NUCLEAR SUPPORT SCHEMES IN DYNAMIC U.S. ELECTRICITY MARKETS

Muhammad Maladoh Bah, University of Basel, +41 612073381, muhammadmaladoh.bah@unibas.ch

Overview

Since 2017, several states in the U.S. introduced out-of-market support schemes for financially distressed nuclear power plants (NPPs) operating in wholesale electricity markets. The subsidy schemes are active in five U.S. states covering 19 reactors with a total installed capacity of 19.4 GW. In late 2021, the Biden administration proposed two new federal level support schemes known as the Civil Nuclear Credit (CNC) program and the Zero-Emission Nuclear Power Production Credit (NPPC) with the overall goal of providing additional financial support to vulnerable NPPs (Schneider et al. 2022). The introduction of the federal support layer for NPPs at this point in time is perplexing considering the improvement in wholesale market prices, which would ensure sufficient revenues for the plants. The federal schemes will significantly widen the pool of nuclear plants that would be eligible for financial support as Figure 1 illustrates.

Against this backdrop, this paper empirically tests whether out-of-market support schemes are justified for NPPs operating in the New York Independent System Operator (NYISO) and PJM wholesale electricity markets. Given the policy developments at the federal level, the analysis is extended to assess whether the coexistence of state and federal support schemes would result in excess profits for NPPs. This paper is unique since it provides regulators with a timely assessment on the profitability of NPPs, taking into account both state and federal level revenue streams. More importantly, this paper provides practical suggestions on how the nuclear support schemes can be redesigned to reflect dynamic electricity market conditions and ensure only vulnerable plants are granted out-of-market support.

Figure 1: State and federal nuclear support scheme coverage in the U.S.
Source: (Bah 2023)

Methods

To answer the policy questions, this paper evaluates the profitability of 16 state supported nuclear reactors in the NYISO and PJM electricity markets over a five year period between 2017 and 2021. A simplified two-step approach is adopted for the profitability assessments. In the first step, total revenues from both market and out-of-market sources are estimated for the sample NPPs and compared with operating costs. In the second step, 2021 is selected as a hypothetical start date for the federal level schemes. Total revenues are then re-estimated and compared with operating costs. The profitability assessments are based on several publicly available datasets, including plant

specific historical generation data, average day-ahead market prices, plant specific capacity market prices, historical NPP operating costs and support scheme credit prices.

Results

The results of the assessment indicates that NPPs were able to cover their operating costs over the duration of the sample period without the need for state support schemes. The results prove that with moderate to high wholesale market prices, NPPs in both markets are able to continue operating without a support scheme in place. If state and federal support schemes coexist, the magnitude of excess profits would be substantial. In NYISO, a single federal level scheme alongside the state Zero Emission Credit (ZEC) policy will generate relative profits ranging between $365,000/MW to $369,000/MW annually. While, in the PJM market, relative estimated profits would range between $266,000/MW to $370,000/MW annually.

Conclusions

This paper reviews the profitability of state subsidized NPPs in two electricity markets and over a period of time. The results prove that NPPs are in an economically robust condition to continue operating without the need for any support schemes. Moreover, the results suggest that an additional federal support buffer is not needed in the current market conditions. From a policy perspective, the eligibility criteria for the federal scheme needs to be fortified to avert the possibility of NPPs benefiting from both state and federal revenue sources. In this dimension, NPPs already subsidied at the state level should be disqualified from applying for federal funding. Likewise, rate-regulated facilities that cover a substantial proportion of their costs through cost-of-service contracts should be disqualified from the federal support schemes. Turning to the dynamics of electricity markets, state credit prices should be regularly reviewed to ensure it matches with market conditions.

References

Bah, Muhammad Maladoh. 2023. “State and Federal Nuclear Support Schemes in Dynamic Electricity Market Conditions: Insights from NYISO and PJM.” WWZ Working Paper. https://edoc.unibas.ch/93914/.

Schneider, Mycle, Antony Froggatt, Julie Hazemann, M. V. Ramana, Michael Sailer, Tatsujiro Suzuki, Christian von Hirschhausen, et al. 2022. “World Nuclear Industry Status Report 2022.” Paris: Mycle Schneider Consulting.