

Thermal storage for use in industry and homes

Why Heat Storage is so important:

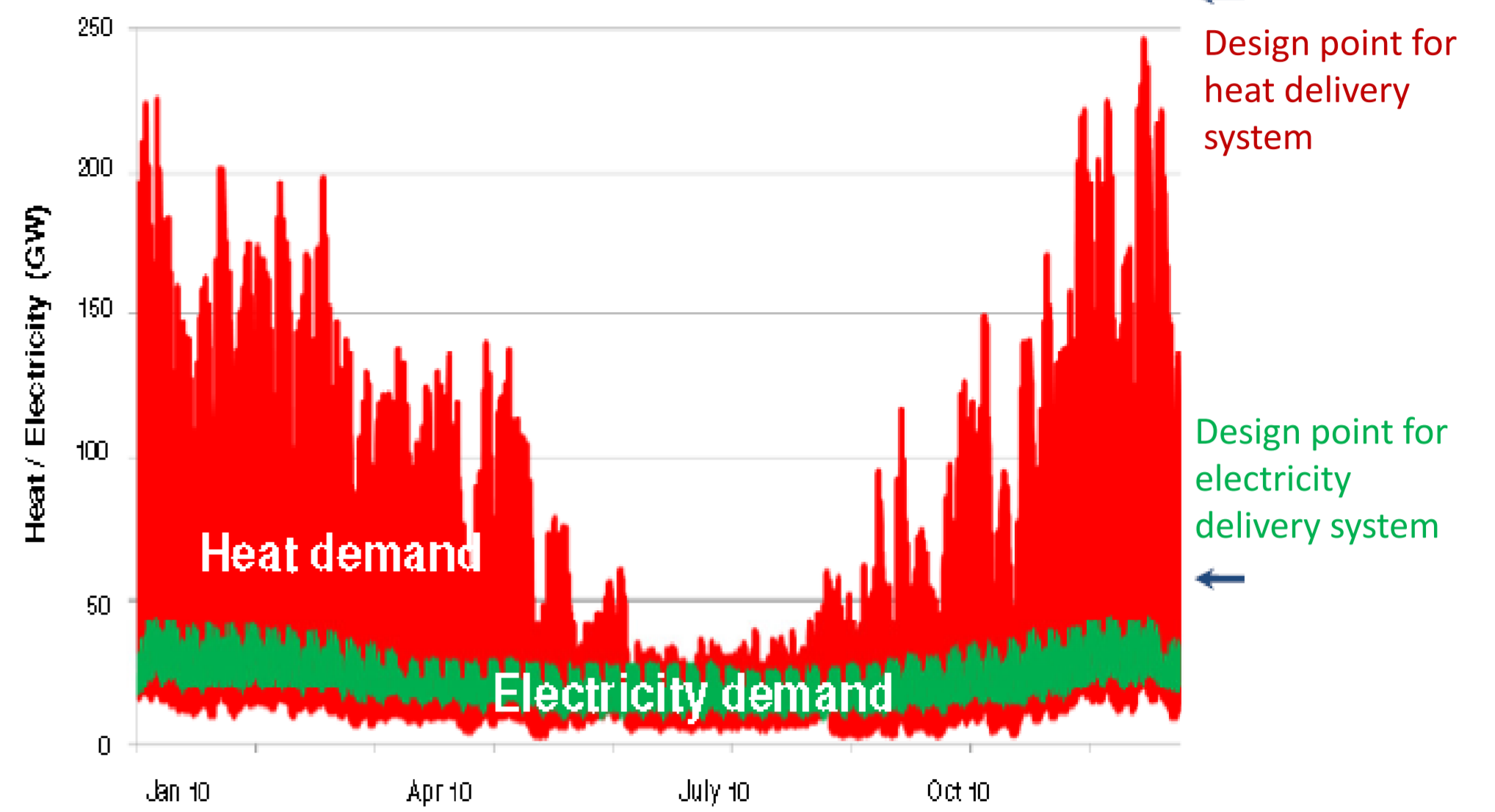
- The demand for both heat and electricity vary enormously, both during the day (diurnally) and year (seasonally).
- The variation in heat demand is much more than that in electricity demand, but at present is within the capabilities of the gas supply and distribution network.
- If renewable electric heating using heat pumps becomes the norm then the peaks and troughs in electricity demand will be beyond the capacity of the electricity production and distribution network. It would need to be doubled or tripled in size at vast capital cost.

To avoid these issues we need to store energy, either at the point of generation or the point of use.

Our effort is on End Use Energy Demand, where heat storage is more practical.



2010 UK heat & electricity hourly demand variability

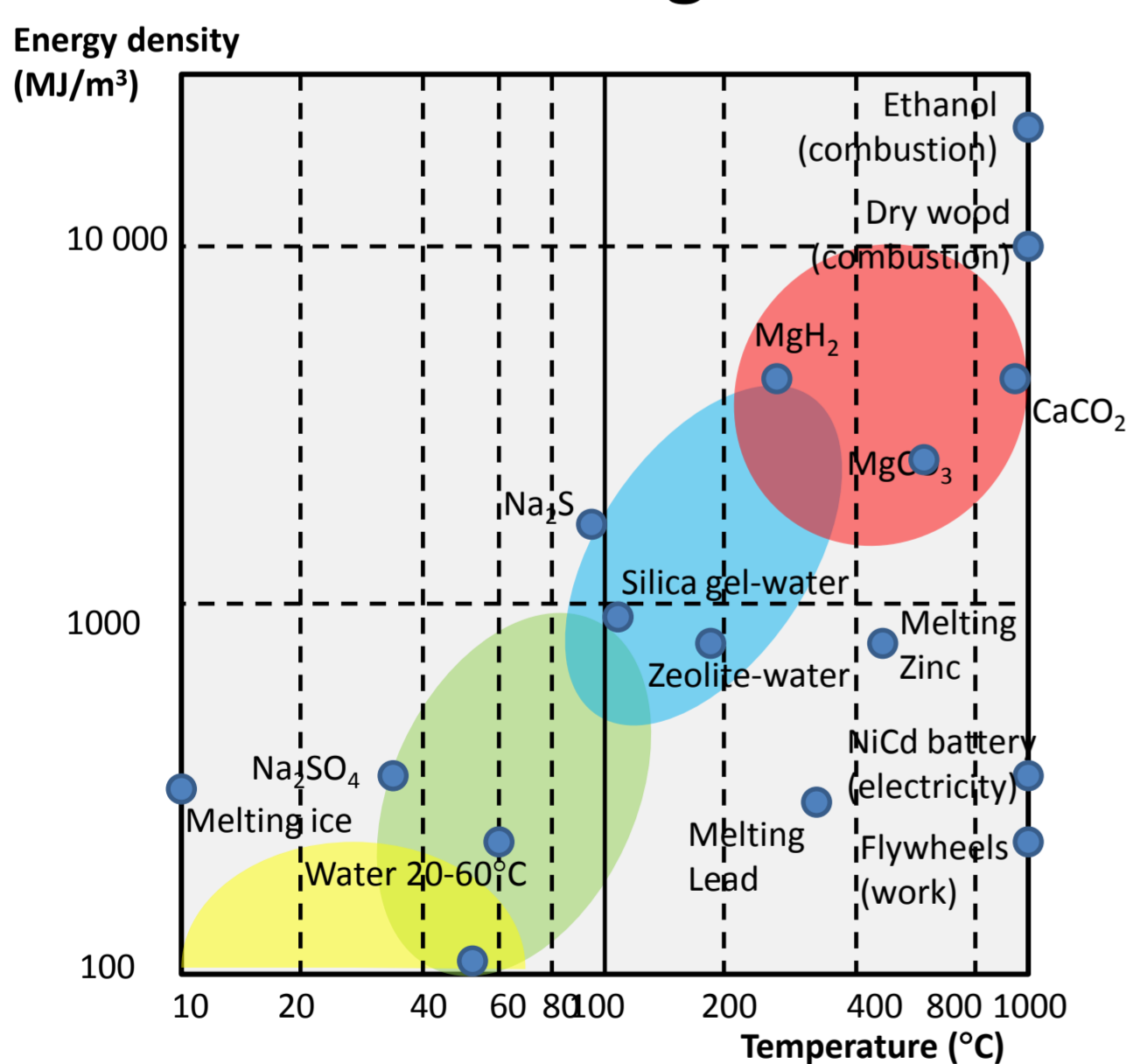


Source: Energy Technologies Institute, 2012
Delta EE, 2014

Applications:

1. Storing the heat output of domestic electric heat pumps for hours or up to a day. This has the advantages of:
 - Reducing the fluctuating demand on the supply network
 - Allowing the use of smaller, lower cost, heat pumps that can be sized for mean daily load rather than peak load
2. Many industrial processes, particularly in the food processing industries generate large quantities of waste heat in batch processes. Ideally this waste heat could be used elsewhere in the factory, but the demand occurs at a different time. Storage can make this waste heat useful and reduce industrial End Use Energy Demand.

What sort of storage?

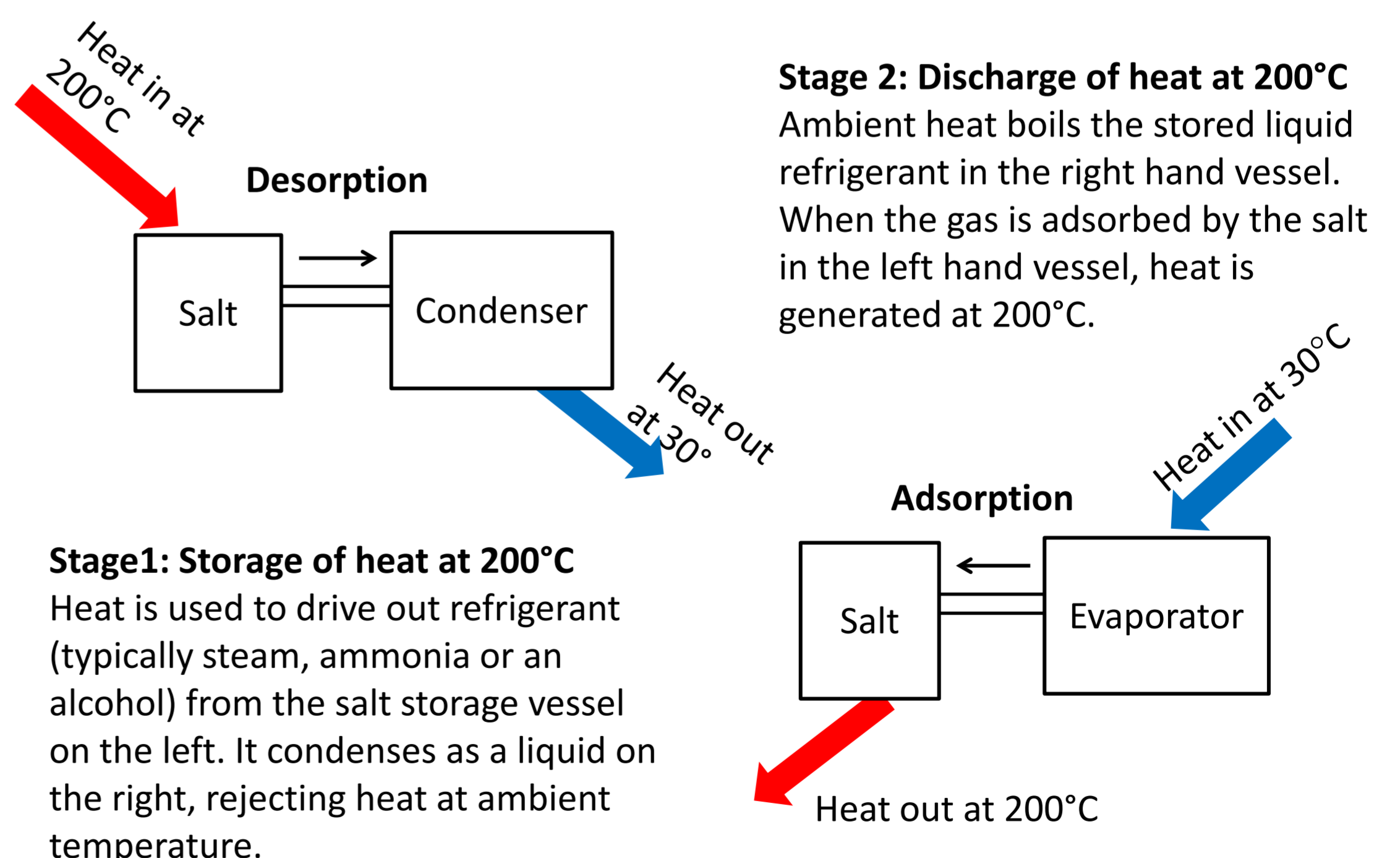


Low storage density, temperature

- Sensible heat (change in temperature)
- Phase change materials (melting)
- Sorption (gas – solid physical reaction)
- Reversible chemical reactions

High storage density, temperature

Research at Warwick – sorption and chemical reactions



1-salt thermal store (c. 2 MJ/litre)