



carbonclean

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06. December 2023: ESTEP/EASE Webinar

High Temperature Thermal Storage for Industrial Process Heat

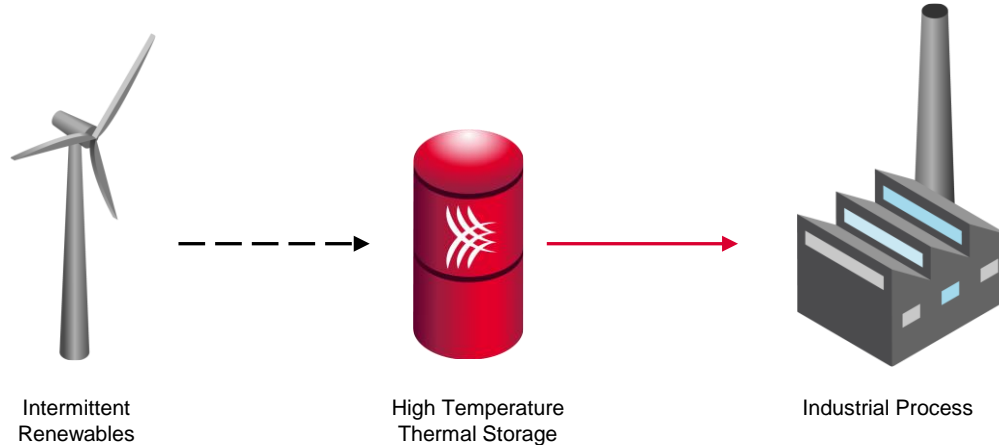


25%

**Proportion of
global CO₂
emissions
caused by
industrial
process heat**

The solution is simple

We believe that cheap, renewable electricity buffered by storage provides a cost-competitive solution

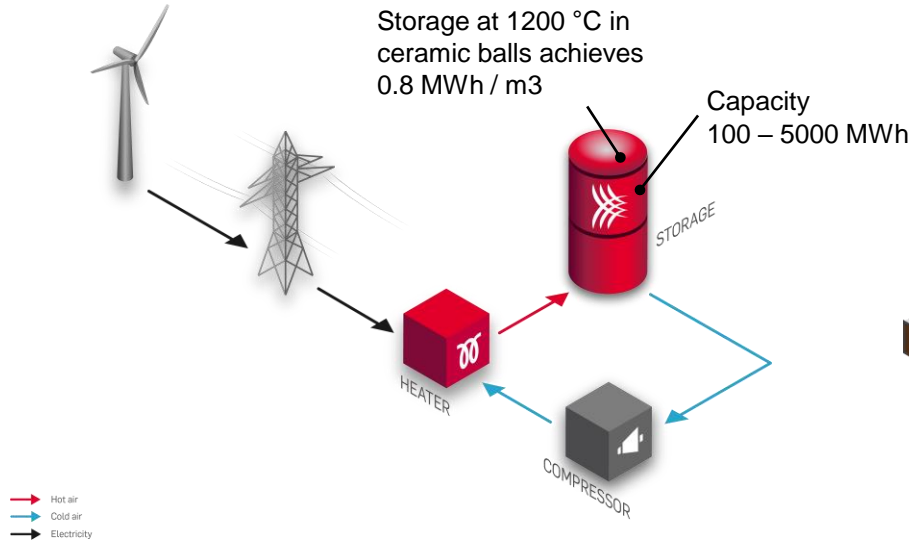


High Temperature Thermal Storage for Industrial Process Heat

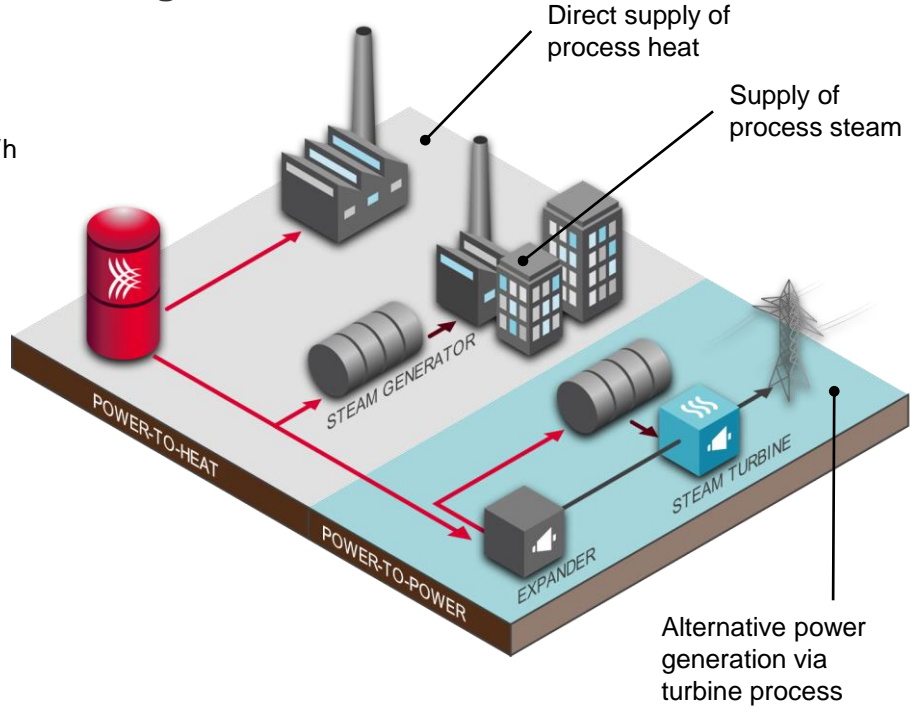
Technology Overview

Our technology

Charge

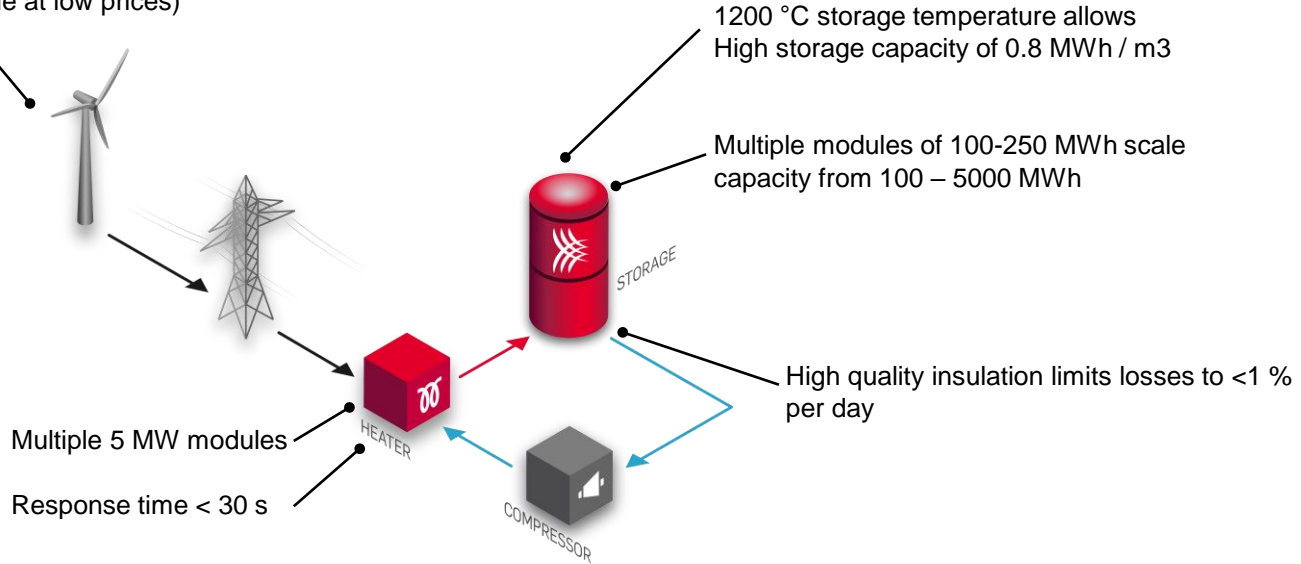


Discharge

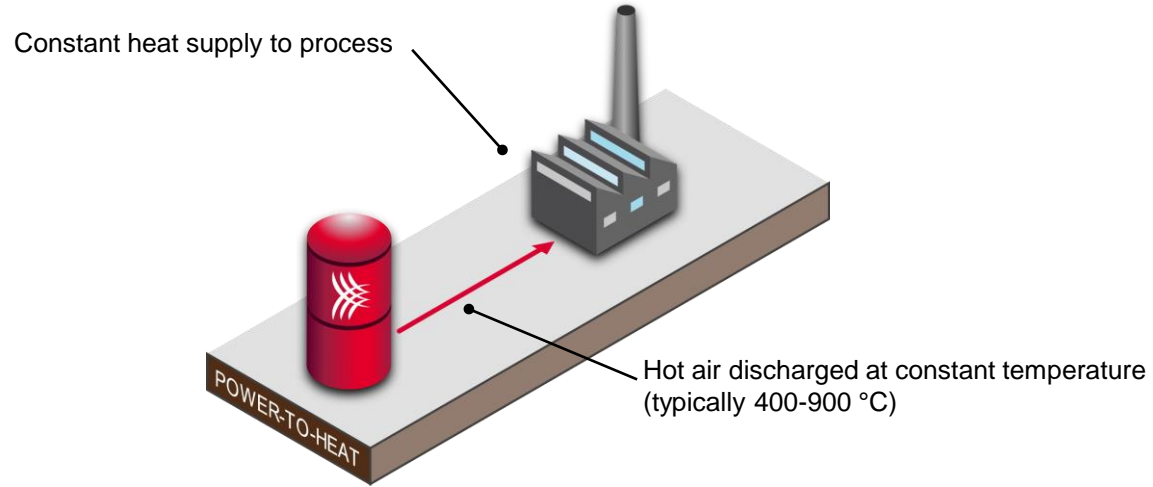


Key features

System is charged during high availability of renewables (ie at low prices)

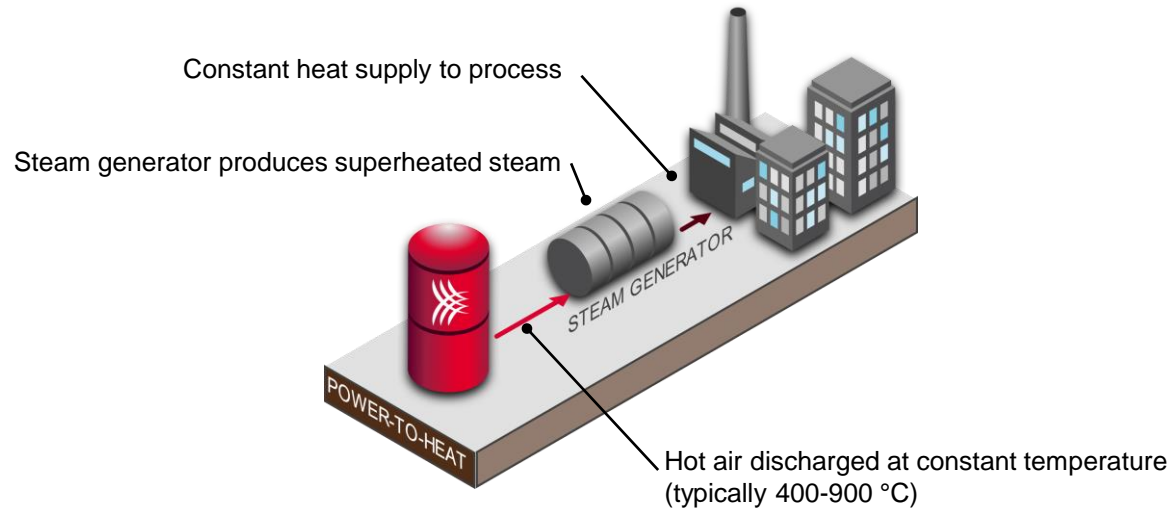


Integration into high-temperature processes



High Temperature Thermal Storage for Industrial Process Heat

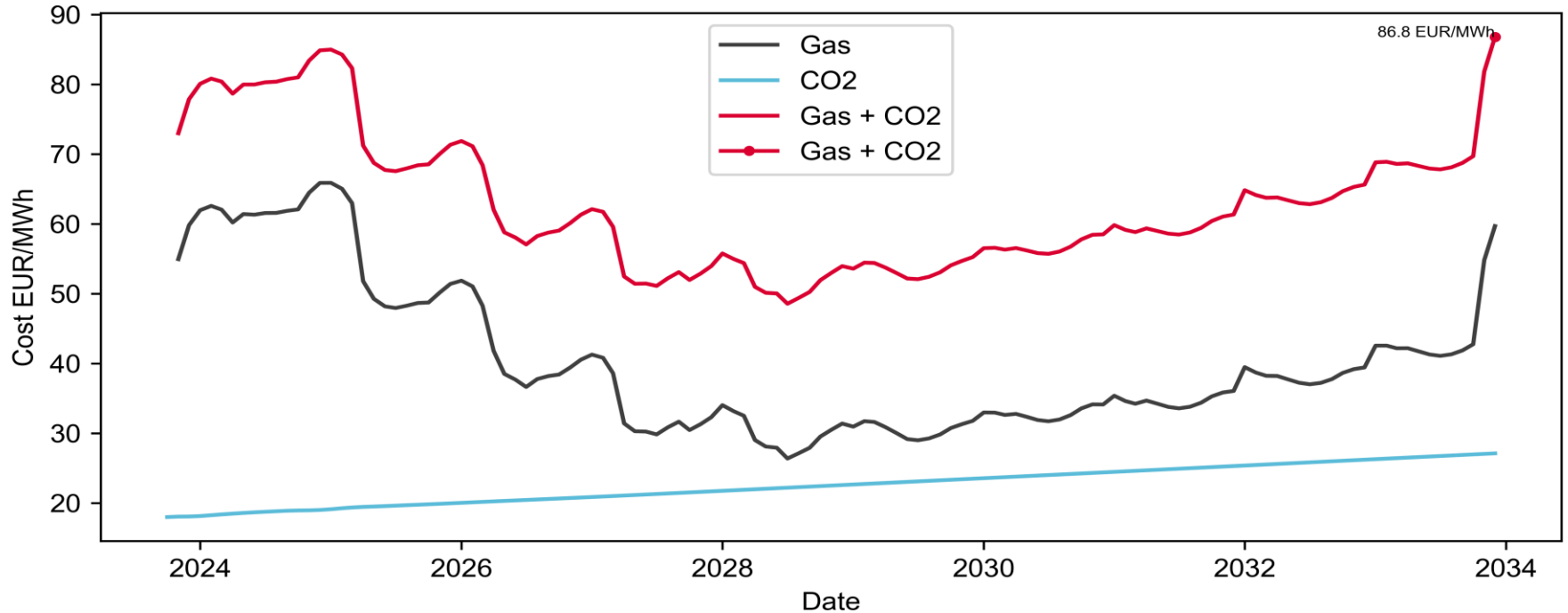
Integration into steam processes



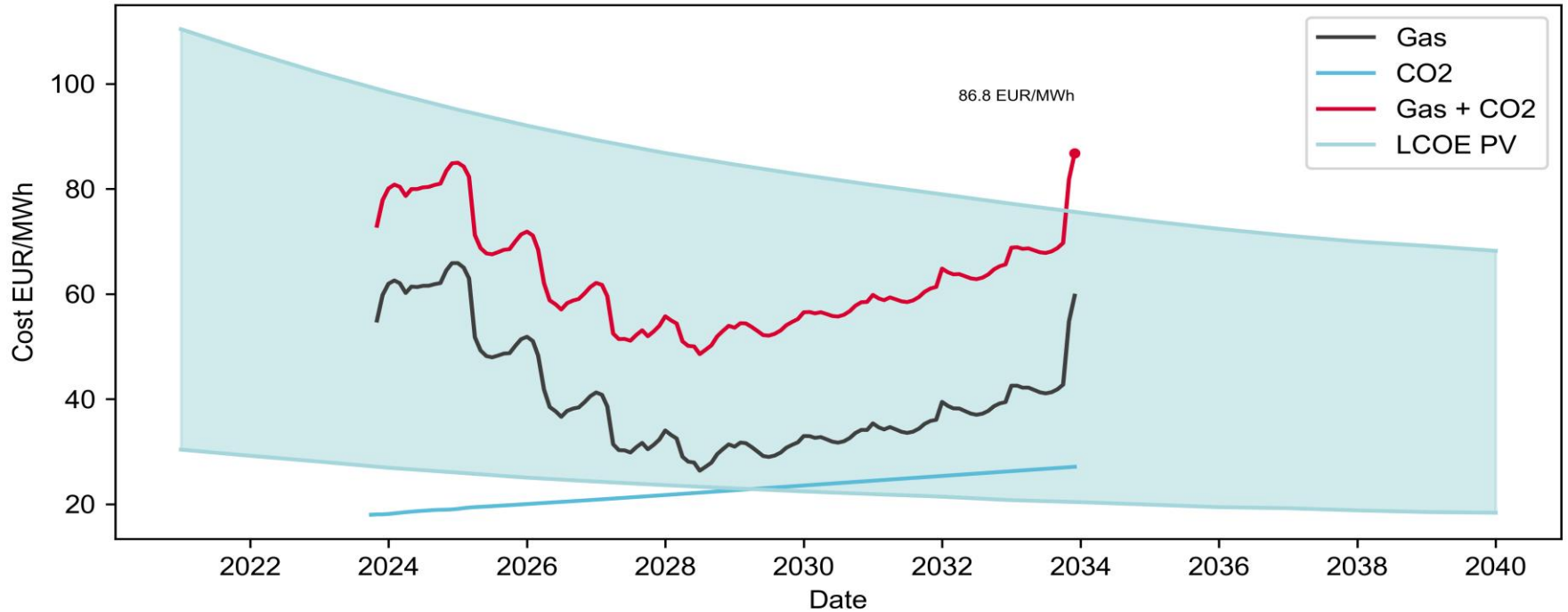
High Temperature Thermal Storage for Industrial Process Heat

Economics of power-to-heat

Fossil heat is expected to remain expensive for the foreseeable future



PV LCOE is already cheaper than gas

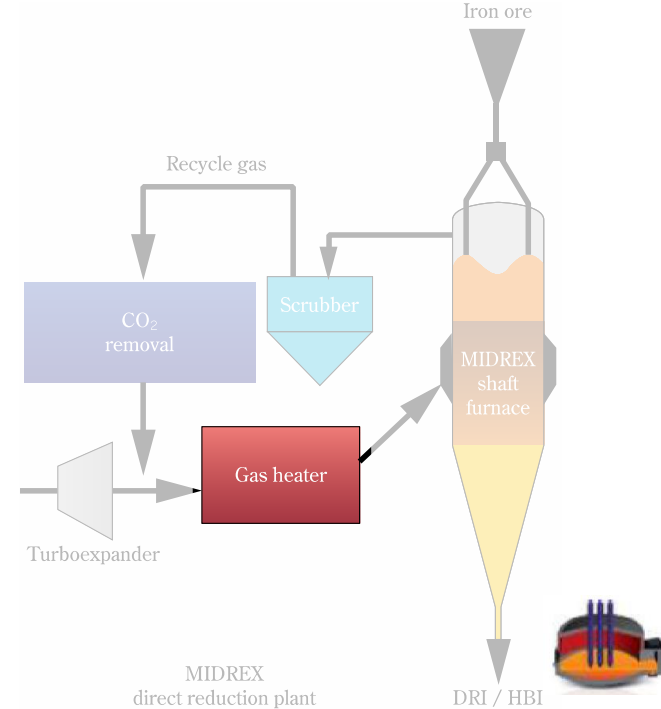
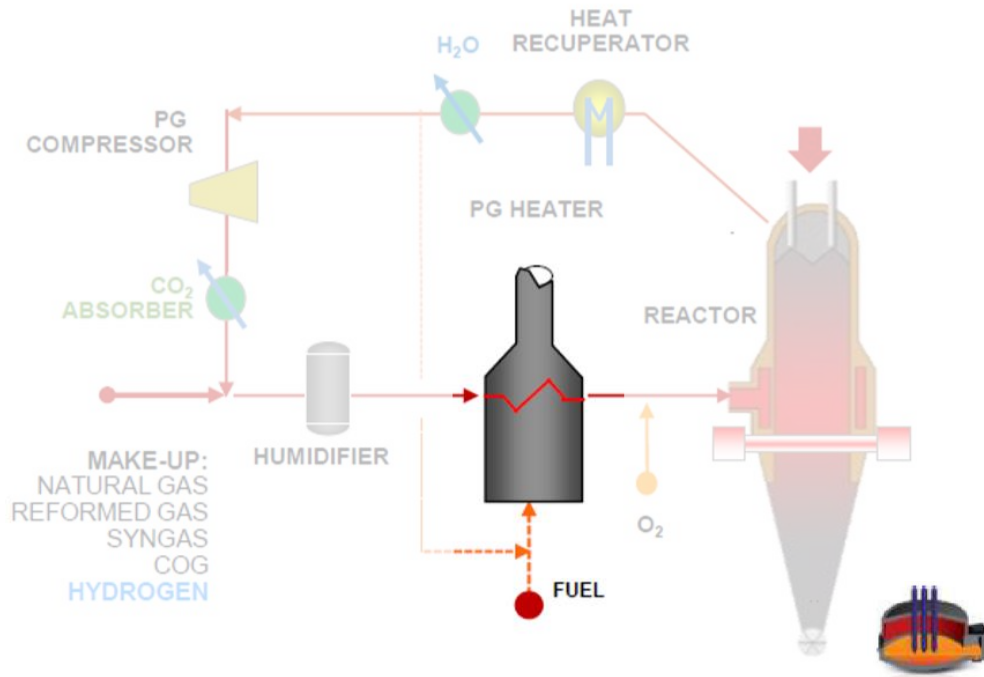


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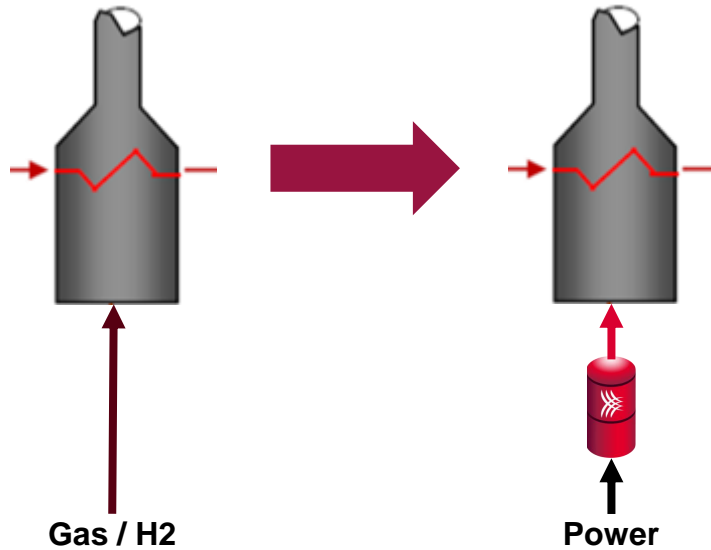
Applications for the steel industry

DRI processes have a large heat requirement

Either gas or H₂ will be burned to indirectly heat the reducing gas flow



The process heat requirement can be supplied by high temperature storage



- » CO2 free process
- » Better efficiency than H2 (95% vs. ca. 70%)

High Temperature Thermal Storage for Industrial Process Heat

R&D and Innovation Potential

Active research and development of the storage technology



Energy Systems
and Technology
Prof. Dr.-Ing. B. Epple



TECHNISCHE
UNIVERSITÄT
DARMSTADT

- » Leading European institute for power plant and CHP-plant design
 - » Prof. Dr. Bernd Epple (Director)
 - » Dr.-Ing. Falah Alobaid (Research Team Lead)

- » 1 MWh demonstrator in operation.

- » Scale-up of heater is underway (1 MW; 1200 °C), supported by regional grant

Innovation potential

- » We are interested in discussions with the steel industry regarding the application of thermal energy storage
 - » For process heat in ironmaking
 - » For replacing gas combustion in furnace

Let's talk

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Let's talk!

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Agenda

<u>Zeit</u>	<u>Thema</u>	<u>Referent</u>
12:30 – 12:40	Ankunft & Begrüßung // Vorstellungsrunde	Alle
12:40 – 12:50	x y z	Thomas Mustermann
12:50 – 13:10	x y z	Thomas Mustermann
13:10 – 14:00	x y z	Thomas Mustermann
14:00 – 14:30	x y z	Thomas Mustermann