

## **SE-29.4 Challenges in the European natural gas market: Parsing the value and costs of supply diversification (S)**

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European natural gas markets are in a state of change. New challenges are arising as a result of fundamental changes throughout the value chain of natural gas. While production in Western Europe decreases, in particular in the Netherlands, Great Britain and Norway, the future importance of natural gas in the European energy mix is subject to growing uncertainty. On the one hand, natural gas power plants provide flexible conventional back-up capacities in electricity systems to balance intermitted renewable feed-in. With lower relative CO<sub>2</sub>-emissions than lignite, coal and oil, natural gas also provides an opportunity to reduce emissions not only in the electricity sector, but also in heating and transportation. On the other hand, new natural gas power plants may create new lock-in effects that obstruct a transition to a total RES-based energy system envisaged by climate policy objectives for 2050. Political uncertainty still exists, generating concerns of stranded assets, especially as current (and expected) electricity prices are quite low and not incentivising relative expensive gas power technologies. Hence, investors are currently hesitant to install new natural gas power plants. However, the gap between natural gas demand and European natural gas supply is likely to remain more or less constant for the next decades. As it stands, Europe is dependent on natural gas imports. The major non-European supplier Russia is intent on avoiding transits routes through Ukraine. New import routes through Turkey and a direct connection from Russia to Germany through the construction of the Nord Stream pipeline have spawn discussions concerning security of supply, diversification strategies and European solidarity between Western and Eastern European countries, e.g. the formation of the EU Energy Union.

In light of these developments, the following research question arises: What is the value and costs for the EU to diversify the natural gas imports of their associated member states?

A fundamental modelling approach is implemented in the gas market model (GAMAMOD) that covers the European natural gas infrastructure as well as new pipeline projects. The results show a rising importance of Germany as a natural gas transit country and an increasing amount of natural gas from Russia. The increasing share of liquefied natural gas (LNG) provides an opportunity to increase diversification in natural gas imports. The infusion of LNG imports, however, is accompanied by higher costs.

The results point to Russia dominating the European natural gas market in the coming decades. An increased diversification, e.g. with higher shares of LNG, would considerably increase the cost of energy provision for European citizens.