

# IAEA Activities on SMRs

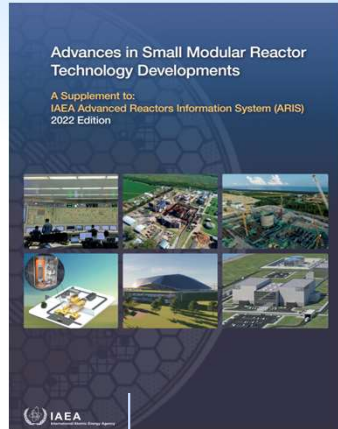
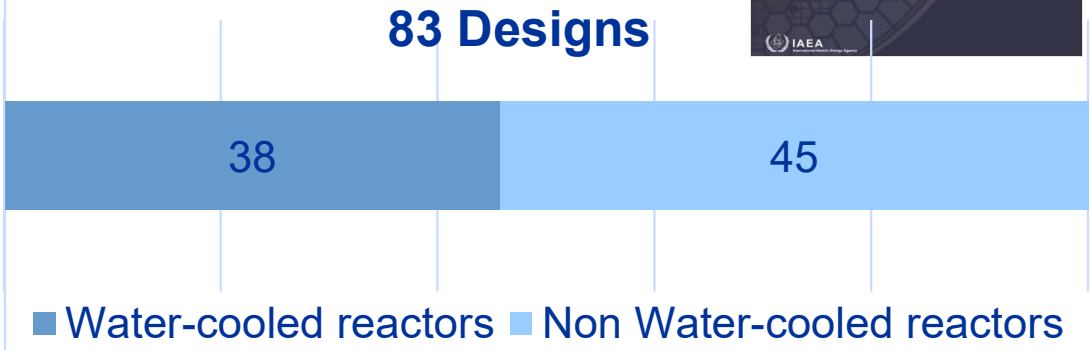
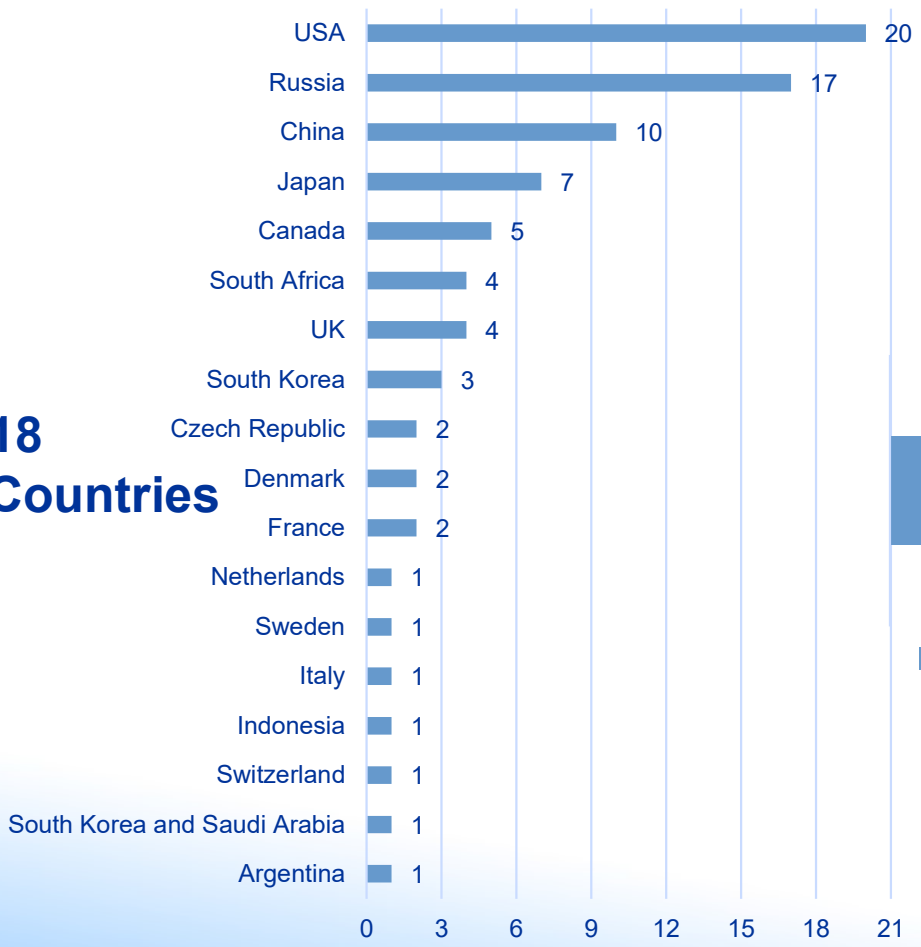
22<sup>nd</sup> INPRO Dialogue Forum on  
Successful Development and Sustainable Deployment of SMRs

6-10 May 2024

**Dohee Hahn**  
SMR Platform Coordinator  
Department of Nuclear Energy

# SMRs under Development and Deployment

**18 Countries**



- HTGR 21
- MSR 13
- LFR 8
- SFR 3

# Growing interest in SMRs among Newcomer Countries

**27** Newcomers

17

10

## Decision-making phase

Countries considering nuclear power without having made a final decision

- |   |             |   |             |
|---|-------------|---|-------------|
|    | Algeria     |    | Philippines |
|    | El Salvador |    | Senegal     |
|   | Estonia     |   | Sri Lanka   |
|  | Ethiopia    |  | Sudan       |
|  | Indonesia   |  | Thailand    |
|  | Kazakhstan  |  | Tunisia     |
|  | Mongolia    |  | Uganda      |
|  | Morocco     |  | Zambia      |
|  | Niger       |   |             |

## Post-decision-making phase

Countries that have made a decision and are building the infrastructure or have signed a contract and are preparing for or started construction

- |   |            |   |              |
|---|------------|---|--------------|
|    | Bangladesh |    | Nigeria      |
|    | Egypt      |    | Poland       |
|   | Ghana      |   | Saudi Arabia |
|  | Jordan     |  | Turkiye      |
|  | Kenya      |  | Uzbekistan   |

# Key IAEA Activities on SMR



## Technology Development and Deployment

- TWG-SMR/GCR
- ARIS Database
- SMR Booklet



## Reactor Technology Assessment

- Updated Method incorporates SMR

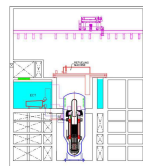


## Fuel, Safe management of Spent Fuel, Radioactive Waste and Decommissioning



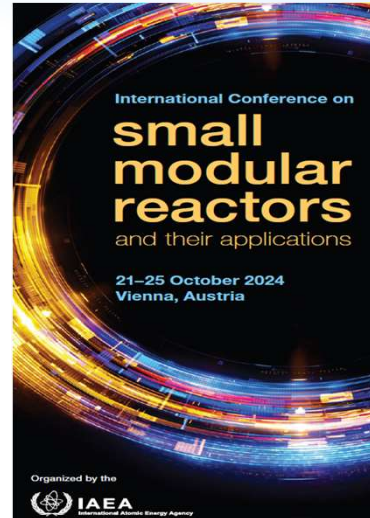
## Approaches to Commissioning and Operation

- Issues on the conduct of operation, OLC and MCR for multi-unit plant



## Economics

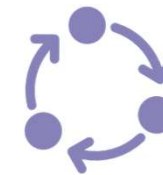
- Economic Appraisal of SMR Projects: Methodologies and Applications



## Technical Cooperation for MS Capacity Building



**Legal Frameworks for safety, security, safeguards and civil liability for nuclear damage**



## Safety & Security

- Applicability of Safety Standards and Security Guides
- Emergency Preparedness and Response



## Nuclear Harmonization and Standardization Initiative

- Industry Track
- Regulatory Track



## Safeguards-by-Design

- Facilitation of safeguards inspection early in reactor design stage

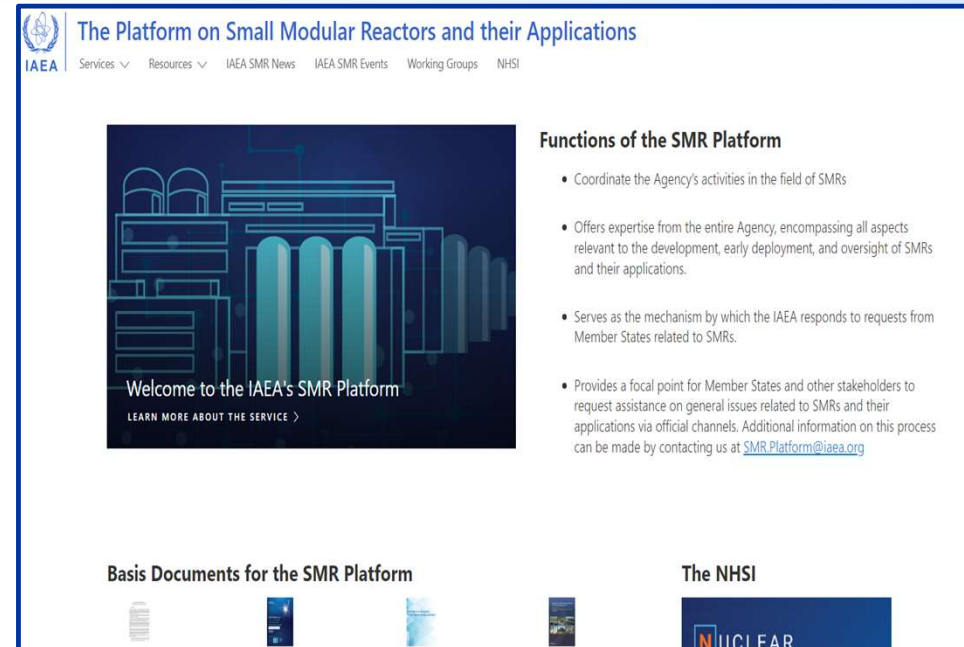


## Infrastructure Development

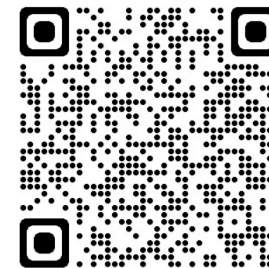
- IAEA Milestones Approach applicable to SMR
- New deployment models

# IAEA SMR Platform

- Serves as a **focal point** for the IAEA activities on SMRs and their applications
- Provides **coordinated support and expertise from across the entire Agency**, for consideration, development, deployment, and oversight of SMRs
- **SMR Portal** provides latest news, IAEA events, and publications on SMRs
- **New service** under development for newcomer countries interested in SMR
- Enquiries and requests for assistance: [\*\*SMR.Platform@iaea.org\*\*](mailto:SMR.Platform@iaea.org)



The screenshot shows the IAEA website for the Platform on Small Modular Reactors and their Applications. The header includes the IAEA logo and navigation links: Services, Resources, IAEA SMR News, IAEA SMR Events, Working Groups, and NHSI. The main content area features a large graphic of a reactor core with the text "Welcome to the IAEA's SMR Platform" and a link "LEARN MORE ABOUT THE SERVICE >". To the right, under the heading "Functions of the SMR Platform", there are four bullet points: 1. Coordinate the Agency's activities in the field of SMRs; 2. Offers expertise from the entire Agency, encompassing all aspects relevant to the development, early deployment, and oversight of SMRs and their applications; 3. Serves as the mechanism by which the IAEA responds to requests from Member States related to SMRs; 4. Provides a focal point for Member States and other stakeholders to request assistance on general issues related to SMRs and their applications via official channels. Additional information on this process can be made by contacting us at [SMR.Platform@iaea.org](mailto:SMR.Platform@iaea.org). Below the main content, there are sections for "Basis Documents for the SMR Platform" and "The NHSI" with a "NUCLEAR" logo.



# Technical Cooperation INT-2023 Project

**Supporting Member States' Capacity Building on Small Modular Reactors and Microreactors and their Technology and Applications – A Contribution of Nuclear Power to the Mitigation of Climate Change**

Period: 2022 – 2025

Field of Activity (#6 Nuclear Power Reactors)

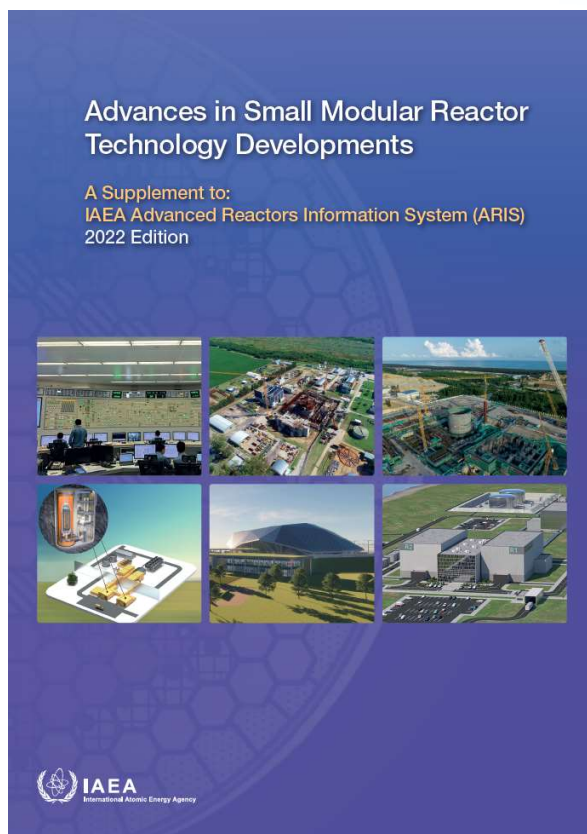
## Objective

To improve technical knowledge, capacity building and safety review capability in developing countries addressing the fundamental aspects of SMRs/MRs and their electric and non-electric applications.

## Outcome

Awareness raised on SMRs/MRs technology and their applications to enhance nuclear energy contribution in social-economic development in Member States

# IAEA ARIS SMR Booklet 2022



IAEA SMR Booklet, 2022 Edition	
Number of reactor designs:	<b>83</b>
Member states involved:	<b>18</b>
Reactor types	<ol style="list-style-type: none"> <li>1.1. Water-cooled Land Based – <b>25</b></li> <li>1.2. Water-cooled Marine Based – <b>8</b></li> <li>2. High temperature Gas-cooled – <b>17</b> including <b>3</b> test reactors</li> <li>3. Liquid Metal-cooled Fast Neutron Spectrum – <b>8</b></li> <li>4. Molten Salt – <b>13</b></li> <li>5. Microreactors – <b>12</b></li> </ol>
Distinguishing features	<ul style="list-style-type: none"> <li>• Annexes on <b>economics, non-electric applications, experiments for design validation, fuel cycle and waste management</b></li> <li>• Insightful annexes with various charts and tables</li> </ul>
Status	Published in hardcopies and online.
Link to download	<a href="https://aris.iaea.org/Publications/SMR_booklet_2022.pdf">https://aris.iaea.org/Publications/SMR_booklet_2022.pdf</a>

The 2022 IAEA SMR ARIS Booklet is a biennial publication as a supplement to the IAEA Advanced Reactor Information System (ARIS) Database. It provides a brief yet comprehensive design description of 83 different reactor designs. The 2022 version is an updated version of the 2020 booklet. It includes 11 more designs and a more comprehensive set of annexes.

# Technical Working Group on SMR

- **Members:** 20 MSs and 4 International Organizations as observers

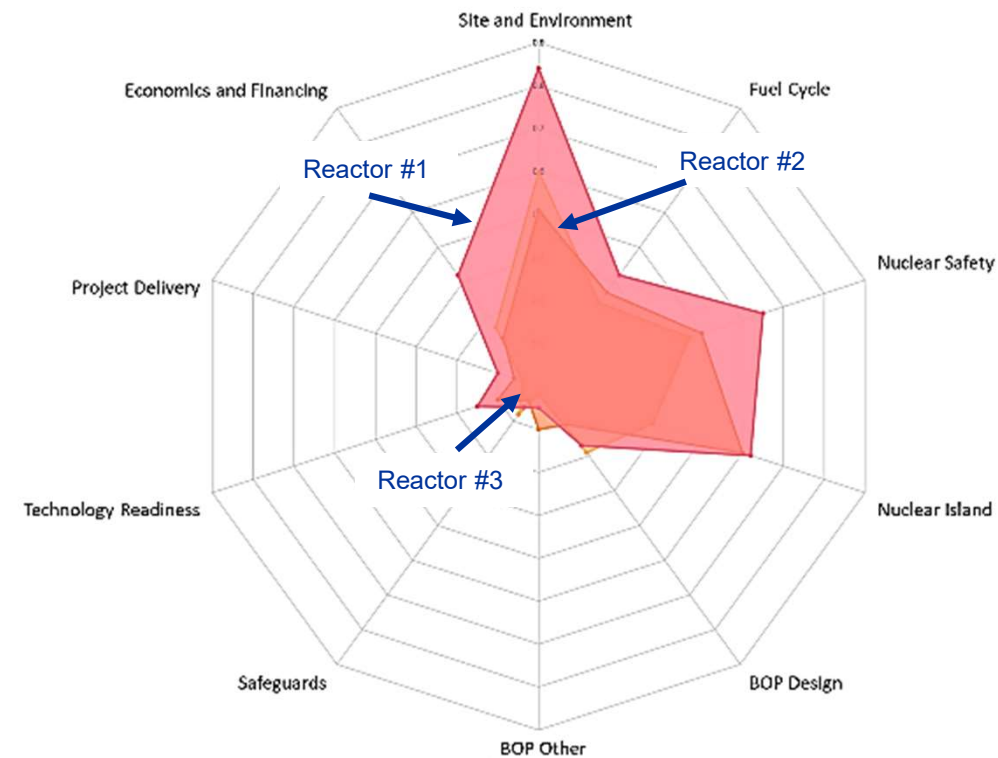
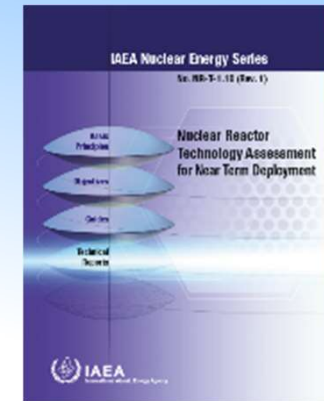


- **Technical subgroups**
  - **SG-1:** Update of SMR Technology Roadmap
  - **SG-2:** R&D, Codes & Standards and Preparation for Operation
  - **SG-3:** SMR Technology Deployment for Cogeneration

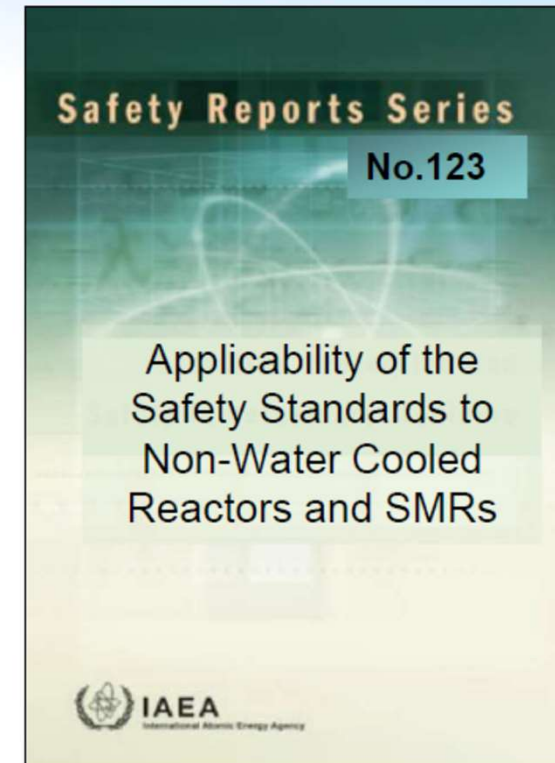
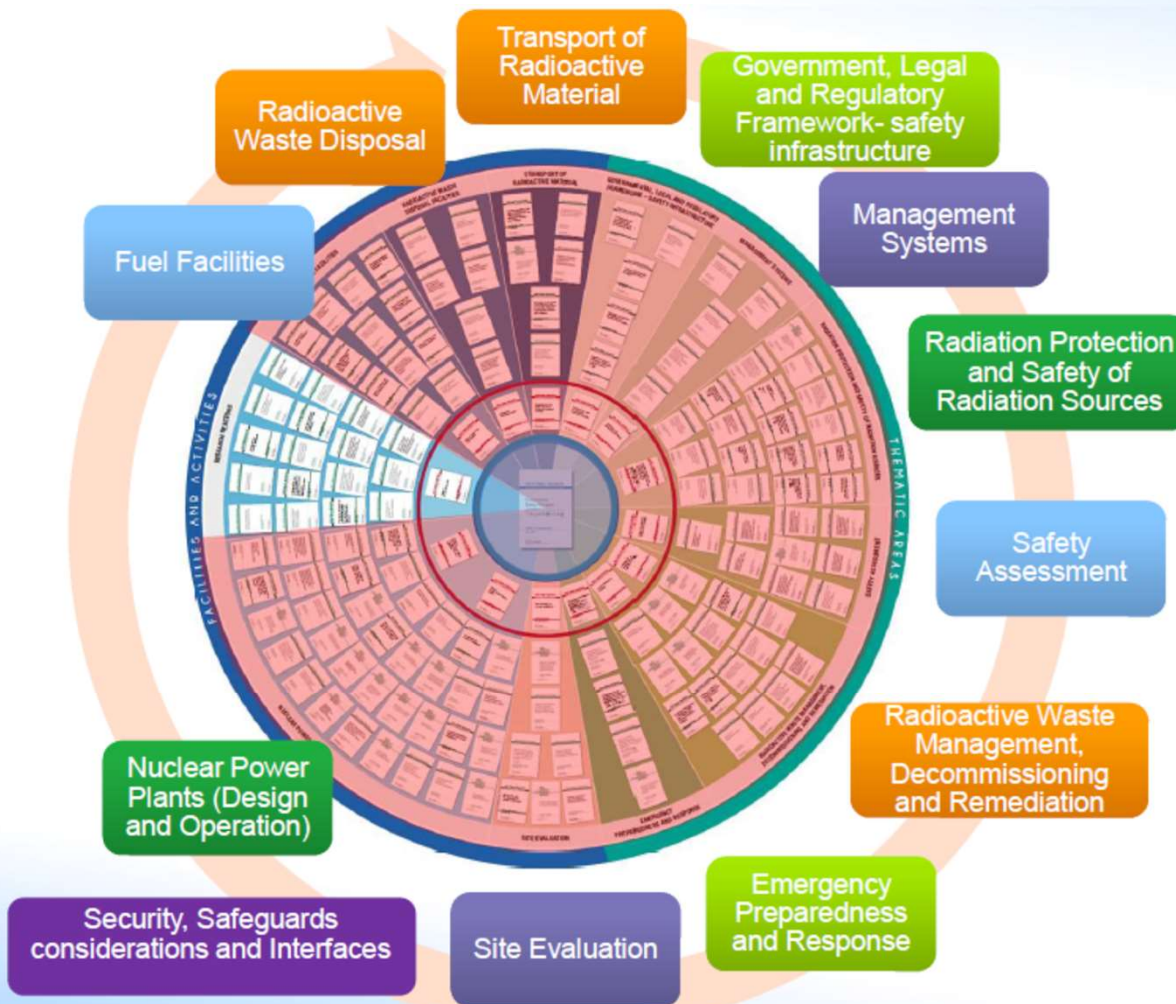


# Reactor Technology Assessment

- **Design selection process for the most suitable reactor technology** to meet the objectives of a Member State's nuclear power programme
- User defines its own **degree of importance** among different Key Elements of the decision
- **Self assessment tool** revised in 2022 after 10 years of practice by MSs



# Review and Adjustment of Safety Standards



[https://preprint.iaea.org/search.aspx?orig\\_q=RN:53077569](https://preprint.iaea.org/search.aspx?orig_q=RN:53077569)

# International Symposium on the Deployment of Floating Nuclear Power Plants – Benefits and Challenges



14-15 November 2023, Vienna International Centre



- Explore and discuss the feasibility of **FNPP deployment**: 1) in territorial waters — near and away from the shoreline, and 2) in international waters
- Examine **legal aspects** (safety, security, safeguards, liability) with a focus on legally binding instruments in place
- Examine challenges related to **licensing and regulation** in scenarios where FNPPs are constructed and commissioned in one country and then exported/transported to another country
- Discuss and propose **further actions** by the international community to facilitate the expanded safe, secure and sustainable use of FNPPs for peaceful applications

# Nuclear Harmonization and Standardization Initiative

Effective Global Deployment of  
Safe and Secure Advanced  
Nuclear Reactors



**H**armonization of  
Regulatory  
Approaches Track

- **WG1:** Framework for information exchange
- **WG2:** International pre-licensing regulatory reviews
- **WG3:** Leveraging other regulatory reviews

**IAEA as facilitator  
within and between the tracks**

**H**armonization  
and  
**S**tandardization of  
Industrial  
Approaches Track

- **TG1:** Harmonization of high-level user requirements
- **TG2:** Common Approaches to Codes and Standards
- **TG3:** Experimental Testing and Validation for Design and Safety Analysis Computer Codes
- **TG4:** Acceleration of nuclear infrastructure implementation for SMR

Regulators

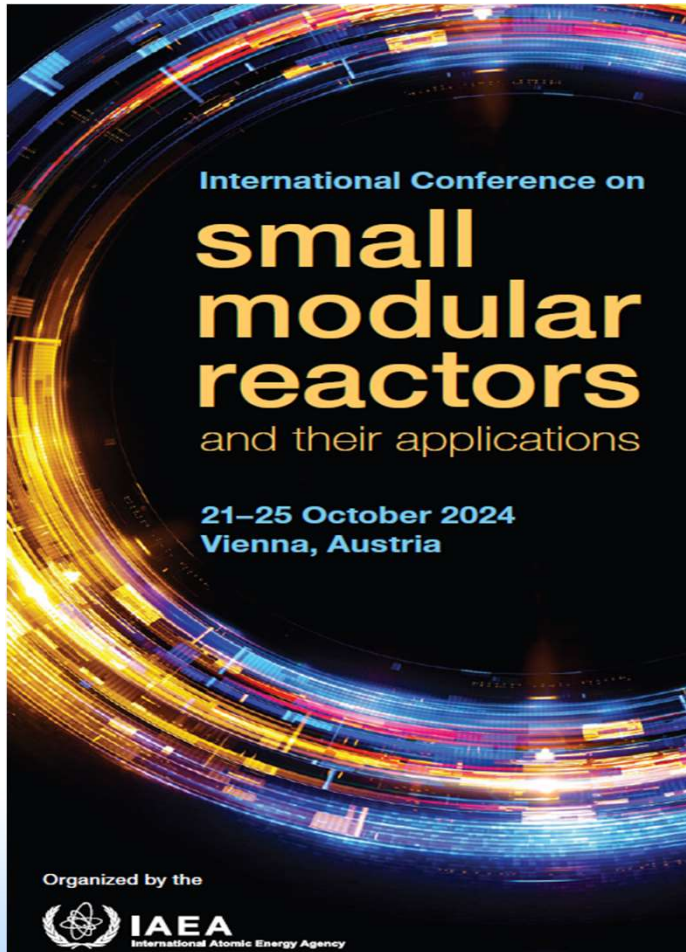
Governments

Technology Holders

Operators and other end-users

International Organisations and Associations

# SMR Conference



- To provide **an international forum** for relevant stakeholders to discuss opportunities, challenges and enabling conditions to accelerate the development of safe and secure SMRs
- **Plenaries, Side Events and Technical Sessions**
- **Main topics**
  - SMR Design, Technology and Fuel Cycle
  - Legislative and Regulatory Frameworks
  - Safety, Security and Safeguards
  - Considerations to Facilitate Deployment of SMRs

# Takeaway

- **Expanded role of nuclear** expected for energy security and climate change mitigation
- **Various SMR designs** at various stages with challenges to be addressed for deployment
- **Growing interests in SMRs in newcomer countries** mainly for lower upfront capital cost, scalability, and operation in small or off-the-grid
- **IAEA SMR Platform** provides coordinated support in all areas of SMRs



**IAEA**

International Atomic Energy Agency  
*Atoms for Peace and Development*

**Thank you!**

