

PROSPECTS FOR SHALE GAS EXPLORATION IN EUROPE: ONGOING EXPERIENCE

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Overview

Unconventional natural gas, and especially shale gas, is considered a success story in the US. Many reports point out economical and geopolitical advantages. This opens the discussion of a possible reproduction of this scenario in Europe. However, both scientific community and policy makers in Europe raised a number of questions about the trade-off between potential benefits and environmental impacts. In addition, obscure geological information about recoverable resources combined with the existing obstacles of political and social acceptance of fracking makes the future of European shale gas industry unclear. Nonetheless, shale gas resources are considered significant in several European countries.

Furthermore, the role of shale gas in Europe must be seen in the context of other challenges in the European gas sector: declining indigenous natural gas production, limited amount of suppliers and political turbulences that raise energy security issues.

The objective of this paper is to estimate the potential impact of shale gas exploration within the EU member states on European natural gas market. In particular we focus on the following questions:

1. To what extent can shale gas production influence energy security concerns of EU (or certain member states) by compensating the drop of indigenous conventional gas production?
2. To what extent can shale gas production be a substitute to gas imports thus reducing European energy prices and dependence on external supplies?

Methods

The analysis is done with a large-scale partial equilibrium natural gas market model for Europe. The model encompasses 31 countries with detailed data of transmission pipelines and transit activities, major production regions, natural gas liquefaction and regasification terminals. The analysis covers the time period until the year 2025. The model is formulated as a mixed complementarity problem (MCP) in which each market participant (gas producer, wholesale trader, investor, etc.) optimizes own revenues. Thus, the approach incorporates modelling of a strategic behavior. The model is solved in GAMS.

In order to focus on the stated questions we omit the issues of potential environmental impacts of shale gas development (fugitive methane emissions, groundwater contamination, earthquakes).

Results

The paper provides a general insight into prospective impacts of shale gas exploration in Europe.

We show that, under the set of taken assumptions, Europe will remain a net import region even if several projects on domestic shale gas will be realized. Thus production of shale gas is not a sufficient tool to fully cover the decline in conventional gas production. Furthermore, results show that shale gas development will not lead to a significant drop in European gas prices. The reason for that is that production costs of shale gas are estimated to be above costs of conventional gas up to the long-term marginal supply cost of main exporters. Exploration of shale gas, however, supplemented with new investments in natural gas infrastructure, can substantially influence the import/export portfolio of particular European countries and improve their bargaining position in bilateral agreements with gas exporters.

Conclusions

We conclude that shale gas in itself should not be perceived as a solution to European energy security concerns. Furthermore, even if several projects on shale gas will be completed it will not provide any significant contribution declining European gas prices. The shale gas production, though, can have a positive influence on a market situation in particular European countries by reducing their import dependence. Additionally, it may contribute to a further physical integration of gas market in Europe and can be considered as an additional instrument in support to a low-carbon climate policy.