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Complementarity of renewable energy generation and its storage in desalination processes

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ABSTRACT

Addressing the variability of renewable energy sources (RES) remains a fundamental challenge in the establishment of stable and sustainable energy grids. This review emphasises the significance of integrating various RES, such as solar, wind, and hydropower, to mitigate intermittency. Technological advances, including energy storage solutions and smart grid systems, play crucial roles in balancing energy distribution. Cooperative game theory and interregional collaboration show potential for optimising multi-energy complementarity. In particular, the integration of large-scale energy storage technologies, especially in desalination plants, demonstrates promising cost reduction and emission reduction. Furthermore, the strategic selection of energy storage technologies aligned with specific RES characteristics proves essential to achieve a stable and efficient energy mix. These insights provide a roadmap for a more sustainable, reliable energy system supported by renewable energy sources.

Keywords: Desalination; Renewable energy sources; Energy storage

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