

StORIES MENTORING PROGRAMME REPORT

Mentee (PhD Student) Details	
First Name:	Elham
Last Name:	Abohamzeh
Affiliation / Employer:	Saarland University
Country of Employer:	Germany
PhD Thesis Title:	Development of a sorption heat storage system for seasonal energy storage in buildings
Mentor (Supervisor) Details	
First Name:	Esther
Last Name:	Rojas Bravo
Affiliation / Employer:	The Centre for Energy, Environmental and Technological Research (CIEMAT)
Country of Employer:	Spain
Online Meetings	
How often and since when do the mentee and mentor meet online?	
Monthly online meetings since December 2024.	
In Person Meeting (if applicable)	
Where and when did the mentee and mentor meet in person?	
Location: Trondheim, Norway Date: 9–12 June 2025 Occasion: Third StoRIES Summer School	
Mentoring Programme Report	
<p>[The report must include information about the PhD dissertation, the added value of the programme, and a communication flow (meetings) to be confirmed by both parties (maximum 1 page)]</p>	

PhD Dissertation Overview:

Sorption-based thermal energy storage offers a promising solution to bridge seasonal mismatches between renewable heat generation and demand, owing to its high energy density and negligible heat losses. However, the interaction of multiple physical phenomena, particularly under vacuum conditions, presents challenges for reliable modeling, design, and system control under realistic conditions. This research addresses these challenges by developing an integrated Computational Fluid Dynamics (CFD) modeling and experimental framework on a prototype for a closed zeolite/water-based sorption storage system to accurately capture the phenomena involved and provide a basis for further optimization. The goal is to support the design of an efficient and controllable system for integration into residential energy infrastructures. A co-simulation framework combining the CFD model with a Simulink-based building energy system is developed to evaluate system performance under real-world conditions.

Added Value of the Mentoring Programme

Within the framework of the StoRIES mentoring programme, the collaboration contributed meaningfully to the development of both the experimental and numerical aspects of the PhD project. The mentoring supported the design of special components and informed decisions regarding the selection and integration of system elements for the laboratory-scale sorption heat storage setup. In addition to conceptual input, the construction and mechanical reliability of critical components were discussed and evaluated to ensure proper functioning under the defined operating conditions.

The mentoring also supported the development of the instrumentation strategy. Recommendations were made regarding sensor type, number, and placement within the reactor and other components in the setup to ensure accurate data collection under realistic operating conditions and for the planning of reliable and repeatable experimental procedures.

On the numerical side, the mentoring contributed to the review of the model structure, its underlying assumptions, and the interpretation of simulation results. Constructive feedback was provided to improve the accuracy and reliability of the model. This input helped to identify specific limitations in the simulation workflow and plan to refine the modeling.

Moreover, a review paper on sorption-based thermal energy storage systems for building applications is currently being developed within the framework of this mentoring exchange.

Communication Flow:

Since December 2024, monthly online meetings have been held to review progress and discuss both technical and strategic aspects of the project. An in-person meeting took place during the Third StoRIES Summer School in Trondheim, Norway, from 9–12 June 2025.

• Confirmation

This report has been confirmed by both parties (27/06/2025).

☒ Hereby, we authorize the publication of this report on the StoRIES website.

☒ Hereby, we consent to the processing of our personal data according to the StoRIES [privacy policy statement](#).