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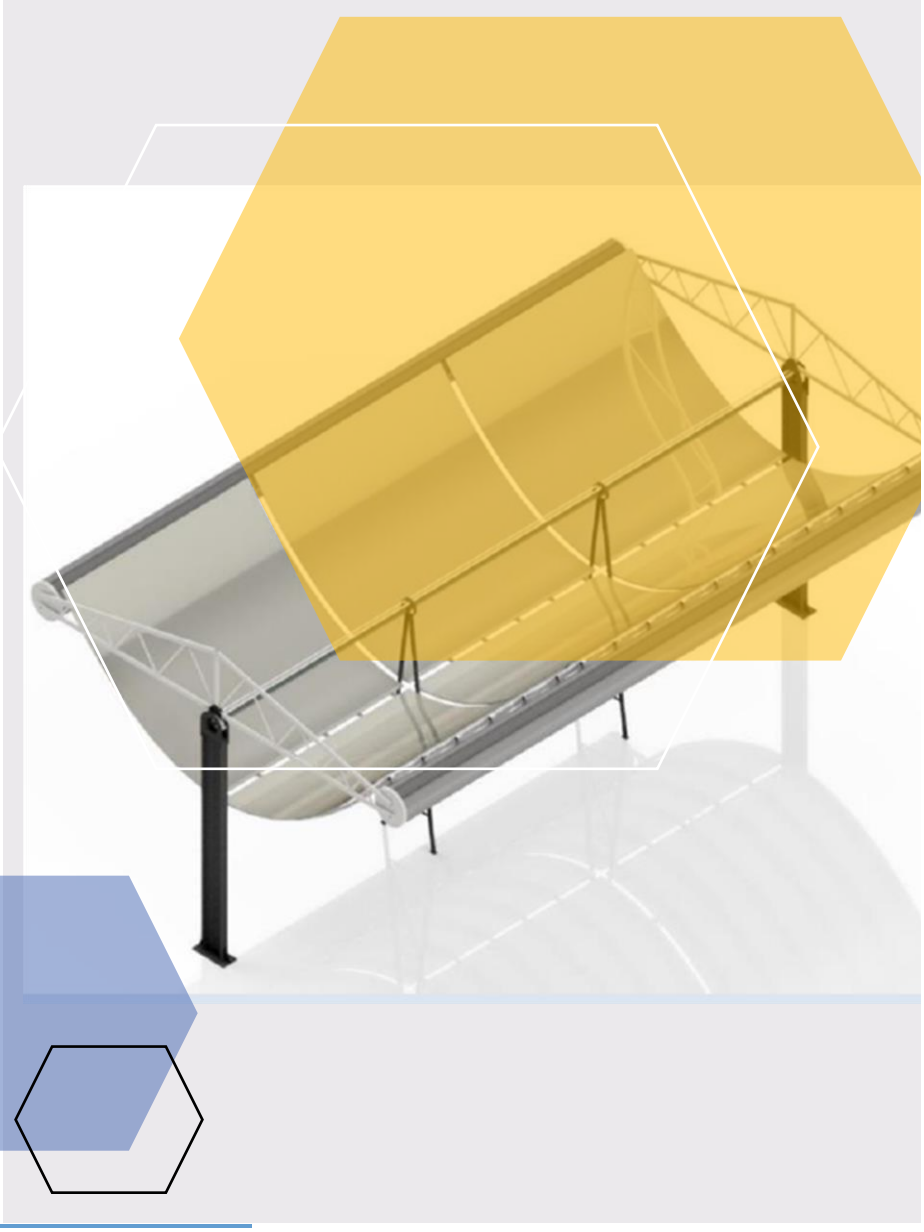
MSA TROUGH

MSA-Trough NEWSLETTER



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SECOND ISSUE

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UNIVERSIDADE DE ÉVORA · Ferrum tecnoindustrial · solarlite · DLR Deutsches Zentrum für Luft- und Raumfahrt German Aerospace Center · ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development · ome · RODAMA

MSA-TROUGH KEYWORDS SUMMARY

Modularity Reliability Circularity Innovation

Parabolic Trough **Concentrated Solar Power** Molten Salt

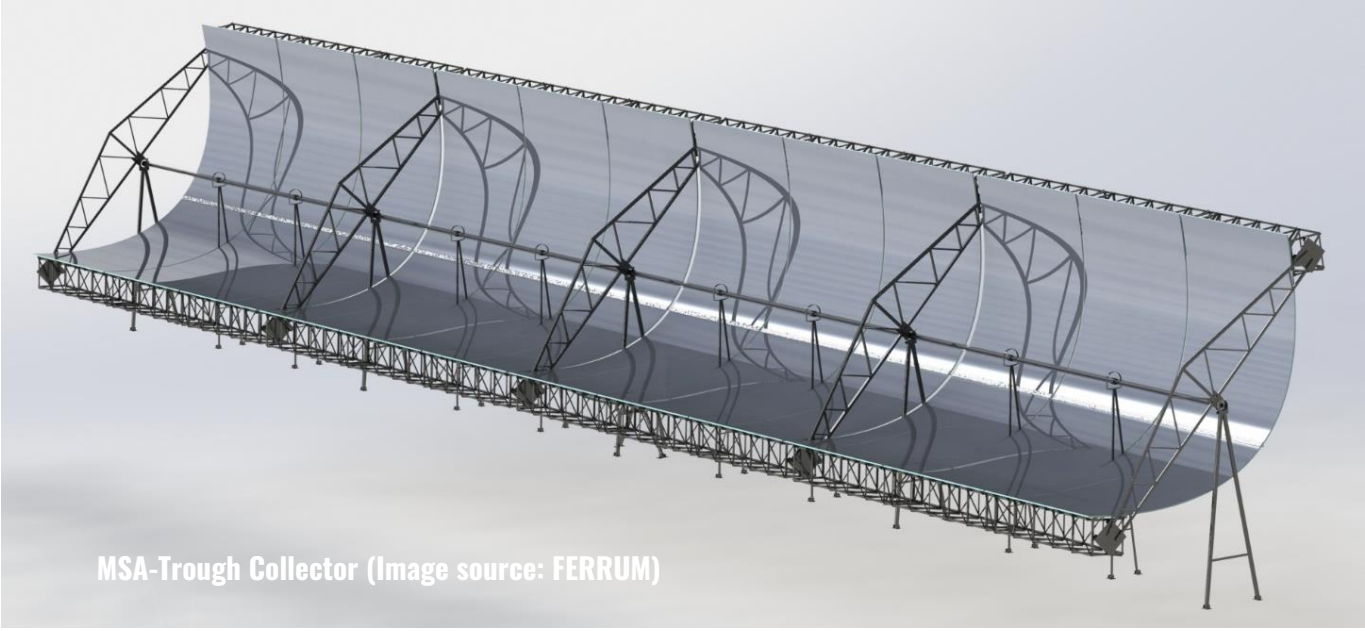
Renewable Electricity System Stability Efficiency

WHAT HAS THE TEAM ACHIEVED SO FAR

During the first year of the project implementation, the activities focused on the design and manufacturing of the collector components and assembly jig. These activities fall under WP1 and 2, whose tasks and accomplishments are summarized below. At M11, WP6 activities related to the analysis of the environmental performance of the materials adopted to build the MSA-Trough plant have started, in preparation for the cradle-to-grave Life Cycle Assessment.

In parallel, a comprehensive communication and dissemination strategy has accompanied the technical activities with the aim to inform and engage with stakeholders about project progress (WP7).

WP1 - DETAILED COLLECTOR AND ASSEMBLY JIG DESIGN DEVELOPMENT



MSA-Trough Collector (Image source: FERRUM)

WP1 is focusing on the detailed design of the collector and assembly jig. WP1 activities have been completed, including the following:

- **Collector structure design optimization**: The design of the collector structure was refined using wind load simulations, resulting in the use of torsion boxes and triangular beams for enhanced strength and load distribution. This reduces material weight while improving stability under strong winds.
- **Design of collector bearings and torsion compensators**: Bearings and torsion compensators were engineered to minimize friction and increase durability, and withstand. These components were designed to be cost-effective, easy to install and capable of withstanding extreme conditions.

- **Absorber sliding system and mirror cones development**: A robust and durable absorber sliding system, precision-engineered mirror cones were developed to maximize heat production and optimize solar energy capture with minimal shading.
- **Collector drive system design**: The collector drive system was designed to ensure precise sun tracking with real-time monitoring and remote control. Emergency safety features were integrated to ensure reliability in diverse weather conditions.
- **Collector foundation design**: The collector foundation was designed for stability while minimizing material costs. Adjustments were made to meet European safety regulations, with ongoing research into optimized drilled structures.
- **Composite mirrors and manufacturing device design:** Innovative composite mirrors were designed for high performance and sustainability, utilizing sustainable composite material and renewable materials. New collaborations were initiated to explore cost-effective manufacturing methods.
- **Assembly jig engineering**: The assembly jig was designed for precise mirror alignment with the absorber tube, enhancing the efficiency and reliability of the installation process through a step-by-step assembly procedure.
- **Piping system design for MSA-Trough integration**: Connection pipes were engineered to integrate the MSA-Trough system with molten salt storage tanks, designed to handle high temperatures and pressures while minimizing thermal losses.
- **Electrical and instrumentation design**: The system's electrical and instrumentation layout was developed, including sensor placement and a heat tracing system to maintain optimal molten salt temperatures.
- **Automatic mirror washing device development**: An eco-friendly, self-operating mirror washing device was developed, designed to reuse wash water and minimize fresh water usage, reducing environmental impact.

WP2 – MANUFACTURING/PROCUREMENT OF ASSEMBLY JIG AND COLLECTOR PARTS

WP2 focuses on manufacturing the necessary parts for assembling and installing the collector. The following activities have been performed:

- **Manufacturing of assembly jig components**: FERRUM manufactured all parts for the assembly jig, managing both in-house production and outsourcing for specialized components, such as laser-cut parts. DLR conducted quality control measurements to verify compliance with specifications.
- **Steel component manufacturing for the collector**: FERRUM completed the manufacturing of all steel components for the collector, including the steel structure and pylons. External production was coordinated for specialized parts, and DLR ensured high-quality standards through rigorous control measurements.
- **Mirror manufacturing device and mirror production**: SOLARLITE provided all materials for the mirror manufacturing device, installed the device, and is producing mirrors for the 350 m² collector with a 3% surplus of spare mirrors.
- **Production of DLR-Patented components**: DLR is in the process of manufacturing and supplying components, including those for which material process started (concentrator bearings, mirror cones, and torsion compensators) as well as the sliding system (new design finalized) and absorber tubes (tender process started). Basic parts are being produced in-house, while complex components are being outsourced.
- **Drive and tracking system components**: RODAMA is in the process of procuring and waiting for the final offers to order all hardware for the drives and tracking systems of five MSA-Trough concentrator units.
- **Connection of collector to balance of plant**: FERRUM procured all components for connecting the MSA-Trough collector to the

BOP at EMSP, including valves, compensators, and pipes. Repair and tracing cables were installed, but installation of new cables was pending contractor selection.

- **Mirror washing device manufacturing**: RODAMA and FERRUM are collaborating for the manufacturing of the mirror washing device. The necessary devices for this system have been defined, and quotes for their procurement have been requested.
- **Construction application for MSA-Trough collector**: UEVORA prepared and submitted the construction application for the MSA-Trough collector, along with permits for environmental concerns, based on technical results from WP1.

SOLARLITE Team working on manufacturing of the composite mirrors for the MSA-Trough collector

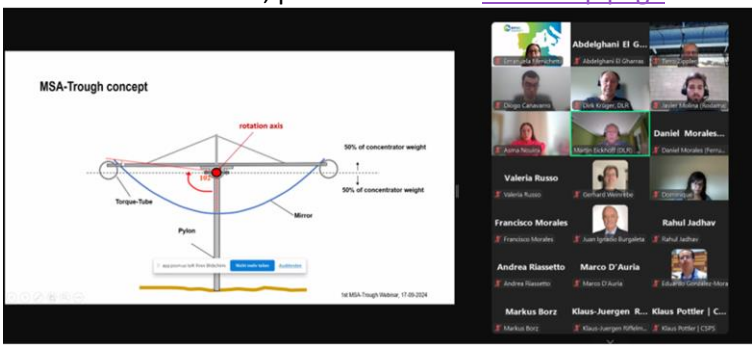
WP6 - ECONOMIC, SOCIO-ECONOMIC, ENVIRONMENTAL ASSESSMENT AND COMMERCIALIZATION PREPARATION

OME started some preliminary activities on the **Life Cycle Assessment (LCA)** of the MSA-Trough plant in late August, which will run until end of the project. Key updates include:

- Review of all WP1 deliverables and annexes (SolidWorks projects) to prepare life cycle inventories for MSA-Trough collector component manufacturing.
- Collaborations with FERRUM and SOLARLITE are underway to refine input quantities and model the manufacturing processes, including the type and quantity of materials used, their origin, resource consumption and releases.
- Ongoing work focuses on analyzing WP2 data, gathering input/output data on energy, water, materials, and emissions.

WP7 – DISSEMINATION, EXPLOITATION AND COMMUNICATION

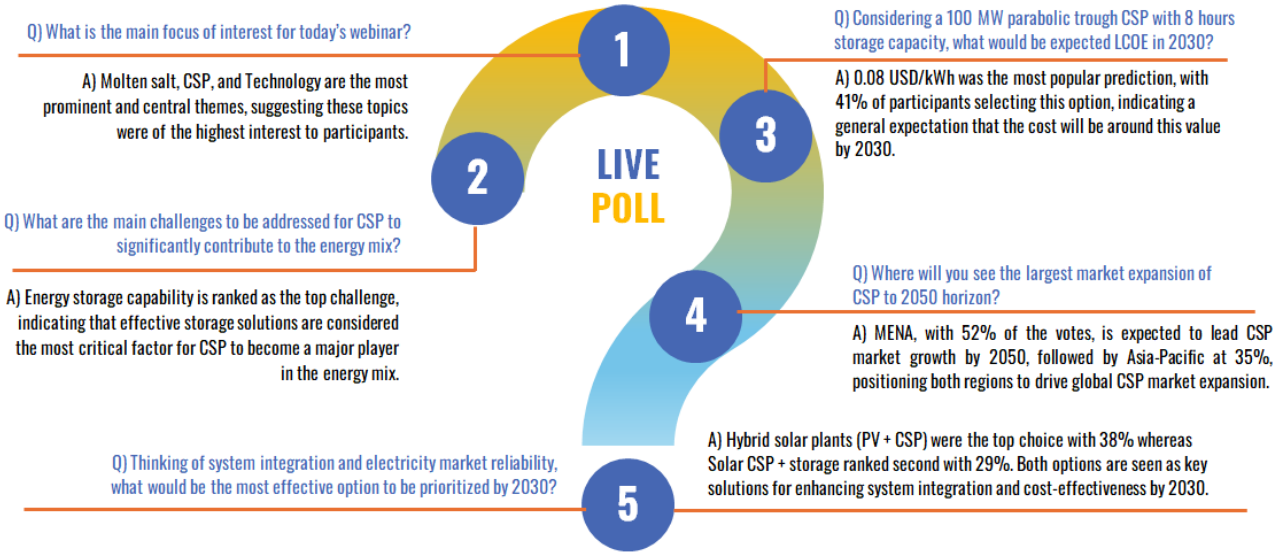
On September 17th MSA-Trough team organized the **first MSA-Trough webinar** : "**Design of an innovative parabolic trough collector – the MSA-Trough concept**". The webinar illustrated the main challenges addressed in the design of the innovative parabolic trough collector and explained the technological solutions adopted. About 50 stakeholders from academia, research, industry participated actively in the webinar. For more information, please check the workshop page.



The project leader (UEVORA) provided a general introduction, followed by DLR's presentation on the MSA-Trough concept, emphasizing its advancements in solar energy technologies. A panel discussion with key partners then addressed various related questions:

- **Collector design challenges**: Discussion of the main challenges faced in adapting the collector design to the MSA-Trough concept, focusing on structural and functional adaptations.
- **Collaboration between designers**: Examination of the key issues addressed in discussions between the collector steel structure and the composite mirror designers, particularly focusing on compatibility and integration of materials.
- **Automatic mirror washing device**: Exploration of the configurations analyzed for integrating the automatic mirror washing device into the MSA-Trough collector design.
- **Efficiency and cost assessment**: Evaluation of how these technological improvements, including the washing device, have impacted efficiency and cost reductions in the system.
- **Replicability and scalability**: Analysis of the potential for replicating and scaling these technological advancements, along with plans and ideas for wider applications in other solar energy projects.

Along with the "questions and answers" session, there was also a live interaction with the participants, as summarized below.

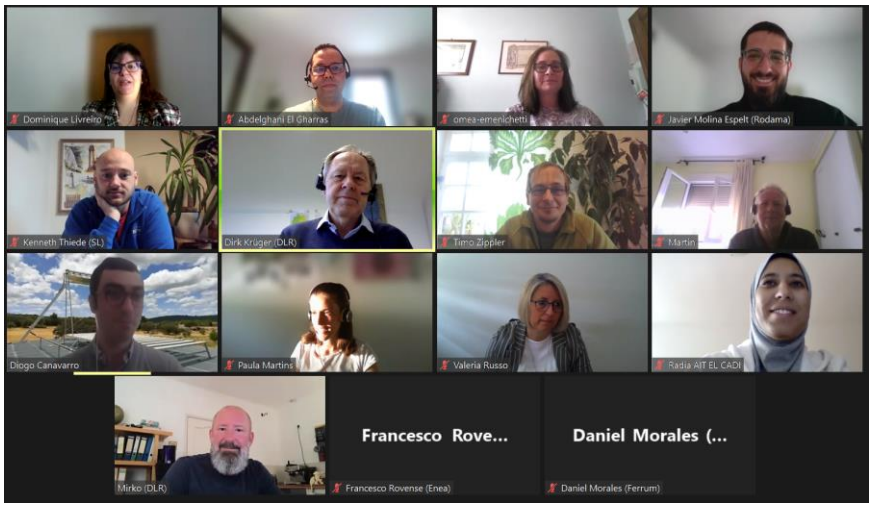


WP8 – PROJECT MANAGEMENT AND COORDINATION

The **Third General Assembly** meeting took place on October 15th and 16th, 2024 at the University of Évora, Évora, Portugal. The MSA-Trough team discussed the project overall status and achievements, erection budget review and permitting process, lessons learned from WP1 (detailed collector and assembly jig design development), scope and activities performed within each work package and next steps as well as quality assurance and risk mitigation.

MSA-Trough Partners at the Third General Assembly in Evora, Portugal

The **Second General Assembly** meeting took place on April 16th – 17th, 2024 online and discussed the overall project goals, the expected work, scope and activities performed within each work package and next steps.



MSA-Trough Partners at the Second General Assembly online

DELIVERABLES & MILESTONES

During the last seven months (M7 – M13) of the project implementation, the following deliverables/milestones have been produced/achieved:

DELIVERABLES:

D1.6: Detailed drawing of composite mirrors, SOLARLITE, SEN, M7.

D1.7: Technical drawing assembly jig, FERRUM, SEN, M7.

D1.10: Design report – automatic mirror washer, RODAMA, SEN, M7.

D2.2: Collector parts manufacturing report, FERRUM, SEN, M13.

D7.3 : Stakeholders Database, OME, SEN, M7.

ACCOMPLISHED MILESTONE:

MS5 – Design freeze “assembly jig”, FERRUM, M7.

ABOUT MSA-TROUGH

MSA-Trough project encompasses the development, installation and testing of an industrial-scale innovative parabolic trough collector for CSP plants. MSA-Trough is a novel parabolic trough collector that is visibly different from conventional collector designs due to its fixed focus and its innovative torque frame structure, which improves the optical collector efficiency and decreases investment costs at the same time.

The project will demonstrate the technology at the Évora Molten Salt Platform (EMSP) facility, located in Évora, Portugal. This platform, jointly managed by UEVORA and DLR, offers unique conditions for the large-scale demonstration of molten salt-driven technologies, ensuring its validation up to TRL7. Such results will be crucial not only for the demonstration of the potential CAPEX/OPEX reduction of the technology but also to set the appropriate conditions for its future market penetration and respective commercialization, especially in the European southern regions and northern Africa.

MSA-Trough project will be implemented over a three-and-a-half-year term: October 2023—March 2027.

TEAM

The MSA-Trough consortium is composed of seven partners, and is coordinated by the University of Évora (Portugal)

UEVORA	UNIVERSIDADE DE EVORA	Portugal
FERRUM	FERRUM TECNOINDUSTRIAL SL	Spain
Solarlite	SOLARLITE CSP TECHNOLOGY GMBH	Germany
DLR	DEUTSCHES ZENTRUM FUER LUFT UND RAUMFAHRT EV	Germany
ENEA	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUP PO ECONOMICO SOSTENIBILE	Italy
OME	OBSERVATOIRE MEDITERRANEEN DE L'ENERGIE	France
RODAMA	RODAMA MAQUINARIA SL	Spain

STAKEHOLDERS

MSA-Trough has a comprehensive approach to communication and dissemination beyond the research component. In order to get involved in and receive updates about the project activities, you are kindly asked to send us your contact details through the following form.

For more information about the project, please visit the project website and follow-us through social media related channels:

Project Website

LinkedIn Account

X Account

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