Long-term European strategies to enhance gas supply security

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Overview

Europe gets a third of its gas from Russia, with 40% of that pumped through Ukraine. The recent political crisis between Russia and Ukraine has led Europe to reconsider its long-term procurement strategy in order to reduce dependence on Russian gas. At a time when European conventional gas reserves are being depleted while consumers' appetite continues to increase, the source of new gas supplies is increasingly critical to the EU. The gas strategy to be followed by the EU must also take into account its recently announced new energy and climate targets, which propose to reduce greenhouse gas emissions by 40% and source 27% of energy from renewable sources by 2030 (EC, 2014). Such targets are critical for ensuring Europe remains on a transition pathway to meet a proposed 80% reduction in 2050 as per the low carbon roadmap (EC, 2012). Achieving the transition to a low carbon energy system as well as parallel energy security objectives will be challenging, particularly given the range of geopolitical uncertainties associated with gas and the evolution of the international energy system under different climate regimes.

Method

To explore these uncertainties, this paper looks at the long-term impact of different gas strategies' on the dynamics of European system decarbonisation by examining the following scenarios of gas supply diversification away from reliance on Russia:

a) Increased imports from North-Africa, Central Asia and the Caspian Region
b) Development of new EU gas resources (both conventional and unconventional) and the associated intra-EU gas supply network
c) Increased LNG imports

Additionally, each of these 3 scenarios is modelled under two different world climate cases: reaching 2 degrees and 5 degrees of global warming.

This paper utilises two energy systems models linked together: ETM-UCL (the European TIMES Model at UCL) and TIAM-UCL (TIMES Integrated Assessment Model at UCL). Both models are comprehensive E3 (energy-environment-economy) systems model built using the TIMES (The Integrated MARKAL-EFOM System) model generator (Loulou et al, 2005). The use of models with different geographical scales allows us to explore the impact of the evolution of the global energy system under different climate regimes on European demand for resources and technology investment. The disaggregated European model can then be used to provide more detailed insights into the different technology pathways and costs across different parts of Europe in meeting climate mitigation targets under alternative gas supply scenarios.

Results and Conclusions

Initial insights from the scenario analysis suggest that reducing dependence from Russian gas is achieved at a lesser cost via increased LNG and natural gas imports from non-Russian regions. However, this is affected by the evolution of the international energy system, particularly if there is high GDP growth in key non-EU regions, and significantly increases exposure to the risk of geopolitical turmoil in producer or transit countries. The impact of domestic undeveloped gas sources, while obviously enhancing self-sufficiency to some extent, is unlikely to be sufficient to be transformational for the European energy market as a whole.

References

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