



# Guidelines for improving the synergy between the different European STE initiatives

<b>STAGE-STE Project</b>	
SCIENTIFIC AND TECHNOLOGICAL ALLIANCE FOR GUARANTEEING THE EUROPEAN EXCELLENCE IN CONCENTRATING SOLAR THERMAL ENERGY	
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<b>Partner responsible</b>	CTAER
<b>Person responsible</b>	Gonzalo Lobo, Manuel Silva
<b>Author(s) /Contributions:</b>	CIEMAT, CYI, FBK, UEVORA, CTAER, CNRS, FYSE, DLR, PSI
<b>Reviewed by:</b>	Manuel Silva
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# 1. Introduction

The present deliverable D3.1. is entitled '*Guidelines for improving the synergy between the different European STE initiatives*'. The objectives of the Task 3.1 is to fine-tune the synergies between the various on-going initiatives relevant to the enhancement of the cooperation in the field of CST aiming at contributing to establish a collaboration agreement that enables to coordinate the efforts already in place in these CST initiatives (such as SFERA II, EU-SOLARIS, etc.) avoiding overlaps and enhancing complementarity in the activities offered.

On the other hand, and although this is the main goal, it is also interesting to analyse various other initiatives, in this document referred to as '*distributed initiatives*', which are already being worked on in the CST field. Section 5 contains a first approach to them.

The present first version of the deliverable contains a preliminary approach to its very objective, although further steps will be necessary in the next months in order to reach the final target.

Frequent communication with coordinators and relevant partners of the EU-SOLARIS and SFERA-II projects has been held to ensure that overlapping of complementary activities is avoided as much and possible and to take advantage of possible synergies between them.

## 2. SFERA-I & II

SFERA stands for ‘Solar Facilities for the European Research Area’.

SFERA I & II are ‘Integrating Activity’-type (IA) projects, under the *Capacities* program of FP7. The *Capacities* programme includes a range of activities for developing world-class research infrastructures and to ensure the optimal use of existing ones.

SFERA I started in July 2009 and finished in June 2013. This IA was worth 9,04 M€ with a co-funding of 7,40 M€ by the EC. On the other hand, SFERA II started in January 2014 and will finish in December 2017. SFERA-II is worth 8,57 M€ with a co-funding of 7,00 M€ by the EC.

‘Integrating Activities’ (IA) scheme aims to provide a wider and more efficient access to and use of, the existing research infrastructures. This will ensure that European researchers may have access to the high performing research infrastructures they require to conduct their research, irrespective of the location of the infrastructure. Normally, an IA includes in the partnership several research infrastructures providing access and shall combine, in a closely coordinated manner: (i) *Networking activities*, (ii) *Trans-national access activities* and (iii) *Joint research activities*.

(i) *Networking activities*: To foster a culture of co-operation between the participants in the project and the scientific communities benefiting from the research infrastructure. Networking activities could include: development of common standards, protocols and interoperability, benchmarking; spreading of good practices; provision of training courses to new users; dissemination of knowledge or internal and external communication.

ii) *Trans-national access activities*: To provide trans-national access to researchers or research teams to one or more infrastructures among those operated by participants. These access activities should be implemented in a coordinated way.

(iii) *Joint Research activities*: These are innovative activities to explore new fundamental technologies or techniques underpinning the efficient and joint use of the participating research infrastructures. The main target is to improve, in quality and/or quantity, the services provided by the infrastructures.

### 2.1. Scope/Objectives

For both IAs and through coordinated integration of the complementary strengths, efforts and resources of the involved RIs, progress was made by:

- a. Increasing the scientific and technological knowledge base in the field of concentrating

- solar systems in both depth and breadth
- Providing and improving the research tools best-suited for the scientific and technologic community in this field
  - Strengthening the European industry through stimulating technology transfer by fostering the use of World-class R&D facilities
  - Increasing general awareness and especially of the scientific community in the possible applications of concentrated solar energy, including creation of new synergies with other scientific disciplines (e.g., materials treatment)

## 2.2. Previous historical projects

Though SFERA-I meant a ‘quantum leap’ in providing free access to European RIs in the CSP field both in quantity and quality, there were already a number of European-funded ‘access’ projects in the former years. Particularly, CIEMAT’s *Plataforma Solar de Almería* (PSA) has been participating in all the similar EU-funded access schemes for decades since year 1990. The table below shows the historical evolution of ‘access projects’ at PSA.

PROGRAM	Large Installations Programme (LIP)	Human Capital & Mobility (HCM)	Training & Mobility of Researchers (TMR)	Improving Human Potential (IHP)	IHP-2
<b>Period (from/to)</b>	01.01.90 30.06.93	01.01.94 31.12.95	01.01.96 31.12.98	01.02.00 31.01.03	01.03.02 28.02.04
<b>Level of access</b>	3 facilities, 231 weeks	5 facilities, 290 weeks	8 facilities, 157 weeks	8 facilities, 156 weeks	8 facilities, 48 weeks
<b>Program users</b>	12, from 7 countries	15, from 9 countries	50, from 15 countries	67, from 27 countries	20, from 15 countries

On the other hand, CNRS’ PROMES laboratory has been participating also in such ‘transnational access’ schemes. The SOLFACE project ran very successfully at the facilities in Odeillo since year 2004 to year 2007.

## 2.3. Partners involved

As it can be seen in the table below, all institutes owning/operating large CSP-related R&D infrastructures in Europe were partners in SFERA-I (marked in green).

Participant #	Organisation short name	Country
1 (Coordinator)	CIEMAT	Spain
2	DLR	Germany
3	CNRS	France
4	PSI	Switzerland
5	ETH	Switzerland
6	WEIZMANN	Israel
7	ENEA	Italy
8	DIN	Germany
9	UPS	France
10	AUNERGY	Spain
11	CEA	France
12	INESC-ID	Portugal

Later on, SFERA-II (January 2014-December 2017) was conceived as the natural extension of SFERA-I. The table below shows the participants in SFERA-II. Nine participants remain the same as in SFERA-I, while one of the new partners is the University of Évora (Portugal) which is developing its own infrastructures to become a RI and another one is ESTELA, the main representative of European CSP industry.

Participant #	Organisation short name	Country
1 (Coordinator)	CIEMAT	SPAIN
2	ENEA	ITALY
3	DLR	GERMANY
4	PSI	SWITZERLAND
5	ETHZ	SWITZERLAND

Participant #	Organisation short name	Country
6	CEA	FRANCE
7	CNRS	FRANCE
8	INESC-ID	PORTUGAL
9	U.EVORA	PORTUGAL
10	UNILIM	FRANCE
11	ESTELA	BELGIUM
12	UTV	ITALY

## 2.4. Access offered

The chapter 'Transnational Access' is the most important within the project. *Capacities* program emphasizes the role of the Research Infrastructures as the backbone of the European Research Area. Through this tool, facility owners open the door of certain test installations to research groups coming from another European country. The access is granted through a competitive process and an independent experts committee is in charge of the proposals assessment on a scientific merit basis.

The table below shows the amount of access provided per institute and test installation within SFERA-I. A calendar week is considered the *Access Unit* by default.

Organization short name	Short name of Infrastructure	Installation short name	Min. Quantity of Access to be provided	Estimated total number of users	Estimated total number of projects
CIEMAT	PSA	CRS	16	8	4
	PSA	SF-60	12	12	6
	PSA	SF-5	32	32	16
	PSA	DISTAL	12	12	6
	PSA	DISS	24	12	6

Organization short name	Short name of Infrastructure	Installation short name	Min. Quantity of Access to be provided	Estimated total number of users	Estimated total number of projects
	PSA	HTF	24	12	6
	PSA	ACUREX	20	18	9
	PSA	DESAL	16	18	9
	PSA	DETOX	38	48	24
<b>CNRS</b>	PROMES	MWSF	12	12	6
	PROMES	MSSF	50	52	24
	PROMES	THEMIS	15	12	3
	PROMES	SDISH-50kW	10	8	4
<b>PSI</b>	STL	HFSF	10	13	7
	STL	HFSS	24	24	10
<b>WEIZMANN</b>	SRFU	ST100KW	26	20	8
	SRFU	ST2MW	18	6	2
<b>ENEA</b>	SOLTERM	PCS	20	12	8
	SOLTERM	MOSE	41	14	12

Total figures for SFERA-I are: 420 weeks of access to carry out 187 projects by 345 individual users.

On the other hand, the table below shows the breakdown of ‘access weeks’ committed with the EC for SFERA-II: it accounts for 458 weeks, 187 projects and 339 individual users, figures are even a bit higher than in SFERA-I.

Organization short name	Short name of installation	Min. quantity of access to be provided	Estimated number of users	Estimated number of days spent at the infrastructure	Estimated number of projects
<b>CIEMAT</b>	<b>CRS</b>	16	8	224	4



Organization short name	Short name of installation	Min. quantity of access to be provided	Estimated number of users	Estimated number of days spent at the infrastructure	Estimated number of projects
	ACUREX	32	32	896	16
	DISS	16	10	280	5
	Molten salts loop	16	10	280	5
	PTTL	4	2	56	1
	KONTAS	4	2	56	1
	CAPSOL	16	8	224	4
	HSF	36	18	504	9
	VSF	16	8	224	4
	DISTAL	8	4	112	4
	DESAL	16	18	504	9
	DETOX	38	32	896	16
	DESINF	32	16	448	8
CNRS	Thémis	12	12	84	3
	MWSF	12	12	84	6
	MSSFs	65	65	455	32
	SDISH 50 kW	6	6	42	3
	MiniTrough	6	6	42	3
PSI	HFSS	28	28	392	14
WEIZMANN	ST100kW	24	16	320	8
ENEA	PCS	20	12	168	8
	MOSE	35	12	420	12

## 2.5. Relevance

In the light of the SFERA-I & II partnerships, their extension in time and the intensity of the joint activities carried out, it can be said that these projects started nucleation of current EU R&D organizations partnerships in the CSP field, crystallizing in the current, more ambitious ones, STAGE-STE and EU-SOLARIS.

## 3. EU-SOLARIS

EU-SOLARIS stands for 'The European Solar Research Infrastructure for Concentrating Solar Power'.

EU-SOLARIS is a combination of FP7 *Collaborative Project* and *Coordination and Support Action* (CP-CSA) funding tools, applied to this project which is in its *Preparatory Phase*, according to the *European Strategy Forum on Research Infrastructures*<sup>1</sup> (ESFRI) nomenclature.

This is a four-year project (2012-2016), worth 5,91 M€ with a co-funding of 4,45 M€ by the EC.

### 3.1. Scope/Objectives

EU-SOLARIS aims to create a new legal entity to explore and implement new and improved cooperation and exploitation mechanisms for research infrastructures (RI) for Solar Thermal Electricity (STE) technology, in order to optimize research infrastructure development and R&D coordination in Europe. The following actions will be included:

- a. developing and determining all necessary arrangements for hosting the new legal entity;
- b. developing the collaborative model between public and private entities and fostering the collaboration between industry and research centres;
- c. establishing one access point and clear rules for users;
- d. preparing all the necessary mechanisms to secure sustainable financial resources;
- e. defining appropriate systems for knowledge and IPR management;
- f. coordinating the efforts of the participating infrastructures around Europe;
- g. establish joint future development of research facilities;
- h. elaborating effective rules for the dissemination of project;
- i. assessing the impact of the new EU-SOLARIS RIs and the deployment of STE technologies for a sustainable development.

### 3.2. Partners involved

The project consortium involves all institutions owning/operating large RIs for CSP in Europe,

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<sup>1</sup> [https://ec.europa.eu/research/infrastructures/index\\_en.cfm?pg=preparatory\\_phase\\_projects](https://ec.europa.eu/research/infrastructures/index_en.cfm?pg=preparatory_phase_projects)

belonging to nine countries as shown in the table below.

<b>Participant #</b>	<b>Participant Organization Name</b>	<b>Acronym</b>	<b>Country</b>
1 (Coordinator)	Centro Tecnológico Avanzado de Energías Renovables	CTAER	Spain
2	CIEMAT-Plataforma Solar de Almería	CIEMAT-PSA	Spain
3	Ministerio de Ciencia e Innovación	MINECO	Spain
4	Cyprus Institute	Cyl	Cyprus
5	European Solar Thermal Electricity Association	ESTELA	Europe
6	Centre Nationale de la Recherche Scientifique	CNRS	France
7	Deutsches Zentrum für Luft-und Raumfahrt	DLR	Germany
8	Aerosol & Particle Technology Laboratory CPERI / CERTH	APTL	Greece
9	Centre for Renewable Energy Sources and Saving	CRES	Greece
10	Agenzia Nazionale per le NouveTecnologie, l'Energia e lo Sviluppo Economico Sostenibile	ENEA	Italy
11	Weizmann Institute of Science	WEIZMANN	Israel
12	Laboratorio Nacional de Energia e Geologia	LNEG	Portugal
13	Universidade de Évora	UEVORA	Portugal
14	Centre for Solar Energy Research and Applications (Middle East Technical University)	GUNAM	Turkey
15	Selcuk University	SELCUK U	Turkey

So far, the following member countries have expressed their interest in further supporting EU-SOLARIS: Spain, Portugal, Italy, France, Germany, Greece and Cyprus, plus others to

join later on.

### 3.3. Proposed governance

The future organizational structure proposed for EU-SOLARIS at its project deliverable 'ID.2.1 *Motivational Report on the legal organism selected to host EU-SOLARIS*' is an *European Research Infrastructure Consortium (ERIC)*<sup>2</sup>. The Community legal framework for a European Research Infrastructure Consortium (ERIC) entered into force on 28 August 2009. This specific legal form is designed to facilitate the joint establishment and operation of research infrastructures of European interest.

Here is a brief description of profiles for the governance bodies shown in Figure 1 below:

#### **General Assembly:**

- Representatives of the Members (States).
- Duly empowered to bind Members when voting in the General Assembly.
- Acting as collegiate decision body of EU-SOLARIS in corporate and strategic issues.
- The European Commission may be represented in the General Assembly.

#### **Managing Director and Supporting:**

- Appointed by the General Assembly.
- Acting as sole administrator of EU-SOLARIS.
- High experience and reputation.
- Project management and economic and technical expertise.
- It also implies administrative personnel and staff of EU-SOLARIS

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<sup>2</sup> [https://ec.europa.eu/research/infrastructures/index\\_en.cfm?pg=eric](https://ec.europa.eu/research/infrastructures/index_en.cfm?pg=eric)

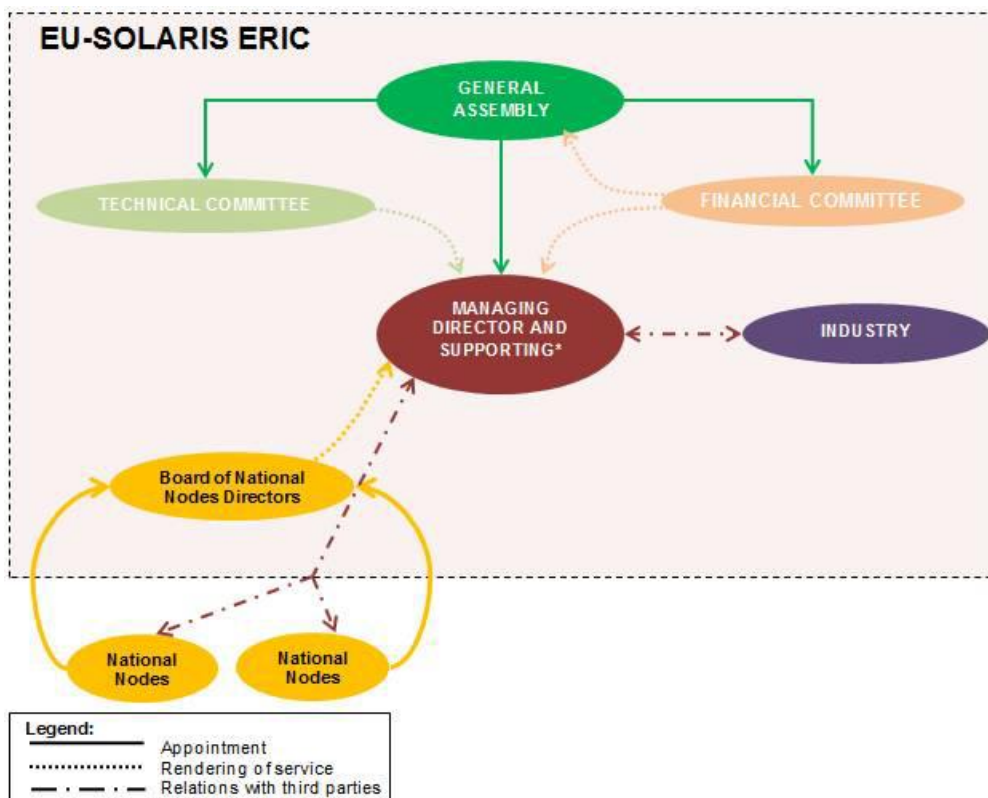


Figure 1. Organizational Structure proposed for EU-SOLARIS ERIC

### Financial Committee:

- Appointed by the General Assembly.
- Experts in control (accounting, auditing and risk management) and in economic and financial issues.
- As possibility, experts from the Governments of the Members and independent experts.
- Also as a proposal, the Financial Committee may be empowered by the General Assembly to authorize investment decisions that are beyond the powers of authorization of the Managing Director (if limitations are established), in order to facilitate the management of the institution.

### Technical Committee:

- Appointed by the General Assembly.
- Independent and prestigious experts and experts from the National Nodes.
- Upon request, it may also advice the General Assembly.

### Board of National Nodes Directors:

- Integrated by all the Directors of the National Nodes.

- Coordination activities within EU-SOLARIS.

#### **National Nodes:**

- Entities collaborating with EU-SOLARIS in the CST field (i.e. the Consortium Partners).

- An agreement with EU-SOLARIS will be necessary.

### **3.4. Target/Potential activities**

EU-SOLARIS will operate on the basis of a non-profit entity and its main activity will be the improvement of the accessibility and interoperability of the existing Research Infrastructures to the research communities. To meet this target, the following activities are foreseen:

- a. Research actions for the improvement of infrastructures: activities that will improve test facilities at the RI
- b. Publicity and dissemination of information: dissemination activities and transfer of knowledge to the research community
- c. Scientific Capacity Building: performance of key training activities for the research community
- d. Industry related activities: collaborative activities with industry for the exchange of knowledge and information, and for knowing industry's needs
- e. Research Infrastructures access fees: use of the RI by the research and scientific community

### **3.5. Proposed Business Plan**

There are two deliverables related with the Business Plan at the *Description of Work* document of EU-SOLARIS. First is a *Business Plan Mid Term Prospective Report*, (Deliverable 1.1) committed for month 24 of the project and already delivered. Second is the final, consolidated version of the *Business Plan* (Deliverable 1.3), committed for month 46 of the project and so still pending.

An average annual budget of around 2,5 M€ has been estimated for the first five years of operation.

The main '**Contribution**' would come in cash as *Member Countries Contributions*, though it would evolve also, starting at a 88% for the first year to go down to a more moderate 55% in the fifth year. On the other hand, *Provision of Services* would rise from a modest 4% up to a 23%.

As far as the '**Costs**' are concerned, there are three major chapters: *RI Access Fees*, *Research Actions for the Improvement of the RIs* and *Human Resources* which, all together, sum for roughly 75% of the annual costs.

It is worth to stress here the meaning of the *RI Access Fees* concept. This is the value of 'access time' to the different RIs contributed in kind to the European community of *users* by the consortium members.

### 3.6. Current status of development

The *EU-SOLARIS Preparatory Phase* project started in November 2012 and is about to finish in October 2016.

According to the ESFRI's nomenclature, the next step following the successful completion of *the Preparatory Phase* would be the *Implementation Phase*. The purpose of this activity would be to support the actual implementation of the new European research infrastructures (or major upgrades of existing ones). This phase would include funding of the appropriate *Coordination Activities* as well as relevant technical work.



## 4. STAGE-STE

STAGE-STE stands for ‘Scientific and Technological Alliance for Guaranteeing European Excellence in Concentrating Solar Thermal Energy’.

STAGE-STE is an ‘Integrated Research Program’ (IRP) comprised by *Coordination and Support Actions* (CSA) and, in parallel, *Collaborative Projects* (CP) covering the full spectrum of current concentrating solar energy research topics.

This is a four-year project (2014-2018), worth 21,2 M€ with a co-funding of 10,0 M€ by the EC.

### 4.1. Scope/Objectives

This IRP engages all major European research institutes, with relevant and recognized activities on STE and related technologies, in an integrated research structure to successfully accomplish the following general objectives:

- a. Convert the consortium into a reference institution for concentrating solar energy research in Europe, creating a new entity with effective governance structure;
- b. Enhance the cooperation between EU research institutions participating in the IRP to create EU added value.
- c. Synchronize the different national research programs to avoid duplication and to achieve better and faster results;
- d. Accelerate the transfer of knowledge to industry in order to maintain and strengthen the existing European industrial leadership in STE;
- e. Expand joint activities among research centres by offering researchers and industry a comprehensive portfolio of research capabilities, bringing added value to innovation and industry-driven technology;
- f. Establish the European reference association for promoting and coordinating international cooperation in concentrating solar energy research.

### 4.2. Partners involved

The table below shows the STAGE-STE partners at the beginning of the project. Almost all relevant players in Europe are included, both from academia and industry.

Participant no.	Short name	Country
1 (Coord.)	CIEMAT	Spain
2	DLR	Germany
3	PSI	Switzerland
4	CNRS	France
5	FISE	Germany
6	ENEA	Italy
7	ETHZ	Switzerland
8	CEA	France
9	CYI	Cyprus
10	LNEG	Portugal
11	CTAER	Spain
12	CNR	Italy
13	CENER	Spain
14	TECN	Spain
15	UEVORA	Portugal
16	IMDEA	Spain
17	CRAN	United Kingdom
18	TKN	Spain
19	UNIPA	Italy
20	CRS4	Italy
21	INESC-ID	Portugal
22	IST-ID	Portugal
23	SENER	Spain
24	Blank	Blank
25	HITIT	Turkey
26	ACCIONA	Spain
27	SCHOTT	Germany
28	ASE	Italy
29	ESTELA	Belgium
30	ASNT	Spain
31	KSU	Saudi Arabia
32	UNAM	Mexico
33	SUN	South Africa
34	CSERS	Lybia
35	CSIRO	Australia
36	FUSP	Brazil
37	IIECAS	China
38	UDC	Chile
39	UCAM	Morocco
40	FBK	Italy
41	SUNCNIM	France
42	COBRA	Spain

### 4.3. EERA context

EERA stands for 'European Energy Research Alliance'.

The EERA was launched in year 2008 and is the public research arm of the EU Strategic

Energy Technology Plan (SET-Plan). This tightly focused strategy aims at accelerating the development and market uptake of key low carbon technologies. Since 2014, EERA has evolved and become an AISBL (International Non-Profit Organization), as it has been recently confirmed as one of the SET-Plan pillars.

On the other hand, a *Joint Programme on Concentrated Solar Power* (EERA JP CSP) was formally approved on April 2011 with the goal to become the umbrella for all R&D activities on CSP at the European domain. Today, in the light of the data contained in this document, it is quite evident that such target has been successfully achieved. For example, as it is shown in the table below, most of STAGE-STE partners are also members of EERA JP.

EERA JP CSP has currently 29 members, 16 of them are 'Full Partners' and the rest are 'Associate Partners'. The main difference relies on the manpower effort committed.

The key point is that 22 out of the 29 members are also partners of the STAGE-STE project, showing a very high degree of coincidence.

#	Member	Country	Committed Effort (Person-yr/yr)	Status	STAGE-STE partner ?	EU-SOLARIS partner?
1	CIEMAT	SPAIN	14,00	Full partner	Yes	Yes
2	ENEA	ITALY	13,50	Full partner	Yes	Yes
3	FRAUNHOFER	GERMANY	6,00	Full partner	Yes	No
4	CNRS	FRANCE	7,50	Full partner	Yes	Yes
5	CEA	FRANCE	8,00	Full partner	Yes	No
6	CENER	SPAIN	6,00	Full partner	Yes	No
7	PSI	SWITZERLAND	6,00	Full partner	Yes	No
8	IMDEA	SPAIN	6,00	Full partner	Yes	No
9	LNEG	PORTUGAL	5,00	Full partner	Yes	Yes
10	CNR	ITALY	5,50	Full partner	Yes	No
11	DLR	GERMANY	5,00	Full partner	Yes	Yes
12	CYI	CYPRUS	5,00	Full partner	Yes	No
13	CTAER	SPAIN	5,00	Full partner	Yes	Yes
14	TECNALIA	SPAIN	5,00	Full partner	Yes	No
15	FBK	ITALY	5,00	Full partner	Yes	No
16	IK4-TEKNIKER	SPAIN	5,50	Full partner	Yes	No
17	ETHZ	SWITZERLAND	3,00	Associated partner	Yes	No
18	UEVORA	PORTUGAL	3,00	Associated partner	Yes	Yes
19	IST-ID	PORTUGAL	1,50	Associated partner	Yes	No
20	UNIPA	ITALY	1,50	Associated partner	Yes	No
21	CRS4	ITALY	3,00	Associated partner	Yes	No
22	CRANFIELD	UK	6,00	Associated partner	Yes	No
23	USEVILLA	SPAIN	6,00	Associated partner	No	No
24	UPC	SPAIN	2,00	Associated partner	No	No

#	Member	Country	Committed Effort (Person-yr/yr)	Status	STAGE-STE partner ?	EU-SOLARIS partner?
25	UNINA	ITALY	5,00	Associated partner	No	No
26	CRES	GREECE	0,75	Associated partner	No	Yes
27	UNIFI	ITALY	6,00	Associated partner	No	No
28	METU	TURKEY	4,00	Associated partner	No	No
29	CIC-EnergiGUNE	SPAIN	1,00	Associated partner	No	No

Also, there is a high overlapping with EU-SOLARIS partnership, with 8, out of 15 EU-SOLARIS partners involved at the Joint Program too.

## 4.4. Key activities identified by EERA Secretariat to JPs

Latest inputs from the European Commission unveil the key activities expected to be managed directly by the JPs in the near to mid-term future (among others):

- a. Transnational access
- b. Mobility of researchers
- c. International collaboration
- d. Key Performance Indicators (KPIs)
- e. R&D agenda definition

EERA and the European Commission are working together in a joint document to clearly outline the way JPs will handle these activities, to which extent EERA AISBL is expected to participate and the feasible ways to fund them.

## 4.5. Status of STAGE-STE+ concept

A further step to this IRP is already being conceived and under discussion within STAGE-STE consortium.

## 4.6. STAGE-STE + financing schemes

The latest communications from the EC suggest two ways of funding according to the type of activities. 'Coordination and Support Activities' (CSA) would be funded by the concerned

member states (MS) exclusively. On the other hand, R&D activities would be funded (partially at least) by the EC.

## 4.7. The Implementation Plan to reach STE/CSP defined targets and the role of R&D community

The EU's SET-Plan has been moving forward through the stages listed below in the last three years<sup>3</sup>:

- Towards an Integrated Roadmap (2013)
- Adoption of 10 Key Actions (2015)
- Target setting per technology –Declarations of Intent (2016)
- Elaboration of 'Implementation Plans' (2016 –1st quarter 2017)

The CSP/STE community has been doing so and the current goal is the elaboration of the 'Implementation Plan'. According to the SET-Plan guidelines, it is necessary to follow the procedure below (at national level for every committed country)<sup>4</sup>:

- i. Setting up of a 'Temporary Working Group'
- ii. Selection of R&I Activities to reach the targets

### **-Max. 5-10 per Implementation Plan**

Ongoing activities conducted at national and/or at European level (or by industry alone) can be considered enough to reach some targets

### **-Specific non-technological barriers/enablers to be identified**

### **-Funding Main sources**

Governmental funds and/or by stakeholders at National level  
Joint R&I Activities between SET Plan countries

### **-Secondary sources**

At EU level when there is strong EU added value

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<sup>3</sup> <https://setis.ec.europa.eu/set-plan-process/integrated-roadmap-and-action-plan>

<sup>4</sup> Presentation 'Set Plan status and next steps', by Gwennaél Joliff-Botrel, Head of the Energy Strategy Unit, European Commission DG Research and Innovation at the EERA Summer Strategy Meeting (28 June, 2016; Trondheim)

**-Info on the selected R&I Activities**

Who will implement what, with which resources, and when

- iii. Monitoring of the progress (to be done by the EC services)

**-To agree on the quantification of targets and to consent on the monitoring and reporting mechanisms necessary to enable SETIS' mandate. In particular:**

Current state-of-play for the targets (baseline)

Approaches for quantifying the progress of activities

- iv. Transparency

**-To be posted on SETIS**

Information on the launch and composition of the WG

Minutes of all the WG meetings

Final Implementation Plans agreed by the WG and endorsed by the SET Plan

Steering Group

If relevant, the following actions at EU level are applicable also:

- v. Focus on Joint Actions between countries
- vi. Identify Flagship & International Cooperation Activities

The current status of the STE/CSP community in preparing the 'Implementation Plan' can be summarized as follows:

Representatives from a number of Member States and associated countries (MS)<sup>5</sup>, the Commission and the main stakeholders have agreed on the following terms to guide the implementation of the strategic targets on CSP (approved by the SET-Plan Steering Group and the main stakeholders in December 2015).

<b>Strategic targets ('the Targets'):</b>
<ol style="list-style-type: none"> <li>1. 40% cost reduction by 2020 (from 2013) translating into a supply price* &lt; 10 c€/kWh for a radiation of 2050 kWh/m<sup>2</sup>/year (average in Southern Europe)</li> <li>2. New cycles (including supercritical ones) with a first demonstrator by 2020</li> </ol>



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<sup>5</sup> France, Greece, Italy, Germany, Lithuania, Malta, Portugal, Cyprus and Turkey were involved in preliminary discussions on an Initiative for Global Leadership in CSP/STE already in May 2015. Switzerland and UK are also active in CSP. Other countries such as Norway, Denmark or the Netherlands might also be interested in joining.

**Implementation of the Targets:**

1. A Working Group ('WG') has been set up to prepare and guide the Implementation Plan
2. The Implementation Plan will contain the priority actions needed to achieve the Targets, both technological and non-technological, including international actions and 'Flagship' first-of-kind projects
3. The WG will propose the most efficient partnership implementation instrument between MS, the EC and stakeholders to ensure delivery on the Targets

## 5. Distributed initiatives

The partners decided not to focus only on facilities and research infrastructure (RI) initiatives, as indicated in the DoW, but also to search for any other CST initiatives that could be of particular interest for STAGE-STE and knowledge of which or activities can add value to the joint CST research effort in Europe. The activities identified, designated herein as distributed initiatives (DIs), can range from the organisation of dissemination and general information actions, training activities, access to infrastructures, performance of RTD activities, provision of access to RIs, to consulting services or provision of funding for CST activities.

During the execution of this task of the project, all task 3.1 partners continued with the search in Europe and in some associated countries for relevant CST-related organisations which support CST in any way (RTD organisations, educational institution, administration, industry, association, technology platform, etc.). The partners participated also in the design and the distribution of an online questionnaire aimed at gathering information on the activities carried out by the identified CST initiatives.

Some conclusions may be drawn, in summary, from the results obtained in this initial survey.

As far as the initiatives' geographical scope is concerned and taking into consideration that those with a wider one do operate at a national and regional level as well, 50% of CST related initiatives are international (see Figure 2), which opens the door to establishing collaboration frameworks.

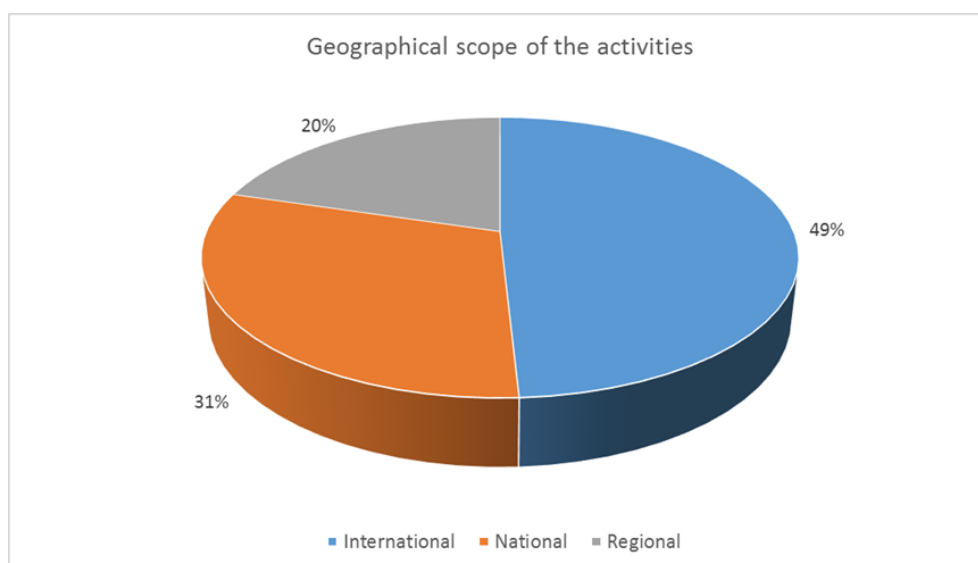


Figure 2. Geographical scope of 'distributed initiatives'



The initial survey asked about the specialization field of DIs as to the development of CST. The graph in Figure 3 below shows, in percentages and based on the information gathered; the various action types that DIs perform.

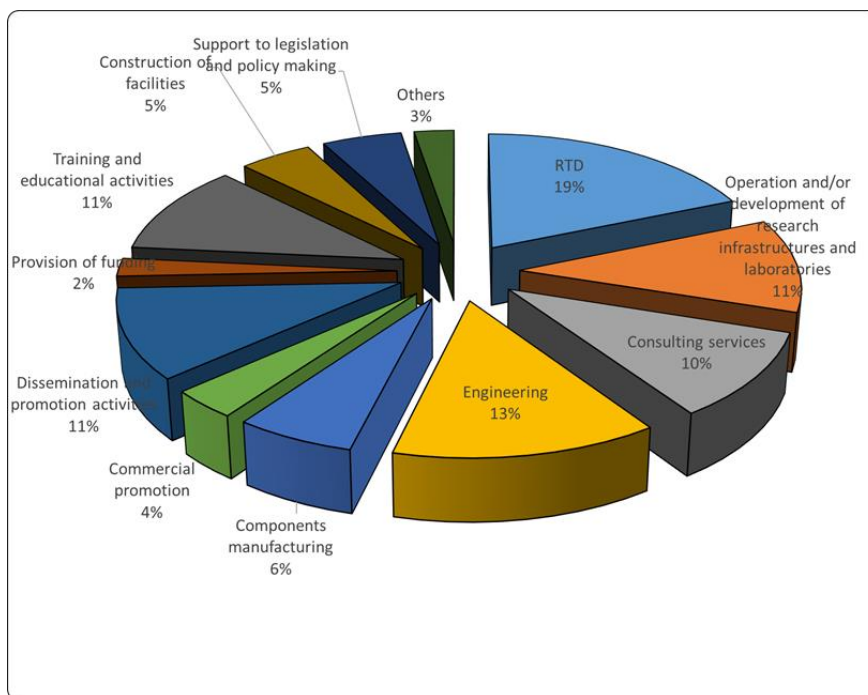


Figure 3. Distribution of 'distributed initiatives' per type of activity

Data analysis highlights the possibility of concluding agreements in matters such as training, research, infrastructures and laboratories, dissemination as well as engineering and consulting services.

## 5.1. Scope/Objectives

As already mentioned in this document, CST is one of the smallest R&D communities at EERA.

On the other hand, participation of these '*distributed initiatives*' in such large organizations like EERA may result difficult and complex, particularly for small R&D groups, local energy agencies, SMEs, non-CST labs, etc. All those '*modest players*' in the field will surely find difficulties to put their ideas and visions in the spotlight. In order to mitigate that, a bottom-up participative methodology should be conceived so a better integration can be achieved.

It is not about dismissing the existing procedures or tools, like technology platforms for instance, but given the current status of CST other options should be reinforced in the

international science landscape. A brand new activity within EERA framework could be envisaged to pave the way to all those DIs, in an agile and efficient manner, so they can share knowledge, visions, intelligence and efforts.

## 5.2. Partners involved

All '*distributed initiative*' partnerships, both existing and future ones, which wish to share knowledge and work with the rest of CST community.

## 6. Considerations about merging the two existing European CST Research Frameworks

In the light of all the above, the following considerations can be done.

The European R&D community for CST (hereinafter the Community), composed by industry, research centres and universities, counts around thirty partners, being one of the smallest communities within EERA. An advantage of this fact is that the degree of collaboration and coincidence of partners in projects used to be quite high, which makes integrating activities easier.

Another interesting fact is that around one third of these partners own/operate the existing 'Large-Scale Research Infrastructures' (RI) specific for this field. In addition, some of these RI-partners have been handling historically the largest amount of resources, particularly R&D staff.

It's worth considering the following two options for the evolution of this R&D community framework in a near future:

1. Keeping two working frameworks as of today:
  - a. All R&D institutes engaged in an IRP-like (Integrated Research Program) scheme, backed by the EERA JP and dealing with any research topics.
  - b. RI-operating institutes engaged additionally in a EU-SOLARIS-like scheme (or an upgraded one as an ESFRI infrastructure) and dealing just with RI-related research topics and developments.
2. Unification of all the joint activities in just one framework: All R&D institutes are engaged in EU-SOLARIS-like scheme (or an upgraded one as an ESFRI<sup>6</sup> infrastructure) and dealing with any research topics, including those RI-related.

In both cases, the EERA JP would keep its role of formal liaison with the European Commission, think-tank and discussion forum, entry point for new partners joining this technology and community resource for dissemination and outreach.

Option #1 would be a continuation of the current scenario and Option #2 would rely on an eventual success of a further EU-SOLARIS initiative, shifting from the current '*Preparatory*

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<sup>6</sup> [https://ec.europa.eu/research/infrastructures/index\\_en.cfm?pg=esfri](https://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri)

*Phase*’ project status into a *Landmark* one, likely as an ERIC (European Research Infrastructure Consortium) within ESFRI framework and mostly funded by interested MSs.

Option #2 would simplify the bureaucratic burden as one instead of two consortia would be managed by more or less the same people. As a significant fraction of the research activities is already being carried out at the existing RIs, it would be natural to make such new CST working framework to rotate around them.

Moreover, the SET-Plan’s *Implementation Plan* phase envisages the choice of a number of *Key Projects* (Flagship Actions) to be chosen and proposed by the CST community. Such *Key Projects* are likely to be jointly funded by EC and the interested MSs. They are expected to be of a big size, nearly industrial-scale, as the Community and the EC will be looking for ‘quantum leap’ advances in the technology, so the ultimate goals of cost reduction and increased reliability are achieved.

Due to their characteristics, such *Key Projects* would be most likely implemented in a RI environment which reinforces also Option #2.

Framework scheme depicted as Option #2 would easily integrate also all CSA activities (Coordination and Support Activities), i.e. Access, Mobility, International Cooperation and Capacity Building, among others.

As a conclusion, the merging of the two existing R&D frameworks for CST can be considered as a serious option for the upcoming scenario within the EERA context and thus, is strongly recommended.

Also, it would be very convenient coordination with DIs in this future scenario.

## List of abbreviations and definitions

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AISBL	Association without lucrative purpose
CP	Coordinated Projects
CSA	Coordination and Support Actions
CSP	Concentrated Solar Power
CST	Concentrated Solar Thermal Technologies
DI	Distributed Initiative
EERA-CSP	European Energy Research Alliance – Concentrated Solar Power joint programme
ESTELA	European Solar Thermal Electricity Association
ERIC	European Research Infrastructure Consortium
EU-SOLARIS	The European Solar Thermal Research Infrastructure for Concentrated Solar Power.
EU	European Union
FP	Framework Programme
IRP	Integrated Research Project
R&D	Research and Innovation
RES	Renewable Energy Sources
RI	Research Infrastructure
RTD	Research and Technological Development
SFERA	Solar Facilities for the European Research Area
STE	Solar Thermal Electricity
STAGE-STE	Scientific and Technological Alliance for Guaranteeing the European Excellence in Concentrating Solar Thermal Energy
WP	Work Package