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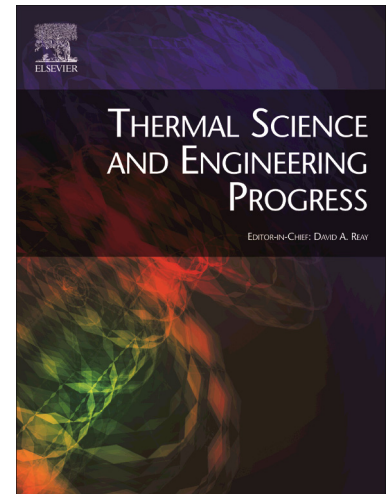
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## Experimental investigation into the feasibility of using a variable conductance heat pipe for controlled heat release from a phase-change material thermal store

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### Abstract

Traditional heat storage uses large water tanks, with wide operating temperature differentials that restrict their use with heat pumps and Stirling engine DCHP systems. In contrast, the system developed under the 'THERMAC' project uses phase change materials (PCMs) for thermal storage to reduce system size, with a self-regulating, variable conductance heat pipe (VCHP) to control heat output. The VCHP is a heat pipe whose condenser is linked to a reservoir of non-condensable gas – in this case argon. Small temperature gradients expand or contract the argon along the condenser, so that it acts as a thermal switch by controlling the active length of the condenser.

The study was successful in its main objective of demonstrating the basic technical feasibility of (i) Erythritol PCM as a means of heat storage (ii) over-coming the PCM's low thermal conductivity by using fins on the VCHP, and, (iii) a VCHP as a means of controlling the thermal output of the PCM storage system, thereby increasing their overall efficiency.

Recommendations are made for further development of the 'THERMAC' concept.

### Abbreviations

BSRIA – Building Services Research and Information Association

DCHP – Domestic Combined Heat and Power

DHW – Domestic Hot Water

HP – Heat Pump

mCHP – Micro-Combined Heat and Power

NCG – Non Condensable Gas

PCM – Phase Change Material

TES – Thermal Energy Storage

THERMAC – Thermal Management Controller for Domestic Micro-Generation Systems

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