹⁰ Cf. Brüggemann, A (2015): *Energieeffizienz in Industrie und Gewerbe: Wo liegen die größten Potenziale?* –Only available in German, Focus on Economics No. 96, KfW Research.