MAGALDI GREEN THERMAL ENERGY STORAGE (MGTES)

ELECTRO-THERMAL ENERGY STORAGE TECHNOLOGIES FOR INDUSTRIAL DECARBONIZATION

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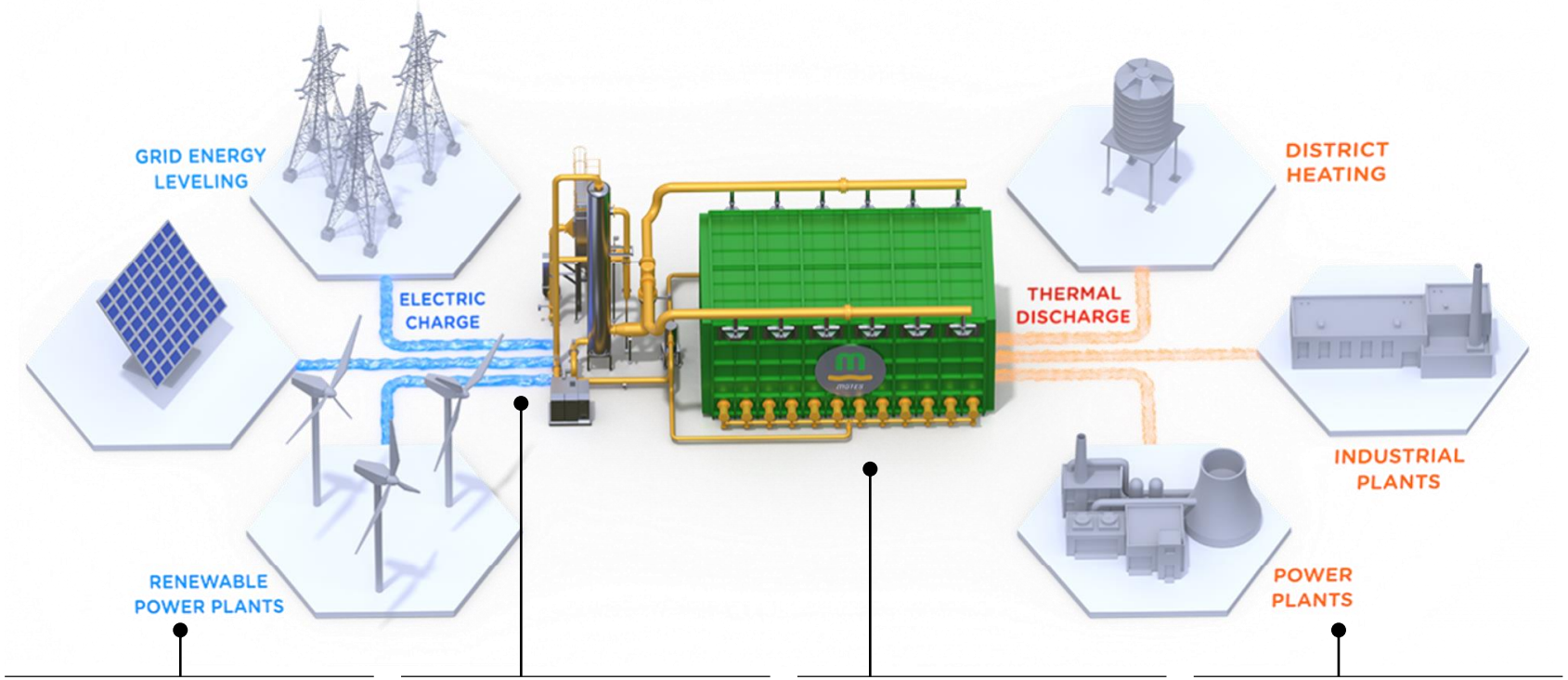
dependable energy storage

Magaldi Green Thermal Energy Storage (MGTES)

Overview of MGTES "Power to Heat" storage system



1 Electricity is used to heat sand with resistive heaters

2 Air is blown to fluidize the sand and enable charge / discharge

3 *Heat is stored in high temperature sand (up to 620°C)*

4 *Steam is generated and delivered on demand to meet customer needs*

Technical highlights

Steam temperature in between

150-450°C

+90% RTE[1]

power to heat

1. Round Trip Efficiency

Principle of Technology

Bed of fluidizable solid particles

MODE ON
The system is ready to exchange energy

Fluidized Sand Bed

Not fluidized Sand Bed

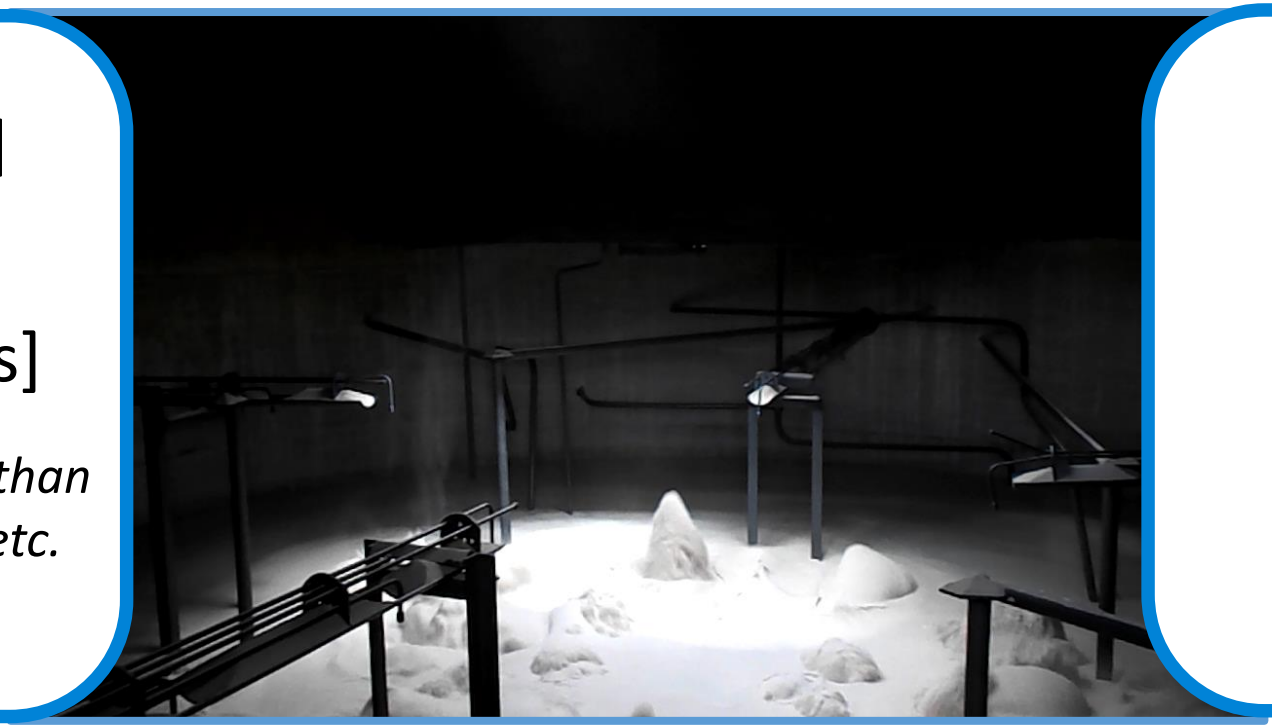
MODE OFF
Thermal insulation at maximum temperature

High Thermal Diffusivity

~ 1×10^{-3} [m^2/s]

i.e. ~1,000 times higher than concrete, rocks, gravel etc.

Fast Response Time



Long Term Storage

Negligible losses

< 1.5-2.0% per day

Our MGTES[1] pilot plant in Buccino, Italy…

you are welcome to visit!

Key parameters

40 tons of sand

0.45 MWe charging power

4.3 MWht storage (steam T=200°C)

Distinctive features of Magaldi Green Thermal Energy Storage

Modular

Possibility to connect MGTES to the **grid, solar PVs or both**

System modularity to adapt MGTES to specific customer needs

Standardized and resource-efficient

Leveraging safe, well-known, non-scarce materials[1]

Dependable & Safe

Ease of access to critical components (e.g., resistors)

No system corrosion from sand usage (vs. Molten Salt)

No risk of fire (non-flammable storage medium)

Plug & Play

Easy and fast solution to **integrate with existing steam systems**

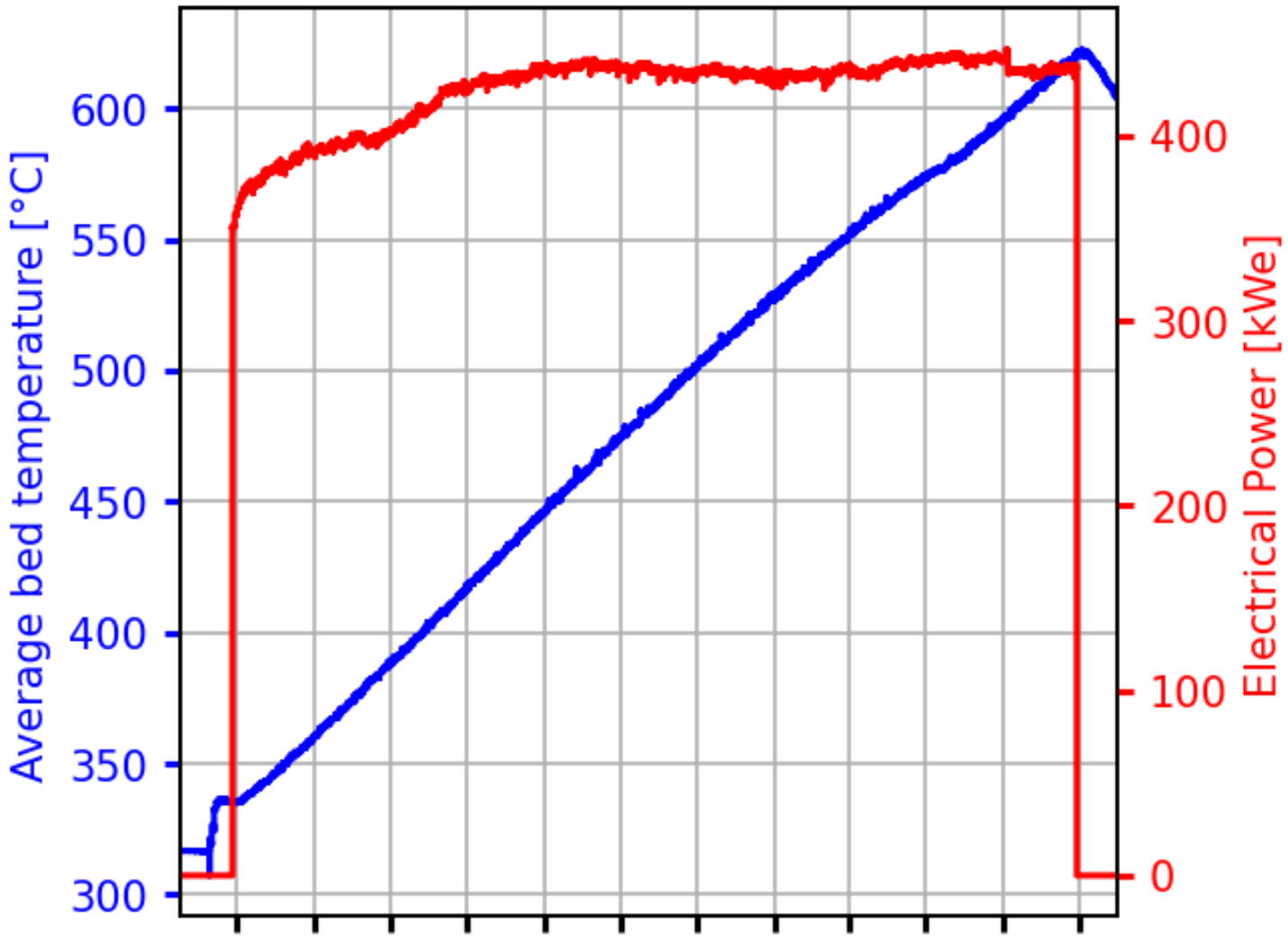
Flexible – Fit for baseload steam demand

Possibility of **synchronous charge and discharge**

1 Sand, steel, resistors, …

MGTES - Renewable Energy Storage

Examples of electric charging by Joule effect



Fluidized sand bed w/ **uniformity @ range** of **250-620°C.**

- Heating test @ 450 kWe heaters power input
- Fluidization velocity @ 0.04 m/s

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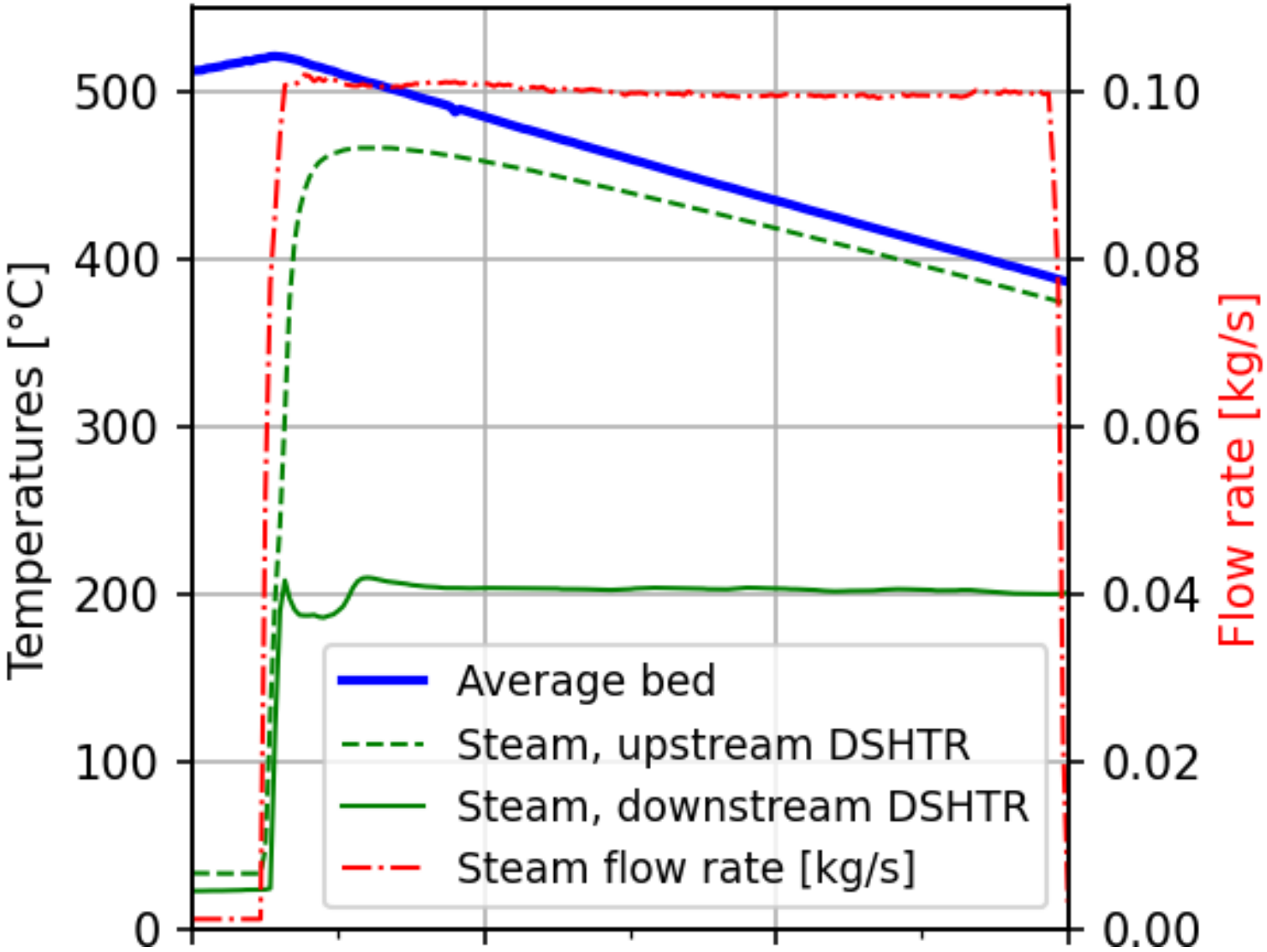
Examples of steam generation tests



- Steam generation tests at a flow rate of 0.1 kg/s @ 200°C/11 bar(g), with desuperheating
- Sand fluid bed temperature starting @ 520°C

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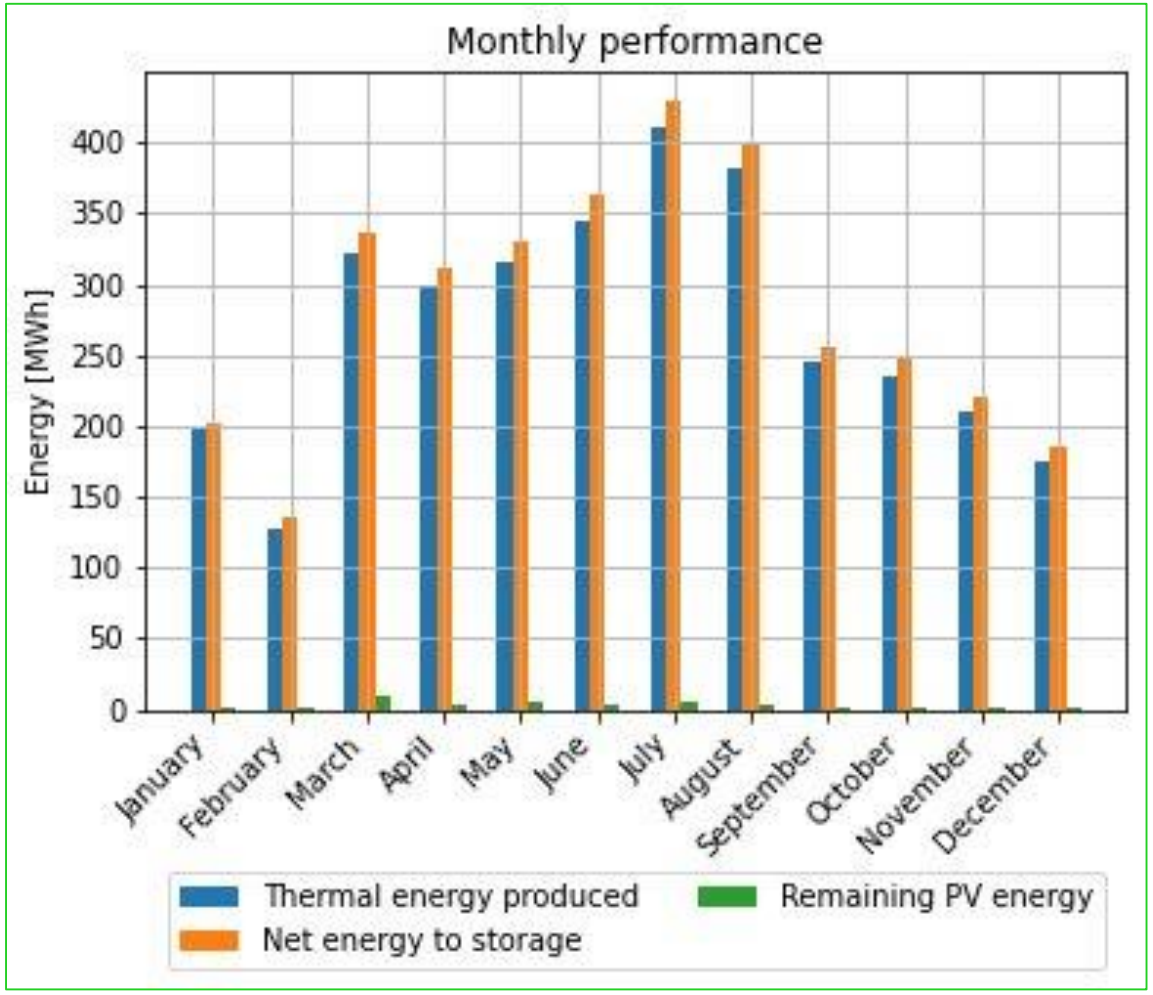
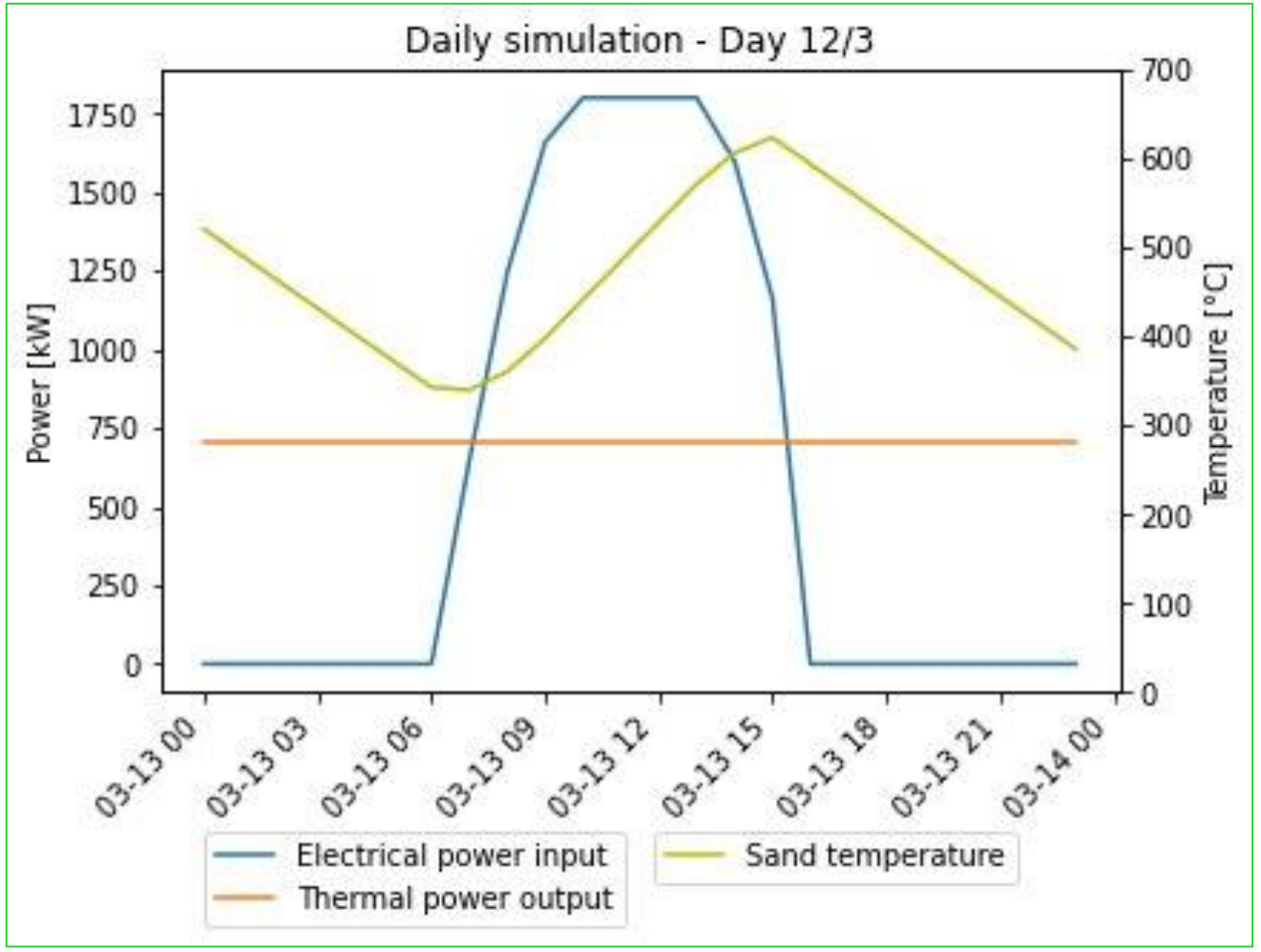
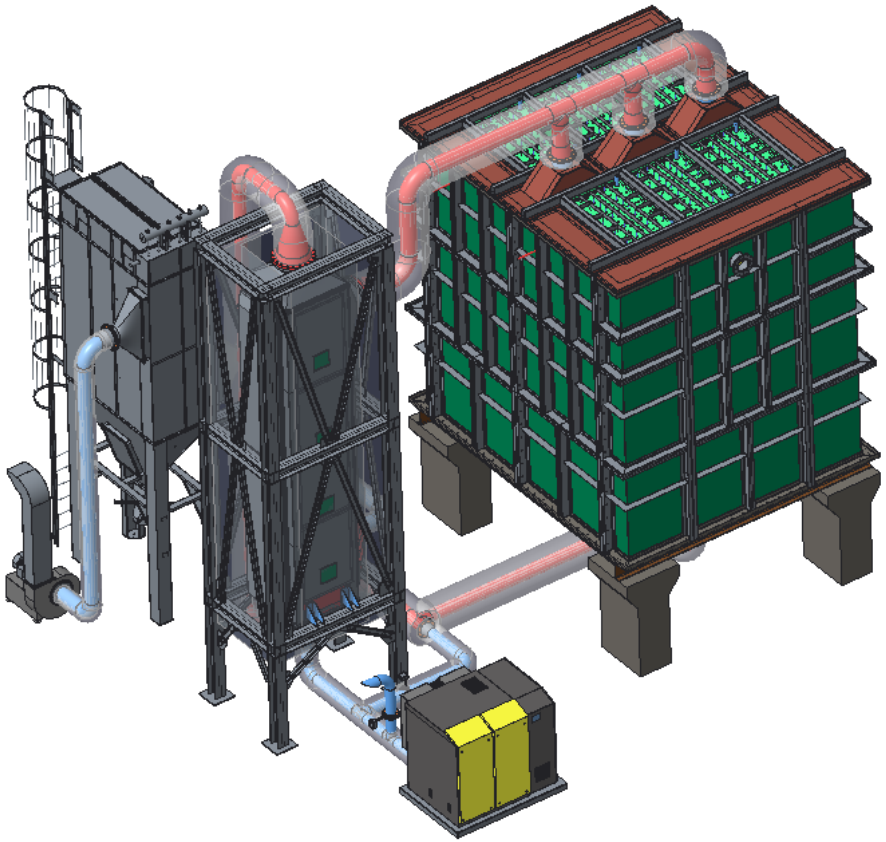
Process simulation





Commercial Project 1: TES

Food & Beverage



Location:	Italy	
Mass of Sand	~80	Ton
Operating Temperatures	~270 - 620	°C
Thermal Capacity	~8.4	MWh
Max Charging Power	~1.8	Mwe
Discharge Power (design)	~0.7	MWt
Steam Flow Rate (design)	~0.3	Kg/s
Produced Steam Properties	11 195	bar °C

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Please contact us at mgtes@magaldi.com

Come and visit!