MISSION INNOVATION

HEATING AND COOLING - SORPTION HEAT PUMP SYSTEMS

Catch-up meeting (ZOOM)

Thursday 8th October 2020

3pm BST – 4pm BST

Dr. Eng. Salvatore Vasta, PhD.
Research Engineer
Head of Thermally Driven Heat Pumps and Thermal Storage Research Group

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ROLE of CNR - ITAE

1. Modelling of alternative applications of the technology to higher temperatures (for use in industry) and storage devices

2. Simulation and optimization of different reactor designs.

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TASK 1: Identification of possible alternative application for heat storage in INDUSTRIAL field

THE BACKGROUD

Solar energy is regarded as one of the most promising substitutes for traditional energy sources in the industrial field

…HOWEVER…

its intermittent and unstable nature is a major drawback, leading to an UNACCEPTABLE mismatch between supply and demand.

In such a context, solar heat storage is an appropriate method of CORRECTING the time and power mismatch

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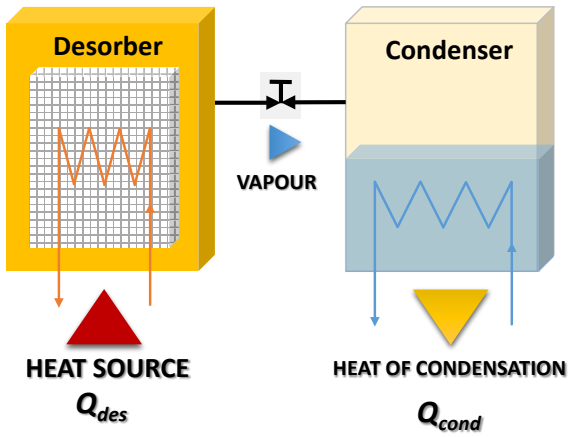
MOREOVER

Thermal storage systems today are perceived as crucial components in solar energy applications:

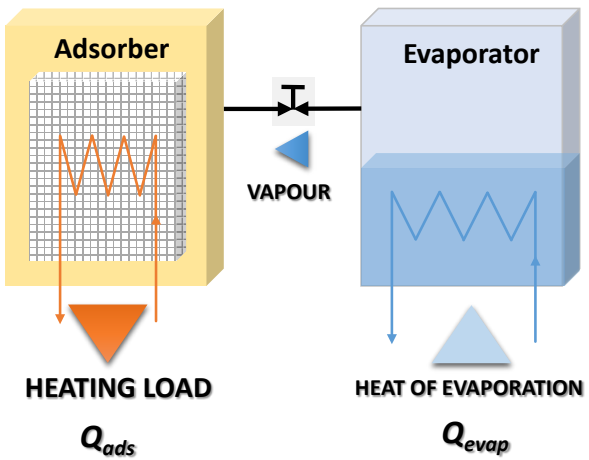
- **enhance the fraction of solar heat utilisation and**
- **make solar energy products more practical and attractive**

THE IDEA: investigate the possibilities of CLOSED CYCLE sorption system coupled with solar energy

a) CHARGING PHASE (Desorption)



b) DISCHARGING PHASE (Adsorption)



It's HALF HPing cycle

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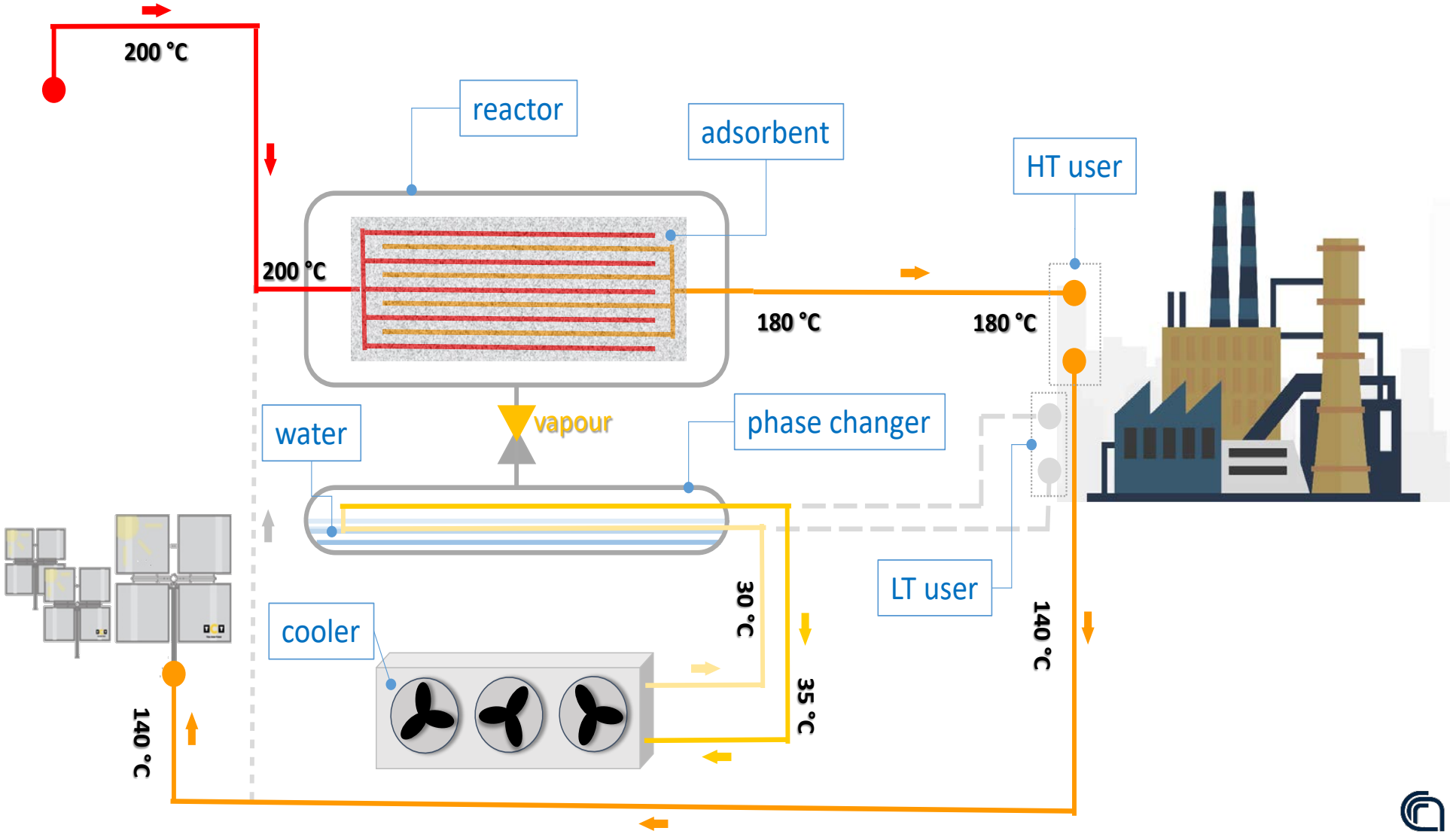
How it WORKS: charging stage



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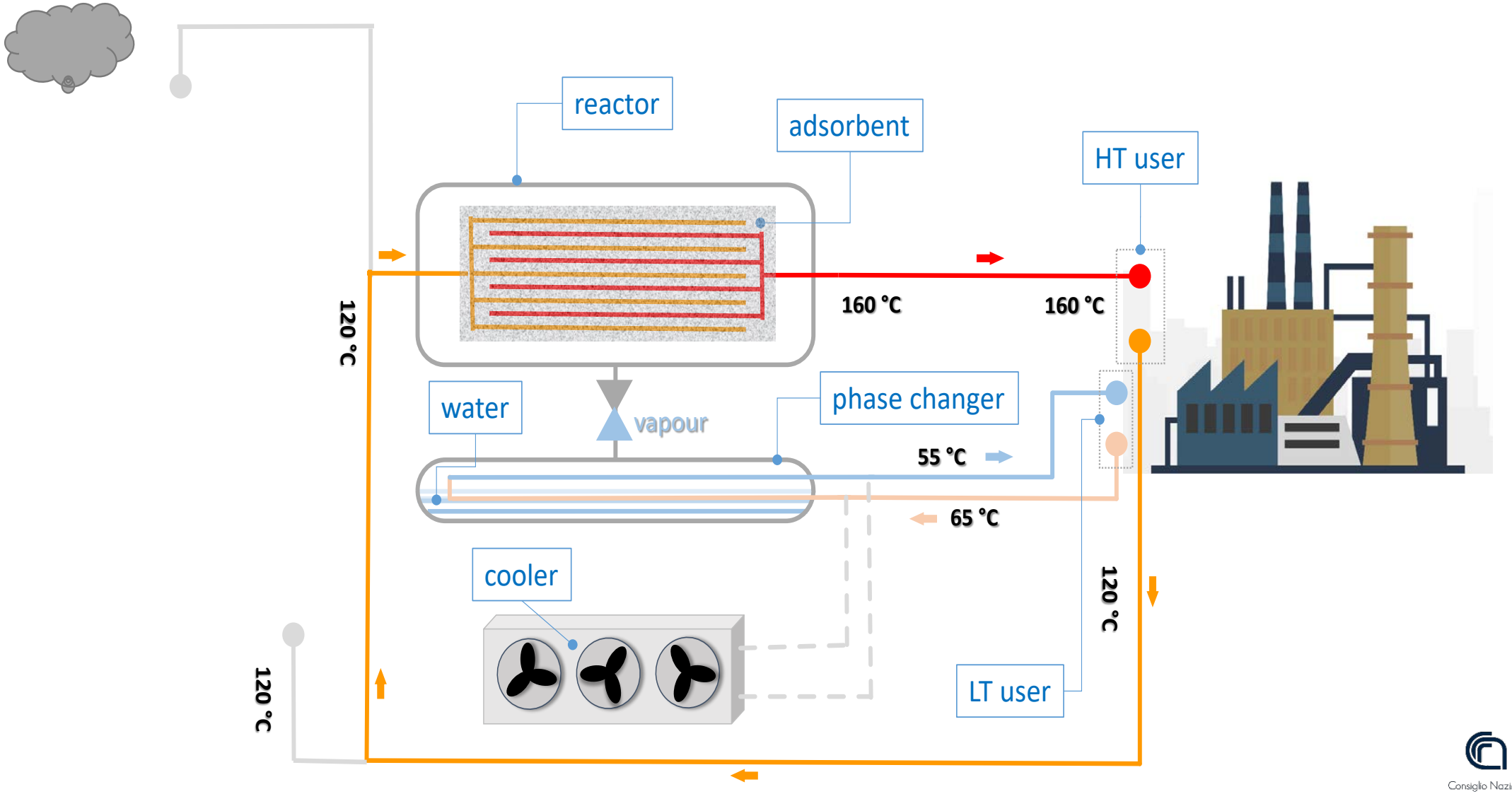
How it WORKS: discharging stage



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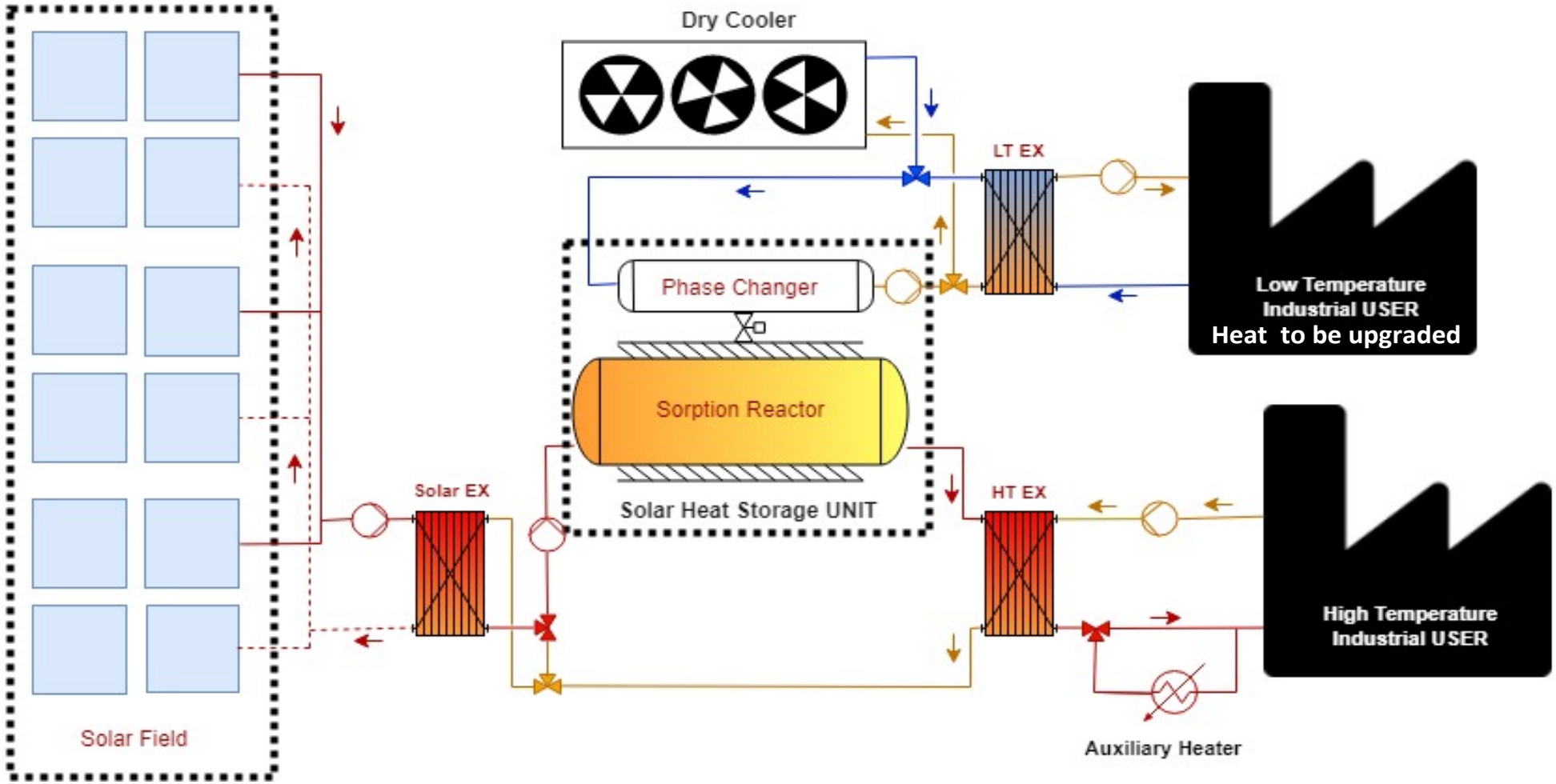
How it WORKS: more details/1



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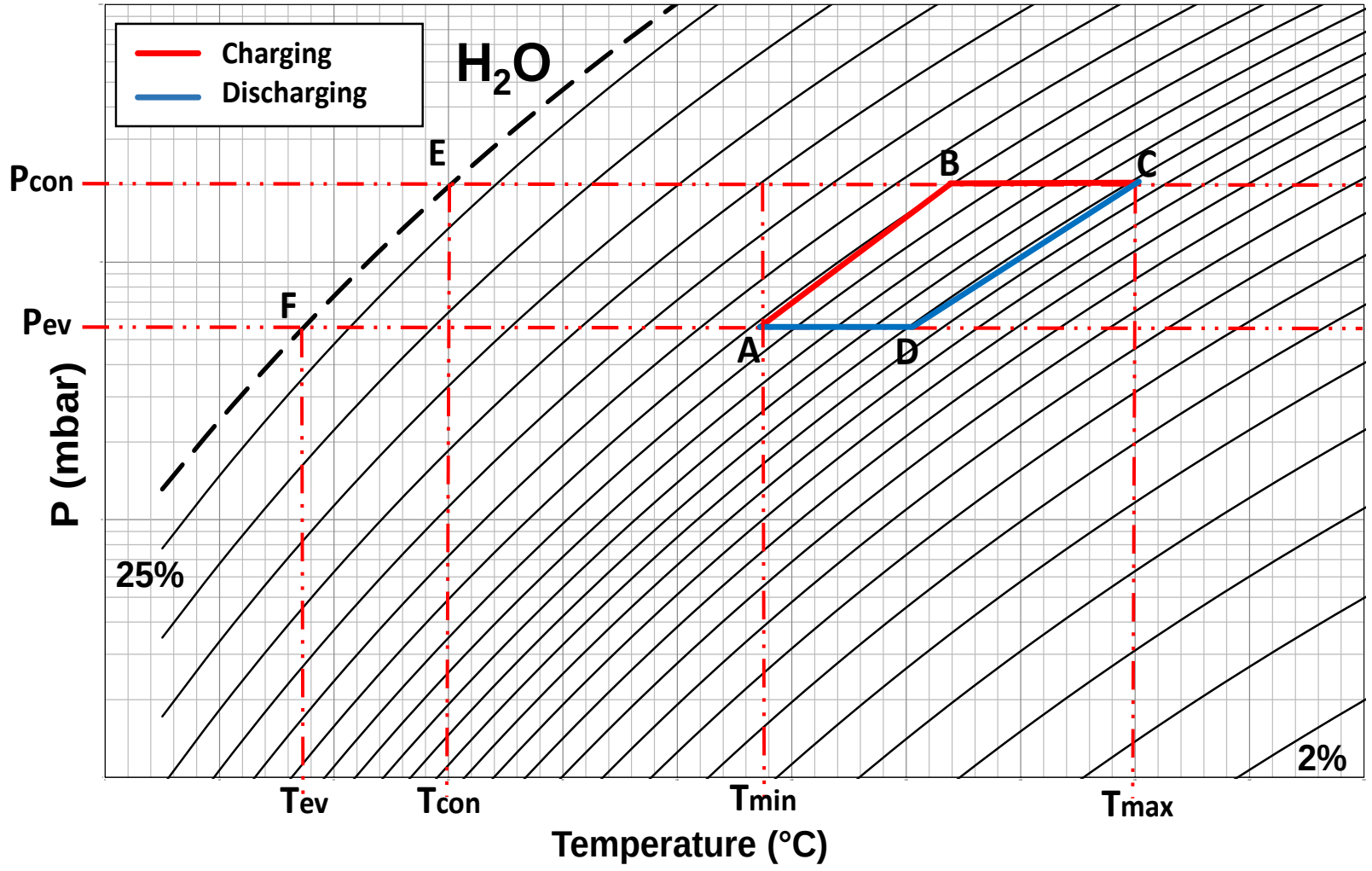
How it WORKS: more details/2



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WHY?

To demonstrate (once for all) the feasibility of such technology in operating conditions typical of the industrial field.

AS WELL AS

- Mathematically calculate the technical limits of a compact storage based on the adsorption technology with water and commercial adsorbent → materials screening;
- Simulate the application of the storage in a large system environment, which allows active process cooling during discharge with the aim to prove that such systems can allow a storage efficiency of 1.5
- Simulation of a thermal energy storage system with a storage density higher of a factor 4 compared to sensible pressurised water systems;

EVENTUALLY

- To propose a modular lay-out to allow for an easy adaptation to different required heat storage capacities for further future development

THANK YOU

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