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Solar desalination and water treatment

SFERA-III
Final Event
December 13, 2023 | Madrid, Spain

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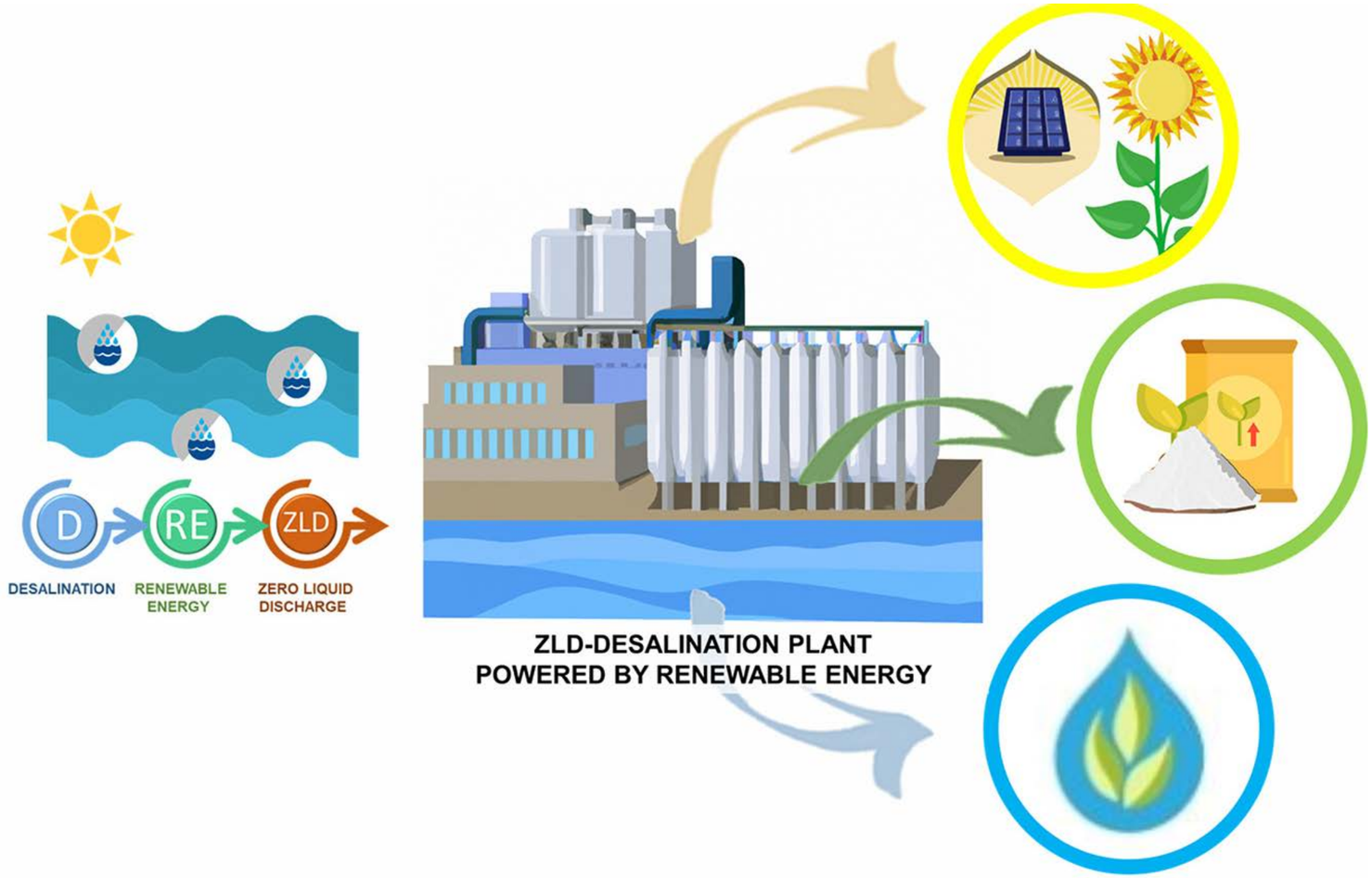
Big picture



- **Transform the desalination industry**

  to decarbonized industry

- Renewable primary energy (either thermal or electrical)
- Zero brine disposal back to the sea (Zero Liquid Discharge)
- Recovery of minerals that can be used for other process / applications

Our approach

State of the art facilities for testing desalination and water treatment processes

Testing of new components that could help reduce the cost, complexity and operation expenses

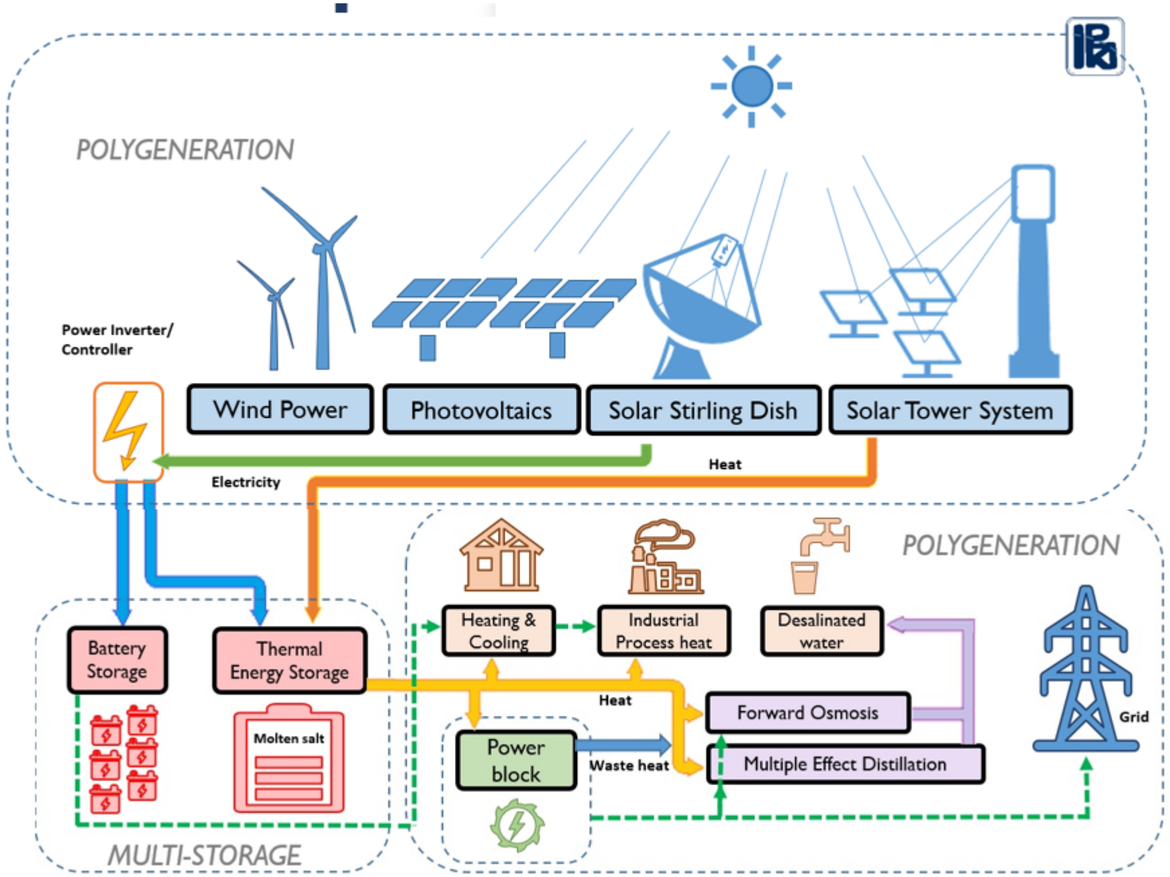
Control strategies for simple, reliable and robust operation

Development of models and validation with data from real plants

Our contribution

Desalination Facilities

Installation, Integration and operation of the first fully renewable powered Forward Osmosis desalination unit



Our contribution

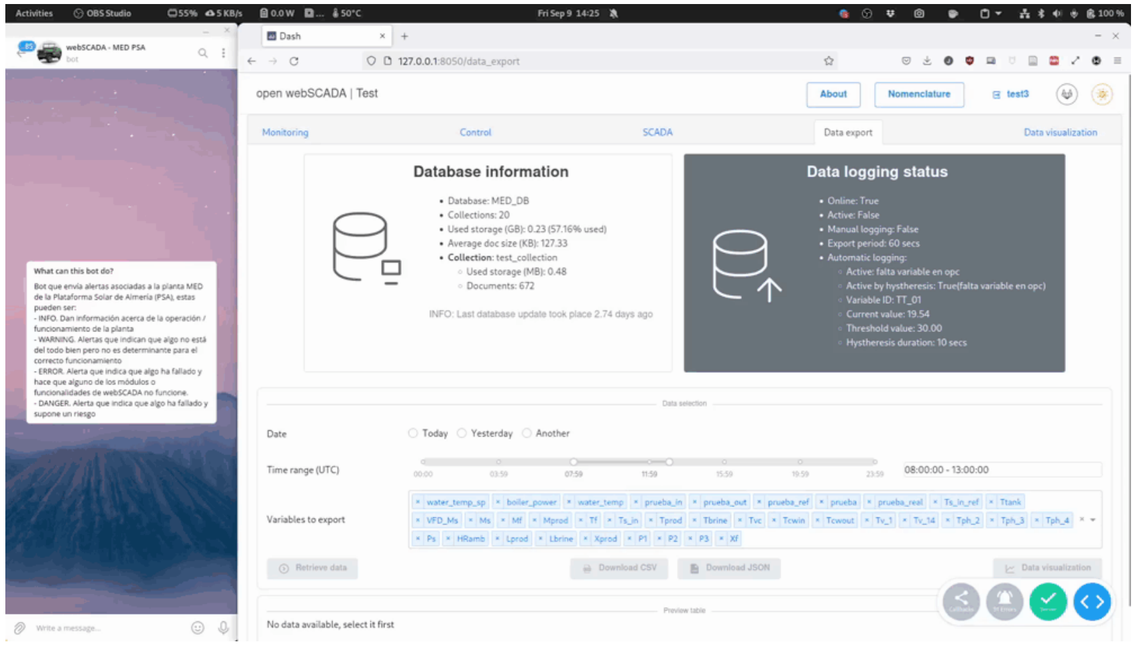
Water Treatment Facilities

Installation and operation of a prototype of a solar photo-reactor for wastewater treatment with a simplified design of One-Sun Compound Parabolic Collectors (CPC)

Our contribution

Implementation of a control and data acquisition system using open source tools with a web-based dashboard for visualization of real-time data and plant performance analytics.

It has been successfully tested in DWT pilot plants at PSA.-CIEMAT (MED, RO-NF).



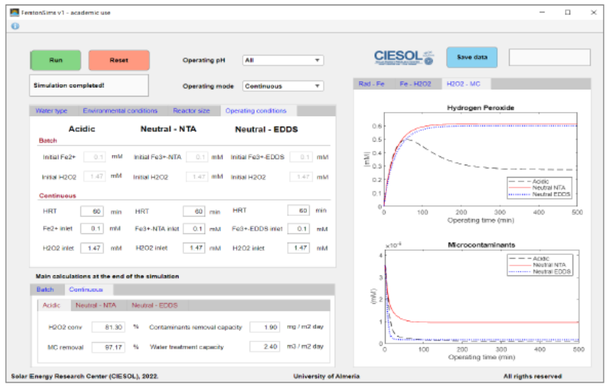
Open SCADA developed in MED pilot plant at PSA-CIEMAT

Our contribution

Solar photo-Fenton treatment plant interactive simulation tool

Friendly, interactive and simple graphical interface that offers the user the possibility to perform design and optimization studies

FentonSims® Validation of kinetics models developed in WP2



Kinetic models

- Acidic pH ($FeSO_4$) [1]
- Neutral pH (Fe^{3+}-EDDS) [2]
- Neutral pH (Fe^{3+}-NTA) [3]

- Development software: Matlab® App Designer R2021.b
- Free download : https://ciesol.com/software/
- For Matlab or stand-alone app (Windows & Mac)

Scan me!

Future possible investigations

- Further testing and exploration of innovative and low-cost heat exchangers like polymeric or plastic heat

- Continue the testing and the operation of innovative process and technologies like Forward Osmosis

- Check how the proposed technologies can be technologically and economically coupled with zero or near zero liquid discharge processes

- Improve further the modelling capabilities for the integration of the renewable powered desalination and fair comparison between different processes

- Progression on ISO protocols for water treatment technologies efficiency assessment.

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Thank You

For Your Attention

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