

How cool hot the magnets can be?

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Magnetic Heat Pump:
Works on the basis of **magnetocaloric (MC) effect**.

Certain materials become hot when exposed to magnetic field and cold when removed.

MC effect is utilized in a thermodynamic cycle to build a **magnetic heat pump**.

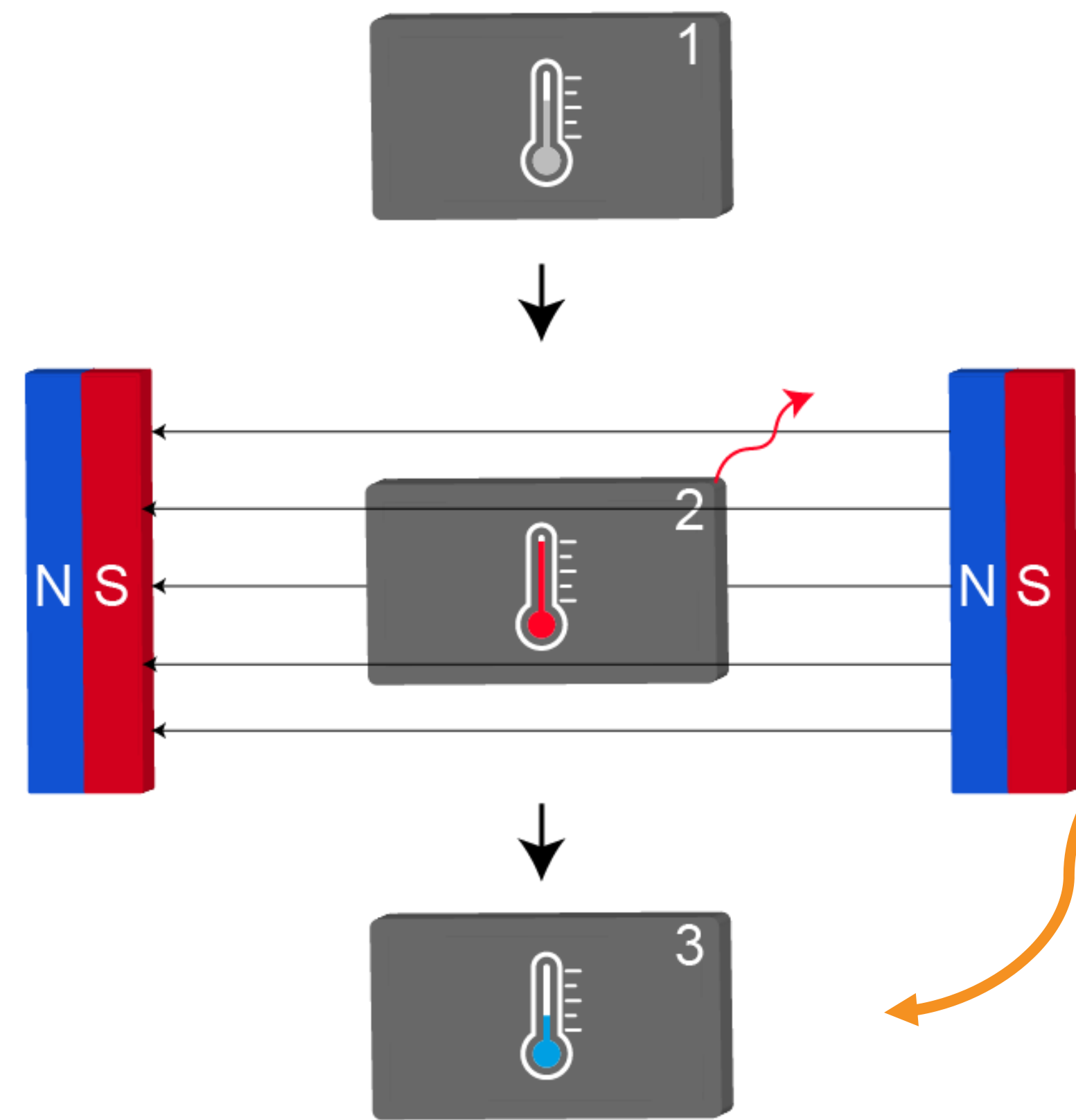


Fig. 1 - Magnetocaloric effect: Temperature change induced by magnetic field change.

10 to 20% energy efficient and eco-friendly when compared to the dominantly used vapor compression heat pump. This is considerable as nearly **one-seventh of the global energy** consumption is for heating and cooling. (Gschneidner, and Pecharsky, Int. J. Ref. 945-961, 2008)

Why?

Where?

It can be used over a wide range of temperature – from **approaching absolute zero** to **ambient refrigeration** to **industrial waste heat upgradation**.

What's new?

We envision to build a magnetic heat pump with **no moving parts** and using **liquid metal heat transfer fluid**.

increases system-reliability

lowers system-cost, as its desirable thermal properties lowers the amount of magnets used, which is the most expensive component.

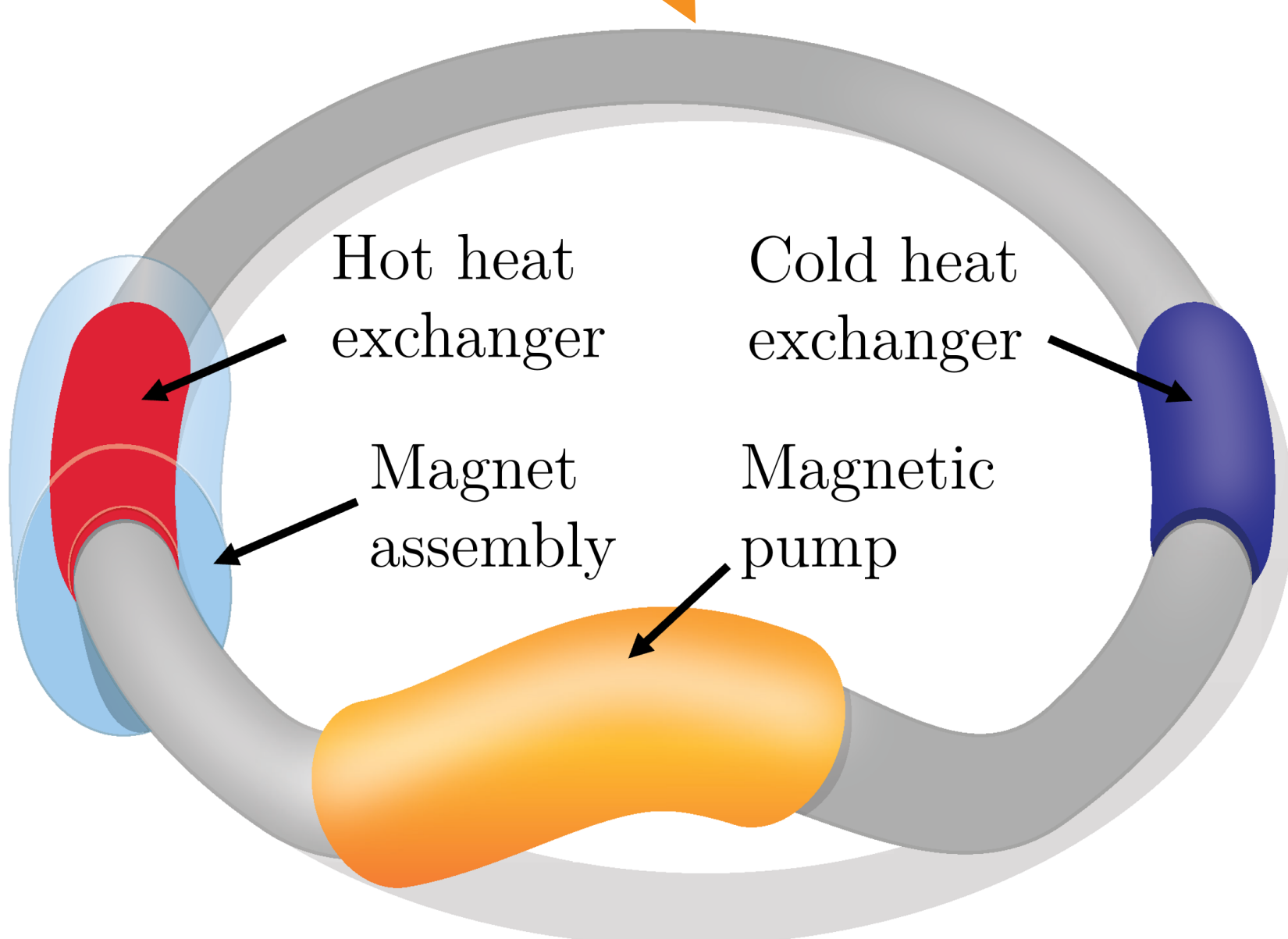


Fig. 2 - Schematic of a magnetic heat pump with no moving parts. Read more at: K. Rajamani et al., Applied Energy, 122253, 2024.

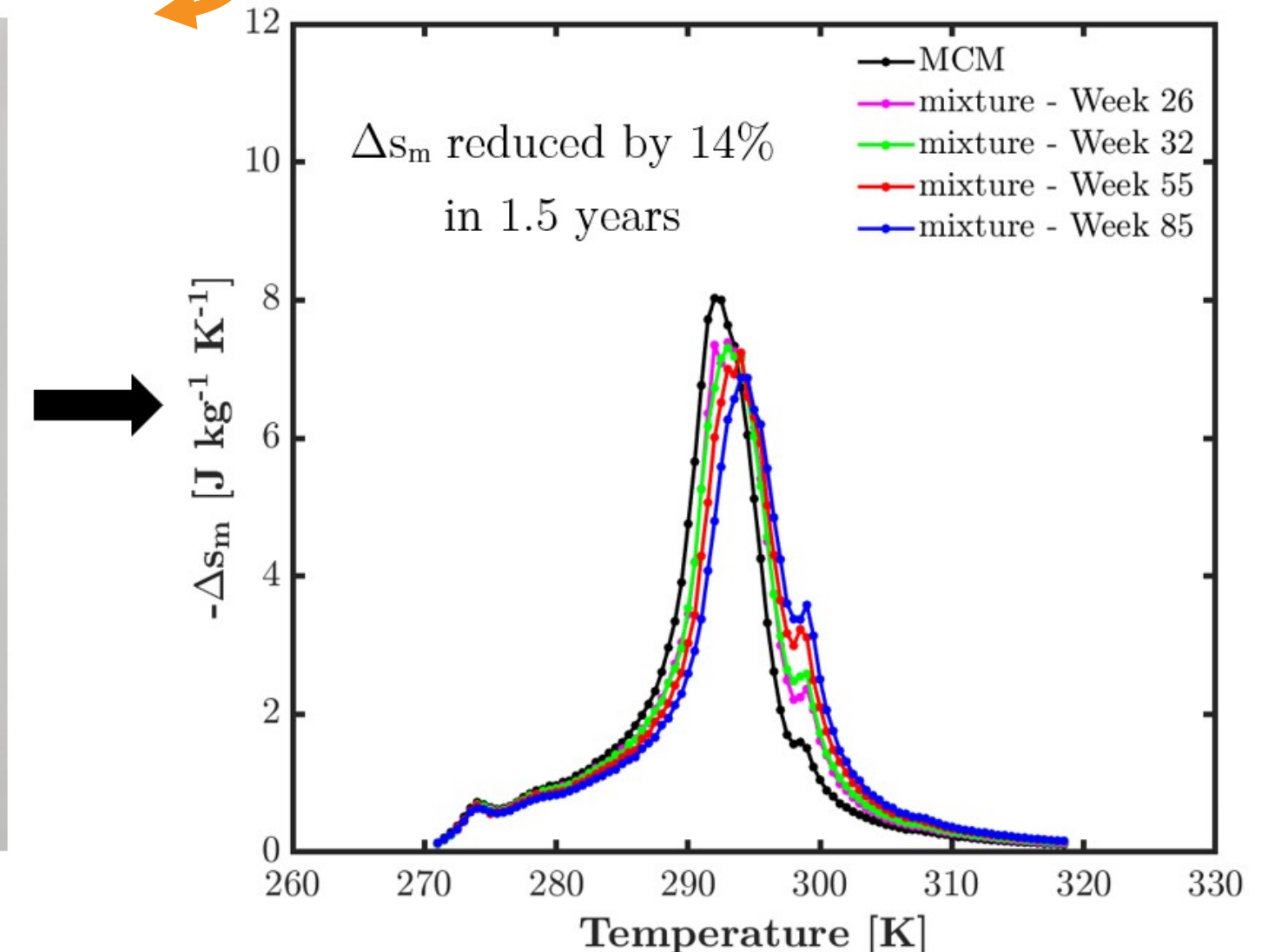


Fig. 3 - Testing the compatibility of liquid metal for magnetic heat pump. Read more at: K. Rajamani et al., ACS Omega, 49027-49036, 2023.

We are actively looking for collaboration. If interested, do connect through email (k.rajamani@utwente.nl) or LinkedIn, and I will be happy to discuss further 😊.



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