

# ECC-SMART

## Project Newsletter

June 2024

Dear ECC-SMART Partners!

The ECC-SMART project has almost completed the **46th month** of its implementation and we are glad to introduce you a new issue of the **external newsletter**. In its first part, you can find a brief retrospective on the last project meeting, which took place at the end of April in Brussels. From perspective of coordination, the meeting significantly contributed to strengthening of bonds and increased mutual understanding between the technical work packages.

In the other part of the current issue, we present an overview of important events related to the ECC-SMART project. We hope to meet most of you at least at one of them.

**Once again, let us thank to the whole team for performing perfect work and moving the project towards its successful completion!**

*The Coordination Team*



### 3rd in-person project meeting 22nd – 24th April, Brussels

Special thanks to **ENEN**, especially Gabriel Pavel and Camila Boix for hosting the event.

The project meeting gathered representatives from most of the partner institutions and the EC as well. On this occasion, our new EC Project Officer, Mr. Michal TRATKOWSKI presented a general overview of topics related to SMR projects and to the ECC-SMART project, in particular. It was a great opportunity to review the work performed in every work package, to observe the advancement in the field and to assess the status of the action for the remaining period.

## The implementation of the ECC-SMART from the perspective of the WP leaders:

### WP2: Material Testing

- Approx. 90% of the tests (~700 specimens) have been completed and led to comprehensive understanding of corrosion and mechanical behavior of the selected materials' (800H, 310S and AFA) under simulated operation conditions of SCW-SMR.
- Preliminary results indicate high potential for their use as a fuel cladding of advanced SMR.
- **Electrochemical tests** under SCW conditions were successfully performed and deepened the knowledge of corrosion behaviour of selected materials.
- Preliminary data strongly suggests that net radiolysis can be suppressed in an SCWR operating at up to 400 °C using hydrogen.
- The **corrosion tests with pre-irradiated coupons** are ongoing in Hot Cell in CVR. Studies on radiation effects are being enhanced with **proton irradiation** research by colleagues from CNL.
- In cooperation with WP3 and 4, the list of the design requirements is continuously filled.

### WP4: Neutron physics of SCW-SMR

- Significant progress has been made in core design calculations. Following detailed Monte Carlo calculations for a number of core configurations, a reactor core has been designed using **fuel assemblies enriched between 4.5% and 10%** (lower stages of the reactor core). According to the results, with this core layout, the reserve reactivity and burn-up rate allow the reactor to operate for two years.
- The Monte Carlo modelling also contributed significantly to the **coupled Serpent - Apros reactor physics - thermal-hydraulics calculations**. Based on the results, neutronic and thermal-hydraulic parameter distributions for stable normal operation are determined. Calculations for some transients are in progress.
- Due to the large amount of start-up reserve reactivity, the core would not be manageable by control elements alone. Therefore, calculations at assembly and core level have been performed to give a first recommendation for the type, number and distribution of **burnable absorbers**. This will be further developed during the final phase of the project, together with a viable control element layout.

### WP6: Dissemination and Communication

- Proceedings of the two organized workshops were published in Deliverables 6.2 and 6.3.
- The project was presented at these events: **The ENEN General Assembly and Special event: Nuclear Skills in Europe – the impact of E&T**, Brussels, Belgium, February 29 – March 1st, 2024; **Nuclear Conference**, Pitesti, Romania, May 29th, 2024; **Belgian Nuclear Society meeting**, Brussels, Belgium, April 25th, 2024

### WP3: Thermal Hydraulics and Safety of the SCW-SMR

- The **innovative SCW-SMR design concept** has been proposed on the basis of a high-performance light water reactor (HPLWR) and it **includes the experience of Canadian and Chinese** project partners.
- In **collaboration** with WP2 and WP4 the proposed design is iteratively analyzed and **further developed**.
- The study of a pre-conceptual core layout and **passive safety concept** for the proposed SCW-SMR design was completed, while the SCWR thermal-hydraulic reference **database** is being further **extended** using the results provided by the project partners and from the literature.
- The thermal-hydraulic experiments dealing with the effect of corroded surfaces were successfully finished and included in the reference database.
- Another activity still in process is the high-performance direct numerical simulations with focus on the proposed SCW-SMR concept.
- The thermal-hydraulic **bench-marking activities** were **completed**, and the finalizing work to **improve models and codes** (system, subchannel and CFD) for SCW-SMR design and safety analysis is ongoing.

### WP5: Synthesis and Guidelines for Safety Standards

- The already completed activities such as (1) **Licensing and Safety** including the development of generic and specific safety criteria and requirements and (2) the development of the rather detailed Phenomena Identification and Ranking Table (**PIRT**) for the ECC-SMART innovative concept of SCW-SMR.
- The PIRT includes **safety-relevant phenomena** related to neutronics, thermal-hydraulics and materials to be used as fuel cladding.
- The preparatory activities are ongoing to develop the **Pre-licensing study** and to close the WP activities with the guidelines for the demonstration of safety in the future development stages.

JOINT EUROPEAN CANADIAN CHINESE DEVELOPMENT OF SMALL MODULAR REACTOR  
TECHNOLOGY



This project has received funding from the Euratom Research and training programme 2019-2020 under Grant Agreement No 945234.



# ECC-SMART Project Newsletter

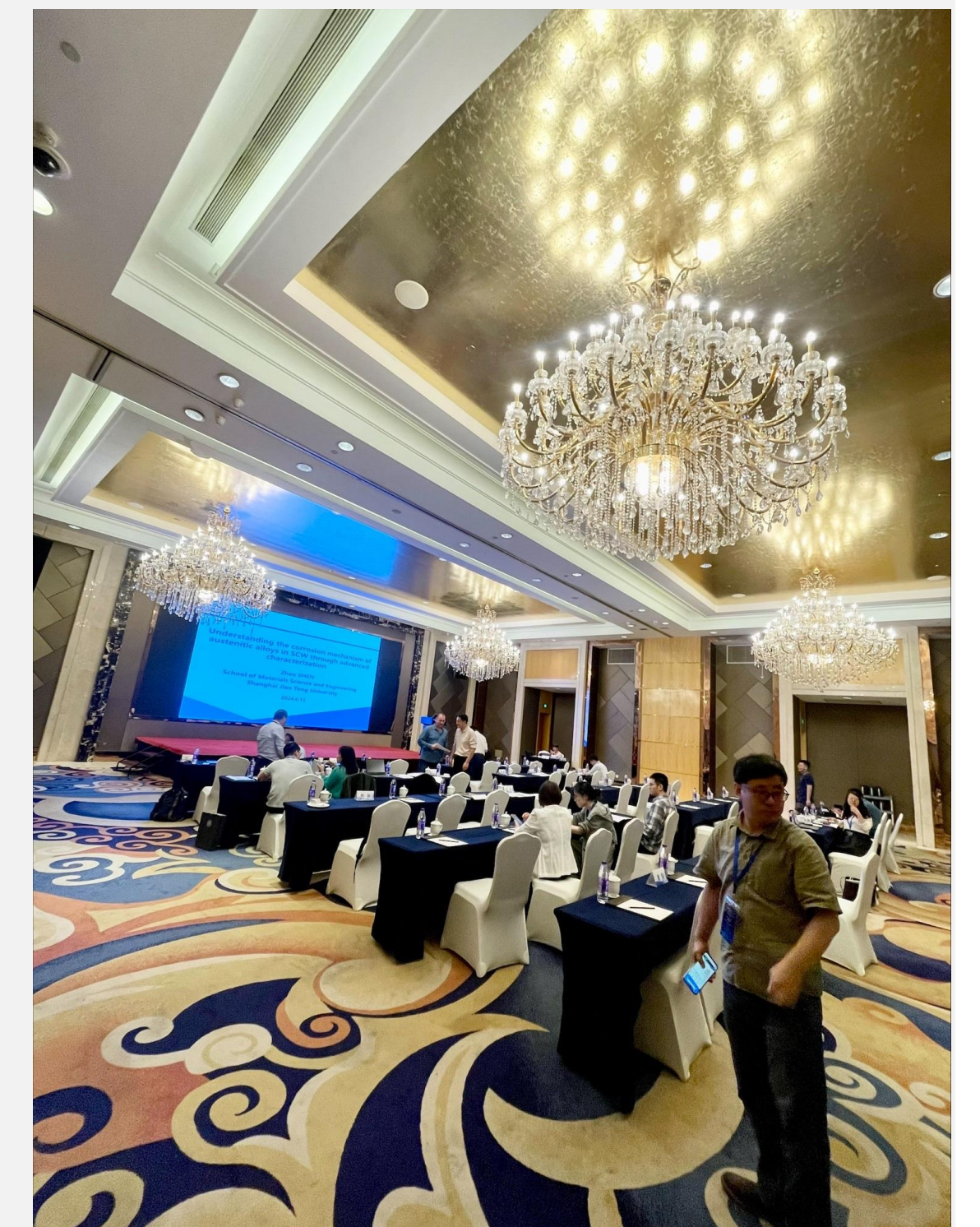
June 2024

## The 2024 Information Exchange Meeting on Super-Critical Water-cooled Reactors (IEM-13)

10-12th June 2024

The event was held in Haili New Century Grand Hotel Haiyan, China. Very special thanks to Lefu Zhang for organizing the meeting!

The three-day event consisted of a lab tour, discussions, and scientific presentations on topics related to thermohydraulic and safety, materials research, and chemistry for supercritical water-cooled reactors, including advanced small modular reactors. About **40 attendees**, including representatives of ECC-SMART, actively participated in this event. This kind of meetings help to deepen knowledge and strengthen international cooperation.



## INVITATIONS

### Workshop on Post- Irradiation Examination (PIE)



26-30th August 2024, Řež (Prague), Czech Republic

- Theoretical courses will cover topics like:
  - ✓ **neutron and proton irradiation**
  - ✓ **methods used for PIE**
  - ✓ **surveillance program**
  - ✓ **fuel inspection, etc.**
- Practical part will include work performed in hot cells with a special focus on new opportunities and challenges
- Tour around the CVR and CVUT infrastructure

contact: [michaela.krydova@cvrez.cz](mailto:michaela.krydova@cvrez.cz)

### 11<sup>th</sup> International Symposium on Supercritical Water-Cooled Reactors

Pisa, Italy - February 3-7, 2025

New Date

The dates of the Symposium have been changed to favour the participation of the Chinese scientific community, involved in their yearly holidays in the previous week

The University of Pisa and the  
Dipartimento di Ingegneria Civile e Industriale

are happy to announce that the first ISSCWR Symposium  
in the post-COVID-19 era will be held  
in the beautiful town of Pisa



VENUE

POLO FIBONACCI

Aula Magna Pontecorvo - Edificio E  
Largo Bruno Pontecorvo, 3 - 56127 Pisa



[www.isscwr11-pisa2025.com](http://www.isscwr11-pisa2025.com)

NEW DATES

ISSCWR-11

3-7th February 2025

Polo Fibonacci, Pisa, Italy

Tentative schedule

- **ISSCWR-11 Symposium**  
3-5 February
- **ECC-SMART Final Project Meeting**  
6th February
- **GIF SCWR**  
7th February

Draft paper submission: **31th July 2024**

CORDIS  
EU research results

[Cordis \(ID945234\)](https://cordis.europa.eu/ID945234)



[ecc-smart.eu](http://ecc-smart.eu)



[ECC-SMART LinkedIn](https://www.linkedin.com/company/ecc-smart)

JOINT EUROPEAN CANADIAN CHINESE DEVELOPMENT OF SMALL MODULAR REACTOR  
TECHNOLOGY



This project has received funding from the Euratom Research and training programme 2019-2020 under Grant Agreement No 945234.

