

Early nuclear power plant phase-out and nuclear decommissioning funds in the U.S.*

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Abstract

In the past decade, depressed wholesale electricity market prices in the United States placed nuclear power plants (NPP) in a financially vulnerable position. Between 2009 and 2022, thirteen reactors totaling 10.2 GW of installed capacity officially shutdown, primarily due to adverse economic conditions. To stem the tide of premature NPP retirements, several U.S. states rapidly introduced targeted out-of-market support schemes for ‘at-risk’ plants. The support schemes are short-term measures that are all set to expire by 2030. Premature NPP retirements severely curtails income streams which has direct implications on the adequacy of funds for safely decommissioning the facility. The aim of this paper is to investigate the U.S. nuclear support policy setting, quantify the total costs of a premature NPP phase-out, and assess the potential implications on decommissioning. In the first step, an ex-post assessment of state subsidized NPPs over a five-year period between 2017 and 2021 is conducted. The assessment tests whether out-of-market support schemes were justified for NPPs operating in two U.S. wholesale electricity markets. Results indicate that state support schemes should be designed flexibly and linked to market conditions. In the second step, a bottoms-up cost-minimization dispatch model is developed for the New York electricity market to investigate a set of potential future development scenarios. Preliminary results of the baseline calibration model and early scenario runs are reported. The flexibility of the dispatch model, would allow for extended scenarios taking into account cross-nuclear plant effects and cross-technology effects such as renewables. In a third step, the model will be deployed to assess the potential implications on the income streams of NPPs and by extension the sufficiency of nuclear decommissioning funds.

Keywords: nuclear phase-out, support schemes, electricity market, nuclear decommissioning

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