

Natural Gas as a Bridge Fuel into a Sustainable Future for Germany

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EUROPEAN GAS SUPPLY SECURITY

The last decade has seen several changes in the European energy sector, mainly in the context of gas market. The use of natural gas in Europe is increasing, driven by industrialization and urbanization. Given the increasing demand for natural gas together with decreasing domestic production it is expected that Europe will import 80% of its natural gas by 2030 [1]. The strong dependence on gas imports means that measures for ensuring security of gas supply are vital. It should be noted that natural gas is more climate-friendly compared with other fossil fuels as it produces less CO₂ [2], which strengthens its significance in the energy mix. Twenty four percent of the energy used by the European Union (EU) countries is produced by natural gas.

EU has a common energy policy including ensuring the functioning of the internal energy market, security of supply, promoting energy efficiency, renewables and the interconnection of transmission grids. It is one of the objectives of the EU energy policy to ensure security of energy supply in the Union, however the most decisive issues on security of supply are determined on a national basis [3]. The guidelines, issued by the EU set the frame within which the member states conduct their individual energy policies. Diversification of supply sources and distribution routes, strong bonds with supplier countries, long-term gas supply contracts, safe supply infrastructure, reliable storage facilities are among these policy measures.

NATURAL GAS IN GERMANY AT A GLANCE

Germany is one of the largest countries in the EU. The country shares borders with Denmark, Poland, the Czech Republic, Austria, Switzerland, France, Luxembourg, Belgium and the Netherlands.

The main source of energy in Germany is oil, although its use has declined over the past decade. Germany does not have much domestic oil resources and relies largely on imports to meet demand. The country has a flexible oil supply infrastructure, consisting of pipelines and import terminals. The domestic market is liberalised and characterised by a large number of players.

Natural gas makes a solid contribution to energy supply in Germany, being the second most important primary energy source of the country's energy mix. Germany's gas reserves are the fourth-largest in Europe, following Norway, the Netherlands and the United Kingdom. Germany is one of the biggest gas markets of Europe. The country uses an extensive system of pipelines for the import of natural gas and its distribution around the country. Germany's geographical location at the heart of Europe strengthens its position in the European gas market as an important natural gas transit hub. Significant amounts of gas are transported across Germany to the other EU countries. The total length of the German gas network is more than 510,000 km [4]. Germany's future plans include using the gas pipeline network as a composite system in which natural gas, biogas as well as hydrogen and synthetic methane produced from renewable energy are combined to form one huge energy source [5].

The German gas market is characterised by a large number of private operators in the areas of networks, storage operations and gas trading. The leading entity for natural gas security in Germany is the Federal Ministry for Economic Affairs and Energy (BMWi). BMWi is responsible for natural gas legislation and for emergency response coordination at the national and the EU levels. Germany has made significant progress on following the EU energy policy. The federal government completed a natural gas security Risk Assessment, the key finding of which is that the security of supply situation in Germany is reliable and safe. The Risk Assessment states that the standards required by EU regulation have been fulfilled and the available market-based instruments are generally sufficient for securing supply [6].

The natural gas storage facilities in Germany also make a significant contribution to energy security. Germany has the largest gas storage capacity in Europe and the fourth-largest in the world. The natural gas storage facilities of the country could theoretically cover approximately a quarter of Germany's annual demand, thus compensating for any short-term supply disruptions. In addition, 13.9 bcm of storage capacity is under development [6].

Natural gas production has been declining in Germany since the beginning of the century. The gov-

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ernment forecasts that local production will continue to decline over the next 20 years, as resources are further depleted. Due to the fall in domestic production the country currently could cover only 10% of its consumption by own reserves. It makes Germany highly dependent on imports of natural gas. The country obtains 90% of overall gas demand from other countries via pipelines. According to the figures of Arbeitsgemeinschaft Energiebilanzen e. V. (AGEB), in 2014, 38% of imported gas was supplied by Russia, 22% by Norway, 26% by the Netherlands and the remaining 4% by other countries [4].

Russian imports account for about 35% of Germany's natural gas demand. However, the current Russia-Ukraine political conflict remains of concern. Diversification of supply routes providing Germany with gas has been improved, particularly with the opening of the Nord Stream pipeline, which added 55 bcm to import capacity. Following the commissioning of the Nord Stream pipeline, natural gas imports from Russia to Europe via Ukraine have dropped. Around 50% of Russia's gas exports to Europe still come via Ukraine [7].

Interconnection with other countries is also improving. The Caspian region has been a focus of the European gas consumers for the last decade. The discovery of the Shah Deniz (SD) in Azerbaijan, one of the world's largest gas-condensate fields, raised expectations that the Caspian region would play a role in the provision of gas to Europe. The International Energy Agency (IEA) estimates that the Caspian region's proven and recoverable natural gas reserves are about 7% of the world's reserves [8]. The region's proven gas reserves only tell part of the story, the prospects for further discoveries remain huge. The Trans Adriatic Pipeline (TAP) is designed to transport natural gas, extracted from the second stage of the SD field in Azerbaijan, via Greece and Albania, and across the Adriatic Sea to Southern Italy, and further to Western Europe. Initial pipeline capacity will be 10 bcm per year with the possibility of further expansion to 20 bcm per year. TAP's landfall in Italy provides multiple opportunities for further transport of Caspian natural gas to some of the largest European markets including Germany. It is a new prospective source of supply for Germany to be provided from 2019 onwards [9; 10].

The LNG market has steadily expanded in Europe over the past decade. Despite LNG supplies to Europe falling due to competition with Asia and South America, it is expected that LNG deliveries could satisfy up to 24% of European gas demand by 2020 [11]. Germany has no LNG infrastructure, as gas is fairly supplied by the existing pipeline network, but it has plans for LNG terminals, being important as an alternative method of gas deliveries. The federal government encourages market participants to purchase regasification capacities in LNG terminals in other countries. Germany provided 2 bn-euro financial guarantees to E.ON for the development of the Canadian Goldboro LNG export project. It is for the purchase of 5 mn tonnes (8 bcm) of LNG per year for two decades. In addition, E.ON is desirous of buying stakes in other LNG export projects in East Africa, South America and the Mediterranean using the government-backed guarantees [12]. Both E.ON and RWE have access capacity at the Dutch Gate terminal. It should be noted that the government of Germany had guaranteed only pipeline projects in the past.

THE ENERGIEWENDE – WAY TO THE FUTURE BASED ON RENEWABLES

With the adoption of the Climate and Energy Package by the EU in 2009, promotion of renewable energy became a distinct element of climate policy. German policy makers have taken a substantial decision to move towards a sustainable energy supply over the long term. The Energy Concept, adopted by the Federal Government of Germany in September 2010 determined renewable energy as the main source of future energy supply.

Perception of the risks of nuclear energy has been significantly changed in Germany after the Fukushima incident. In June 2011, the Bundestag determined by a large majority that, by the end of 2022 Germany will fully terminate the generation of power by German nuclear power plants (NPP). Accordingly, it adopted a second package to accelerate the steps towards energy transition. The second Energy Package, commonly known as the Energiewende, aims a fundamental transformation of the energy system of Germany. The main goal of the Energiewende is a low-carbon energy sector achieved by supporting renewable energy, grid expansion, and energy efficiency [13].

As a result of the termination of the eight NPPs, Germany moved from being a net energy exporter to a net importer for half a year [6]. The energy which was planned to be provided by the closed nuclear plants is to be compensated by the other sources of energy, so why not by natural gas? As nuclear capacity is phased-out, natural gas can promote an easy path to a low-carbon power sector.

Germany has large resources of hard coal and lignite. Hard-coal production and consumption in Germany is declining, but lignite production is successful, providing a major source of energy to the

country. Germany has made a decision to phase-out subsidies for domestic production of hard coal and to decommission all hard coal mines by 2018. It is obvious that Germany needs a cleaner alternative to coal generation, if the government intends to meet its 2020 GHG emissions reduction target of 40% without much of its nuclear fleet.

In fact, natural gas can provide a spare source of electricity supply in the medium term. The role of natural gas in the electricity supply mix of the future will determine its significance for the Energiewende. As the electricity generated from renewable sources varies depending on weather conditions and season, natural gas-fired plants can play an important role in offsetting such fluctuations.

CONCLUDING REMARKS

External factors such as transforming the global gas market, the shale gas boom in North America, the political crisis in Ukraine, emergence of new pipeline projects, LNG projects development, increasing renewables and efficiency measures and other factors have affected the European natural gas market, including Germany and its future gas market development. The capacity lost by the withdrawal from nuclear energy must be replaced by additional power plant capacity. Gas plants may be needed to replace coal generation if Germany is to meet its further emissions reduction targets, as natural gas is more climate-friendly compared to other fossil fuels. As the electricity generated from renewable sources varies depending on weather conditions and season, natural gas-fired plants can play an important role in offsetting such fluctuations. All these facts show how important natural gas is for Germany. I see promotion of local gas production, greater access to global gas markets, strengthened bonds with potential new suppliers as important factors at Germany's current energy stage. Germany is very successful in diversification and expansion of its energy supply system in comparison with other countries, one of the main reasons of which could be the country's technological development. German gas infrastructure companies are expanding internationally, innovating and diversifying. In all cases gas in its role as a transitional fuel will continue to be important for the foreseeable future. Natural gas would be the bridge fuel into a sustainable energy future for Germany.

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