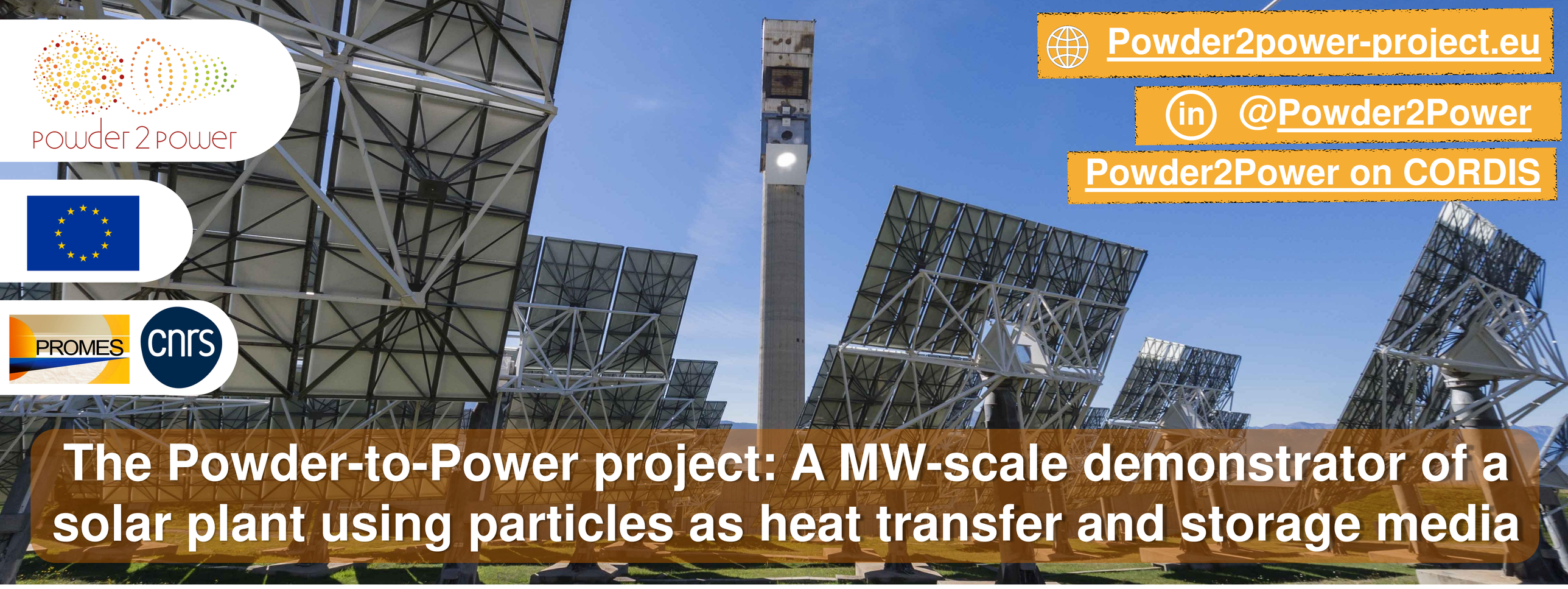

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Powder2Power on CORDIS

The Powder-to-Power project: A MW-scale demonstrator of a solar plant using particles as heat transfer and storage media

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Main goal

To improve and optimize the fluidized particle-driven CSP technology to be used at commercial scale by :

- Testing a vertical particle conveyance system
- Validating an electricty-driven particle superheated thermal energy storage
- Demonstrating the innovative and cost-efficient components & system in operational environment and at MW-scale

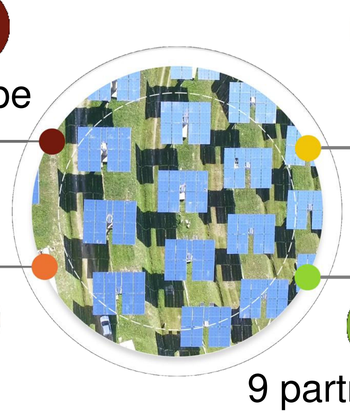
Facts & Figures

Technology

Fluidized particles-in-tube

Duration

48 months

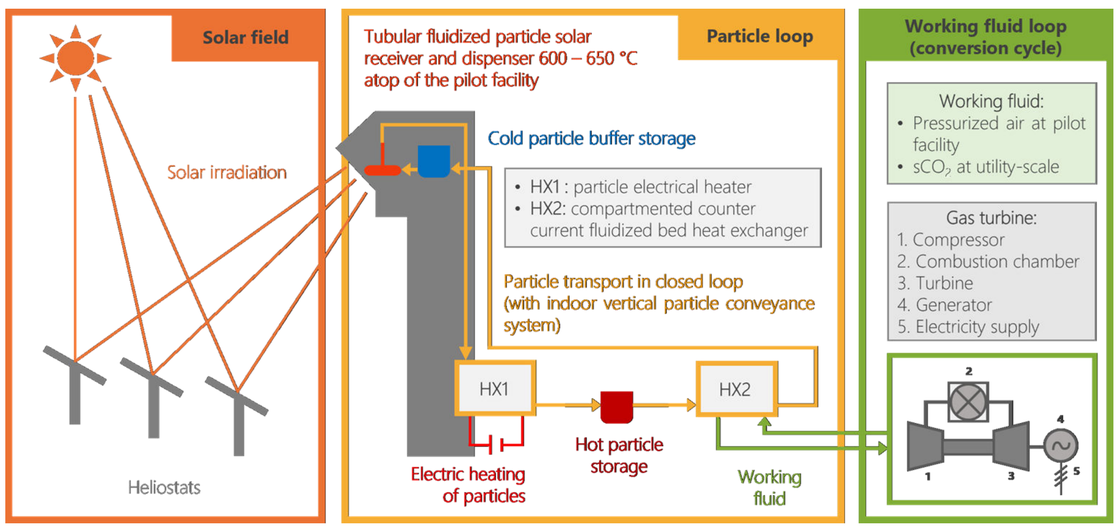


Start – End date

01/10/2023 – 30/09/2027

Consortium

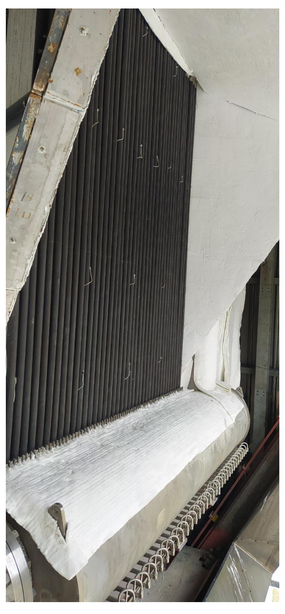
9 partners, 6 EU countries



The solar receiver

Olivine particles
D50 = 78 µm
20 tonnes in the loop

- Nominal flowrate : *16 tons/h*
- Outlet temperature *: 650/700°C*
- Particle velocity in the receiver tubes : *6,6 cm/s*
- Secondary air injection to stabilize the fluidization regime



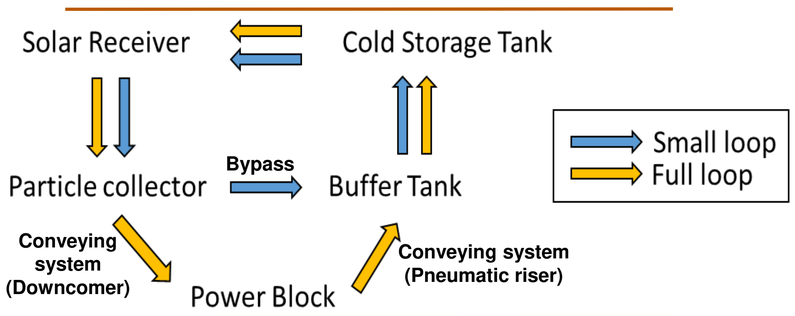
Multi-tubular solar receiver

- 2,6m x 3m
- 40 tubes
- Black coated (Pyromark)
- 2 MW_{th} nominal

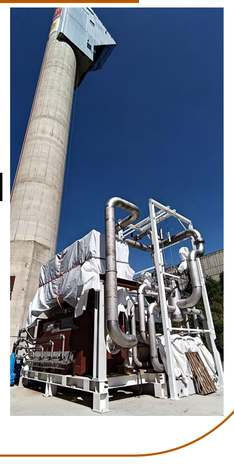
The particle loops

Two particle loops

- A loop at the top of the tower
  - Cold storage tank
  - Solar receiver
  - Particle collector
  - Small conveying system

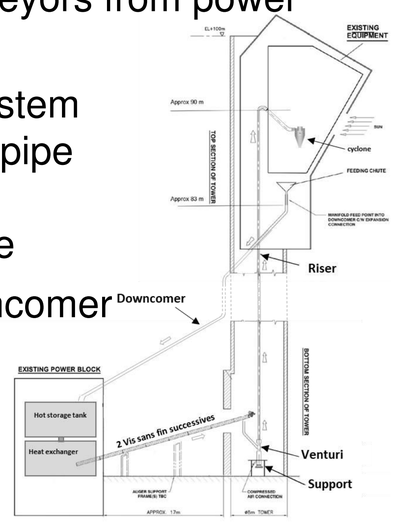


- A loop from the ground level to the top
- Power block at ground level
  - Electrical heater
  - Hot storage tank
  - Heat exchanger
  - Gas turbine (1,2MW_{el})



Particle conveying system

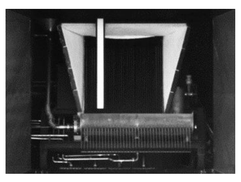
- Inclined screw conveyors from power block to tower
- Pneumatic rising system
  - Insulated vertical pipe
  - Feeding venturi
  - Discharge cyclone
- Gravity-based downcomer from solar receiver to power block

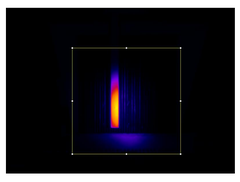


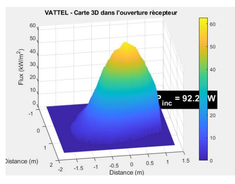
Flux measurement

Non-stationary method :

- White coated moving bar
- Equiped with two calibrated sensors:
  - A heat-flux microsensor (HFM6-Vatell)
  - An inertia heat fluxmeter (IHF-Nextherm)
- A CCD camera
- Digital reconstruction







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