The Team

University of Duisburg-Essen
Prof. Dr. Friedrich-Karl Benra
Prof. Dr. Dieter Brillert
www.uni-due.de/tm/

University of Stuttgart
Prof. Dr. Jörg Starflinger
www.ike.uni-stuttgart.de/

Centrum výzkumu Řež
Petr Hájek jr.
www.cvrez.cz/en/

ÚJV Řež
Petr Hájek
www.ujv.cz/en/

Delft University of Technology
Dr. Martin Rohde
www.rst.tudelft.nl

Gesellschaft für Simulatorschulung mbH
Michael Seewald
www.simulatorzentrum.de/en/

Contact

Coordinator

University of Duisburg-Essen
Chair of Turbomachinery
Lotharstr. 1
D-47057 Duisburg

Prof. Dr. Dieter Brillert
Phone: +49 203 379 1722
Email: dieter.brillert@uni-due.de
Internet: *https://www.uni-due.de/tm/*

Project Management Office

University of Duisburg-Essen
Science Support Centre
Universitätsstr. 2
D-45141 Essen

Dr. Maria Gies
Phone: +49 201 183 7036
Email: maria.gies@uni-due.de
Internet: *https://www.uni-due.de/ssc*

www.sCO2-HeRo.eu

The sCO2-HeRo project is funded by the *Euratom research and training programme 2014-2018* under grant agreement No. 662116.

The supercritical CO_2 heat removal system

sCO2 HeRo
The supercritical CO_2 heat removal system

Opening new avenues towards nuclear reactor safety

Designing a self-propellant, self-launching cooling cycle

Proofing the concept regarding safety and reliability

Demonstrating the ongoing research in nuclear safety to early-stage researchers

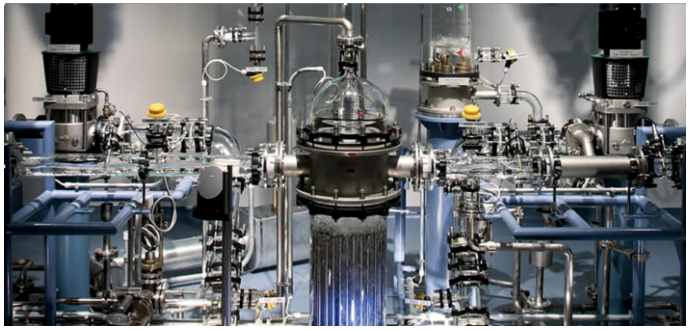
sCO2 HeRo
The supercritical CO_2 heat removal system

An innovative reactor safety concept

sCO2-HeRo is a new Horizon 2020/Euratom research and innovation project whose main purpose is the development of a cooling system that safely, reliably, and efficiently removes residual heat from nuclear fuel without the requirement of external power sources.

In the case of a nuclear station blackout, the sCO2-HeRo transports the decay heat to an ultimate heat sink through a self-propellant, self-sustaining, and self-launching, highly compact cooling system using supercritical carbon dioxide (sCO_2).

The system will be finally demonstrated and experimentally proven by reactor simulation studies in an unique glass model of a pressurized water reactor (PWR).



Glass model of a pressurized water reactor (PWR)
©Gesellschaft für Simulatorschulung mbH

Motivation

The overall ambition is the development of a self-propellant safety system for heat removal in nuclear power plants and the demonstration of its proof of concept in a scaled model. Fundamental understanding will be gained in:

- the turbulent heat transfer in supercritical fluids (sCO_2),
- the investigation of a diffusion welded compact heat exchanger as a new technology in this field of application, and
- the design criteria for turbo-machines in supercritical CO_2 applications near the critical point.

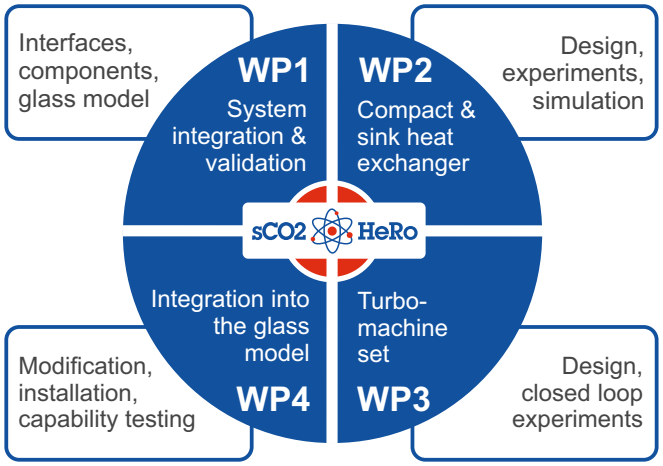
sCO2-HeRo has the potential to significantly increase the safety of nuclear power plants.

Training

The sCO2-HeRo project has an educational purpose towards interested students and PhD candidates aiming at:

- illustrating the processes of decay heat removal within a power plant,
- supporting the future training program at the partner institution GfS,
- motivating students to consider the nuclear sector as a working environment with good prospects.

The project structure



The thermodynamic and mechanical interfaces between the glass model and the single components of the sCO2-HeRo system will be defined in WP1. Later on, it is the intention to integrate the sCO2-HeRo into the European Light Water Reactor (LWR) fleet.

WP2 and WP3 aim at designing, investigating and testing the compact heat exchanger, the sink heat exchanger and the turbo-machine set with regard to the stringent space limitations, the applied conditions and the corresponding working fluids.

In WP4, all single components will be installed and tested in the PWR glass model under different accident scenarios.

Find more information on
www.sCO2-HeRo.eu