



IAEA

International Atomic Energy Agency

Atoms for Peace and Development

Technical Meeting on Reactor Physics, Thermal Hydraulics and Plant Design of Molten Salt Reactors

IAEA Headquarters, Vienna, Austria

22–25 April 2025

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Information Sheet

Introduction

Low carbon nuclear energy has long been a major source of electricity worldwide and is anticipated to remain a critical resource as the world confronts climate change. The introduction of small modular reactors (SMRs), particularly innovative non-water-cooled designs, marks a new paradigm in the energy sector. One such technology line in SMRs is the molten salt reactors (MSRs) that are increasingly recognized as a transformative technology within the nuclear power landscape, promising advancements in safety, flexibility, and efficiency for clean energy deployment. As part of the International Atomic Energy Agency's (IAEA) initiative to support innovative reactor technologies, MSRs offer unique advantages, including low pressure, inherent safety features and the potential for fuel flexibility, thus representing a valuable option for future energy systems, including nuclear propulsions. With the capability to operate at high temperatures and accommodate a range of fuel cycles, MSRs are also particularly suited for hybrid energy applications, such as thermal energy storage, hydrogen production, and process heat for industrial applications.

In 2023, the IAEA published the Technical Report Series (TRS No. 489) on the *Status of Molten Salt Reactor Technology*, offering a comprehensive overview of the current status and latest developments of MSR technology. This report addresses key technological advancements in MSR design along with technological challenges, covering areas such as fuel cycle options, salt chemistry, reactor materials, and safety. Additionally,

it explores the research and development activities in different countries and serve as a foundational resource to guide policymakers, researchers, and industry stakeholders in understanding and advancing MSR technology globally.

The MSRs have unique fuel and coolant composition, high temperature operation, and materials chemistry, and therefore the underline reactor physics, thermal hydraulics and plant design calculations are key research and development topics and of great interest to Member States. This technical meeting on *Reactor physics, Thermal Hydraulics, and Plant design of Molten Salt Reactors* aims to deepen international collaboration on the technical methodologies required to advance MSR technology. This meeting will be focussed on: *i*) reactor physics aspects of MSR to provide the understanding of neutron behaviour within the liquid fuel medium, affecting reactivity control, fuel burnup, and overall safety; *ii*) thermal hydraulics aspects to understand the heat transfer and fluid dynamics in the high-temperature molten salt environment, ensuring efficient heat removal and influencing the reactor's thermal efficiency and safety margins; *iii*) finally, the plant design encompasses the physical layout, materials, and systems engineering that ensure reliable operation.

Objectives

The purpose of the event is to exchange state-of-the-art knowledge and approaches for multiphysics and thermal hydraulics coupling modelling of

molten salt reactors to support nuclear plant engineering design for such reactors.

The objectives of the Technical Meeting are to:

- provide a forum for the exchange of information on status of design and technology developments for MSR;
- discuss key technical issues associated with reactor physics, thermal hydraulics and engineering design of nuclear power plant with MSRs;
- To identify further research and development required to facilitate licensing and deployment of MSRs.

Target Audience

Participation in the Technical Meeting is solicited from research organizations, design and technology developers, potential end-users and operators, regulatory bodies, relevant industries and technology holders, government officials, technical support organizations, universities, representatives of international organizations, and technical experts working in the areas R&D in a nuclear power programme. The IAEA highly encourages the participation of women, early career professionals, and individuals from developing countries.

Working Language(s)

English.

Expected Outputs

The outputs of the meeting will be:

- Working materials will be used to prepare the IAEA TECDOC which will be a source of information for Member States who are currently pursuing design and development of MSR.
- Establishment and/or strengthening collaborations among Member States to accelerate R&D activities relevant to MSRs;

Topics

Participants are expected to provide presentations on one or more of the topics identified below:

Topic #1 Status of advanced research, design and technology developments for MSR

- Reactor physics of MSR that include power distribution, effective multiplication, and the changes of molten salt fuel composition with burnup.
- Materials for the fuels, molten salt, solid fuels with molten salt coolants, moderators.
- Design considerations of reactor's structure and internals and in MSR.

Topic #2 Reactor thermal hydraulics of MSR

- Primary heat transport mechanisms and systems with internally heated molten salts.
- Heat transfer and pressure drop in the reactor, flow stability.
- Neutronic-thermal-hydraulic coupled analyses and computer codes, modelling and simulation.
- Experimental tests for new phenomena and code validation to support safety analyses.

Topic #3 Design engineering for nuclear power plant with MSR

- Site and plant arrangements that define the physical arrangements of the specific buildings on the site: nuclear island, turbine-generator island, balance of plant of NPP with MSR.
- Design of circulating cooling system and ultimate heat sink to the NPP.
- Technology readiness level considerations for components, system and plant systems of MSR.

Participation and registration

All persons wishing to participate in the event must be designated by an IAEA Member State or should be a member of an organization that has 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 **24 March 2025**, 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);
- 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 **24 March 2025**.

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.

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.

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). It should be sent electronically to Mr Vladimir Artisiuk or Ms Anzhelika Khaperskaia, the Scientific Secretaries of the event (see contact details below), not later than **24 March 2025**. Authors will be notified of the acceptance of their proposed presentations by **04 April 2025**.

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 **24 March 2025**.

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:

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.

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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.