

## PV WILL SHINE IN THE NEW CLEAN ENERGY TRANSITION PARTNERSHIP

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**ABSTRACT:** SOLAR-ERA.NET – a network that brings together more than 20 national and regional RTD and innovation programmes in the field of solar electricity technologies in the European Research Area (ERA) – has been working together for more than a decade, providing funding to highly innovative transnational RDTI projects involving some 500 organisations, and further improving transnational cooperation both in the solar power sector and between national funding agencies [1]. Eight Joint Calls have been launched promoting priority topics identified by the European Technology and Innovation Platform Photovoltaics (ETIP-PV). Similar to other relevant energy ERA-Net's, the SOLAR-ERA.NET network is about to be integrated into a thematically much larger and energy system-oriented network called Clean Energy Transition Partnership (CETPartnership) that can seamlessly build on the momentum the ERA-Net's have created over the last 15 years. CETPartnership is a new transnational initiative on joint research, technological development and innovation (RTDI) programming to boost and accelerate the energy transition in Europe, building upon regional and national RTDI funding programmes. CETPartnership enables some 50 national and regional RTDI programmes from 30 countries to align their priorities, pool national budgets, as well as to implement annual joint calls each with an average budget of some 100 million euros from 2022 to 2027. The first joint call is launched in September 2022 and is based on the CETPartnership Strategic Research and Innovation Agenda (SRIA) [2] with respect to the topics and challenges addressed in this joint call. Via the European Technology and Innovation Platform Photovoltaics and its Strategic Research and Innovation Agenda" (SRIA) for Photovoltaics [3]. This contribution shall present i) key figures and findings from the long cooperation of national programmes in SOLAR-ERA.NET and ii) the new CETPartnership and opportunities for the PV industry and research community CETPartnership offers as a network and in the upcoming joint calls.

Keywords: Funding and Incentives, National Programmes

### 1 INTRODUCTION AND CONTEXT

The European Union, member and associated states have been supporting networks of national and regional funding organisations and research and innovation programmes for some twenty years in different formats. This transnational cooperation has become a key instrument and success factor for Europe, both for programmes as well as the industry and research community. This transnational cooperation allows for strengthening the competitiveness of European stakeholders in research and industry and more efficiently tackling major challenges related to energy and climate issues.

The European Strategic Energy Technology Plan (SET Plan) is a key stepping-stone to boost the transition towards a climate neutral energy system through the development of low-carbon technologies in a fast and cost-competitive way. By improving new technologies and bringing down costs through coordinated national research efforts, the SET Plan helps promote cooperation among EU countries and associated states, companies and research institutions, and in so doing also deliver on the key objectives in the energy and climate field. The European Technology and Innovation Platforms (ETIPs) were created to support the implementation of the SET Plan by bringing together EU countries and associated states, industry, and researchers in key areas. They promote the market uptake of key energy technologies by pooling funding, experts, skills, and research facilities.

In the PV area, the European Technology and Innovation Platforms for Photovoltaics has published the regularly updated European Strategic Research and Innovation Agenda for Photovoltaics [3, for the most recent one] and related Implementation Plans. They serve(d) as a reference for SOLAR-ERA.NET, especially for its eight joint calls carried out between 2012 and 2022. The first section shall present key figures and findings from the long cooperation of national programmes in SOLAR-ERA.NET.

With the new EU's Framework Programme for research and innovation, Horizon Europe, larger networks (called partnerships) of national and regional funding organisations and research and innovation programmes with a larger scope are supported. For the PV sector, the Clean Energy Transition Partnership (CETPartnership) provides the most interesting opportunities. As for the more single technology oriented ERA-Net's, joint calls to be carried out by the CETPartnership will refer to the Strategic Research and Innovation Agenda (SRIA) specifically defined, including PV. The CETPartnership SRIA [2] will serve as a guidance and compass for the multilateral collaboration in Europe and beyond for the next years. The second section shall present the new CETPartnership and opportunities for the PV industry and research community CETPartnership offers as a network and in the upcoming joint calls.

## 2 SOLAR-ERA.NET

### 2.1 Network

SOLAR-ERA.NET started in 2012 and has been supported by the EU in three projects (see section on acknowledgement). The network has been composed of some 20 organisations being programme owners and managers. In total, SOLAR-ERA.NET has organised eight joint calls.

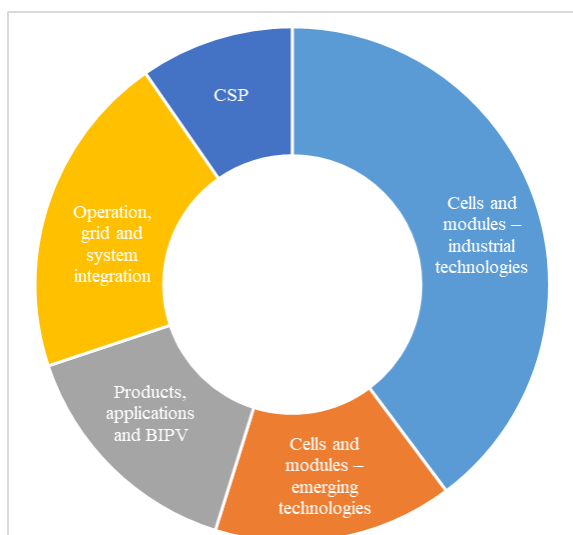
### 2.2 Participation in joint calls – some key figures

The joint calls found good interest in the solar power industry sector and research community. 326 preproposals were submitted with a total budget of around 423 MEUR (of which 296 MEUR funding requested) involving 1'546 organisations (multiple counting – some organisations have been involved in several preproposals). About half of the preproposals were selected for the second stage of the call procedure, resulting in 177 full proposals.

In total, 93 transnational projects have been supported. The total public funding amounts to approx. 79 MEUR for a total project volume of around 117 MEUR. 488 organisations are involved in these transnational projects funded (multiple counting). A slight majority of the organisations involved belong to the categories of small and medium sized enterprises and large enterprises.

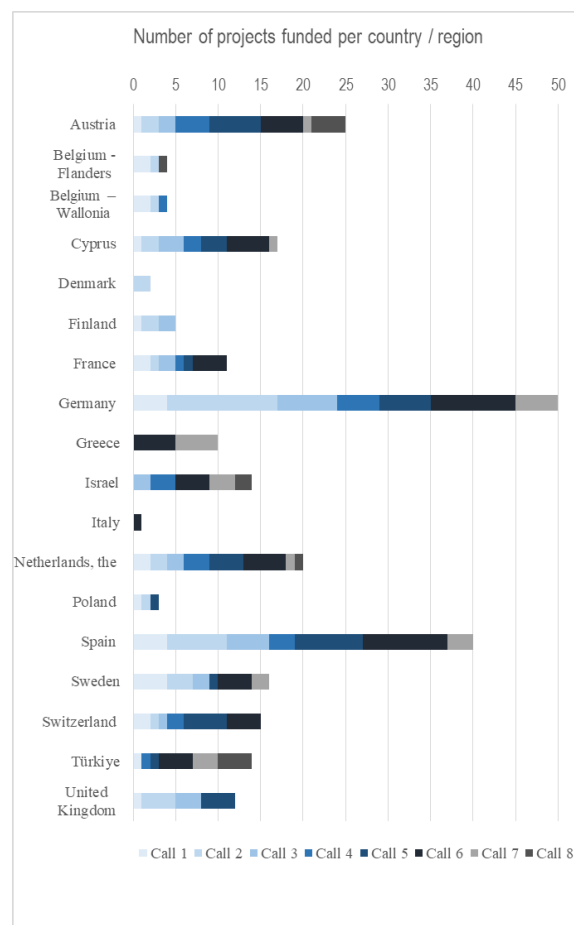
63 projects are finalized by the time of writing this paper. Results of the transnational projects can be consulted on the solar-era.net website. Another 30 projects are running.

Figure 1 displays the thematic split of the 93 projects.

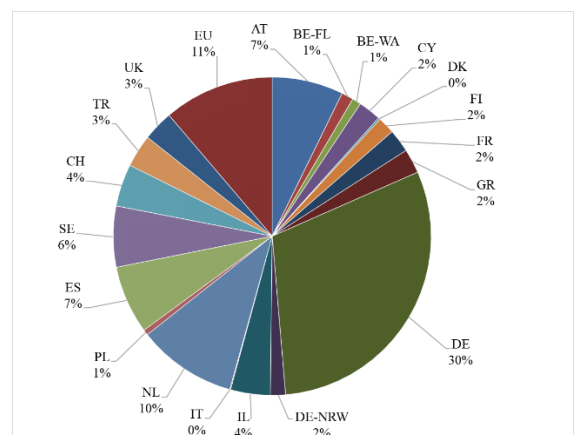


**Figure 1:** Thematic split of the 93 SOLAR-ERA.NET projects.

Figures 2 and 3 show the number of projects and the funding share by country / region resulting from the eight SOLAR-ERA.NET calls comprising 93 projects.



**Figure 2:** Number of projects funded - by country / region as well as by call resulting from the eight SOLAR-ERA.NET joint calls.



**Figure 3:** Funding share per country / region for the transnational projects supported through the eight joint calls carried out by SOLAR-ERA.NET.

### 2.3 Outcomes of the transnational cooperation – some key findings

The successful projects demonstrate i) potential commercial impact / relevance to industrial and market needs / contribution to the SET-Plan and added transnational value, ii) scientific and technological excellence and iii) high quality and efficiency of the implementation and the management.

SOLAR-ERA.NET has provided added-value and opportunities for the research and industry sector, namely:

- Complementarity between national and EU funded programmes
- Building a more robust and consistent research landscape
- Increasing strengths and reducing weaknesses
- Stepping stone for international cooperation
- Flexibility and bottom-up nature, no “one size fits all” approach
- New routes and innovative transnational research for medium-sized projects

Considering the experience made in eight joint calls, the following success factors and recommendations can be identified for potential applications also valid for the upcoming joint calls in the CETPartnership:

- Start with a good idea and have a vision how to realize it
- Build strong, complementary and trustful partnerships
- Communicate with partners and funding agencies
- Respect formal requirements / conditions
- Avoid redundancies with existing projects / proposals
- Identify innovation – excellence
- Head for industrial orientation – impact
- Provide convincing project plan – implementation
- Secure a high transnational value
- SMART Goals (Specific, Measurable, Ambitious, Realistic, Time Bound) / Key Performance Indicators

SOLAR-ERA.NET has not only allowed for supporting innovative research projects on a transnational level but also provided added value in terms of networking and programming, namely:

- New industry-led innovation projects and partnerships in a strongly competitive environment
- More transnational cooperation bottom-up and “cut to measure”
- Larger and more diverse portfolio
- Common initiatives and implementation activities
- Networking and collaboration between countries across Europe
- Overview on European research and insight into trends
- Best practice for supporting projects on the transnational level

Yet, there is a number of challenges respectively opportunities for further improvements related to public-public-partnerships in the future Horizon Europe programme.

- Adequacy and adaptability of European, national and regional funding budgets (Funding needs identified in the SET-Plan are considerably higher than funding budgets actually made available.)
- Flexibility to overcome the “funding gap” by following the ranking list with individual funding budgets running out already further up in the ranking list
- Consideration and inclusion of less strong ERA countries
- Visibility of impact through transnational projects and related projects
- Targeted and fair redistribution / use of Top-Up (Ideally, all funding agencies and transnational projects get the same share of the Top-Up.)

- Minimum extra administrative workload for agencies and project partners on transnational level
- Synchronisation of the timeline with all funding agencies (especially in the negotiation and contractual phase)
- Pragmatic handling (e.g. making reserve list possible)

SOLAR-ERA.NET’s transnational activities have had a strong focus on innovation in new concepts, materials, processes, components and applications, by joining complementary scientific and industrial competences across the European RTDI landscape in view of bringing new solutions to the growing solar electricity market. Industrial relevance, cost effectiveness and scalability of innovative approaches are key criteria to be fulfilled. Increasingly, systemic aspects and integration have become more important and will gain a new dimension within CETPartnership.

This dimension is also aimed at by the European Technology Innovation Platform for Photovoltaics (ETIP-PV). In its recently developed Strategic Research and Innovation Agenda for photovoltaic science, technology and engineering in Europe [3], two overarching challenges to PV’s large potential are identified: i) making the energy transition a European success and ii) supporting economic recovery and building the value chains for renewables. These challenges as well as the topics of highest scientific innovation and relevance in the PV field are also integrated in the SRIA developed by and for the CETPartnership.

### 3 Clean Energy Transition Partnership

#### 3.1 Set-up and mission

With the creation of the CETPartnership, the network and thematic scope will grow considerably, capitalising on SOLAR-ERA.NET and other ERA-Net’s networks, RTDI portfolio and know-how. CETPartnership brings together some 50 participating RTDI programme owners / managers of 30 countries and covers virtually any renewable and efficient energy technology.

The CETPartnership follows a common vision reflected in its Strategic Research and Innovation Agenda (SRIA) [2] and a common ambition all CETPartnership members are committed to:

- 1) Build a transnational transformative RTDI joint programming platform by coordinating, pooling and strengthening regional, national and international RTDI funding programmes for Europe’s pathway towards the clean energy transition.
- 2) Accelerate clean energy technology development and transition to a widely decarbonised energy systems through demonstration and innovation in technology development and integration as well as system change.
- 3) Build an innovation ecosystem that fosters capacity building at all governance and actor levels, faster market diffusion, upscaling and replication and enabling of the clean energy transition.

Concretely, CETPartnership will implement a series of annual joint calls for RTDI projects from 2022 to 2027. Accompanying activities to build a Knowledge Community will ensure a maximum quality, dissemination and consolidation of the findings from the funded projects.

By establishing an Impact Network on programme level, the outputs of the funded projects will be taken to a higher level and the “wheel grip” of the initiative will be enabled by regularly listening to the voice of the need owners, potential buyers and implementers of solutions.

### 3.2 First joint call

CETPartnership translates the challenges identified for the energy technologies into so-called Transition Initiatives (TRIs) which will allow to systematically articulate the upcoming joint calls and activities. The seven TRIs are shortly described below. Out of the seven TRIs, TRI 2 and 7 are of particular interest for the PV sector.

- TRI 1 „Integrated Net-zero-emissions Energy System“: The main objective is to develop the optimised, integrated European net-zero emissions energy system, where electricity distribution and transmission grids are seen as the “backbone” of the future low-carbon energy systems with a high level of integration among all energy carrier networks, by e.g. coupling electricity networks with gas, heating and cooling networks, supported by energy storage and power conversion processes.
- TRI 2 „Enhanced zero emission Power Technologies“: The goal is to develop a pool of zero-emission power technologies and solutions based on Renewable Energy Sources as the backbone of the future energy system, being able to deliver carbon-neutral electricity accessible to all and to contribute to the resilience of the system. TRI 2 is articulated in two submodules. „Advancing RE technologies for power production through cost reduction“ targets demonstration projects aiming at reducing the LCoE and/or CAPEX through technology development of (primarily) components or at system level. „Breakthrough R&D to increase RE power technologies efficiency“ supports breakthrough research (TRL 4 or above) leading to increase the conversion/transfer efficiency and reliability of RE technologies and sustainability.
- TRI 3 „Enabling Climate Neutrality with Storage Technologies, Renewable Fuels and CCU/CCS“: The goal is to provide technological cleaner solutions for storage technologies, hydrogen and renewable fuels, CCS (Carbon Capture and Storage) and CCU (Carbon Capture and Utilisation). In particular, projects are sought that have a significant bearing on accelerating the technologies and provide results showing significant CO<sub>2</sub> reduction by 2030 and demonstrate a contribution to the climate neutrality by 2050.
- TRI 4 „Efficient zero emission Heating and Cooling Solutions“: The goals are to provide enhanced and improved heating and cooling technologies and systems for all major parts of Europe by 2030 and to enable 100% climate-neutral heating and cooling by 2050.
- TRI 5 „Integrated Regional Energy Systems“: The goal is to develop and validate integrated regional and local energy systems, that make it possible to efficiently provide, host and utilize high shares of renewables, up to and beyond 100% in the dynamic local or regional supply by 2030. Such systems shall provide tailor-made solutions that meet the individual regional and local requirements and demand.
- TRI 6 „Integrated Industrial Energy Systems“: The goal is to develop and demonstrate a set of technical

solutions for integrated industrial energy systems that enables efficient carbon-neutral industrial production sites and takes industrial energy systems into development as part of the entire energy system. It focuses specifically on integrated solutions across industries, across energy sectors and across public and private sectors.

- TRI 7 „Integration in the Built Environment“: The goal is to provide solutions and technologies for existing and new buildings to become an active element in the energy system, with enhanced capability to produce, store and efficiently use energy in the residential and non-residential sector, comprising public and commercial buildings, service and mobility infrastructure buildings, etc. Two modules are defined according to the TRL targeted, i.e. „Solutions to energy transition in the built environment“ as an Innovation and Demonstration Action (IDA), targeting TRL 5-9, and „R&I in clean energy integration in the built environment“ as a Research and Innovation Action (RIA), targeting TRL 3-6.

The first joint call opened on 14 September 2022; preproposals can be submitted latest by 23 November 2022. Applications selected in January 2023 for the full proposal phase have then a submission deadline running till 20 March 2023. Projects selected for funding in June 2023 are expected to start in September 2023.

## 4 OUTLOOK

As CETPartnership is in the starting blocks, results will, obviously, still have to be materialised. The set-up of CETPartnership is however already promising in terms of large programmers’ network and a series of annual joint calls with substantial funding budgets.

CETPartnership is based on and anticipating the following results and conclusions: Our energy system is not just an “infrastructure” or a “supply system”. It is - to a growing extent - a complex and dynamic system of systems, with not only technical but also social, economic, environmental, and political dimensions. In order to enable the clean energy transition, innovation is needed on different levels.

A remarkable portfolio of enabling zero emission technologies for the energy system has become available in recent years, with a significant industrial and economic potential, which is especially true for PV. The ongoing deployment is driving a transformation of energy systems around the world while exponential learning curves of these technologies are leading to a decrease of production cost per unit as well as gains in efficiency and performance.

On the next level, these energy system components have to interact in user groups’ specific energy systems. In the context of the built environment, they can help transform existing or new buildings, blocks and districts into active elements in the energy system, providing high-level services to their inhabitants or commercial users. The integrated energy system will meet the users’ demands throughout the seasons, with the aid of storage technologies. Integrated industrial power, heating and cooling systems as well as enhanced processes enable

efficient carbon-neutral industrial sites and production that at the same time provide flexibility to the power system or make excess heat available for local networks. The efficient utilisation of high shares of renewables in the regional supply becomes possible with a smart management of available energy sources and infrastructures as well as users from different sectors like communities, commerce and industry or the transportation system. Such integrated regional systems can increase acceptance and uptake of new solutions, by ensuring that citizens, companies, communities and other stakeholders take part in the related exchange of different kinds of values on different levels.

In the end, all these elements are requested to seamlessly link to an overarching European energy system compatible with climate neutrality, with a high level of integration among all energy carriers, infrastructures and networks, and based on the “energy efficiency first” and “Do-No-Significant-Harm” principles. This will ensure an appropriate level of reliability, resilience and economic efficiency.

Before and for getting there, highly innovative RDTI projects shall continue to and will make their contribution. PV is becoming part of the backbone of the clean energy transition and the future energy system. New bold initiatives are needed, taking advantage of the wide experience and good practice gained over the past decade in SOLAR-ERA.NET, IEA-PVPS and other networks, keeping the momentum and accelerating the efforts. CETPartnership is one of these initiatives.

## 5 REFERENCES AND ACKNOWLEDGEMENT

### References:

- [1] SOLAR-ERA.NET, European Cooperation in PV RTDI and Beyond – Highlights, Lessons Learned and Future Perspectives, paper and presentation at 38th EU PV SEC, September 2021
- [2] Clean Energy Transition Partnership (CETPartnership), Strategic Research and Innovation Agenda (SRIA), November 2020
- [3] European Technology Innovation Platform for Photovoltaics (ETIP-PV), The European Strategic Research and Innovation Agenda for Photovoltaics, May 2022

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