

# Évora Molten Salt Platform (EMSP) – Current Status and Perspectives

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## 1. Retrospective and Status of Construction and Erection of the EMSP

The construction of a molten salt parabolic trough test facility in Évora is converging to the finalization of its erection and commissioning phase. In our contribution, we will present on the current activities taking place at the Évora Molten Salt Platform (EMSP), mainly in the framework of two research projects, HPS and HPS2, involving consortia between research institutions and private companies, generously co-funded by the German Ministry of Economic Affairs and Energy (BMWi). The HPS2 test plant represents the main asset of the EMSP, and is integrated in INIESC – National Research Infrastructure in Solar Energy Concentration [1] as part of the Portuguese Roadmap of Research Infrastructures [2], which is financially supported by the Portuguese FCT – Science and Technology Foundation and CCDRA – Regional Development Coordination Commission of Alentejo.

The goal of HPS2 is to demonstrate the feasibility and operability of molten salt in parabolic trough solar thermal power plants. In order to achieve this goal, an entire test power plant is being erected comprising all relevant sub-systems that are representative for the operation of large-scale power plants.

HPS2 objectives comprise the development and demonstration of the HelioTrough collector, demonstration of a salt-based once-through steam boiler, demonstration of YaraMOST (NaKCa-NO<sub>3</sub>) salt, development and demonstration of the solar field heating system, and proof of safety of relevant operation schemes like system drainage and black-out. The consortium, details and design of the process and equipment are published in [3].

The plant is doing water-run and hot commissioning in summer 2021. With the successful commissioning, a new international, state-of-the-art research platform is being realized. Beyond the initial goals of HPS2, EMSP facilitates a wide range of test and demonstration at relevant scale in an operational environment, advancing the transfer of innovations into market-ready applications. This includes qualification and improvements of subsystems and components, proof and improvement of plant safety, reliability and maintainability, as well as optimization of operation and control for enhanced performance and economics.

## 2. Perspectives: Project Pipeline at EMSP

The HPS2 project at the EMSP has already proven to be a fertile seed for further research activities on different aspects of molten salt technology. The research platform is already booked by different follow-up projects until the end of 2023, partially to further develop the objectives of HPS2 and partially for completely different goals. In the following the project pipeline is shown:

- NEWSOL: design, construction and test of a concrete-based molten salt thermocline storage with filling material, for operation at 500 °C [4];

- MSOpera (Molten Salt Operation): direct follow-up project of HPS2, gathers operational experience with Solar Salt up to 565 °C, including the reduction of standstill heat losses and evaluation of cost-effective pre-heating methods by hot air and mobile impedance heating. Furthermore, project activities focus on the increase of the degree of automation and implementation of individual mass flow control for the solar field, as well as on increasing the collector efficiency by development and testing of optimized components of TSK-Flagsol's HelioTrough 3.1 collector and optimized tracking controls [5];
- ALFR-Alentejo: design, construction and test of an innovative linear Fresnel concentrator following a new optical concept - Dual Macro-focal CEC Asymmetric LFR, designed for two evacuated receivers on the same tower, with an etendue matched primary concentrator – aiming at operation with molten salts as heat transfer fluid [6];
- CSP ERANET EuroPaTMoS (European Parabolic Trough for Molten Salts) pulls together the European expertise and testing infrastructure for parabolic trough with molten salt, to accelerate the transfer of technology from R&D to commercial deployment and prove to IPPs, project developers, owner's engineers, insurance companies and lenders that the technology is ready for the market. The 3-year project links the EMSP with a network of ten partners from industry and research with complementary specialization and abilities, to eliminate real and perceived risks which still hamper the market entry of the technology.

The project pipeline reflects the versatility of the platform along the path from academic research towards ready-to-market qualification of components. EMSP objectives are not limited to the project objectives above. Actively participating in the most prominent European Research Infrastructure initiatives in this field, namely, SFERA III [7] and EU-SOLARIS, the EMSP aims at becoming a reference research infrastructure in molten salt technology, open to research, industrial and academic communities.

## References

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