sCO2-4-NPP

Innovative SCO2-Based Heat Removal Technology for an Increased Level of Safety of Nuclear Power Plants

OBJECTIVES

The overall aim of sCO2-4-NPP is to contribute to an increased safety of Nuclear Power Plants (NPPs) in case of accidents by further specifying, designing and validating the sCO2-based heat removal system developed in the previous sCO2-HeRo project on a NPP and preparing the necessary roadmaps to bring it closer to industrial use.
By bringing the system closer to market, sCO2-4-NPP will provide a heat removal solution for NPPs that will increase the grace period in case of accidents to beyond 72 hours (compared to a grace period in current reactors of ~48 hours), delaying the need for human intervention in case of an accident and thus decreasing the risk of human errors and the spread of radioactive material into the surrounding environment, ultimately reducing harm to both workers and citizens. The sCO2-4-NPP solution will be independent of the type of reactor operated (BWR, PWR, VVER, HTR, etc.) and will have the possibility to be retrofitted to the majority of current reactors in Europe as well as being integrated into future reactors.

EXPECTED IMPACTS

Environment & Society:

- Safe decay heat removal is accomplished without the need of external water or power contributing to an increased level of safety.
- sCO2-4-NPP will help to delay the need for human intervention in case of accidents to beyond 72 hours.

Science & Innovation:

- The project contributes to the overall scientific and technical knowledge base in the field of sCO_2.
- Unique combination of simulation results with physical tests on loops allowing better apprehension of the real behavior of this type of system.
- sCO_2-based heat recovery technology can be used in many industrial processes to significantly increase the energy efficiency of the system concerned (CSP, Waste Heat Recovery, Biomass, Geothermal…).

HIGHLIGHTS

- Validation of sCO2 models in thermal-hydraulic system codes on lab scale (sCO2 loop)
- Validation of sCO2-4-NPP loop in a virtual “relevant nuclear environment” PWR

PARTNERS

EDF / UNIVERSITAET STUTTGART/ Baker Hughes (NP TEC) / Fives Cryo / GFS GESELLSCHAFT FUR SIMULATORSCHULUNG MBH / KSG KRAFTWERKS-SIMULATORGESELLSCHAFT MBH / CENTRUM VYZKUMU REZ S.R.O. / JOZEF STEFAN INSTITUTE / UNIVERSITAET DUISBURG-ESSEN / UJV REZ, a. s. / ARTTIC

DURATION & BUDGET

09/2019 – 08/2022 - 3 years
€ 2 786 971,25

CONTACTS

Technical Project Leader:
Albannie Cagnac (EDF)
Email: albannie.cagnac-1@edf.fr

EVENTS

4th European sCO2 Conference (March 2021 - Czech Republic)

This project has received funding from the Euratom H2020 1.1 and 1.7 under grant agreement No 847606.