Grant Agreement No. 727348

Project Acronym:  
SOCRATCES

Project title:  
SOlar Calcium-looping integRAtion for Thermo-Chemical Energy Storage.

DELIVERABLE D9.7  
PROJECT LEAFLET

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<th>Funding scheme:</th>
<th>Research and Innovation Action (RIA)</th>
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<td>Project Coordinator:</td>
<td>USE</td>
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<td>Start date of the project:</td>
<td>01.01.2018</td>
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<td>Duration of the project:</td>
<td>36 months</td>
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<td>Contractual delivery date:</td>
<td>Month 9</td>
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<td>28.09.2018</td>
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<td>WP9</td>
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<tr>
<td>Authors:</td>
<td>BIOAZUL</td>
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<td>Contributors:</td>
<td>USE</td>
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INTRODUCTION

According to the Deliverable 9.1 “First Dissemination and Communication Plan”, material for mass dissemination has been developed. This deliverable shows the result of developing the project leaflet. It has been made following the Corporate image previously established, respecting the Logotype (Symbol and text), the typography and colours. Furthermore, the European Union flag has been added as required.

Furthermore, it has been developed other initial dissemination materials to be used in conference and events, such as a general information and a template for scientific poster.

We have included them in the ANNEXS of this deliverable.
PROJECT LEAFLET.

SOLAR CALCIUM-LOOPING INTEGRATION FOR THERMO-CHEMICAL ENERGY STORAGE

SOCRATCES

www.socrates.eu

CONTRACT No: 727348
Starting date: 1st January, 2018
Duration: 36 months

PROJECT INFORMATION

One of the great challenges for renewable energy is to develop the technology and storage systems. Efficient energy storage technologies are the thermosolar energy storage systems (TESS). In these systems, energy is used to break chemical bonds, energy that is recovered when the products are recombined. They can reach very high energy densities and allow seasonal storage.

The Ca-looping (CaL) process is based upon the reversible carbonation and calcination of CaO to one of the most promising technologies for thermochemical energy storage (TCS). The scale-up availability of natural limestone (ground pure CaCO₃) means that expensive materials are not required. The CaL process is simple and directly scalable to process energy carriers, and as such, there are a number of factors for the feasibility of the CaL process.

SOCRATCES is a project that demonstrates the feasibility of this integration by building a pilot-scale plant that uses cheap, abundant and non-toxic materials as well as mature technologies in the industry.

SOCRATCES aims to develop a prototype that will demonstrate the scale-up of existing technology and enable further development and optimize the engineering aspects. The project will also address the longer-term goal of enabling highly competitive and sustainable CSP plants.

SOCRATCES TECHNICAL APPROACH

The proposed system works as follows under solar irradiation, to carry out the carbonation of CaCO₃ (endothermic reaction) at high temperatures (750-950°C). Once calcination takes place, the product (CaO) and CO₂ are stored separately. When power is needed, the stored products are brought together to form the carbonator reactor, where energy is released through the exothermic reaction. The key parameter in the process is the CO₂ partial pressure, which leads to a power cycle thermodynamic efficiency higher than that of current conventional CSP plants.

EXPECTED RESULTS AND IMPACT

Main expected results during the SOCRA

TECHNICAL APPROACH

- Integrated systems concepts are used to minimize the TESS design choosing for the most efficient and non-toxic materials as heat transfer media.
- Solar reactor design to reduce the reactor scale up risk. Temperature in the solar reactor reactor could reach 1000°C.
- Higher temperature in the carbonate (≈950°C) could be used for power generation.
- High efficiency of power cycle.
- Potential integration with commercially available technologies (heat exchangers in direct integration) Streamline Blacksea cycles for indirect integration at commercial scale.
- The use of cheap, abundant and non-toxic materials and processes could contribute to the future of solar energy storage.

SOCRATCES is a project that demonstrates the feasibility of this integration by building a pilot-scale plant that uses cheap, abundant and non-toxic materials as well as mature technologies in the industry.

SOCRATCES aims to develop a prototype that will demonstrate the scale-up of existing technology and enable further development and optimize the engineering aspects. The project will also address the longer-term goal of enabling highly competitive and sustainable CSP plants.

PROJECT INFORMATION

SOCRATCES is an integrated and multidisciplinary approach of different knowledge areas, such as solar energy, nuclear, geothermal, power generation, material science, etc., that integrates different fields of knowledge and experiences, from universities, research centers, and other companies in an integrated structure where all the necessary skills for the adequate development of the project are fully covered.

SOCRATCES consortium includes: Spain, France, UK, Italy, Greece, Germany, Norway, Sweden, and other companies in an integrated structure where all the necessary skills for the adequate development of the project are fully covered.

CONTACT DETAILS

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This project has received funding from the European Commission by means of Horizon 2020, the EU's innovation Union (Research and Innovation), under Grant Agreement No. 727348.

The content of this file are the sole responsibility of the Consortium coordinator. This is not in any way related to the Commission’s views and it is not binding on the Commission’s part of the information contained.
ANNEX I – GENERAL PRESENTATION

Solar Calcium looping integRAtion for Thermo-Chemical Energy Storage

DEVELOPING THE NEXT GENERATION TECHNOLOGIES OF RENEWABLE ELECTRICITY

https://socratces.eu/

Project Scope And Goals

Energy storage is one of the greatest challenges for a short-term deeper penetration of renewable energy sources

SOCRATCES is aimed at demonstrating the feasibility of the integration by erecting a pilot scale plant
Main benefits of SOCRATCES concept

1. CaO precursors:
   - Low price
   - Wide availability
   - Harmlessness

2. Carbonation for generating heat ~650-1000°C
   - High efficient generation of electricity

3. Reactants and products can be stored at ambient temperature

4. High energy density to maximize storage capacity

5. Materials and process equipment
   - Well-known in the cement industry

SOCRATCES Consortium

SOCRATCES is an **integral** and **multidisciplinary** approach where different knowledge areas are involved

- Multidisciplinary R&D groups
- SMEs
- Companies

Associations and Stakeholders offer the opportunity for wide dissemination of the project and will link the consortia with the relevant industries in Europe
**Project Scope and goals**

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<th>H2020 -LCE-2016-RES-CCS-RIA/727348/SOCRATCES</th>
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<td>Project total cost</td>
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<td>Coordinator</td>
<td>Ricardo Chacartegui - <a href="mailto:ricardocho@us.es">ricardocho@us.es</a> - [University of Seville, Spain]</td>
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<tr>
<td>Keywords</td>
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**WP’s Budget distribution**

- The R&D core WPs of the project WP2 to WP5 have a relative weight of 50.2% of the staff effort.
- Prototypes **construction and validation**, WP6 and WP7 requires 28.7% of the resources of the project.

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**SOCRATCES**

Thanks for your attention

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This presentation reflects only the author’s view and that the INEA is not responsible for any use that may be made of the information it contains.
ANNEX II – POSTER TEMPLATE

SOCRATCES
Solar Calcium – looping integRAtion for Thermo-Chemical Energy Storage

This Project has received funding from European Commission by means of Horizon 2020, the EU Framework Programme for Research & Innovation under Grant Agreement no. 727348. 
European period: 01/01/2018 – 31/12/2020 (36 months). Total budget: 4,975,402 € (IC contribution: 4,975,402 €).
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