

ELECTRICITY GENERATION AND TRANSMISSION CAPACITY EXPANSION: AN APPLICATION TO THE CENTRAL EUROPEAN REGION

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Abstract

This article presents an electricity dispatch and load flow model with endogenous electricity generation capacity expansion. The target is to quantify how much generation capacity will be needed in 2030 and where within Central Europe it shall be ideally placed when taking into account the projected grid structure of 2030. We explicitly model the interdependence between grid operation and power plant placing as we investigate the contribution of centralized power plant placement on reducing the need for grid expansion. The application focuses on Germany and its neighbors and reference is made to recently published plans on grid expansion (TSO, 2012). We adopt the perspective of a welfare maximizing system planner and thus determine capacity expansion levels as first-best benchmark. Results show that optimal capacity expansion levels for most technologies are much lower than previous studies indicate (e.g. dena (2008); EC (2011); EWI et al. (2010); Maurer et al. (2012)). We also show that the need for grid expansion can be reduced by the appropriate placing of just a few Combined Cycle Gas Turbine (CCGT) power plants.

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