

SOL-BRINE

Renewable energy driven system for brine management with water recovery

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**"Water Resources Management:
Needs and Prospects"**

Jordan, Amman, 22/04/2013



*"Development of an advanced, innovative
energy autonomous system for the treatment of
brine produced from desalination plants"*

LIFE09 ENV/GR/000299

SOL-BRINE Project

- ❖ **Area of implementation:** Tinos Island, Greece
- ❖ **Project Budget:** 1,209,689.00 €
- ❖ **EC Funding (LIFE+):** 604.844,00 € (50% of Total Budget)
- ❖ **Duration:** 39 months
- ❖ **Start date:** 01/10/2010
- ❖ **End date:** 31/12/2013



SOL-BRINE: Partners



Municipality of Tinos Island (Project Coordinator)



National Technical University of Athens (NTUA)
School of Chemical Engineering
Unit of Environmental Science and Technology ([UEST](#))



Culligan Hellas S.A.

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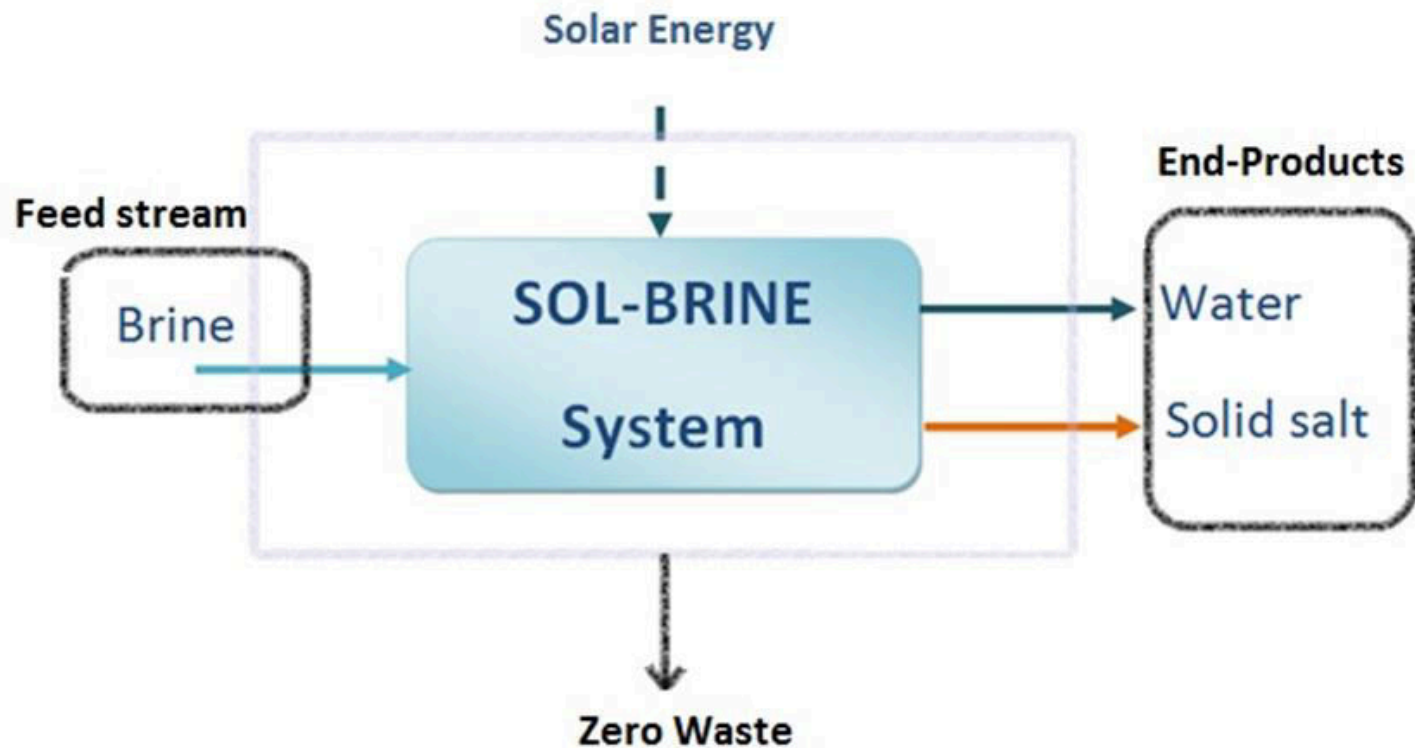
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SOL-BRINE: Main aim

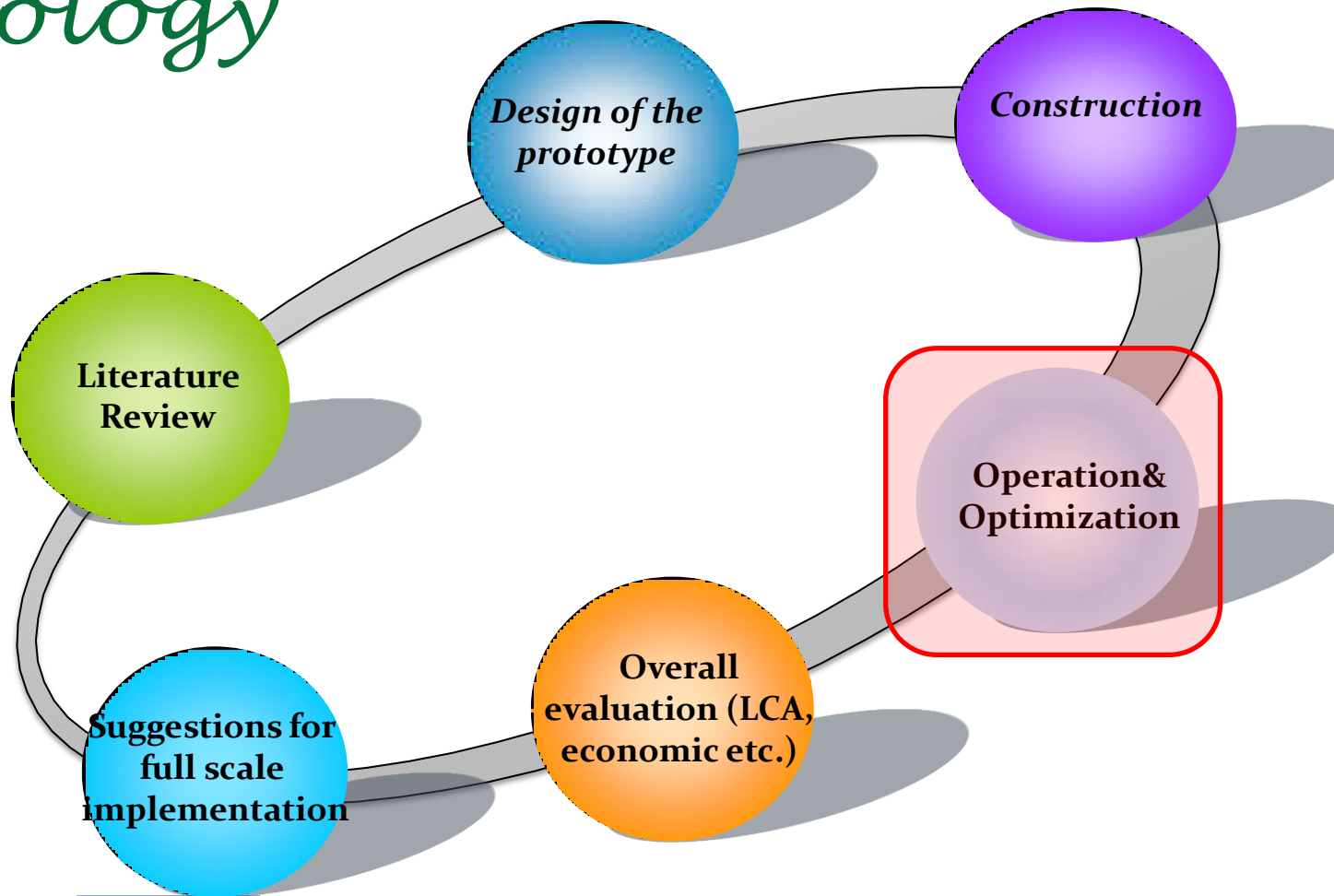
“The main objective of this project is the development of an innovative, energy autonomous system for the treatment of brine from seawater desalination plants”



SOL-BRINE: Concept



Methodology



Innovative aspects of the project

- ❖ **Total brine elimination.** The system has been designed in line with the Zero Liquid Discharge principle
- ❖ **Water Recovery (>90%)**
- ❖ **Production of useful end-products.** Through the operation of the prototype system the following two products are produced: (a) distilled water of high quality and (b) dry salt. These products have potential market opportunities.



Innovative aspects of the project

- ❖ **Energy autonomous operation.** Solar thermal collectors are used for delivering hot water ($10 \text{ KW}_{\text{th}}$ at approximately 70°C) and a photovoltaic generator ($10 \text{ kW}_{\text{el}}$) for electricity. All energy requirements are covered exclusively through the use of solar energy
- ❖ **Use of state-of the art technology:** the evaporation of water is realized through custom designed vacuum evaporation technology (evaporator and crystallizer) and solar dryer



The innovative SOL-BRINE system comprises:

- (a) the energy supply system and*
- (b) the brine treatment system*



Energy supply system



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Brine treatment system

The brine treatment system is consisted of the following units:

- (a) Evaporator
- (b) Crystallizer
- (c) Solar Dryer



Evaporator unit



Figure: View of the interior (1st Effect)



Figure: Transportation of the evaporator unit from the manufacturer's facilities

Evaporator unit



Figure: View of the evaporator
(installed on site)

Crystallizer unit (installation)



Transportation (JCB vehicle,
photos on the top) and
placement (chain pulley
block, photo on the left) of
the crystallizer unit –

16/10/2012

Video 1

Crystallizer unit



Figure: View of the crystallizer (installed on site)

Solar Dryer (installation)

Installation of the dryer – 12-13/10/2012



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Dryer unit

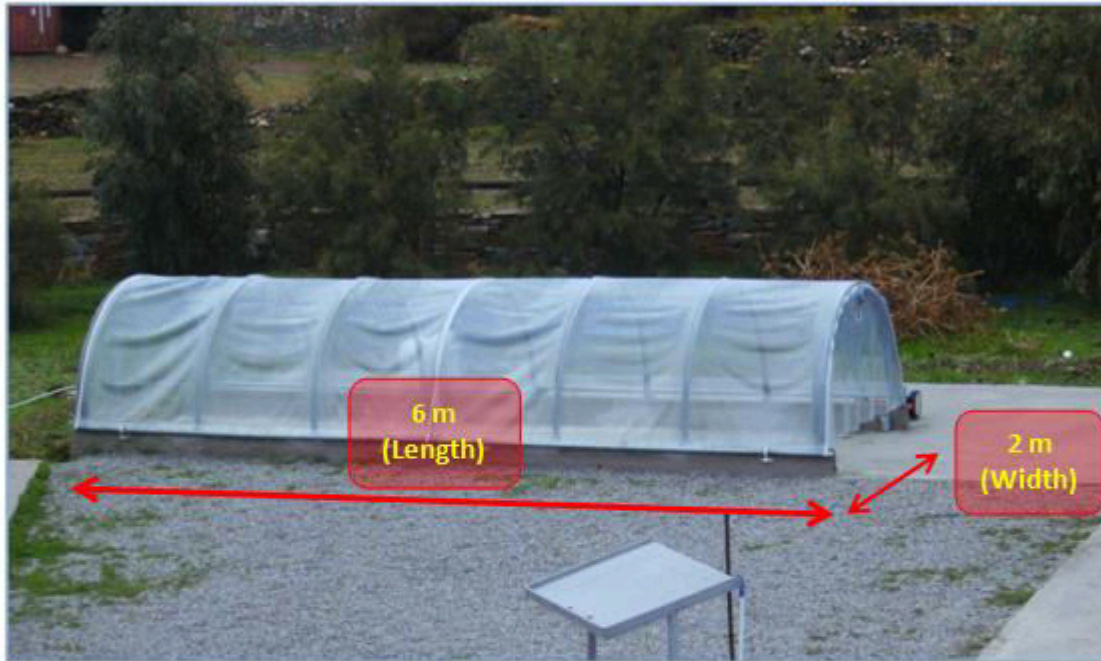
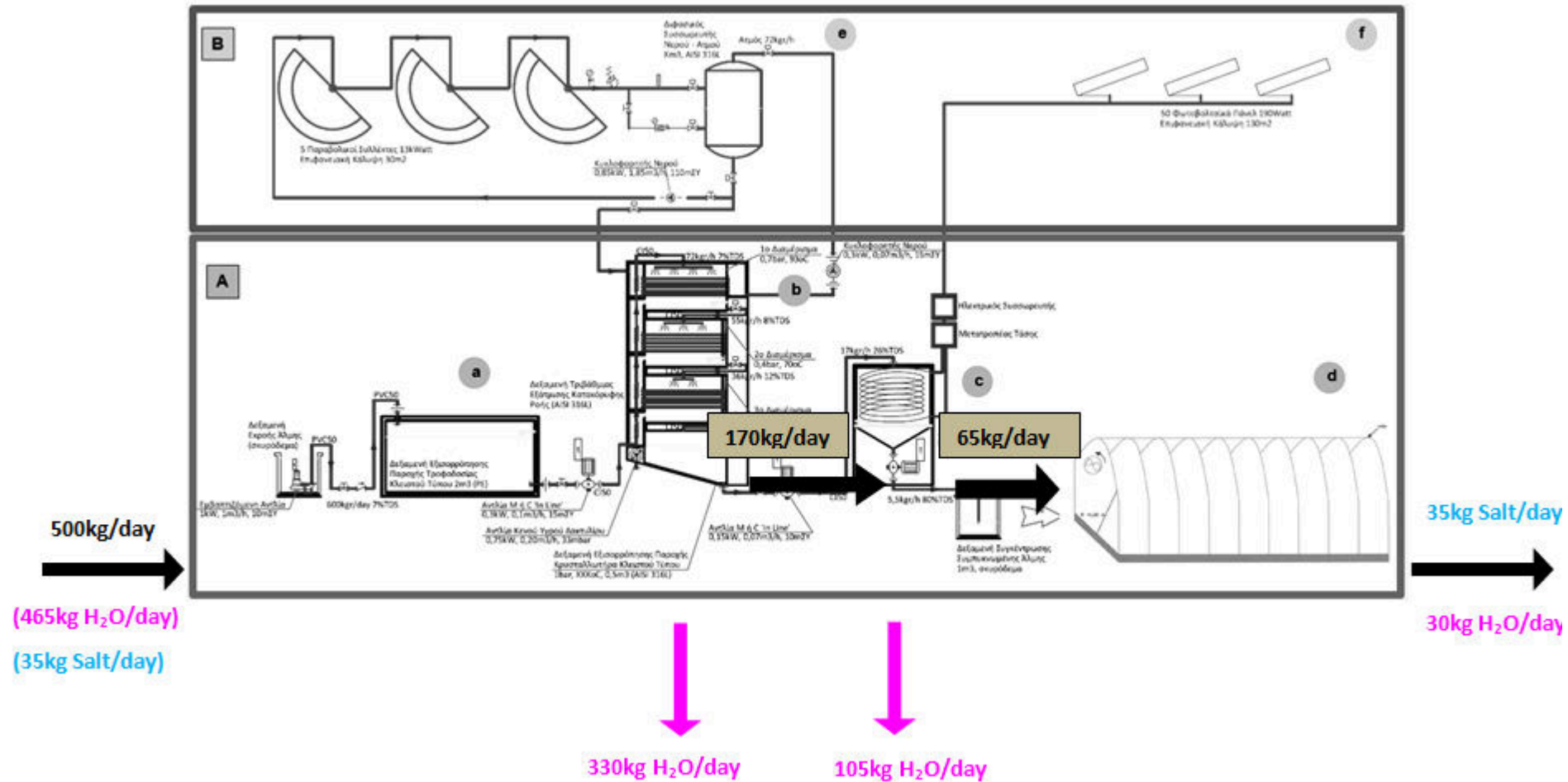


Figure: View of the dryer (installed on site)



Mass Balance



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SOL-BRINE: Next steps

- ❖ The system will operate throughout a whole year in order to test its performance under different climatic conditions
- ❖ A software tool is being developed for the simulation of the prototype's performance. The simulator will be validated through the use of real experimental data
- ❖ The system's performance will be evaluated in economic and environmental terms (LCA)



Conference invitation



water
is
necessary
for
Life

- ❖ Please be informed that in the context of the SOL-BRINE project an **International Conference** will be held in Tinos Island, Greece from **19th to 21st September 2013**.
- ❖ More information available at: <http://win4life.uest.gr>

*Papers on
these topics
are welcome:*

- Water resources: challenges and management
- Industrial wastewater management and reuse
- Integration of wastewater reuse in the overall water resources management
- Zero Liquid Discharge Applications and Best Available Techniques (BAT)
- Role of desalination in addressing water challenges
- Advanced Desalination Techniques
- Desalination powered by Renewable Energy Sources (RES)
- Solar Desalination applications
- Environmental pressures associated with brine production
- Success stories on brine management within EU (cases for islands will be favored)
- Materials and corrosion resistance considerations
- Chemical free desalination
- Barriers and suggestions for full-scale implementation of ZLD approaches

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International Conference
WIN4Life
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First Announcement & Call For Papers

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Authors wishing to submit a paper should send an Abstract to the Scientific Secretariat (konmoust@central.ntua.gr) by 15th May 2013.
 A number of papers will be published in a special volume of *Desalination and Water Treatment* journal.
 More information available at: <http://win4life.com/>

Scientific Committee:

- Maria Lelidou, National Technical University of Athens, Greece
- Anastasios Karabelas, Centre for Research & Technology-Hellas, Greece
- Andreas Andreidakis, National Technical University of Athens, Greece
- Apostolos Vlyssides, National Technical University of Athens, Greece
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- Ethilia Tzan, Center for Renewable Energy Sources and Saving, Greece
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Organizing Committee:

- Konstantinos Moustakas, National Technical University of Athens
- Dimitrios Xenogenis, National Technical University of Athens
- Anagnostos Vidalis, Municipality of Tinos Island
- Antonia Stergiadou, Municipality of Tinos Island

Organized by:

The Conference is organized in the framework of the LIFE+ project with the acronym SOL-BRINE (LIFE09 ENV/GR/000299)

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Photo from the constructed prototype brine treatment system!

*Thank you for
your attention!*

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