

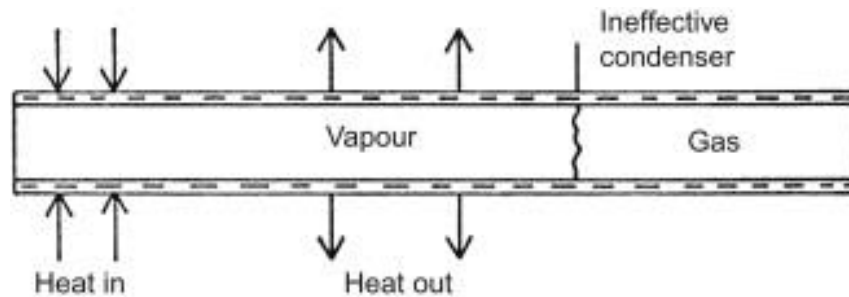
THERMAC

Thermal Management Controller for Domestic Micro-generation Systems

Funding: TSB & EPSRC

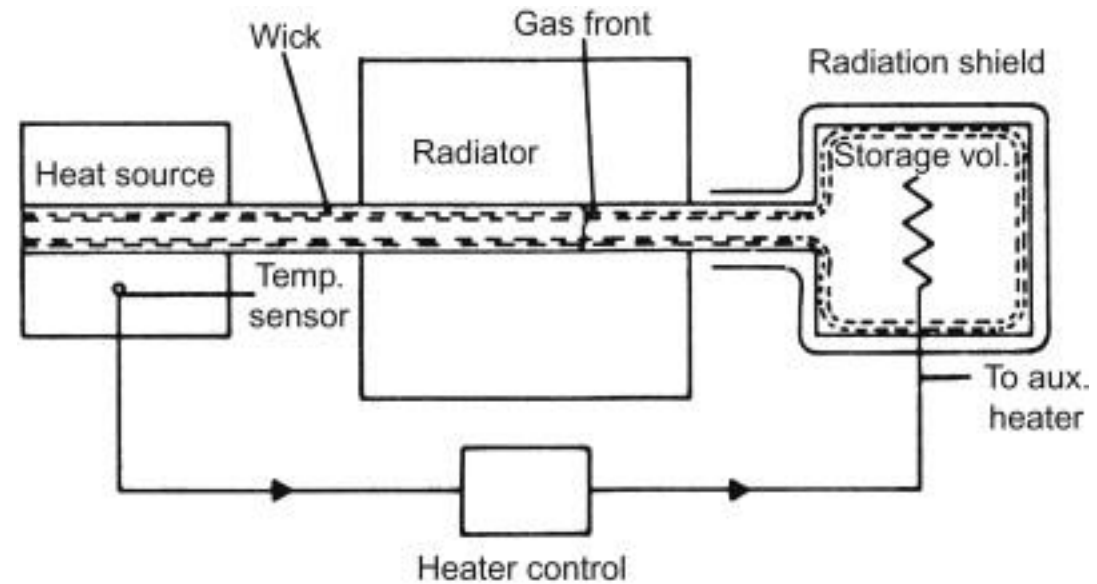
**Partners: SES (Lead); TWI; Thermacore; Northumbria University; DRA
(subcontractor) – the ‘THERMAC Team’.**

The Variable Conductance Heat Pipe (VCHP)



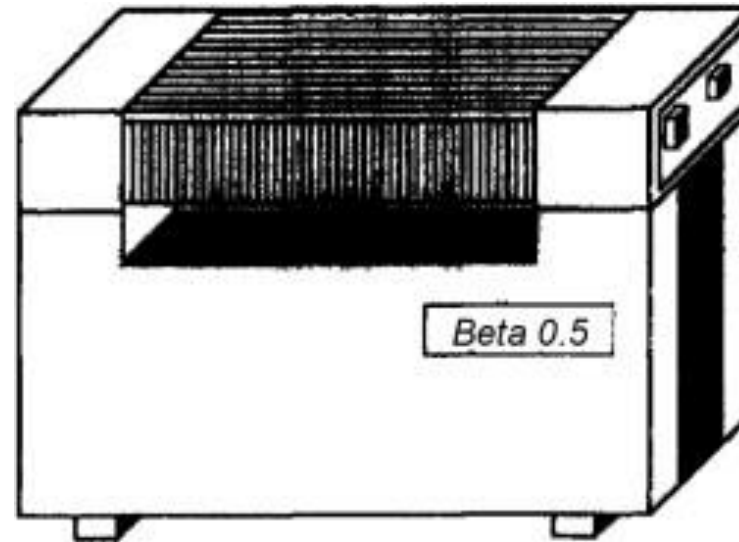
Simple heat pipe with non-condensable gas generation

Feedback-controlled VCHP with heated gas reservoir to control the heat output from the condenser/radiator



Heat Storage Radiator with Heat Pipes – Luikov Institute, Minsk

This unit uses a solid as the heat storage medium.
An alternative is a phase change material (PCM)



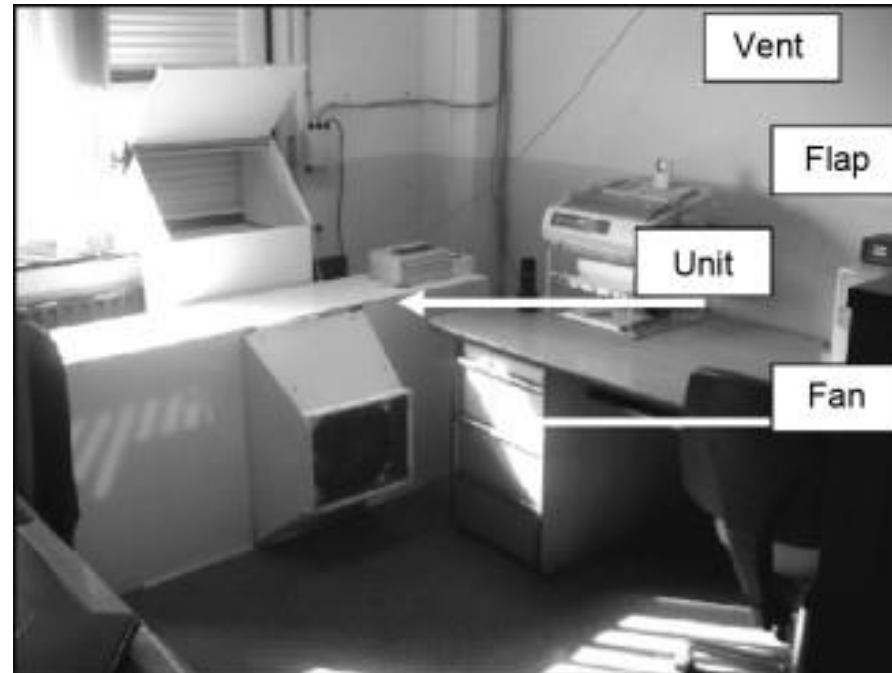
Heat pipes take heat from the brick core to the finned sections on the top, where heat is convected into the room

PCM/Heat Pipe Room Cooler- Nottingham University

By introducing a phase change material (PCM) into a heat store one can reduce the size for a given capacity. Heat delivery temperature can be readily selected.

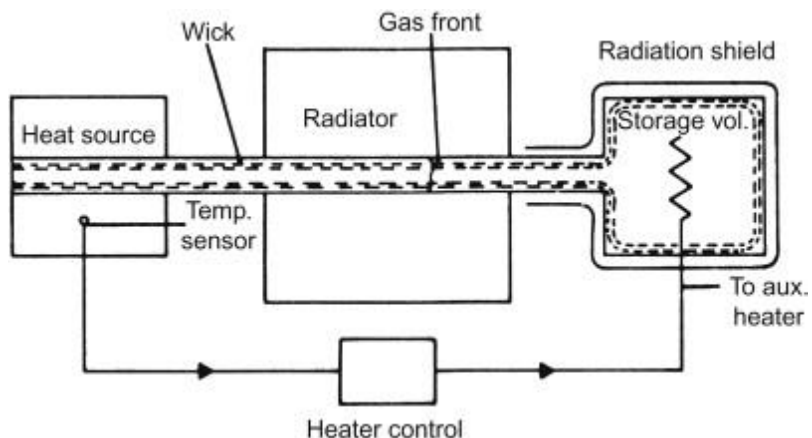
PCMs tend to have low thermal conductivity – so heat pipes can help to put heat (or in this case coolth) into the store, and remove it.

This 4kWh store at Nottingham University was for cooling an office using ‘coolth’ collected overnight.

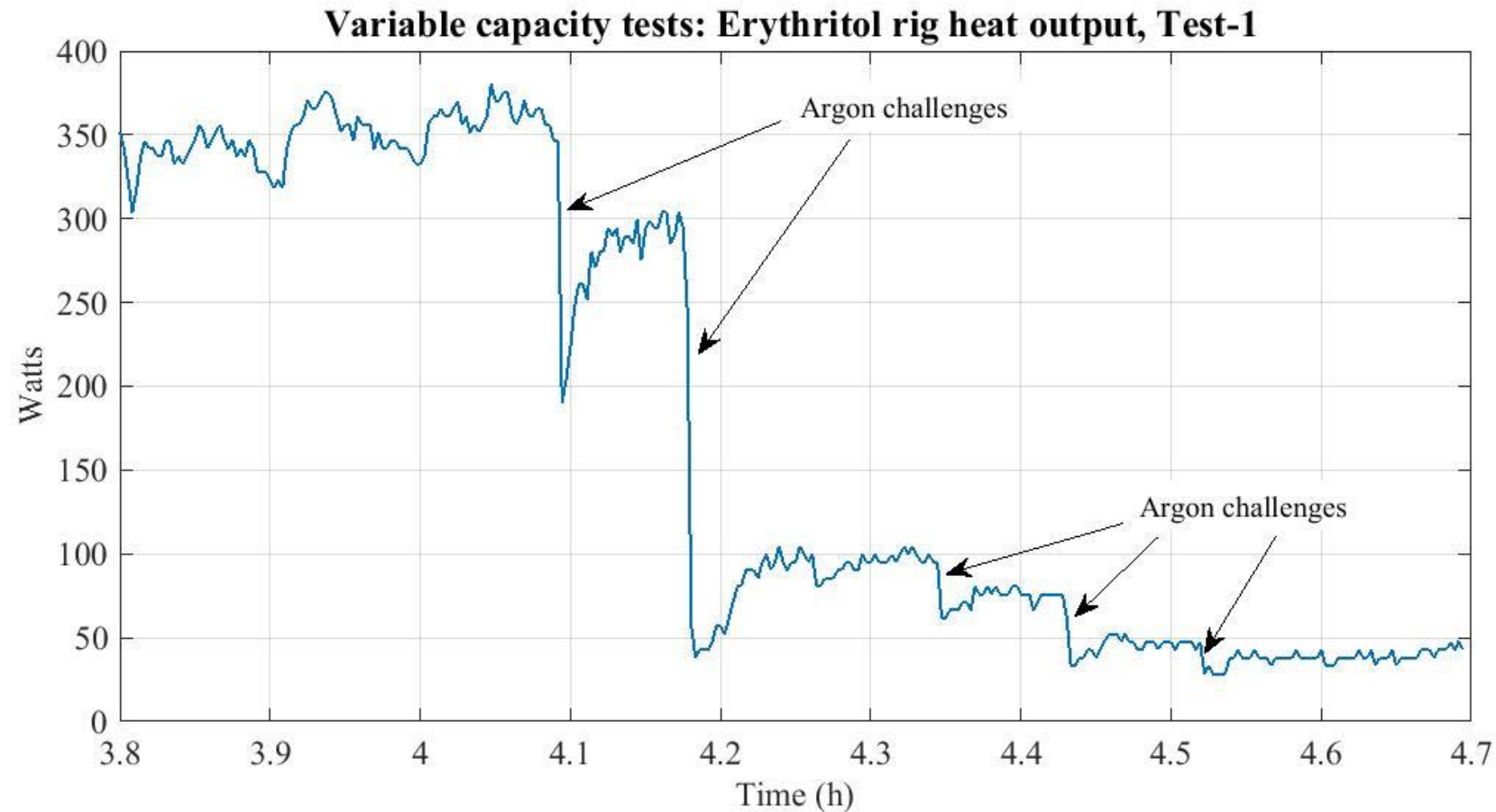


The THERMAC Project

By combining the heat pipe (VCHP type), and the PCM store, linked to a domestic CHP unit, one can control the time and quantity of heat delivered to a DHW system using control based upon varying the gas front in the heat output section (the condenser).



Control Effect – Northumbria University Measurements



Summarising:

- Heat pipes are effective in taking heat into and out of PCM stores
- The VCHP can control the rate of heat removal
- It does this by adjusting (manually or on a feedback loop) the amount of heat pipe condenser surface available for heat transfer
- This one-year feasibility study successfully demonstrated the principle
- A turn-down of almost 5:1 was achieved
- Salt hydrates and sugar-alcohols have been examined as PCMs to date
- Further projects are planned – and additional partners are invited.