



**IAEA**

International Atomic Energy Agency

*Atoms for Peace and Development*

# **Technical Meeting on the Benefits and Challenges of Fast Reactors of the SMR Type**

**Hosted by the  
Government of Italy**

**through  
Intra-University Consortium for Nuclear Technology Research CIRTEN**

**24–27 September 2019**

**Milan, Italy**

**Ref. No.: EVT1803539**

## **Information Sheet**

### **Introduction**

The International Atomic Energy Agency defines small and medium sized or modular reactors (SMRs) as reactors that produce electricity of up to 300 MW(e) in total or per module (small sized or small modular) and reactors producing 300–700 MW(e) (medium sized). There has been an increasing interest in SMRs globally owing to their various benefits, such as flexible power generation options, a wide range of applications, enhanced safety resulting from inherent passive safety features, reduced upfront capital investment, possibilities for cogeneration, and

non-electrical applications. At the same time, SMRs face various technical and economic challenges to their development and wide-scale deployment.

There are a number of different SMR designs currently under development, which combine the benefits of operating a reactor in a fast neutron spectrum with the added benefits of SMR flexibility. For example, fast reactors, in addition to their efficient use of fuel, are flexible in that they can operate either as a breeder, to create more fissile fuel, or as a burner of plutonium and/or long lived minor actinides. Combining this capability with the benefits of SMRs in terms of power generation flexibility could produce increased advantages, although it could also pose challenges related to non-proliferation. Therefore, there is a need to identify such benefits and challenges of fast SMRs.

Currently there are several state-of-the-art fast SMR designs with different features and systems under development and consideration, having both near and long-term deployment aspects. This technical meeting will help in bringing the designers and researchers of these reactors as well as the associated innovative systems to come together to discuss possible benefits that will help in safe, secure, economic and early deployment of the technology as well as to identify challenges that might impede the development of fast SMRs and find possible solutions to address the related issues. Modelling and simulation of advanced reactors is always challenging, specifically with regard to encompassing the development of new reactor simulation codes, physical and mathematical models and numerical techniques to address the issues specific to particular designs. Advanced fuel cycle options and actinide management can also have coupled challenges with the designs. Fast spectrum reactors can have very different coolants from conventional reactors, including, but not limited to, liquid sodium, lead, lead-bismuth eutectic, molten salt and helium, which might significantly challenge the structural integrity of the fuel, as well as other reactor components. Several such issues will be addressed by the fast reactor community during the presentations and the subsequent discussions during the event.

It should be noted that this event, the organization of which was recommended by the Technical Working Group on Fast Reactors following Member States' request for information exchange in this area, will be focused only on fast reactors of the SMR type. It will not cover other large fast reactors or other SMRs designed for the thermal neutron spectrum.

## **Purpose**

The purpose of the event is to discuss the development of fast neutron reactors belonging to the type of small and medium sized or modular reactors (SMRs); to share the up-to-date fast SMR technology; and to identify potential benefits and challenges in the development and deployment of fast SMRs.

## Objectives

The main objectives of the event are to:

- Promote and facilitate the exchange of information within the scope of the event and its related topics at the national and international level;
- Present and discuss the current status of research and development (R&D) in the field of fast neutron SMRs;
- Discuss and identify potential benefits and challenges in the development and deployment of fast SMRs;
- Discuss and identify R&D needs and gaps to assess future requirements in the field, which should eventually lead to efforts being concentrated in the key lacking areas;
- Provide recommendations to the IAEA for future joint efforts and coordinated research activities (if required) in the field; and
- Prepare a reference document summarizing the work presented by the participants, including the findings of the study in the standard IAEA publications format.

## Topics

The event will consist of seven sessions organized based on the following topics:

- Core and system designs: innovative fast neutron SMR concepts and their associated potential benefits and challenges;
- Safety: technical benefits and challenges, including the inherent and passive safety features of fast SMRs;
- Modelling and simulation: challenges in the modelling and simulation of innovative fast SMRs and application of the simulation codes to fast SMR designs;
- Advanced fuel cycle options: benefits and challenges of different fuel cycle options for fast SMRs, including breeding and burning options;
- Coolant and structural materials: benefits and challenges of different coolants and their interaction with structural material;
- Techno-economics: potential economic benefits or challenges of technical innovation; and
- Non-proliferation aspects of fast SMRs.

## Expected Outputs

The expected outputs are:

- Information exchange between interested Member States on the topics of the event;
- Recommendations to the IAEA on future joint efforts and coordinated research activities on fast SMRs; and

- A report on the event, which will serve as a reference for preparing the future IAEA publication *Benefits and Challenges of Fast Reactors of the SMR Type*.

## 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, participants are requested to send the **Participation Form (Form A)** to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) for onward transmission to the IAEA by 15 May 2019. Participants who are members of an organization invited to attend are requested to send the **Participation Form (Form A)** through their organization to the IAEA by above deadline.

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

Please note that the IAEA is in a transition phase to manage the entire registration process for all regular programme events electronically through the new InTouch+ (<https://intouchplus.iaea.org>) facility, which is the improved and expanded successor to the InTouch platform that has been used in recent years for the IAEA's technical cooperation events. Through InTouch+, prospective participants will be able to apply for events and submit all required documents online. National authorities will be able to use InTouch+ to review and approve these applications. Interested parties that would like to use this new facility should write to: [InTouchPlus.Contact-Point@iaea.org](mailto:InTouchPlus.Contact-Point@iaea.org).

## Abstracts, 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 on the topics listed above. The abstract should contain title, contributing author(s) names and affiliation, must be written in English, and provide sufficient information on the contents of the proposed paper for evaluation. The abstract will be reviewed as part of the selection process for presentations. The abstract should be in Microsoft Word format and should not exceed 500 words. It should be sent electronically to the fast reactor technology development team of the IAEA (email: [Fast.SMR@iaea.org](mailto:Fast.SMR@iaea.org)), not later than **15 May 2019**. Authors will be notified of the acceptance of their proposed presentations by **30 June 2019**. The authors will then be requested to prepare and submit the full papers (about ten pages) for peer review by **15 August 2019**. The revised papers will be included in the final IAEA publication *Benefits and Challenges of Fast Reactors of the SMR Type*, which will be published as either as an IAEA Nuclear Energy Series publication or an IAEA Technical Document.

In addition, participants have to submit the abstract together with the **Participation Form (Form A)** and the attached **Form for Submission of a Paper (Form B)** to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or their organization for onward transmission to the IAEA not later than 15 May 2019.

## 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 using the **Grant Application Form (Form C)**, which has to be stamped, signed and submitted by the competent national authority to the IAEA together with the **Participation Form (Form A)** by **15 May 2019**.

## Key Deadlines and Dates

Action	Date
Submission of the Participation Form (Form A) Submission of the Form for Submission of a Paper (Form B) Submission of the Grant Application Form (Form C), if applicable.	15 May 2019
Abstract submission deadline	15 May 2019
Notification of acceptance of the abstract by the IAEA	30 June 2019
Full paper submission deadline Start of peer review	15 August 2019
<b>Technical Meeting</b>	<b>24–27 September 2019</b>
Final deadline for revised papers	December 2019

## **Target Audience**

The meeting is open to all Member States involved or interested in the research, development and/or deployment of fast neutron SMRs, including government organizations (policymakers, analysts, regulators and R&D agencies) and industry stakeholders (vendors, engineering companies, plant operators and technology developers).

## **Working Language(s)**

The working language of this meeting will be English with no interpretation provided. All communications, abstracts and papers must be submitted in English.

## **Visas**

Participants who require a visa to enter Italy should submit the necessary application as soon as possible to the nearest diplomatic or consular representative of Italy.

## **Venue**

The event will be held at Polytechnic University of Milan in Milan, Italy.

## **IAEA Contacts**

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