

Taming the Electricity Market Rollercoaster? – A Systemic Analysis of Contracts for Difference as a Risk-Hedging Instrument

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Extended Abstract

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Abstract Summary

Volatile renewable electricity (VRE) sources have already become the cheapest form of electricity generation. Yet, due to an investment-heavy cost structure, fundamental uncertainty about long-term revenues, and the absence of functioning long-term risk-hedging markets, VRE investments often face difficult financing conditions that prevent them from reaching their full market penetration potential. Public risk-hedging instruments can help by reducing revenue uncertainty and, therefore, the weighted average cost of capital (WACC). One option that gained a lot of traction in recent years is a two-sided Contract for Difference (CfD) between the state and power plant operators that guarantees a certain amount of revenue relative to a predetermined reference price but skims off excess profits.

In this article, we calculate the possible impact of the private-to-public risk transfer implied by different CfD designs on the WACC of VRE investments and, in a second step, on the electricity system as a whole. Additionally, we assess the impact of CfDs on state budget volatility and explore a levying system as a possible hedging option that can also stabilize consumer prices. We do this by combining the numerical greenfield system-cost optimization model PyPSA-EUR for the German bidding zone with an analytical model of the effect of revenue uncertainty on the WACC. We compare scenarios with different WACC assumptions to show that there are significant potential systemic effects on consumer electricity prices, the share of VRE generation, and CO₂ emissions, largely independent of the specific CfD mechanism, especially when also accounting for a hedge against the risk of political market intervention. By relaying budget risks to consumers through a levying system, the variance in annual averages of electricity prices can be reduced by about a third. This effect shows to be especially pronounced for consumer price spikes caused by energy price shocks.

Presenting Author Biography

- B.Sc. and M.Sc. in Physics from the University of Jena with a specialization in Theoretical Physics (2018 to 2024)
- Doctoral Student in Energy Economics and EWI-Fellow at the University of Cologne (since 2024)
- Junior Consultant at Arepo GmbH (Berlin-based political consulting firm with focus on energy & climate policy evaluation, since 2022)
- Various energy-policy-related activities of political engagement on the local, regional, and national level