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EU-SOLARIS: The European Infrastructure for Concentrated Solar Thermal and Solar Chemistry Technologies

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Abstract

EU-SOLARIS project is a European project, co-funded by the 7th framework programme of the European Union. It is a Research Infrastructure (RI) initiative aimed to foster and promote the scientific and technological development of Concentrating Solar Thermal (CST) and Solar Chemistry technologies. EU-SOLARIS aims to create a new legal entity to explore and implement new and improved rules and procedures for the overall coordination and join exploitation of the main European RI for CST and Solar Chemistry technologies, in order to optimize RI development and Research and technology Development (R&D) coordination. It is expected to be the first of its kind, where industrial needs and private funding will play a significant role. The success of the EU-SOLARIS initiative will be the establishment of a new governance body, aided by sustainable financial models for this unique European large and distributed research infrastructure in the CST and Solar Chemistry fields. EU-SOLARIS is expected to be an important tool in consolidating Europe's leadership in these areas. This will be accomplished by linking the research community and the industry involved in the CST sector and providing them the research infrastructures needed to innovate and advance the state of the art of CST and Solar Chemistry technologies. EU-SOLARIS is also expected to increase the efficient use of the economic and human resources required throughout the European research context and to provide efficient resource management to complement research and to avoid unnecessary technological duplication and repetition.

This article presents the vision, objectives, activities and current status of the EU-SOLARIS project and discusses the most important - expected to be achieved - outcomes of the project, which is currently at its last year of its preparatory phase.

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Keywords: Concentrating solar thermal; solar chemistry; research infrastructure; research and technology development; solar thermal electricity

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1. Introduction

EU-SOLARIS project is a European project, co-funded by the 7th Framework Programme of the European Union (EU), whose initiative is to foster, contribute and promote the scientific and technological development of the CST and solar chemistry technologies.

CST technologies are expected to become a considerable supplier of green energy throughout the world. They can provide a dispatchable source of renewable energy, in case that they are deployed with thermal energy storage and/or hybridize with other sources of renewable energies, such as biomass or photovoltaics system. CST technologies use mirrors or lenses to concentrate the direct sunlight onto a small area receiver where the concentrated solar radiation is transformed into thermal energy. There are two main of solar concentrating technologies; line focus and point focus. Line focus technologies concentrate direct solar radiation in one-dimension, i.e, along one line, while point focus technologies concentrate direct solar radiation along two dimensions, i.e., generating a focal spot. The main commercial line focus CST technologies are represented by the parabolic trough and the linear Fresnel collectors, whereas the main commercial point focus technologies are represented by the parabolic dish collectors and central receiver system also known as solar tower, since usually the receiver is located a top of a tower to maximize the concentration of sunlight from the mirrors that compose the heliostat field.

The different types of solar concentrating technologies achieve different degrees of concentration of the direct solar radiation onto the receiver and therefore allow for the achievement of different operating temperatures at varying thermodynamic efficiencies. Typically increasing the concentration allows for operating efficiently at higher temperature, but needs higher accuracy in tracking the sun and higher optical quality in the solar concentrator. Therefore, each technology is used for specific applications. The primary applications of CST technologies are power, steam, solar cooling, desalination and thermochemical plants.

EU-SOLARIS is expected to improve the state-of-art of the abovementioned CST and solar chemistry technologies. It aims to create a new legal entity to explore and implement new and improved rules and procedures for RI for CST and solar chemistry technologies, in order to optimize RI development and R&D coordination. It is expected to be the first of its kind, where industrial needs and private funding will play a significant role.

EU-SOLARIS aims to design a distributed research infrastructure in the form of a legal entity that will rely on a sustainable financial mechanism; a structured organization that brings together the resources and infrastructure of R&D of its members, and a shared management that acts as a single access point to European solar thermal research for the rest of the world. This initiative is integrated in the frame of European Strategy Forum on Research Infrastructures (ESFRI) in the EU. Through this project new technologies in the field of CST energy will be identified and coordinated by the main European centers of the sector to respond to future technological needs.

The EU-SOLARIS consortium consists of fifteen (15) partners that provide an excellent mix representing all actors relevant for supporting the further development of the CST and solar chemistry technologies research. The fifteen partners represent seven EU countries (Portugal, Spain, France, Italy, Germany, Greece and Cyprus), two associate countries (Turkey and Israel) and one European Association.

Nomenclature

Acronyms

CST	Concentrated Solar Thermal
EU	European Union
ESFRI	European Strategy Forum on Research Infrastructures
ERIC	European Research Infrastructure Consortium
GIS	Geographical Information System
R&D	Research and technology Development
RES	Renewable Energy Sources
RI	Research Infrastructure
STE	Solar Thermal Electricity