
STORAGE RESEARCH INFRASTRUCTURE ECO-SYSTEM

# RI Information sheet 2022

KIT, LIMCKA labs

Thermal energy storage

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| **Project Acronym** | StoRIES |
| **Call** | H2020-LC-GD-2020 |
| **Grant Agreement No.** | 101036910 |
| **Project Start Date** | 01-11-2021 |
| **Project End Date** | 31-10-2025 |
| **Duration** | 48 months |

1. Photo

2. Geographical coordinates (˚, “, … N/S, E/W)

49.09797, 8.43184

3. Description of the research infrastructure for the webpage

The Liquid Metal Competence Center Karlsruhe (LIMCKA) Labs consist of liquid metal facilities for materials, thermal energy storage systems and loop components testing. https://limcka.forschung.kit.edu/english/index.php

The LIMCKA Labs infrastructure provides:

1) material testing in stagnant liquid metals at different conditions – ideally for screening experiments for thermal energy storage materials and structural materials (from melting temperature of the liquid metal up to 1100°C)

2) testing of direct and indirect thermal energy storage systems with liquid metal as heat transfer fluid (temperatures from the melting temperature of the liquid metal up to 550°C, heating power up to 1 MW, cooling power up to 500 kW, test port max. 4 m)

3) loop components testing (valves, pumps, measurement devices) in liquid metal flows (temperatures from the melting temperature of the liquid metal up to 550°C, heating power up to 1 MW, cooling power up to 500 kW)

Services currently offered by the infrastructure:

The LIMCKA infrastructure enabled researchers in various research fields dealing with liquid metal as heat transfer fluids to new findings in the past years. For example, a first-of-its-kind thermal energy storage system with liquid metal and filler material was designed and is currently tested, and the production of

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hydrogen from natural gas without carbon dioxide emissions in liquid metal was successfully demonstrated (awarded with the Innovation Award of the German Gas Industry).

The LIMCKA Labs were utilized in numerous national programmes for experimental investigations in the field of concentrating solar power, liquid-metal based projects and EU projects in the fields of nuclear safety, e.g. in SEARCH, MAXSIMA, MYRTE and currently in PASCAL and PATRICIA. Furthermore, the LIMCKA Labs are part of the EERA-JPNM und EERA-CSP networks.

Scientific publications in peer-reviewed journals in the field of liquid metal thermal-hydraulics reached high citation numbers, e.g. the "Handbook on lead-bismuth eutectic alloy and lead properties, materials compatibility, thermal-hydraulics and technologies" (2015, Fazio et al.), which resulted from the European collaboration.

4. Availability of the research infrastructure

(Please indicate time periods in which infrastructure will not be available for StoRIES in the next 2 years – if already known)

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5. Special considerations (confidentiality / NDA agreements, insurance requirement, special training, HSE training)
Confidentiality / NDA agreements, insurance requirement, HSE training

6. Energy storage technology that can be analysed/studied by using the research infrastructure

- Electrochemical ☐
- Chemical ☐
- Thermal ☒
- Mechanical ☐
- Superconducting Magnetic ☐
- Cross-cutting ☐ (Specifically: ... )

7. Key words for the webpage
Liquid metal, high temperature storage, corrosion mechanisms, heat transfer in complex structures, heat transfer in packed beds, material tests, component tests

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8. TRL level (if applicable):

- 1-3 ☒
- 4-6 ☒
- Above ☐

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