

RENEWABLE ENERGIES
CHAIR_10 YEARS



UNIVERSITY
OF ÉVORA



NewSOL

New StOrage Latent and sensible concept for high efficient CSP Plants

Funding: Horizon 2020 Grant ID: 720985

01/01/2017 - 31/07/2021

Renewable Energies Chair / October 2021
Scientific Symposium on Molten Salt Parabolic Troughs

NewSOL: concrete based TES solutions Consortium

- 16 partners, 4.5 years, 5.5 M€ funding (Demonstrator @ EMSP)



- Coord: UEvora
- <http://www.newsol.uevora.pt/>

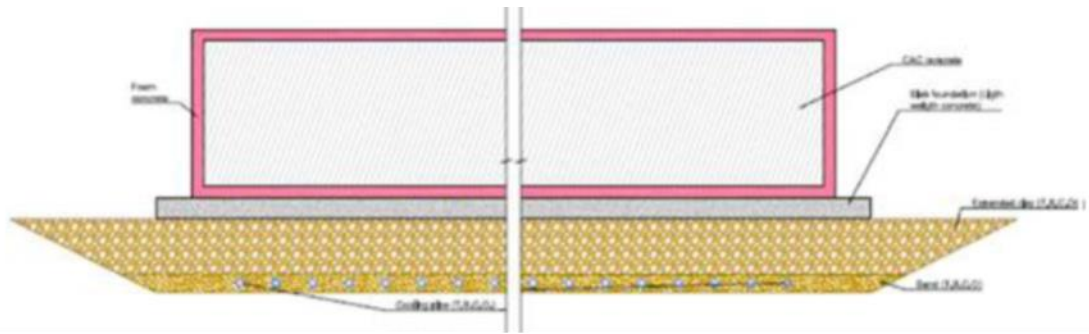
 H2020 GA ID 720985



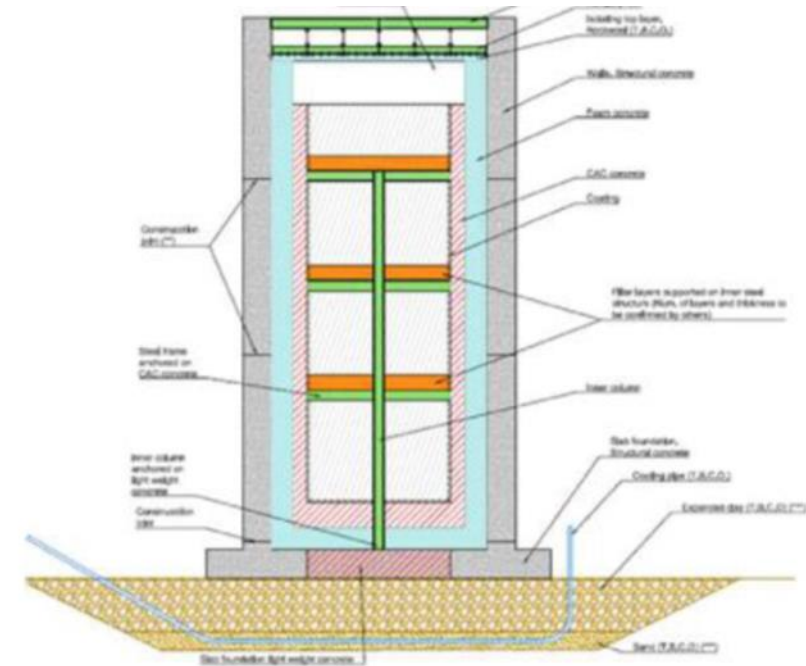
NewSOL: concrete based TES solutions

Storage concepts

- 2 concrete based **Molten Salt thermal storage** concepts



- **Concrete module:**
Sensible
HSM: concrete



- **Thermocline:**
Sensible
HSM: Molten Salt + filler

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Materials development

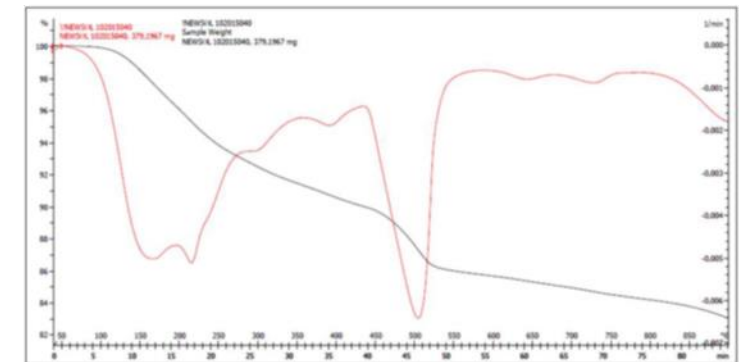
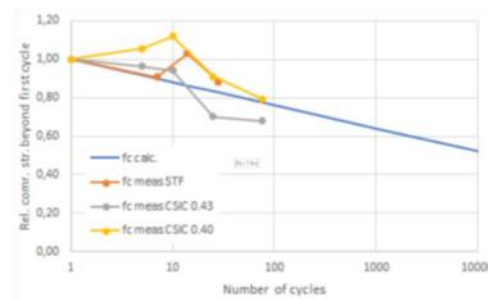
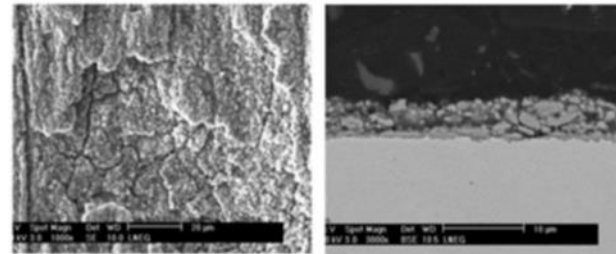
- Materials development: **storage materials**
- **High temperature structural** concrete: CAC and Portland based solutions
- **Insulating foam concrete**: silica aerogel and thermal aggregates
- Molten **salts**: Ca and Li ternary mixtures
- **Filler** material: PCM, slag from mining
- **Steel** materials: PCM encapsulation, hydraulics



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Materials development

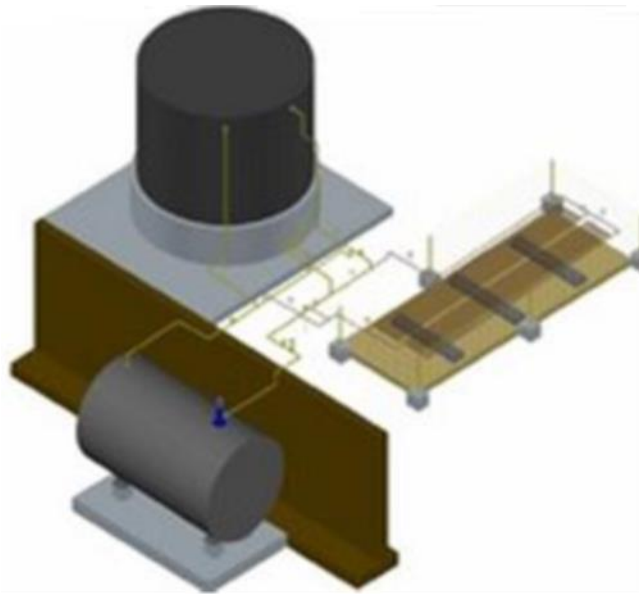
- Materials development: **materials interaction**
- Concrete / Molten Salt**
- Steel / Molten Salt**
- Steel / PCM**
- Slag / Molten Salt**
- Thermal cycling
- Corrosion
- Expansion
- Dehydration
- Stress-strength



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Demonstrator

- Thermocline with ferrous slag material filler in stand-alone MS loop



Thermocline TES

- 28 m³ (Salt + Filler)

- Capacity w/ filler: **2.9 MWh @ 500 °C / $\Delta T = 210$ K**



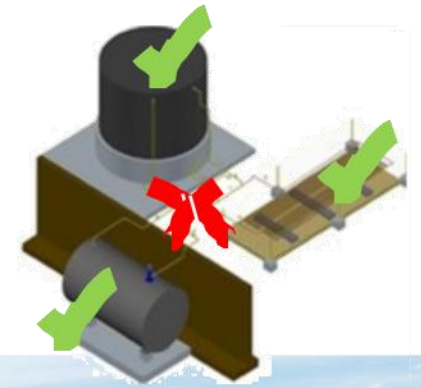
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Demonstrator

- Construction (completion hydraulics & control: 26/11)



- Formworks
- Concrete pouring
- Concrete pumping
- Concrete drying
- Dimensional precision
- Filler material installation

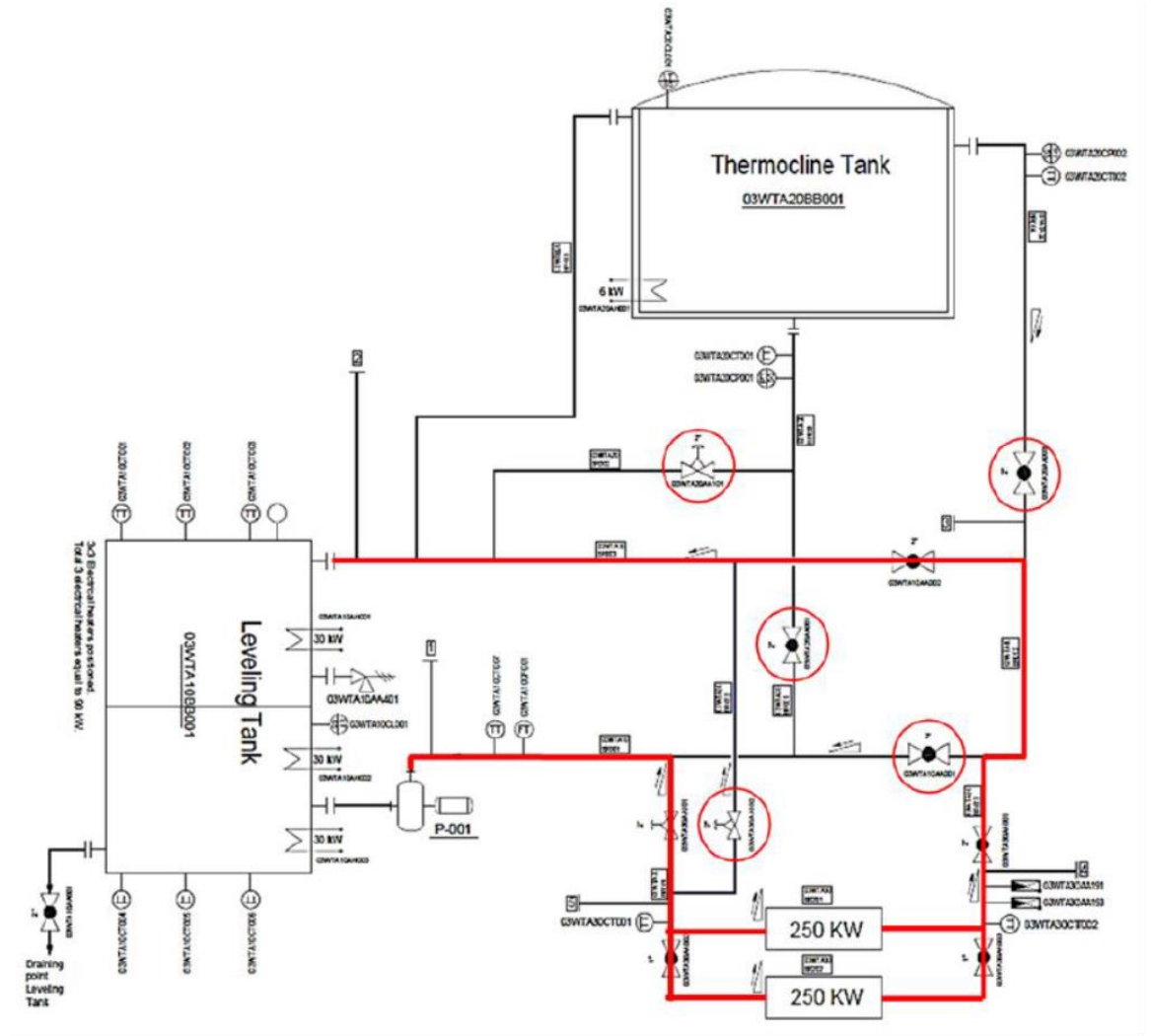


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Demonstrator

- **Commissioning (24/11 → 23/12)**
- Salt melting and heating @ 300 °C
- Thermocline pre-heating @ 200°C
- Hydraulics pre-heating @ 200 °C
- Thermocline filling @ 300°C
- Hydraulics filling @ 300°C
- Loop heating @ 500°C

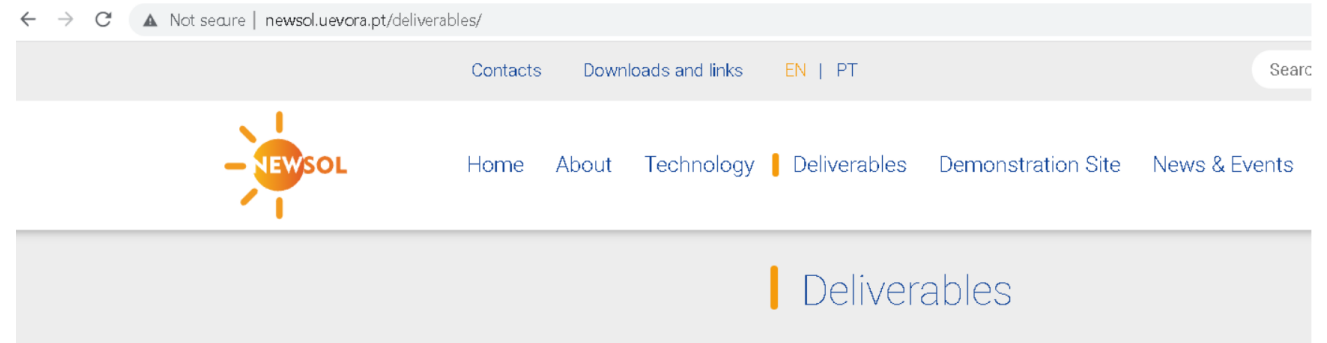
- **Testing (27/12 → 28/01)**
- Thermal losses
- Charging / discharging @
 - 50% nominal flow rate (5.3 kg/s)
 - 100% nominal flow rate
 - 150% nominal flow rate



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Available information

- **Final Report under submission**
- Public deliverables and abstract of confidential deliverables available on the project website
- **Technical-economic assessment (confidential) submitted**
- **Exploitation Plan (confidential) submitted**
- Project selected for **EU Innovation Radar** (5 innovations)



<http://www.newsol.uevora.pt/deliverables/>

Work Package 1: Overall project coordination

| Deliverable Number | Deliverable Title | Type | Dissemination mode | Due Date (months) |
|--------------------|--|--------|--------------------|-------------------|
| D1.1 | Project handbook (*) | Report | Confidential | 2 |
| D1.2 | Data Management Plan and Quality Management Plan (*) | ORDP | Confidential | 4 |
| D1.3 | Project Management Collaborative Space (*) | Other | Confidential | 4 |
| D1.4 | 1st Technical Report to EC | Report | Confidential | 12 |
| D1.5 | 2nd Technical Report to EC | Report | Confidential | 24 |
| D1.6 | 3rd Technical Report to EC | Report | Confidential | 36 |

ORDP: Open Research Data Pilot



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