CST4ALL

Support to the Activities of the Concentrated Solar Thermal Technology Area of the SET Plan

CST4ALL Newsletter: No. 3, January 2025

Upcoming Project Events

TBD = Exact time and date To Be Determined.

Online Workshops Targeting Industry Led by ESTELA	
Jan./Feb. 2025 (TBD)	*Hybridisation of Concentrated Solar Thermal Technologies (CST) with Geothermal*
March 2025 (TBD)	*Integration of Concentrated Solar Thermal Technologies (CST) with Energy Storage*

Online Workshops Targeting R&I Actors	
Feb. 2025 (TBD)	*Future Energy Mix with 100% Decarbonization Level*, Led by CIEMAT.

CST4ALL Project Meetings	
Sept. 2025 (TBD)	Closing Meeting, tentatively in Brussels, Belgium.

Completed Online Workshops

Industry Workshop on the Hybridization of Concentrated Solar Thermal Technologies (CST) with Biomass

7 May 2024

Yuvaraj Sathiyadev Pandian (Solarlite CSP Technology GmbH) presenting CSP-biomass integration possibilities and challenges.

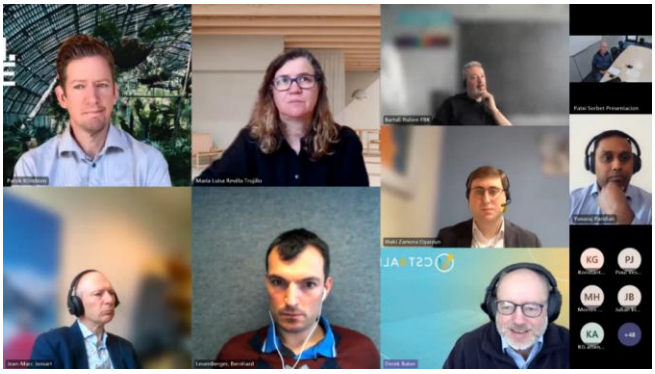
The online "CST4ALL Industry Workshop on the hybridisation of Concentrated Solar Thermal Technologies (CST) with biomass" on 7 May 2024 brought together over 90 stakeholders from 17 countries, with the aim to assess the industrial potential of CST-biomass hybrid systems.

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101075408. Views and opinions expressed are those of the authors only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Elisabeth Schellmann gave a welcome message on behalf of the European Commission, outlining the EU's policy landscape and encouraging collaboration between policymakers, researchers and industry to develop innovative clean energy solutions that combine CST with other renewable energy technologies.

The keynote presenters, namely, Yuvaraj Sathiyadev Pandian (Solarlite CSP Technology GmbH), Morten Tony Hansen (Ea Energy Analyses/IEA Bioenergy Task 32 Biomass Combustion) and Poul Vestergaard Jensen (Brønderslev Forsyning A/S), highlighted applications of CST-biomass hybrid systems for power co-generation, industrial heat supply and district heating.

The workshop continued with a roundtable discussion moderated by Dr. Derek Baker (ODTÜ-GÜNAM Center for Solar Energy Research and Applications), inviting experts from the CST and biomass sectors to share their insights on industrial maturity of technologies, bankability of projects, R&I contributions, necessary skills and manufacturing facilities in Europe.



Roundtable discussion on CST-biomass hybridization.

This online workshop, organised by ESTELA with the collaboration of all CST4ALL partners and the support of the European Technology and Innovation Platform Bioenergy (ETIP Bioenergy), underscored the substantial potential of CST-biomass hybrid systems for clean, reliable, and secure energy generation. Despite challenges, particularly regarding project financing and integration complexity, collaboration between stakeholders across industry, research, and policy can significantly advance the deployment of this promising technological combination.

The agenda of the event, with details on the speakers and presentations, can be found here.

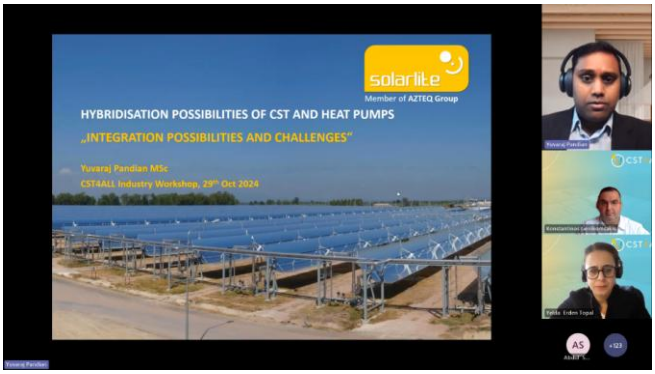
Industry Workshop on the Hybridization of Concentrated Solar Thermal Technologies (CST) with Heat Pumps

29 October 2024

The online “CST4ALL Industry Workshop on the hybridisation of Concentrated Solar Thermal Technologies (CST) with heat pumps” on 29 October 2024 brought together over 170 stakeholders from 27 countries worldwide. This project event, organised by ESTELA with the collaboration of all CST4ALL partners and the support of the European Technology and Innovation Platform on Renewable Heating & Cooling (RHC-ETIP), aimed to assess the industrial potential of CST-heat pump integration concepts.

In his opening address on behalf of the European Commission, Philippe Schild acknowledged the role of the CST4ALL project and its alignment with the objectives of the European Strategic Energy Technology Plan (SET Plan).

Keynote presenters Yuvaraj Sathiyadev Pandian (from Solarlite CSP Technology GmbH), Dr. Miguel Ramirez (from Netherlands Organisation for Applied Scientific Research, TNO) and Dr. Pankaj Kumar (from United Nations Industrial Development Organization, UNIDO) explored integration opportunities of CST and heat pumps for building heating, district heating and industrial process heat, as well as demonstrated the use of a CST-heat pump hybrid system for industrial heat supply in a pharmaceutical facility in India.



Yuvaraj Sathiyadev Pandian (Solarlite CSP Technology GmbH) presenting CST-heat pump integration concepts.

Following the keynote presentations, Dr. Maurizio Pieve (from ENEA) moderated a roundtable discussion on technology readiness, project financing and financial instruments, regional factors, regulatory frameworks, skills gap, R&I priorities, market dynamics and potential collaboration opportunities between the CST and heat pump sectors, including demonstrations hybrid plants.

Roundtable discussion on CST-heat pumps integration.

The workshop participants emphasized the potential of combining CST with heat pumps to enhance renewable energy efficiency, particularly in industrial and district heating applications. To fully harness this potential, intensified efforts are needed to scale up demonstration projects and drive innovation in thermal storage and heat pump technologies. Addressing operational, financial, and technical complexities is essential to unlocking the economic and environmental benefits of CST-heat pump hybrid systems and accelerating the adoption of these solutions to decarbonize various industrial sectors.

The agenda of the event, with details on the speakers and presentations, can be found here.

R&I Workshop on Meteorology for Renewable Energy Technologies

11 December 2024

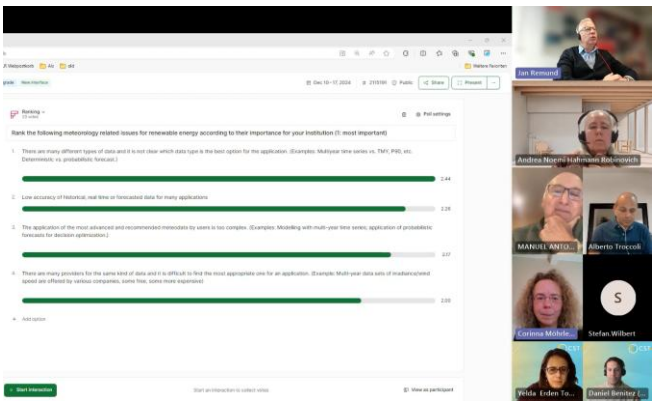
On December 11, 2024, DLR, in collaboration with the CST4ALL consortium, hosted a successful online workshop on R&I Meteorology for Renewable Energy Technologies.

Over 90 participants from research, industry and governmental organisations joined the two technical sessions of the workshop, covering key research areas in meteorology for concentrated solar thermal, photovoltaics and wind energy.

Message from the European Commission by Philippe Schild (DG for Research and Innovation, EC) with Peter Heller (CST4ALL Coordinator, DLR, DE), Yelda Erden Topal (METU, TR), Stefan Wilbert (Head of Solar Meteorology Group, DLR, DE) and Manuel Silva (Professor and Researcher at University of Seville, ES).

The technical sessions included presentations on the topics of:

- The state of the art of meteorology for solar technologies and further renewable energy systems;
- Ongoing long-standing research;
- Current meteorological research for wind energy resources;
- Wind resource assessment, monitoring and forecasting;
- Solar resource assessment, monitoring and forecasting.



Roundtable of experts analyzing outcomes of poll to the audience on research topics relevant to energy meteorology.

A poll was conducted among the audience, which revealed the crucial role of meteorological research in achieving firm power. The investigation of the effects of the so-called “Dunkelflaute”, climate change, and extreme weather risks were identified as key areas of focus. The poll also

revealed a discrepancy between research and application, with the appropriate selection of meteorological data sets among the various available data types identified as a challenge. During the roundtable, the experts discussed research priorities and industrial solutions to solve the key challenges identified.

A summary of the main outcomes of this event can be found here.

CST4ALL 2024 General Assembly Meeting

Rome, Italy
October 14, 2024

The CST4ALL General Assembly Meeting was held at ENEA at our project partner's premise in Rome, Italy. The hybrid meeting format allowed attendance by all of the project partners. It was an important gathering after the 1st project review meeting being successfully completed on May 28th, 2024. Each work package lead presented developments in regard to the expected deliverables and milestones of the project. The consortium reiterated its commitments to further the potential and prevalence of CST through support for the CST IWG meetings and the SET Plan within its working groups. Updates on the industry and R&I workshops were detailed and suggestions for future workshops were elaborated within the consortium. The consortium members also discussed the criticality to sustain the outcomes of the workshops. The consortium aims to sustain and extend its project impacts, as the project will close on September, 2025.

The meeting included representation by all partners. The top left picture is the physical attendees. The other pictures are online attendees.

CST4ALL's Participation In-Person Events

SolarPACES 2024

Concentrating Solar Power, Thermal, and Chemical Energy Systems Conference
October 8-11, 2024
Rome, Italy

The CST4ALL project was represented at the 30th SolarPaces Conference in Rome, Italy, with an oral presentation and poster presentation. SolarPaces is an important international Concentrating Solar Power (CSP) network under the framework of the International Energy Agency (IEA). The conference included 504 esteemed researchers around the world demonstrating different country implementations and research on solar thermal energy and chemical energy applications, case studies on on-going work and EU project visibility to projects working on CSP and CST. The SolarPaces community also hosts the women CST community with the *Women+ in Concentrated Solar* Platform. The conference was chaired by CST4ALL project researcher Luca Turchetti from ENEA.

CST4ALL researchers in front of the CST4ALL project poster. (Left to right: Hande Eryılmaz, Luca Turchetti, Simona de Iuliis, and Yelda Erden Topal).

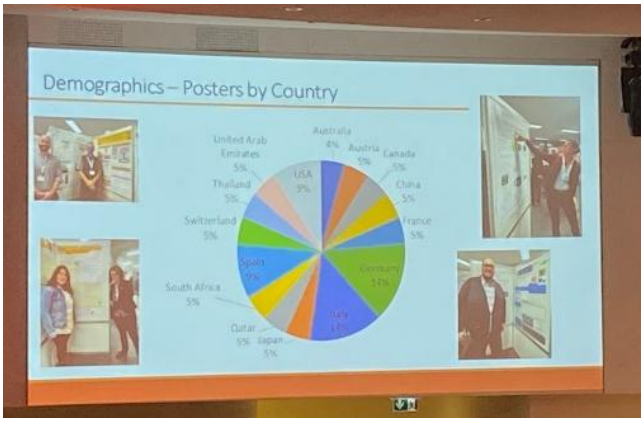
The poster presentation entitled 'Designing a Holistic CST Policy Framework for the European Green Deal: Challenges and Opportunities from Social Sciences and Humanities Aspects with a Gender Inclusive Agenda' presented under the

CSP Integration & Commercial Projects category was showcased throughout the conference program.

Yelda Erden Topal (METU) presented our project on October 8th to the conference audience. The session was also chaired by CST4ALL researcher, Simona de Iuliis from ENEA.

Yelda Erden Topal (right) presenting the CST4ALL paper with Simona de Iuliis chairing the session (left).

The conference closing session also included credit to our CST4ALL poster presentation and also crediting the women researchers in the project. The conference was an important opportunity for project visibility with representation from project partners DLR, ENEA, and ODTÜ-GÜNAM.



Slide from closing session. Bottom-left picture is Hande Eryılmaz and Yelda Erden Topal in front of CST4ALL poster.

Enlit Europe 2024

End-to-End forum addressing industry, project and research aspects of the energy agenda

October 22-24, 2024

Milan, Italy

Scene from Enlit Europe 2024.

The CST4ALL project was represented at the Enlit Europe 2024 ETIPs Forum panel session entitled 'ETIPs as catalysts for EU Sustainable Competitiveness'. The session was moderated by Zabala Innovation Europe director, Alessandro Provaggi and included an introductory talk on the digitalization of energy systems by project officer George Paunescu. Solar Power Europe (Niki Foder), EIT Inno Energy (Alessandro Romanello), EERA (Ivan Matejak), International Hydropower Association (Matteo Bianciotto), Offshore Wind Concepts at Equinor (Hanne Wigum) and CST4ALL (Hande Eryılmaz) was represented in the session which provided a unique outlook to the role of ETIPs and projects in supporting the energy transition.

ETIPs Forum panel session: ETIPs as catalysts for EU Sustainable Competitiveness.

The panel session was designed to explore how European Technology and Innovation Platforms (ETIPs) can play a pivotal role in guiding Research & Innovation (R&I) outcomes from academia and industry into actionable solutions for the European Commission (EC). The discussion centered on the role of ETIPs to identify and promote technologies in the EU to reduce dependency on critical raw materials (CRMs) and increase autonomy to bolster Europe's sustainability, competitiveness and technological independence.

The attendees reflected their unique insights to support energy security and competitiveness under their R&I focus. The panel was critical in examining best practices for fostering multi-stakeholder partnerships and leveraging innovation solutions for scaling and deployment.

Participants in the ETIPs Forum panel session: ETIPs as catalysts for EU Sustainable Competitiveness.

The panelists individually drew attention to the following opportunities to enhance the potential of renewable energy technologies to enhance strategic autonomy, energy security and economic competitiveness: increase of European storage capacity; increased demonstration/show-case opportunities; importance of energy directives for market uptake; hybridization and SHIP opportunities; maturity of technologies at affordable prices; supply chain independence; sustainable competitiveness; and de-fragmenting the EU R&I landscape to support better scale-up and de-risking.

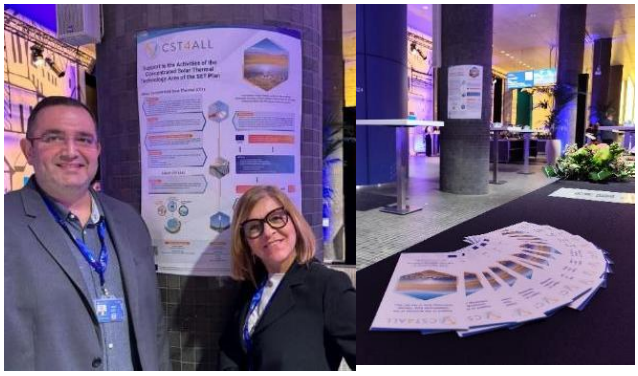
The 3-day event included rich panel discussions, industry representation and also a workshop to discuss action items for skills and technology enhancement.

18th SET Plan Conference

18th Strategic Energy Technology (SET) Plan Conference

November 14-15, 2024

Budapest, Hungary



CST4ALL at 18th SET Plan Conference. Left: CST4ALL was represented by Konstantinos Genikomsakis of ESTELA and Simona De Iuliis of ENEA. Right: CST4ALL brochures were distributed to raise awareness of and support for CST4ALL.

The CST4ALL team participated in the 18th SET Plan Conference, engaging with attendees at the exhibition area to promote the project's objectives, activities and results.

Session: The solar energy joint research and innovation agenda.

During the conference session "The solar energy joint research and innovation agenda", Thomas Ven, Secretary General of ESTELA, emphasized the benefits and role of solar thermal technologies, particularly CST, in the clean energy transition, while María Luisa Revilla Trujillo, Co-chair of the CST IWG, stressed the importance of aligning R&I with market needs.

Key takeaways from the session dedicated to solar technologies included the need for a level playing field for all technologies, strong public-private partnerships to drive innovation and market uptake, and a collective commitment to accelerate deployment of solar technologies at scale.

Cluster Workshop for IWGs and ETIPs

Cluster Workshop for Implementation Working Groups (IWGs) and European Technology & Innovation Platforms (ETIPs)

November 13, 2024

Budapest, Hungary

Scenes from Cluster Workshop for IWGs and ETIPs.

Konstantinos Genikomsakis of ESTELA and Simona De Iuliis of ENEA on behalf of the CST4ALL project, together with María Luisa Revilla Trujillo, Co-chair of the CST IWG, participated in the "Cluster Workshop for Implementation Working Groups (IWGs) and European Technology & Innovation Platforms (ETIPs)", held in Budapest, Hungary as a side event ahead of the 18th Strategic Energy Technology (SET) Plan Conference.

The workshop aimed to foster collaboration and advance the activities of the IWGs and ETIPs according to the five cross-cutting topics in the SET Plan:

- Circularity and materials substitution;
- R&I for societal needs;
- Digitalisation;
- Skills;
- Access to market.

The CST4ALL team contributed to the workshop by sharing insights on CST sector priorities for future SET Plan activities, such as improving public acceptance, leveraging AI and other digital tools, developing and aligning training programmes, and supporting innovative technology testing and viable business model development.

SolarHub Ignite Demo Day

CST4ALL Project Dissemination

December 12th , 2024

İzmir, Türkiye

The CST4ALL project was presented to over 160 energy professionals in İzmir, Türkiye. The presentation included insights into project scope and also mention of the completed workshops and the upcoming workshops in 2025 including CST-Geothermal, CST-Energy Storage and Future Energy Mix with 100% Decarbonization Level. The presentation also included mention of the SSH survey unique to the project, which aims to support key requirements for sectoral collaboration, technology adoption, social acceptance, just transitions and gender inclusion/gender equality for CST related industries. The CST4ALL values gender inclusion and is in support of integrating EU policy frameworks such as REPowerEU and The Green Deal Industrial Plan to support energy autonomy.

Dissemination activity conducted by Hande Eryılmaz (ODTÜ-GÜNAM).

Our project continues to interest distinguished researchers from across the world and we value the opportunity to communicate and collaborate to further the opportunities for CST and its community.

As an energy professional, if you would like to support our survey, please kindly reflect your views through our link or using the QR code. Your insights are important in shaping the energy community and strengthening its future potential.

Clustering Corner

The underlying aim for CST4ALL is to accelerate Europe's Clean Energy and Green Transitions by identifying, strengthening and exploiting synergies. To this end, in this Clustering Corner two strongly aligned European activities are highlighted with an aim to increase the impacts of all activities by:

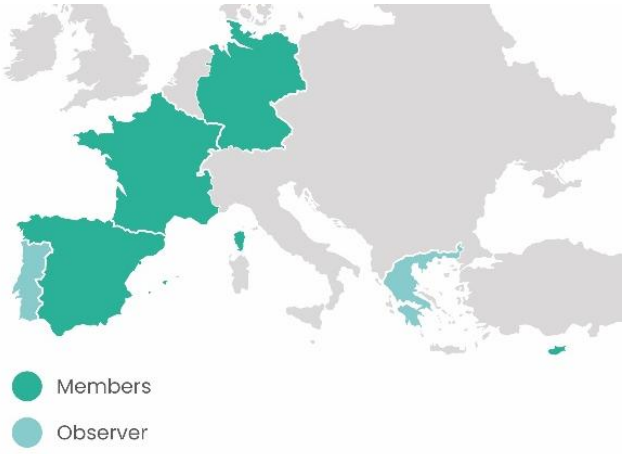
- Strengthening engagement between CST4ALL and these activities;
- Supporting the creation of a holistic and inclusive vision for how these activities can be aligned and coupled to increase returns on EC investments;
- Raising awareness of and support for how Europe's globally leading CST sector can contribute to high-performing and integrated clean energy solutions.

EU-SOLARIS ERIC

The European Research Infrastructure Consortium for CSP Technologies

Starting from a long tradition of collaboration, in 2010 a set of European research centres that develop and operate research facilities dedicated to concentrating solar technologies begun the development of the European Research Infrastructure for Concentrating Solar Power (EU-SOLARIS), a distributed research infrastructure using a common legal form, a joint management board and one access point for users, targeting the integration and coordination of research and development activities in concentrating solar technologies and related applications. As a result, EU-SOLARIS was included in the 2010 Roadmap of the European Strategy Forum on Research Infrastructures (ESFRI). The European Strategy Forum on Research Infrastructures plays a key role in policy-making on Research Infrastructures in Europe. In 2021 EU-SOLARIS achieved ESFRI 'Landmark' status.

EU-SOLARIS ERIC member countries are Germany, France, Cyprus and Spain with the Statutory Seat at Plataforma Solar de Almería, Spain, and the temporary Observer countries aiming at becoming full Members are Portugal and Greece. It is envisaged the establishment of National Nodes where all RI-related research institutes of a country will be invited to take part in EU-SOLARIS activities. Meanwhile, the institutes leading this initiative are DLR (Germany), PROMES-CNRS (France), CYI (Cyprus), PSA-CIEMAT (Spain), LNEG & UEVORA (Portugal) and CERTH & CRES (Greece).



Current EU-SOLARIS Members and Observers

EU-SOLARIS ERIC's vision is to become the European reference research infrastructure in the technological development of Concentrating Solar Power/Solar Thermal Electricity (CSP/STE) and related applications including production of electricity, solar chemistry and thermochemistry, materials, desalination and brine management,

water treatment, energy storage, and industrial process heat. Membership in EU-SOLARIS ERIC is open to all countries in the European Research Area (ERA) and EU-SOLARIS ERIC is actively working to expand its membership.

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HYBRIDplus

The Horizon Europe Project

Advanced HYBRID solar plant with PCM storage solutions in sCO2 cycles.

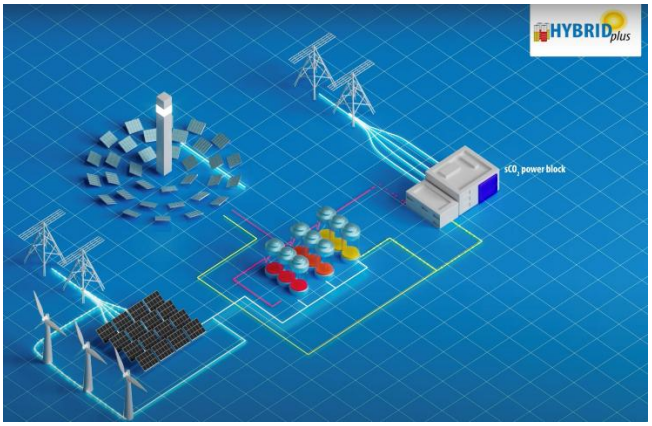
Started in October 2022, HYBRIDplus is a European project funded by the Horizon Europe Programme (Grant Agreement ID: 101084182). Coordinated by Professor Cristina Prieto from University of Sevilla, the project aims to advance renewable energy technologies by developing an electrified thermal energy storage (TES) system. This system leverages phase change materials (PCM) in a cascade configuration and integrates with a high-temperature supercritical CO_2 power cycle.

The primary goal of HYBRIDplus is to improve efficiency and reduce the levelized cost of electricity (LCoE) compared to current state-of-the-art technologies. By incorporating an electrified TES system with embedded electric heaters, the project enables full dispatchability, facilitating the integration of variable renewable energy sources into the grid. This approach enhances environmental sustainability by lowering CO_2 emissions and reducing water consumption while supporting the transition to a more resilient and flexible energy system.

The project consortium includes prominent European research institutions and industry sharing responsibilities of the work programme:

- Build to Zero leads the CSP plant conceptualization with hybrid TES system configuration (WP2);
- Universitat de Lleida conducts the TES media characterization, compatibility analysis (WP3), and overlooks the project dissemination effort (WP6);
- University of Sevilla coordinates the project and leads the activities around the test rig development and the experimental validation (WP4);
- KTH Royal Institute of Technology oversees the CSP plant control integration, modeling, and optimization (WP5);
- STAX develops and supplies innovative metal wool;
- SEICO Heizungen GmbH develops advanced heat exchangers;
- Finally, R2M Solution France acts as communication manager (WP6).

Together, the consortium is working to demonstrate the feasibility and benefits of a hybrid PV+CSP plant, a concept with the potential to transform renewable power generation and storage.



Screenshot from HYBRIDPlus Concept Video (Video).

A few months ago, HYBRIDplus released its first project concept video, presenting an engaging overview of its innovative hybrid power plant and groundbreaking technologies. The video highlights the integration of photovoltaic (PV) and concentrated solar power (CSP) systems with electrified TES, explaining the project's vision and potential impact. You can watch the video here.

To date the TES module concept and the combinations of PCM-wool that constitute the cascade have been selected. During 2025, these modules will be tested at the HYBRIDplus pilot plant in Sevilla, marking a major milestone for the project. The plant will assess the performance of the complete cascade PCM heat exchangers, as predictions cannot be solely based on characterized representative units.

We invite everyone to explore HYBRIDplus publications, available in open access on Zenodo – EU Open Research Repository.

We look forward to fostering collaboration with EU projects and initiatives in 2025!

Learn More About and Follow HYBRIDPlus	
Websites:	Project
	EU Cordis
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X (Formerly Twitter): Follow

Contact CST4ALL

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Consortium Members

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