

TOWARDS A CARBON-FREE FUTURE: IMPACTS OF REGULATORY AND MARKET-BASED INSTRUMENTS IN GERMANY

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Overview

In Germany, both regulatory and market-based mechanisms for emission-reduction are currently in use. The legal framework put into action to reduce greenhouse gas emissions covers several sectors. As coal-fired generation is an emission intensive source for the system, the Coal Phase-out Act is part of Germany's efforts to shut down both lignite and brown coal power plants. On the market side, the European Emissions Trading System serves as a cap mechanism that is set on the total amount of emissions allowed, which decreases every year. This contribution analyses whether Germany complies with the emission targets set for the energy sector, considering both the regulatory framework and latest developments in the price for carbon emissions in the European Emissions Trading System.

Methods

We use the EM.POWER Invest model, which dynamically determines the investment and dispatch in partial equilibrium for the EU-27 countries. The energy system optimization model is formulated as a linear problem, and it computes the cost minimal development of conventional power plants. We define two empirical scenarios which include the regulatory implementation of the Coal Phase-out Act and are distinguished through developments in both fuel costs and carbon prices. One scenario considers a future as expected when the regulated coal phase-out was decided (2019) and the second scenario incorporates the increase in carbon and fuel prices observed in the recent years. The carbon emissions obtained from the model computations are benchmarked against emission reduction goals included in the Federal Climate Change Act (Federal Law Gazette I, p. 2513, 2021).

Results

By comparing model results with carbon emission targets set by regulation, two important outcomes can be highlighted. First, the regulatory coal phase-out would not be sufficient to meet the emission reduction targets for several milestone years. Second, the regulatory coal phase-out together with higher carbon costs and fuel prices would accelerate the decommissioning of coal power plants. This effect is discussed in more detail in (Sgarciu et al., 2022). A direct effect of the accelerated decommissioning is the decrease in carbon emissions, which would put the system on track for achieving the climate goals.

Conclusions

Our results highlight that the regulatory coal phase-out intervention accompanied by increased carbon and fuel prices would facilitate a system with lower carbon emissions and foster the attainment of emission reduction targets. A potential option to ensure that the system stays on track could be the implementation of a national carbon price floor. Taken together, our findings are relevant for policymakers with an interest in strongly decarbonized energy markets.

References

Federal Law Gazette I, p. 2513. Bundes-Klimaschutzgesetz vom 12. Dezember 2019 (BGBl. I S. 2513), das durch Artikel 1 des Gesetzes vom 18. August 2021 (BGBl. I S. 3905) geändert worden ist. <https://www.gesetze-im-internet.de/ksg/BJNR251310019.html>

Sgarciu, S., Scholz, D., Müsgens, F. (2022). „How CO₂ prices accelerate decarbonisation – The case of coal-fired generation in Germany”, *Energy Policy*, Vol. 173, 113375, <https://doi.org/10.1016/j.enpol.2022.113375>.