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DEMAND FOR STORAGE OF NATURAL GAS IN NORTHWESTERN EUROPE – A SIMULATION BASED FORECAST FOR 2030

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Overview

The seasonality of demand for natural gas requires the provision of supply flexibility. In northwestern Europe, this "swing" is currently provided largely from indigenous production. Declining reserves will, however, increase the dependency on imports from far distant sources, which are far less flexible. Hence, flexibility must be provided by additional storage. We estimate that by 2030, at least, an additional 15.5 billion cubic meters of working gas volume – equivalent to 42 per cent of the existing capacity – are required. This estimation is based on production and consumption forecasts for natural gas, and observations of the relationship between demand and supply of gas and the demand and supply of flexibility for the period 1995-2004. Scenarios and Monte Carlo simulations are provided to check for the robustness of our results. We also briefly discuss policy implications for the regulation of third party access to storage facilities and national policies on the exploitation of indigenous resources.

Methods

To answer the question of how much additional storage facilities will be required in 2030, we use a simple top-down analysis. We start from a given forecast for the overall *gas consumption* in NWE in 2030, provided by the IEA. Based on *historical ratios of gas consumption and the seasonal swing* for the period 1995-2004, we forecast the demand for seasonal swing in the year 2030. Using a similar approach, we take an existing prediction for the *supply structure of natural* gas for NWE in 2030 from EUGAS, a forecast model of the German EWI (Institute for Energy Economics, see Bothe and Seeliger 2005). Again, based on *historical observations of the ability to supply swing from production* for each country of origin, we approximate the possible swing supply from production and imports in 2030. Although our model is not constructed as an equilibrium model, it could be interpreted as such if one assumes competitive supply and inelastic demand.

Results

We provide three types of results.

(i) *Point Estimate*: Comparing the resulting figures to the storage facilities which existed in 2005 and are planned already, we find a significant gap of at least 15.5 billion cubic meters (BCM) of required working gas volume. This is in the order of one-third of the facilities operational in 2005. Thus, our main finding is that the projected growth in gas consumption is inconsistent with the current level of gas storage facilities in NWE. Since the triggering event for this gap – the depletion of indigenous gas fields – is largely undisputed, this implies that either gas demand cannot grow, or new storage facilities have to be build.

(ii) *Monte Carlo Simulation:* Accounting for the considerable uncertainty concerning many of the underlying parameters of our extrapolation, results from Monte Carlo simulation are provided. They suggest that the probability that there will be no storage gap is virtually zero, while, with a probability of 7%, it will be larger than 20 BCM.

This shows that the finding of a significant storage gap is robust with respect to key uncertainties.

(iii) *Security of Supply Scenarios*: The results of (i) and (ii) reflect situations with low levels of security of supply. Taking into account provision for extreme temperature (as it is common today) and allowing for strategic stocks to reduce dependence from imports, increases the storage gap up to 40 BCM.

Conclusions

The foreseeable change in the import structure of natural gas will cause a significant demand for gas storage, which can not be met without new investments. This has strong policy implications. First, regulation of storage, as already introduced as negotiated third party access (TPA), reduces investment incentives. The European regulation allows for exemptions from this for new facilities, which, in the light of our results, seems to make sense. Second, in particular in the Netherlands, we see strong state intervention reducing the speed of the exploitation of indigenous gas reserves. Although a full welfare analysis is beyond the scope of the paper, our results suggest that this is a useful instrument for reducing potential shortages in the supply of flexibility in the long-term.

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