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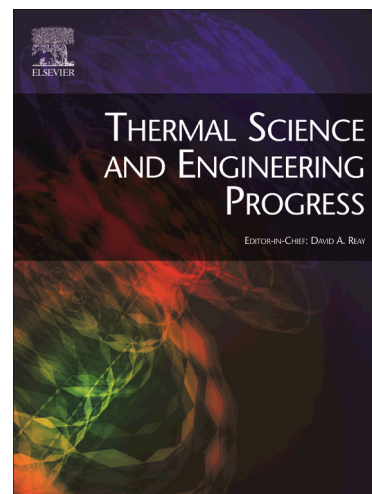
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Pumped Thermal Electricity Storage: a technology overview

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Abstract

A large penetration of variable intermittent renewable energy sources into the electric grid is stressing the need of installing large-scale Energy Storage units. Pumped Hydro Storage, Compressed Air Energy Storage and Flow Batteries are the commercially available large-scale energy storage technologies. However, these technologies suffer of geographical constraints (such as Pumped Hydro Storage and Compressed Air Energy Storage), require fossil fuel streams (like Compressed Air Energy Storage) or are characterised by low cycle life (Flow Batteries). For this reason, there is the need of developing new large-scale Energy Storage Technologies which do not suffer of the above-mentioned drawbacks. Among the in-developing large-scale Energy Storage Technologies, Pumped Thermal Electricity Storage or Pumped Heat Energy Storage is the most promising one due to its long cycle life, no geographical limitations, no need of fossil fuel streams and capability of being integrated into conventional fossil-fuelled power plants. Based on these evidences, in the present work, a literature survey on the Pumped Thermal Electricity Storage technology is presented with the aim of analysing its actual configurations and state of development.

Keywords:

Pumped Thermal Electricity Storage, Pumped Heat Energy Storage, Reversible Brayton cycle, Transcritical Rankine Cycle, Compressed Heat Energy Storage.

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