

# Techno-economic study of output-flexible light water nuclear reactor systems with cryogenic energy storage

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## Abstract

This study explores whether a nuclear power plant can be combined with a cryogenic energy storage plant to allow the resultant facility to provide variable power to the grid. The study expands on previous literature by performing novel market-led system optimisation to best design the output profile of the plant to improve economic performance in the UK electricity grid. There are three key conclusions that emerge from this study:

- the current UK electricity market favours plant designs with rapid discharge rate,
- provided that the capital cost expectations of the NuScale SMR are realised, strike prices of £55/MWh are sufficient to ensure a return on investment, however,
- the case for storage remains weak and only becomes viable in extreme spot market conditions.

**Keywords** uncertainty analysis, power grid economics, energy storage, nuclear power

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