

SHARP-SCO₂

NEWSLETTER #2 - JULY 2024

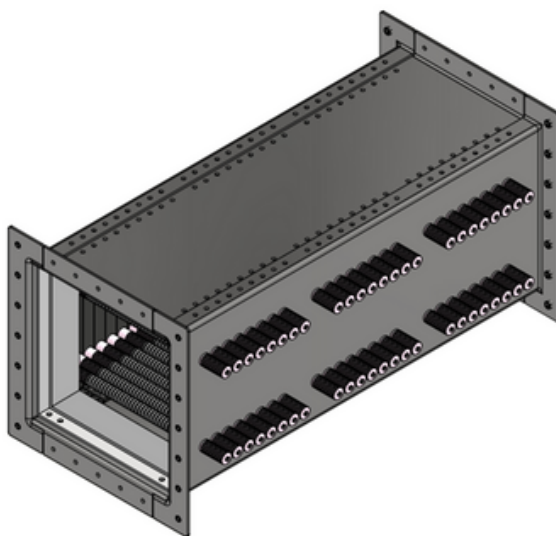
DEAR READER,

We are excited to share the latest updates on our innovative project, **SHARP-sCO₂**, which aim to advance the development of highly efficient and flexible hybrid PV-Concentrated Solar Power (CSP) plants by focusing on innovative technologies.

Innovative Medium Voltage Heater Design by SEICO

Over the past 18 months, **SEICO** has been developing an **advanced medium voltage heater** with a state-of-the-art modular design. This versatile heater is engineered to handle a wide range of operational conditions, including high-temperature environments, varying voltage supplies from low to medium, and power requirements from low to high.

The breakthrough design incorporates a BW aspect that ensures the heater can adapt swiftly to changing system conditions, maintaining a consistent outlet temperature. Additionally, users can set their desired outlet temperature, providing enhanced personal control over the heating process.



Design optimization via CFD and FEM

This task has been fully completed. Through appropriate **3D CFD simulations** conducted on the **ANSYS Fluent**® platform, the designs of both the Thermal Energy Storage and Medium Voltage Electrical Heater components have been optimized.

Multiple designs and operating conditions were investigated for each case to identify the most suitable ones that meet the technical requirements and provide optimal component performance. The numerical results were validated against design data or results from other numerical tools.

Finally, FEM analysis provided the necessary overview of the components' material behavior during the cyclic operation of the Thermal Energy Storage component.

Environmental and Social/Industrial Stakeholders Impact Assessment via LCA and s-LCA

The Task is ongoing this period and it is focused on assessing the proposed SHARP-sCO₂ fully operating **air-driven/sCO₂ CSP-PV hybrid configurations** from an environmental and social perspective. Primary data regarding advanced layouts, optimized components and operational scheduling are being collected for the simulation LCA models development.

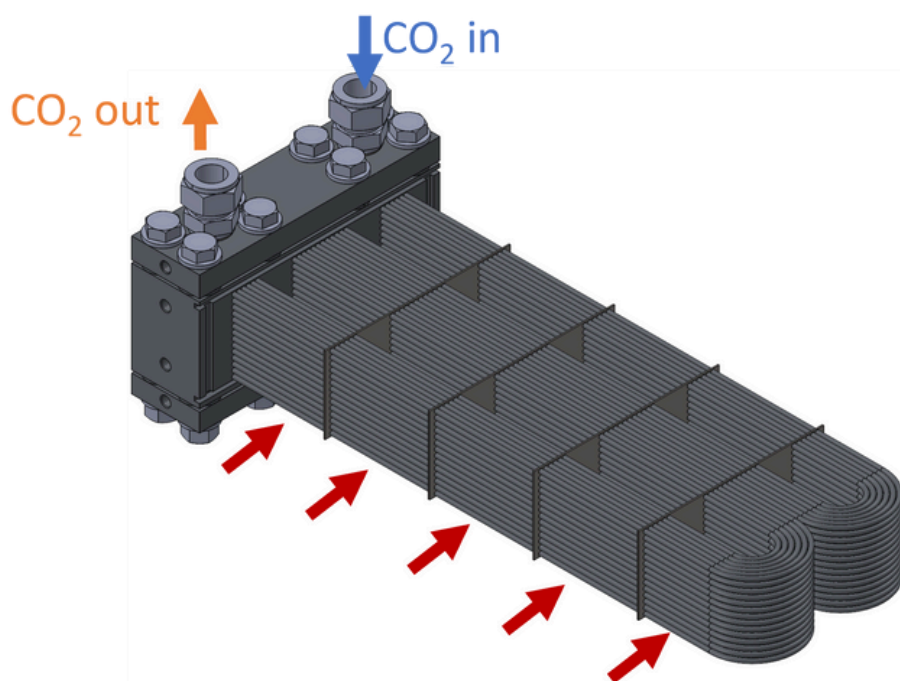
Partners' contribution, literature research and previous deliverables are the main sources for database construction. At the same time, **Stakeholder groups** have been identified and a preliminary selection of covered social topics is being finalized for the scale-based Questionnaires that will be distributed in the forthcoming period.

Design and Testing of a Novel Air-sCO₂ Heat Exchanger: Advancements and Future Steps

Work Package 3 of the **SHARP-sCO₂** project focuses on designing and testing a novel air-sCO₂ heat exchanger. In collaboration with **RINA Consulting**, a **shell-and-tube heat exchanger featuring microtubes for the supercritical CO₂-side** has been crafted. A new in-house design tool was developed for this purpose, tested against literature data and numerical computational fluid dynamics (CFD) simulations.

This tool facilitates a thorough evaluation of potential designs, optimizing factors like size, pressure loss, and power efficiency while also considering manufacturability, scalability, and cost. Thermomechanical analyses using finite element methods and CFD simulations have validated the final design. Currently, **TU Dresden** is coordinating with manufacturers to build three modules of the new heat exchanger for preheating, testing, and recooling. Additionally, the supercritical CO₂-loop in the **suCOO-Lab** at TU Dresden is being extended with a hot air loop, with commissioning planned for the end of the year.

The project's latest results were recently showcased at the "**Twenty-Second Symposium on Thermophysical Properties**," in the session on "**Modeling and Calculations for the Power Industry**."



Latest Publications

- [Innovation trends on high-temperature thermal energy storage to defossilize energy systems](#)
- [Design optimization of an innovative layered radial-flow high-temperature packed bed thermal energy storage](#)

Past Events

sCO₂ SYMPOSIUM, February 2024, San Antonio



The sCO₂ Symposium held in San Antonio, Texas, provided a highly valuable experience for attendees. The event facilitated engagement with the international sCO₂ community, including researchers, manufacturers, and experts in sCO₂ technology.

During the conference, Rafael Guedez, from partner KTH, participated in the International R&D Projects panel, presenting updates on the project.

Feedback received from the sCO₂ industrial community, including insights from experts associated with the STEP Demo facility, was highly constructive. The Southwest Research Institute's organization of a tour of the STEP Demo facility was also greatly appreciated.

Enerstock 2024, June 2024, Lyon

From June 5th to June 7th, 2024, SHARP-sCO₂ project participated to Enerstock 2024 event, held in Lyon, France. During the event, partner KTH delivered a technical presentation, showcasing key insights and advancements related to the project.

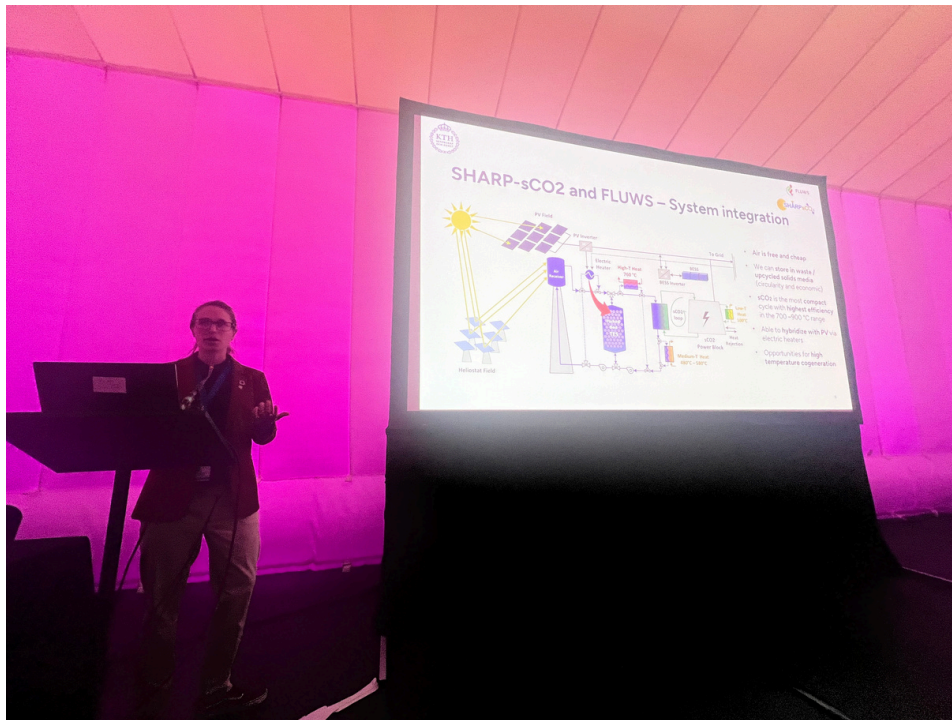
EUSEW 2024, June 2024, Brussels

From June 11th to 13th, 2024, the project took part in EUSEW 2024 event, held in Brussels. At the event, partner Rina Consulting showcased the SHARP-sCO₂ project at a dedicated booth, presenting its key features and progress to attendees.

ASME Turbo Expo 2024

On June 26th, Silvia Trevisan from partner KTH presented the SHARP-sCO₂ Project alongside the at the ASME Turbo Expo 2024 Turbomachinery Technical Conference & Exposition in London.

The presentation provided an exciting opportunity to showcase the project's advancements and engage with industry professionals, highlighting its contributions to the field of turbomachinery and energy solutions.



Upcoming Events

- Renewable Thermal Collaborative, 30th September, 1st October 2024
- SOLARPACES 2024, 8th-11th October 2024
- Energy Storage Global Conference, 15th-17th October 2024

Stay tuned for more updates as SHARP-sCO₂ continues to revolutionize solar energy conversion.
For more information about the project, visit our [website](https://www.sharpsco2.eu) or reach out to us directly at info@sharpsco2.eu.

Best regards,

SHARP-sCO₂ Team