



# **Technical Meeting on Advanced Manufacturing and Qualification Programmes for New Materials for Small Modular Reactors and Non-Water Cooled Reactors: Safety Considerations**

**IAEA Headquarters, Vienna, Austria**

and virtual participation via Cisco Webex

**18-21 November 2024**

**Ref. No.: EVT2303767**

## **Information Sheet**

### **Introduction**

There is a growing interest among Member States in the commercial deployment of various reactor types, particularly non-water cooled reactors and small modular reactors (SMRs) both water and non-water cooled. Many advanced designs present more corrosive, higher temperature and higher-irradiation environments than those in today's large water cooled reactors. Consequently, there is a pressing need for the accelerated development of new materials and processes to meet these distinctive requirements. Also, advanced manufacturing techniques have gained significant attention within the nuclear industry. These techniques could facilitate the manufacturing of intricate designs, and it is claimed that they can contribute to enhanced component quality and safety. Moreover, they play a pivotal role in reducing both the time and cost associated with manufacturing processes.

In 2021 and 2022, the IAEA conducted a comprehensive high-level review to assess the applicability of existing IAEA safety standards to evolutionary and innovative reactor designs. The outcomes of the review are presented in the IAEA Safety Report Series No.123, "Applicability of Safety Standards to Non-Water-Cooled Reactors and Small Modular Reactors". Advanced manufacturing methods and novel materials have emerged as areas of novelty within the evolutionary and innovative reactor technologies. The review identified certain gaps and areas, related to these topics, which warrant additional consideration in the relevant IAEA safety standards for design and construction; in particular:

- Qualification of novel materials presents unique challenges due to the reliance on insights from historical large-scale qualification experiments and service experience with established materials. Notably, irradiation effects, a critical aspect of the qualification, pose a particularly data-scarce challenge.
- Many advanced manufacturing methods, construction techniques, and novel materials currently under consideration lack full qualification, and existing consensus codes and standards may not be fully applicable. This introduces the need for the development and establishment of standards tailored to these innovative approaches.
- Some advanced manufacturing methods may impose limitations on the ability to comprehensively verify the process control through subsequent (post-build) inspection and testing. For example, a type of additive manufacturing that uses an electron beam to melt metal powder in a vacuum. The rapid melting and solidification process can cause internal porosity and microstructural inhomogeneities, which are difficult to detect and quantify with standard inspection techniques. This necessitates a careful examination of alternative methods for ensuring the quality and reliability of components.

To effectively address the identified findings, it is imperative to undertake additional work aimed at further investigating those areas where the current IAEA safety standards may require adaptation or may not be directly applicable, and compiling relevant information necessary to update those standards in due course.

In addition, in the SMR Regulator's Forum, the manufacturability of SMRs has been recognized as an area that could pose challenges during regulatory reviews. In Phase 2 of the SMR Regulator's Forum, a specialized working group focusing on 'Manufacturing, Commissioning, and Operations' was established. The common positions of this working group can be found in the Phase 3 Summary Report, which was issued in December 2023.

Hence, in light of the rapidly advancing landscape in SMRs and non-water cooled reactors, there is an urgent need to foster information sharing and dialogue among Member States, to collectively explore common approaches to the safety demonstration of advanced manufacturing techniques and new materials integral to these advanced reactor designs.

## Objectives

The objective of this event is to provide a platform for Member States to exchange information and insights regarding the safety considerations related to the utilization of new materials and advanced manufacturing techniques for SMRs and non-water cooled reactors, including their qualification for the specific and highly challenging environments encountered in those reactor technologies.

The IAEA is planning to develop a new publication (TECDOC) entitled "Considerations for Qualification of Advanced Manufacturing and Materials for Components Important to Safety in Small Modular Reactors and Non-Water Cooled Reactors". The event will make a valuable contribution to the ongoing development of the TECDOC.

## Target Audience

Participation is targeted at professionals from institutions involved in research, design, manufacturing, and standard development, licensee organizations, national regulatory bodies, and technical support organizations, who have knowledge of, or experience in, advanced manufacturing techniques, material qualification, including related codes and standards, or safety assessment in this context. Although the main focus of the event will be on SMRs and non-water cooled reactors, participation is encouraged from professionals involved in the topical areas for existing nuclear power plant projects to share their knowledge and experience.

The event is open to representatives of all Member States with an active nuclear power programme, including those from embarking countries in Phase 3 of their nuclear programme, and Member States with large expertise in the topics covered by the event.

The event is in principle open to all officially designated persons. The IAEA, however, reserves the right to restrict participation due to limitations imposed by the available meeting facilities. It is, therefore, recommended that interest persons take the necessary steps for the official designation as early as possible.

## Working Language(s)

The working language of the event will be English. No simultaneous interpretation will be provided.

## Topics

The event will be focused on the safety considerations related to the utilization of new materials and advanced manufacturing techniques in SMRs and non-water cooled reactors. The following topics will be covered:

- Qualification of new materials utilized for items important to safety: challenges and solutions.
- Advanced manufacturing techniques used for items important to safety: challenges and solutions.
- Safety demonstration of items important to safety that incorporate new materials or are manufactured using advanced techniques.
- Regulatory perspectives and case studies on assessing safety cases for items important to safety that incorporate new materials or manufactured using advanced techniques.
- Experience gained from past or ongoing nuclear power plants projects involving advanced manufacturing and new materials.
- Feedback on the application of IAEA safety standards in nuclear power plants projects involving advanced manufacturing techniques and new materials.

## Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State or invited organization, participants are requested to submit their application via the InTouch+ platform (<https://intouchplus.iaea.org>) to the competent national authority (Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or organization for onward transmission to the IAEA by **16 August 2024**, following the registration procedure in InTouch+:

1. Access the InTouch+ platform (<https://intouchplus.iaea.org>):
  - Persons with an existing NUCLEUS account can sign in to the platform with their username and password;
  - Persons without an existing NUCLEUS account can register [here](#).
2. Once signed in, prospective participants can use the InTouch+ platform to:
  - Complete or update their personal details under ‘Complete Profile’ and upload the relevant supporting documents;
  - Search for the relevant event under the ‘My Eligible Events’ tab;
  - Select the Member State or invited organization they want to represent from the drop-down menu entitled ‘Designating Authority’ (if an invited organization is not listed, please contact [InTouchPlus.Contact-Point@iaea.org](mailto:InTouchPlus.Contact-Point@iaea.org));
  - If applicable, indicate whether financial support is requested and complete the relevant information (this is not applicable to participants from invited organizations);
  - Based on the data input, the InTouch+ platform will automatically generate the Participation Form (Form A) and/or the Grant Application Form (Form C);
  - Submit their application.

Once submitted through the InTouch+ platform, the application, together with the auto-generated form(s), will be transmitted automatically to the required authority for approval. If approved, the application, together with the applicable form(s), will automatically be sent to the IAEA through the online platform.

NOTE: The application for financial support should be made, together with the submission of the application, by **16 August 2024**.

For additional information on how to apply for an event, please refer to the [InTouch+ Help](#) page. Any other issues or queries related to InTouch+ can be sent to [InTouchPlus.Contact-Point@iaea.org](mailto:InTouchPlus.Contact-Point@iaea.org).

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

Participants are hereby informed that the personal data they submit will be processed in line with the [Agency’s Personal Data and Privacy Policy](#) and is collected solely for the purpose(s) of reviewing and assessing the application and to complete logistical arrangements where required. The IAEA may also use the contact details of Applicants to inform them of the IAEA’s scientific and technical publications, or the latest employment opportunities and current open vacancies at the IAEA. These secondary purposes are consistent with the IAEA’s mandate. Further information can be found in the [Data Processing Notice](#) concerning IAEA InTouch+ platform.

## Papers and Presentations

The IAEA encourages participants to give presentations on the work of their respective institutions that falls under the topics listed above.

Participants who wish to give presentations are requested to submit an abstract of their work. The abstract will be reviewed as part of the selection process for presentations. The abstract should be in A4 page format, should extend to no more than 2 pages (including figures and tables) and should not exceed 500 words. It should be sent electronically to the Scientific Secretary of the event, Ms Man Liu (Email: [M.Liu@iaea.org](mailto:M.Liu@iaea.org)), not later than **16 August 2024**.

Authors will be notified of the acceptance of their proposed presentations by **20 September 2024**. They will then be requested to prepare and submit their presentations in Microsoft PowerPoint or as a PDF file by email to the Scientific Secretary of the event, Ms Man Liu (Email: [M.Liu@iaea.org](mailto:M.Liu@iaea.org)), by **18 October 2024**.

## Expenditures and Grants

No registration fee is charged to participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to the event.

The application for financial support should be made, together with the submission of the application, by **16 August 2024**.

## Venue

The event will be held at the Vienna International Centre (VIC) where the IAEA's Headquarters are located. Participants must make their own travel and accommodation arrangements.

General information on the VIC and other practical details, such as a list of hotels offering a reduced rate for IAEA participants, are listed on the following IAEA web page: <https://www.iaea.org/events>.

Participants are advised to arrive at Checkpoint 1/Gate 1 of the VIC one hour before the start of the event on the first day in order to allow for timely registration. Participants will need to present an official photo identification document in order to be admitted to the VIC premises.

## Visas

Participants who require a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria at least four weeks before they travel to Austria. Since Austria is a Schengen State, persons requiring a visa will have to apply for a Schengen visa. In States where Austria has no diplomatic mission, visas can be obtained from the consular authority of a Schengen Partner State representing Austria in the country in question.

## IAEA Contacts

### Scientific Secretary

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Subsequent correspondence on scientific matters should be sent to the Scientific Secretary/Secretaries and correspondence on other matters related to the event to the Administrative Secretary.

## **Event Web Page**

Please visit the following IAEA web page regularly for new information regarding this event:  
<https://www.iaea.org/events/evt2303767>