



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

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This working paper explores whether a nuclear power plant should be coupled with a cryogenic energy storage plant to deliver variable-output power to the UK electricity grid. The study combines engineering and financial analyses with a view to minimising project risk in a variety of hypothetical market environments. The engineering modelling allows for an accurate sizing of plant equipment and such considerations are fed into our estimations of capital cost. The subsequent financial modelling allows for a feedback to the engineering design such that the plant output and storage capacity might best be tailored to best suit the particular properties (e.g. price volatility) of the electricity market. Particular consideration is given to a nuclear power plant with energy storage operating in a UK market with output targeted at a combination of long-term Contract for Difference (CFD) commitments and more opportunistic short-term spot market sales. The working paper reveals that, for the electricity markets considered, a hybrid nuclear energy-storage system based upon light water nuclear technology and cryogenic energy storage is unlikely to be attractive proposition, primarily as a consequence of insufficient opportunity for arbitrage in the UK electricity market. The paper considers lower possible CFD prices and the level at which storage for spot market sales might become a more attractive option for part of the electrical output than simple sales under a CFD arrangement.

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