



Masterthesis

Assessment of expected bottlenecks in the German gas network induced by nuclear and coal phase out

With the government's decision phase out nuclear energy by 2022 and the recommendation of the WSBK ("coal commission") to phase out coal by 2038, a path is given to restructure the German energy system. Due to a significant reduction in generation capacity it is expected to increase the use of natural gas in electricity generation. Especially in southern Germany, several gigawatt of generating capacity will be disconnected from the grid by 2038 and will have to be replaced by e.g. new gas-fired power plants. As a result, bottlenecks could occur, especially on the north-south axis of the German gas grid. The extent to which an increasing gas demand in the south creates bottlenecks and where these could occur will be the subject of the thesis.

For this purpose, a simplified gas market model for Germany has to be set up, whereby a detailed modelling of the network topology at the level of the expected network bottleneck is required. Part of this can be built on existing data from the EWI internal gas market model TIGER. In a second step, an optimization of infrastructure use and cost under given restrictions (demand, supply, cross-border flows, capacities, etc.) should be implemented. Considering various scenarios (for example pipeline failures), existing network capacity is to be examined to see whether and when bottlenecks in the gas network can occur.

Modelling skills are not required for the thesis, but programming skills (such as Matlab, GAMS) are recommended. The work is to be done in English language.

Introductory literature

Lochner, Stefan. "Identification of congestion and valuation of transport infrastructures in the European natural gas market." *Energy* 36.5 (2011): 2483-2492.

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