EERA Joint Programme Concentrated Solar Power (CSP)

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Number participants and associates:	27 participants (16 full participate + 11 associated ones), around 145 person-years committed

Why a Joint Programme on CSP?

CSP systems use mirrors to convert the sun's energy into high temperature heat. This heat can then be used directly or converted into electricity. CSP technologies today have a cost slightly higher than Photovoltaic and Wind. Nevertheless, costs are decreasing as market expands and R&D efforts improve performance. Therefore, it is expected that CSP will soon represent an important source for the generation of electrical energy.

JP CSP – objectives

The overall objective of this JP is to integrate and coordinate the scientific collaboration among the leading European research institutions in CSP in order to contribute to the achievement of the targets set by the SET Plan Implementation Plan on CSP: 'Initiative for Global Leadership in Concentrated Solar Power', formally endorsed by the European Commission in September 2017 and elaborated by the whole European CSP community. The two agreed strategic targets are:

1. *Short-term: > 40% cost reduction by 2020 (from 2013) translating into*
   Supply price[1] < 10 c€/kWh for a radiation of 2050 kWh/m2/year (conditions in Southern Europe)

2. *Longer-term: develop the next generation of CSP/STE technology*
   New cycles (including supercritical ones) with a first demonstrator by 2020, with the aim to achieve additional cost reductions and opening new business opportunities.

[1] The supply price is meant to be the targeted price within Power Purchase Agreements (PPA) with a duration of 25 years

Joint Programme on CSP Sub-programmes

Sub-programme 1: Line Focusing CSP Systems *coordinated by Loreto Valenzuela, CIEMAT (ES)*

Main objective is to generate new knowledge and technology of line-focusing solar thermal energy systems with aim to reduce the solar field costs, to increase the efficiency of both parabolic-troughs and linear Fresnel concentrators, to improve the operation and maintenance of CSP plants and to explore and develop new concepts and technologies suitable for distributed CPS applications.

Sub-programme 2: Point Focusing CSP Systems *coordinated by Marcelino Sánchez, CENER (ES)*

Main objective is to advance in the point focusing systems technology reducing the final energy cost. Research will be focused in the increasing of the concentration of the systems in order to achieve higher working fluid temperatures and in the implementation of more cost-effective systems.

Sub-programme 3: Thermal Energy Storage for CSP plants *coordinated by Walter Gaggioli, ENEA (IT)*

Main objective is to assess and develop the best concepts of the TES systems for each of the existing CSP technologies (parabolic trough, central receiver, parabolic dish, linear Fresnel), by evaluating and investigating their fundamental aspects. The Sub-Programme aims at fully develop and demonstrate the most promising concepts, as well as investigating innovative ones.

Sub-programme 4: Materials for Solar Thermal Energy Components and Receivers *coordinated by Peter Heller, DLR (DE)*

The objective is the development of materials with improved optical and thermal performance and higher durability. The main materials of interest are those used for reflectors and absorbers. Main mechanisms for the degradation of such components will be identified, analyzed, and test methods will be developed.

Sub-programme 5: Solar Thermochemical Production of Fuels *coordinated by Martin Roeb (DE)*

This sub-programme encompasses the further development and demonstration of solar thermochemical processes for the production of fuels, as well as cross-cutting actions to identify main technological challenges and formulate essential R&D requirements.

Sub-programme 6: Solar Heat for Industrial Processes and Applications *coordinated by Pedro Horta, FISE (DE)*

Main objective is to develop cost efficient integration layouts for solar driven steam generation in industrial environments (process feed/extraction mechanisms), to integrate thermal energy storage and/or hybridization for 24/7 continuous operation. Definition of appropriate requirements, component evaluation, production analysis, and conceptual design for large-scale implementation are also tackled.