

ECC-SMART

Project Newsletter

December 2021

Dear fans of nuclear!

In the last external newsletter, we familiarised you with the ECC-SMART project – the first joint transcontinental initiative in the development of a supercritical water-cooled small modular reactor (SCW-SMR), covering most of the Generation IV International Forum (GIF) countries involved in the development of the SCW-SMR.

Now that the first year of the project implementation is behind us, we would like to provide you with more details on project objectives in different work packages.

As coordinator, I want to deeply thank the whole ECC-SMART consortium. Despite the challenging situation during the pandemic and the struggles with online meetings, all their hard work, enthusiasm, and effort in the project made it possible to get where we are. Hopefully we can continue the same way to fulfil the ambitious aims and all of us can meet in person soon!

Sincerely,

Daneš Burket
coordinator

GENERAL PROJECT OVERVIEW

The project represents the consortium consisting of 20 institutions across the world. The scope of ECC-SMART is a small modular reactor cooled by supercritical water with the aim to support and help to solve the corresponding issues such as materials, heat transfer, physics and safety. The project is funded by the Horizon 2020 EURATOM.

Nuclear energy generation is called to play a key role during the next decades in achieving a decarbonised economy by 2050, mainly due to its contribution to ensuring security of supply. Currently, nuclear energy is the largest (26.7% in 2019) single source of low-carbon energy in the EU, ahead of hydro (12.3%), wind (13.3%), solar (4.4%), and other (0.5%)*. Thus, one of the main challenges of the ECC-SMART project is the demonstration of the feasibility of the concept of the supercritical water-cooled reactor (SCWR) as one of the six advanced nuclear reactors of the future Generation IV.

*COMMISSION STAFF WORKING DOCUMENT Clean Energy Transition – Technologies and Innovations Accompanying the document REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on progress of clean energy competitiveness (SWD/2020/953 final)



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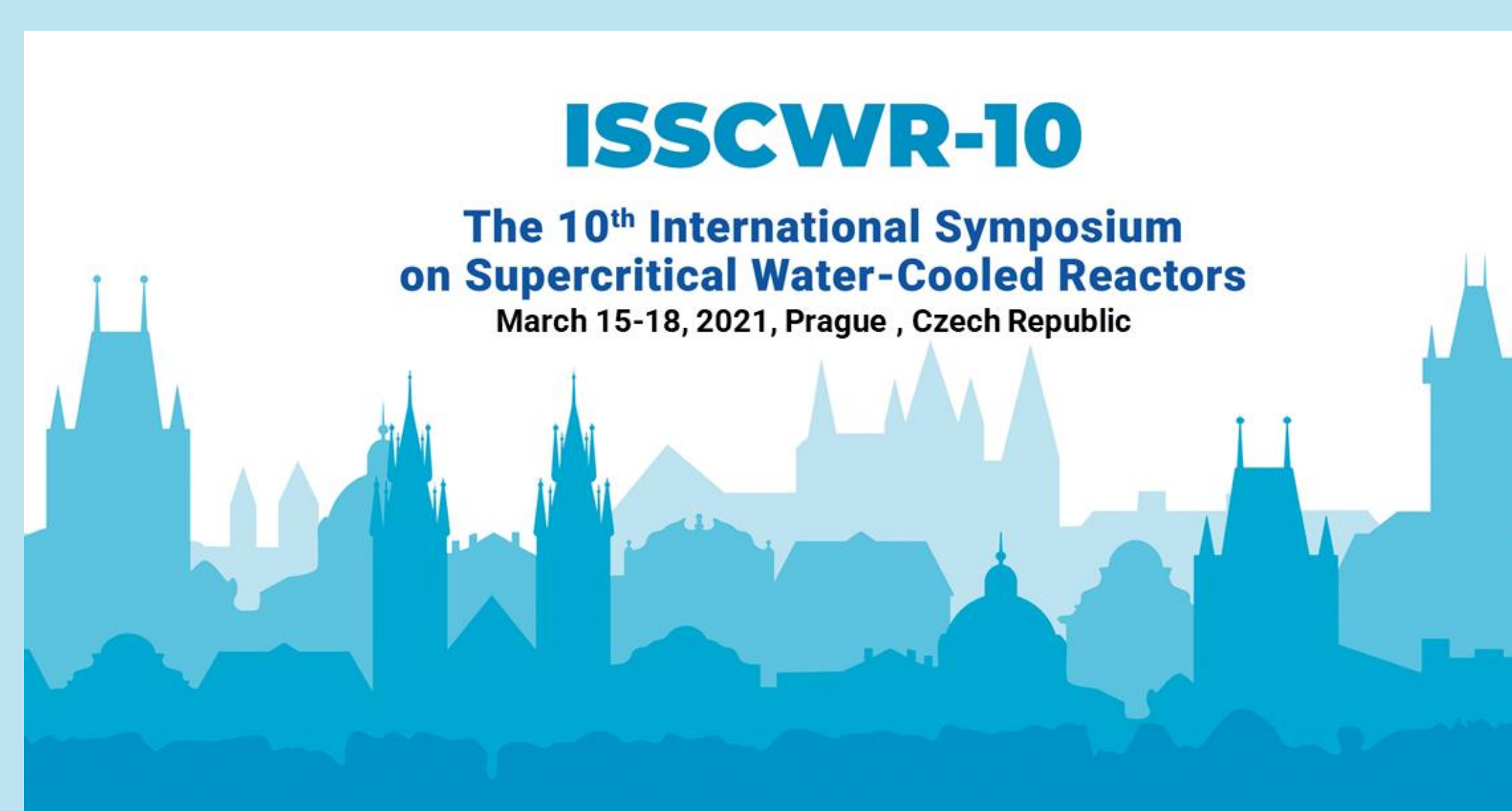
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KEY EVENT IN 2021

In March 2021, the jubilee **10th International Symposium on Supercritical Water-Cooled Reactors (ISSCWR-10)** was held under auspices of CVR and the ECC-SMART project.

In spite of the virtual mode due to the pandemic situation, more than 80 participants were registered and involved in the discussion focused on topics such as materials and corrosion, thermal-hydraulics, and other interesting corresponding issues connected with the development of SCWRs. These topics were covered by the 33 presentations, of which almost one-third were given by students or young scientists.

Additionally, a special section focused on the papers issued from ISSCWR-10 will be published in JNERS (April 2022).



PROJECT CONSORTIUM

20 partners: 15 from Europe, 3 from China, 1 from Canada and 1 from Ukraine



JOINT EUROPEAN CANADIAN CHINESE DEVELOPMENT OF SMALL MODULAR REACTOR TECHNOLOGY



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OVERVIEW OF WORK PACKAGES AND THEIR MAIN OBJECTIVES

WP 1 - Project Coordination

- Monitor project implementation: internal reports, risk database.
- Ensure active internal communications and organisation of project meetings.
- Regularly communicate with the Project Officer (European Commission).
- Communicate project externally: ISSCWR-10, GIF meetings, Advisory Board meetings.

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WP 2 - Materials Testing

- Obtain a deep and complete understanding of corrosion behaviour of the most promising candidate materials for use as cladding of future SCW-SMR.
- Carry out long-term exposures as well as the electrochemical measurements under conditions of SCW.
- Assess the corrosion behaviour of pre-irradiated selected materials under conditions of SCW.
- Provide the achieved results as support for the qualification procedure of future SCW-SMR construction materials, and assess the relation to the existing standards and guidelines.

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WP 3 - Thermal Hydraulics and Safety of the SCW-SMR

- Provide a database using experimental and numerical data.
- Improve, implement and validate the engineering CFD models for turbulent heat and mass transfer.
- Develop and validate the heat transfer correlations and models for applications in system codes.
- Analyse safety and design of the SCW-SMR concept.
- Derive the European-Canadian-Chinese (ECC) design requirements for an ECC SCW-SMR design concept as a basis for a future conceptual design project.

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WP 4 - Neutron physics of SCW-SMR

- Study the design- and safety-related neutronic parameters and reactor physics behaviour of SCW-SMR in order to support the pre-conceptual design.
- Select proper neutron reactor physics code for modelling the complex behaviour of SCW-SMR.
- Calculate safety-related neutron physics parameters.
- Provide reactor physics analysis of preliminary core layouts.

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WP 5 - Synthesis & Guidelines For Safety Standards

- Develop generic and specific safety criteria and requirements for the SCW-SMR concept.
- Synthesise the main safety-related findings and conclusions of the technical work packages 2, 3 and 4.
- Develop a pre-licensing study demonstrating the feasibility of the design to be licensed.
- Develop guidelines for the demonstration of safety in the further development stages of the SCW-SMR concept.

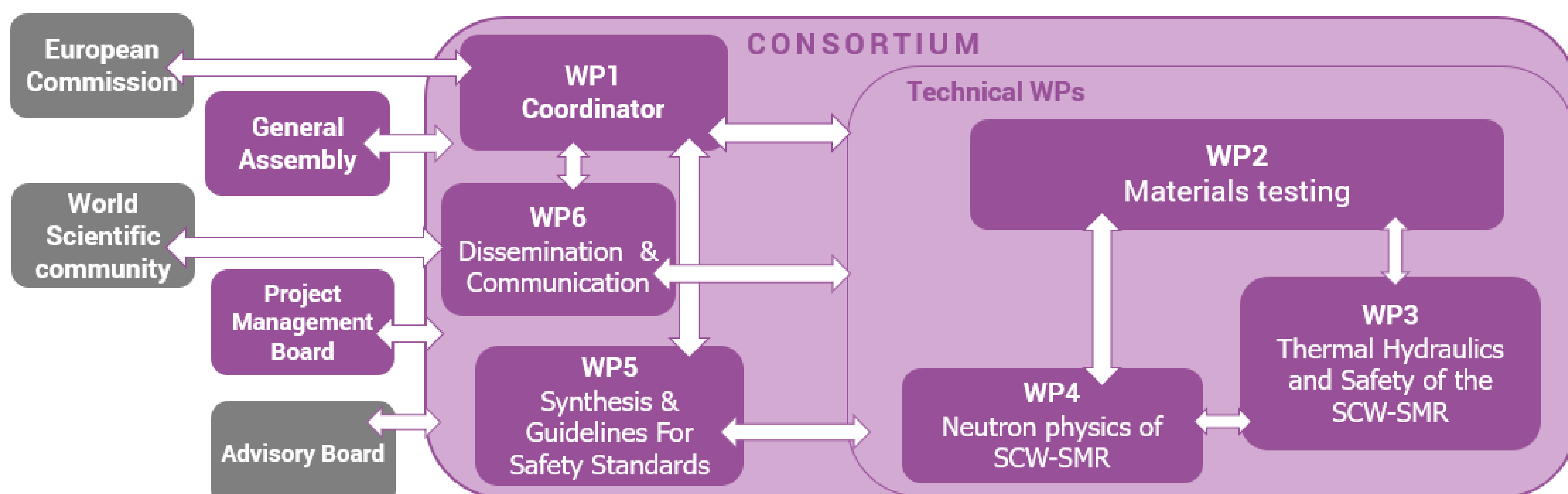
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WP 6 - Dissemination and Communication

- Inform the nuclear community and the public about the project: LinkedIn, website.
- Provide internal communications platform: SharePoint.
- Ensure project visual identity: logo, project templates.
- Organisation of events such as workshops and corresponding symposiums.
- Organise two training courses and set up exchange program for PhD, postdocs, young scientists.

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For the ECC-SMART the strong cooperation among the WPs is crucial as can be seen from the scheme below.



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