SOLWATT PROJECT

The overall purpose of the SOLWATT project is to upscale, implement and demonstrate cost-effective technologies and strategies that bring about a significant reduction of water of CSP plants while ensuring excellent performance of electrical power production.

**Objectives of water reduction of SOLWATT project**

SOLWATT’s objectives for reduction of water consumption:
- 90% for cleaning
- 15% to 28% for condenser cooling
- 90% for recovery and recycling water

Then, a total reduction of water consumption by:
- 35% for a wet cooled CSP plant
- 90% for a dry cooled CSP plant

**Operations of cTES**

1. Moderate to high ambient temperatures: NO USE of cTES
2. Too high ambient temperatures: Partial storage of condenser heat in the cTES
3. Nocturnal operation: Discharge of the cTES

- Water consumption reduction in a wet cooled plant
- Increase of performances in a dry cooled CSP
- Easily implemented in existing plant or built into new plant
- Low CAPEX: excavated pond rather than aboveground tank

**Main objective of SOLWATT project for cooling part is the validation at industrial-scale of the relevancy of the cTES concept**

- Detailed design for the cTES prototype
- cTES engineering for installation and exploitation on La Africana CSP power plant
- Development of cTES control laws for optimal operations
  - Expert laws
  - Predictive control strategy based on MILP approach
- cTES construction
- cTES exploitation
  - Results analysis
  - Numerical model validation
- Study/optimization of related components (fluid distribution, membrane etc…)
- Estimation of benefits related to cTES depending on cooling configuration (dry or wet) and power plant locations
  -...

---

**cTES Prototype in La Africana CSP power plant**

- 1000 m³ water thermocline cTES
- Pit-storage configuration
- cTES in parallel with the existing wet cooling tower
- Membrane at the water/air interface to reduce heat transfer and water loss
- Flexible membrane to separate hot and cold water?
- cTES prototype large enough to allow representative characterization at real-scale and small enough to not interfere with the power plant cooling system

---

**cTES for optimized condenser cooling**

- Water consumption reduction in a wet cooled plant
- Increase of performances in a dry cooled CSP
- Easily implemented in existing plant or built into new plant
- Low CAPEX: excavated pond rather than aboveground tank

---

**SOLWATT (2018-2022)**

**COOLING**
- Water thermocline (1000 m³)

**CLEANING**
- Dust barrier
- Anti-salting/self cleaning coating for absorber
- Anti-salting/self cleaning coating for reflector
- Soiling characterization devices
- Innovative cleaning systems

**WATER RECOVERY**

---

**WASCO (2015-2019)**

**COOLING**
- Water/air thermocline
- Air/air thermocline
- Hybrid cooling (wet/dry)
- Versatile cooling (dry with spray)

---

**Example of Pit-storage for district heating** (http://sunstore4.eu/understand/gallery)

---

The authors would like to acknowledge the E. U. through the H2020 Program for the financial support of this work under the SOLWATT with contract number 6792103.

---

**SOLWATT PROJECT**

- 90% for cleaning
- 15% to 28% for condenser cooling
- 90% for recovery and recycling water