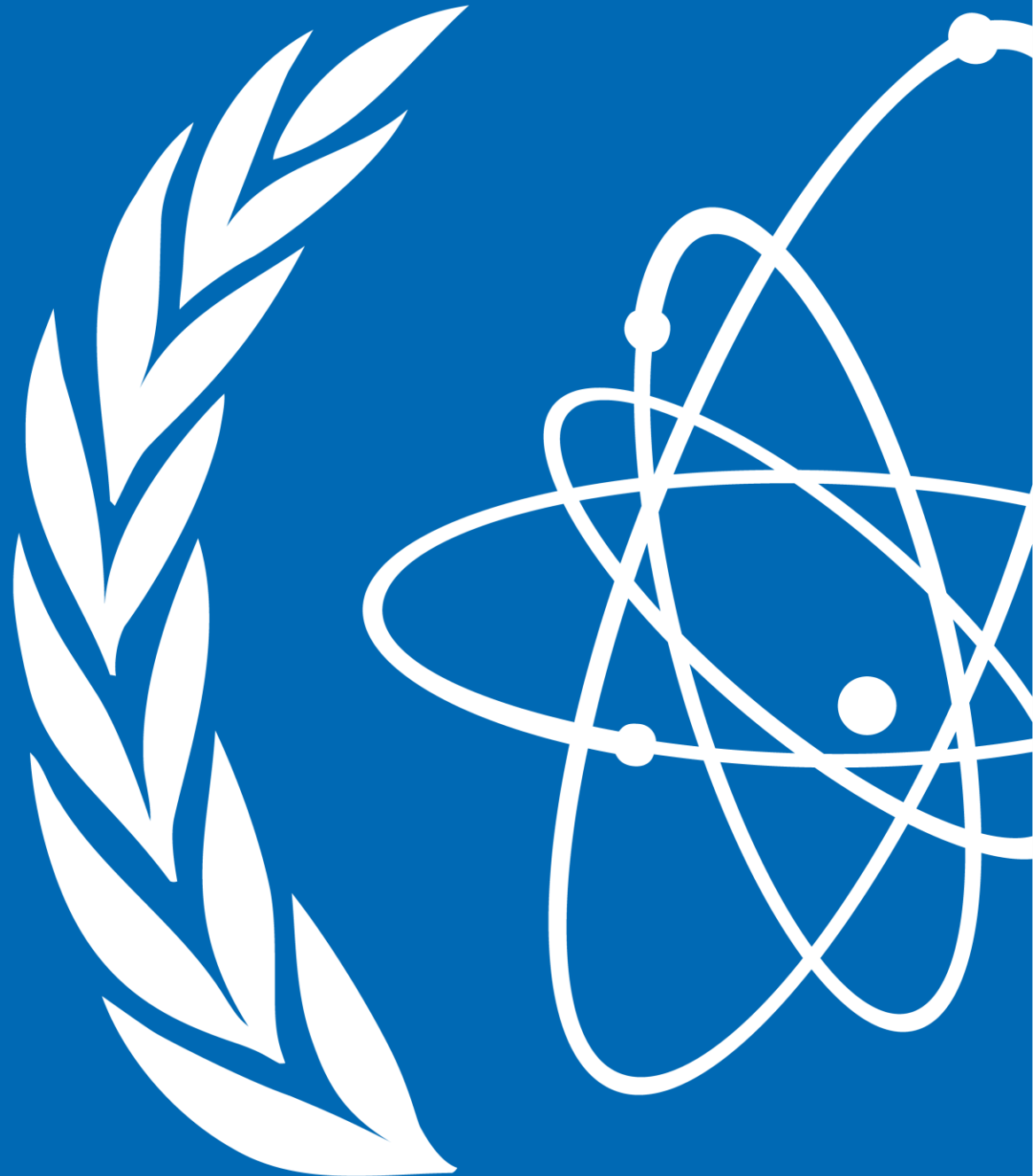


P2. Overview of the workshop & IAEA activities on the safety of SMR

Jorge LUIS HERNANDEZ
Team Lead Design Safety
Safety Assessment Section





OVERVIEW OF THE WORKSHOP



Meeting Objective

The purpose of the event is to **share knowledge and experiences of the safety benefits and challenges of small modular reactors** with the Asian Nuclear Safety Network's member countries. The event will provide participants with insights into licensing preparation and regulatory infrastructure by showcasing several real-world projects from the host country and other invited countries.

Furthermore, the event will serve as a forum for participants to exchange experiences with peers and experts, fostering discussions that enhance their understanding of current approaches to SMR deployment among member states of the ANSN and other Member States that have similar interest.

Day 1: Monday, 31 March 2025		Hybrid Meeting
OPENNING SESSION		
Time	Topic	Presenter
08:30~09:30	Registration, badging, online connection	All
09:30~09:50	Welcome and opening remarks	KINS/KHNP (Republic of Korea) Insuk Jang (IAEA)
09:50~10:10	P1. IAEA’s Support for Knowledge Networking	Insuk Jang (IAEA)
10:10~10:40	P2. Overview of the workshop & IAEA activities on the safety of SMR	Jorge Luis Hernandez (IAEA)
10:40~11:10	Coffee break / Group Photo	
PRESENTATION SESSION		
11:10~11:50	P3. Regulatory Approach for SMRs in Korea	Chanyi Song (KINS, Republic of Korea)
11:50~12:30	P4. Overall introduction to the SMR development in Korea	Sang Gyu Lim (iSMR DA, Republic of Korea)
12:30~14:00	Lunch break	
14:00~14:40	P5. Preparatory activities of the Czech regulatory body for SMR licensing	Michaela Ratajova (Czech republic)
14:40~15:20	P6. Regulatory Approach for the Deployment of SMRs in Romania	Madalina Terteci-Draghici (Romania)
15:20~15:40	Coffee break	
WORKING SESSION		
15:40~17:00	- Working Session 1 - Introduction to the Questionnaire - Completion of Questionnaire	4 working groups
17:00	Adjourn Day 1	
18:00~20:00	Reception (Conference Room)	

Day 2: Tuesday, 1 April 2025		Hybrid Meeting
PRESENTATION SESSION		
Time	Topic	Presenter
09:30~10:10	P1. The current status of i-SMR Standard Design Approval and its FOAK construction plan	Sang Hee Kang (KHNP , Republic of Korea)
10:10~10:50	P2. Introduction of i-SMR passive safety systems	Suk Ho Lee (KHNP, Republic of Korea)
10:50~11:10	Coffee break	
11:10~11:50	P3. Plans for deployment SMR in the Romania	Madalina Terteci-Draghici (Romania)
11:50~12:30	P4. Plans for deployment SMR in the Czech Republic	Michaela Ratajova (Czech republic)
12:30~14:00	Lunch break	
WORKING SESSION		
14:00~15:20	- Working Session 2 - Key safety aspects in the planning for the deployment SMR	4 working groups
15:20~15:30	Coffee break	
PRESENTATION SESSION		
15:30~16:00	P5. Safety consideration on the SMR Siting 1	Paolo Contri (IAEA)
16:00~16:30	P6. IAEA Safety standards for design safety	Jorge Luis Hernandez (IAEA)
16:30~17:00	P7. IAEA Safety standard (SSG-51) for MCR design and application to the SMR	Yun Goo Kim (IAEA)
17:00	Adjourn Day2	

Day 3: Wednesday, 2 April 2025

Hybrid Meeting

PRESENTATION SESSION

<i>Time</i>	<i>Topic</i>	<i>Presenter</i>
09:30~10:10	P1. Development of SMART 100	Han Ok Kang (KAERI, Republic of Korea)
10:10~10:50	P2. Licensing experiences on the standard design approval of SMART 100	Sungchu Song (KINS, Republic of Korea)
10:50~11:10	Coffee break	
11:10~11:50	P3. Safety consideration on the SMR Siting 2	Paolo Contri (IAEA)
11:50~12:30	P4. I&C Design Considerations for SMRs	Hee Taek Lim (KHNP, Republic of Korea)
12:30~14:00	Lunch break	
<i>Technical Tour</i> <i>SMR Simulator (KHNP)</i>		
17:00	Adjourn Day 3	

Day 4: Thursday, 3 April 2025

Hybrid Meeting

PRESENTATION SESSION

Time	Topic	Presenter
09:30~10:10	P1. KEPCO E&C's SMR BANDI	Sangwon Kim (KEPCO-ENC Republic of Korea)
10:10~10:50	P2. Development of SFR (SALUS 100) in Korea	Jewhan Lee (KAERI, Republic of Korea)
10:50~11:10	Coffee break	
11:10~11:50	P3. A. EMRC's Current nuclear regulation and possible challenges toward SMR B. Plans for the deployment of SMR	Osama Sharif Alatawneh Saja Rababah (Jordan)
11:50~12:30	P4. Development of Indonesia’s PeLUIt-40: Progress and Challenges.	Nina Widiawati (Indonesia)
12:30~14:00	Lunch break	
14:00~14:45	P5. Plans for the deployment of SMR	Michał Piotrowski (Poland)
14:45~15:30	P6. Plans for the deployment of SMR	Dustjon Baltabev, (Uzbekistan)
15:30~16:00	Coffee break	
WORKING SESSION		
16:00~17:00	- Working Session 3 - Key safety aspects in the planning for the licensing of SMR	4 working groups
17:30	Adjourn Day 4	

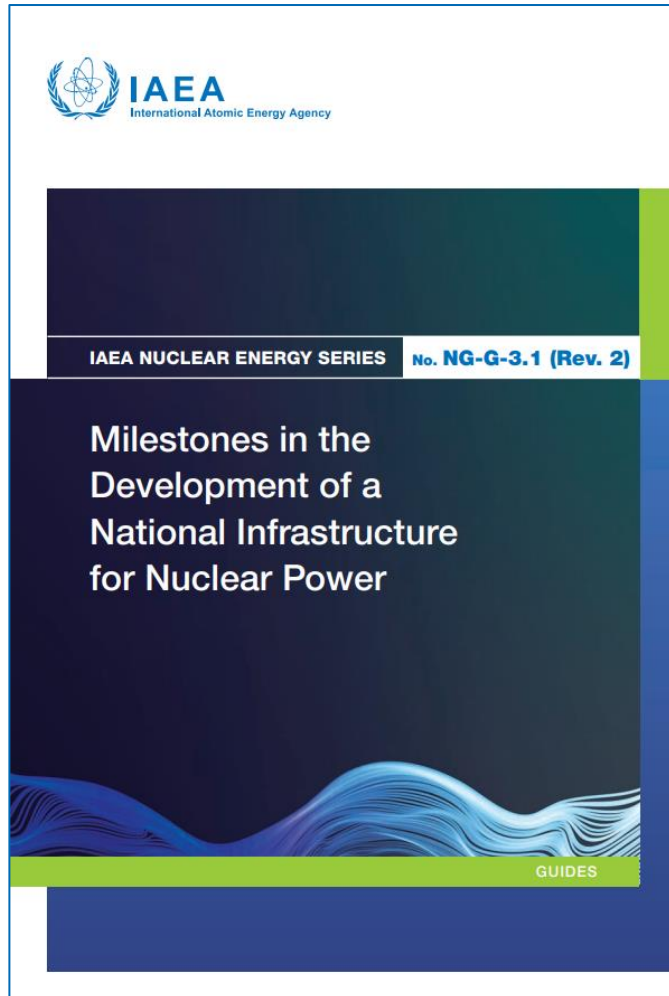
Day 5: Friday, 4 April 2025

Hybrid Meeting

WORKING SESSION

<i>Time</i>	<i>Topic</i>	<i>Presenter</i>
09:30~11:00	- Working Session 4 - Summary of Questionnaire and working sessions	4 working groups
11:00~11:20	Coffee break	
<i>CLOSING SESSION</i>		
11:20~11:50	Summary of the Workshop and Discussions on the ANSN future activities	In Suk Jang Jorge Luis Hernandez (IAEA)
11:50-12:00	Closing remarks	(IAEA, Rep of Korea)
12:00	End of Meeting	

BEFORE STARTING.....



The word 'safety' appears 243 times!

3.2. NUCLEAR SAFETY

Nuclear safety requires commitments by all elements of the government, owner/operator, regulatory body, nuclear technology and equipment suppliers and other organizations to ensure safety in all aspects of the nuclear power programme. Most of the actions described in this publication have some impact upon safety.

IAEA ORGANISATIONAL FRAMEWORK

Nuclear Energy

**Nuclear Sciences
and Applications**

**Nuclear Safety
and Security**

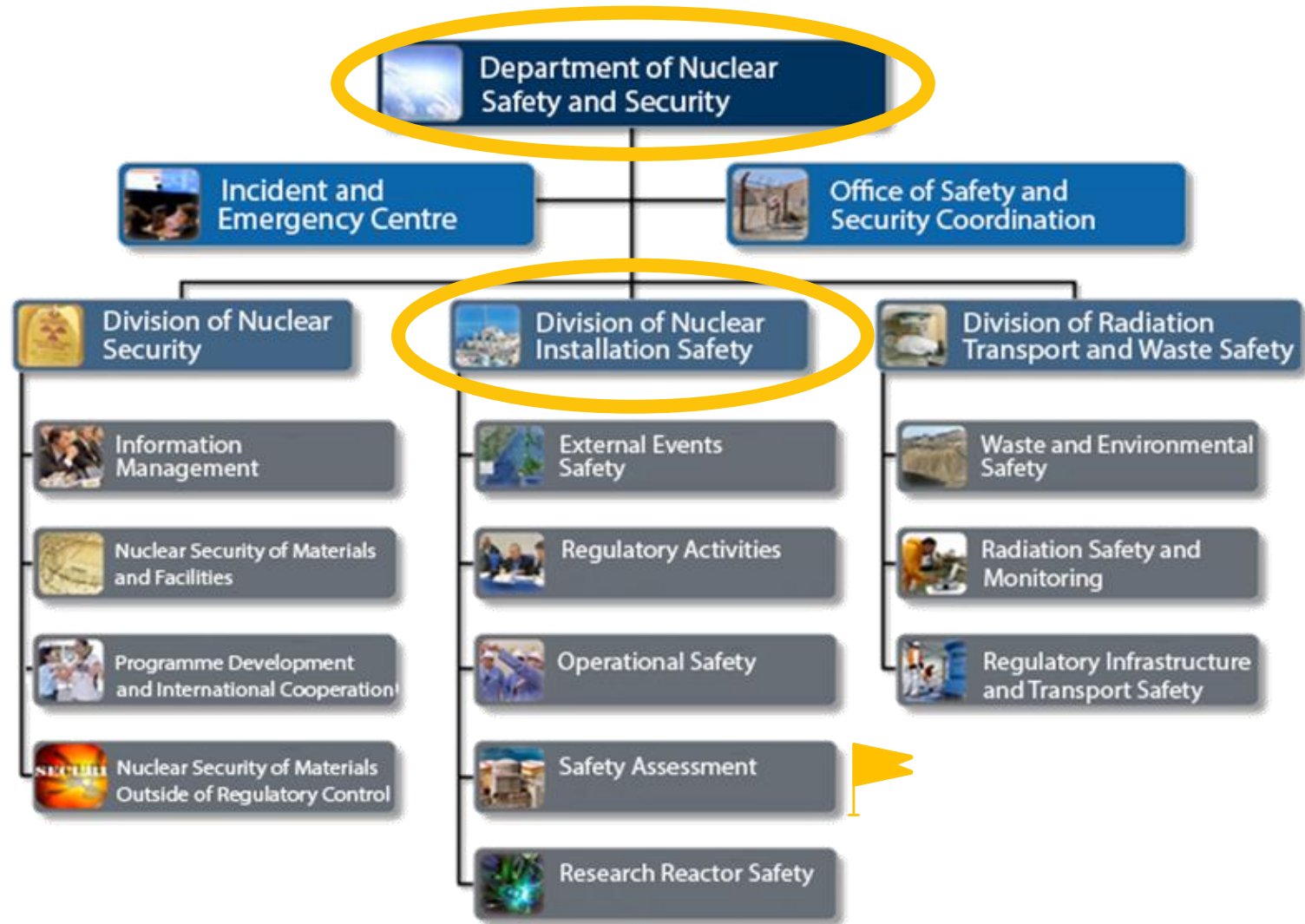
Safeguards

**Technical
Cooperation**

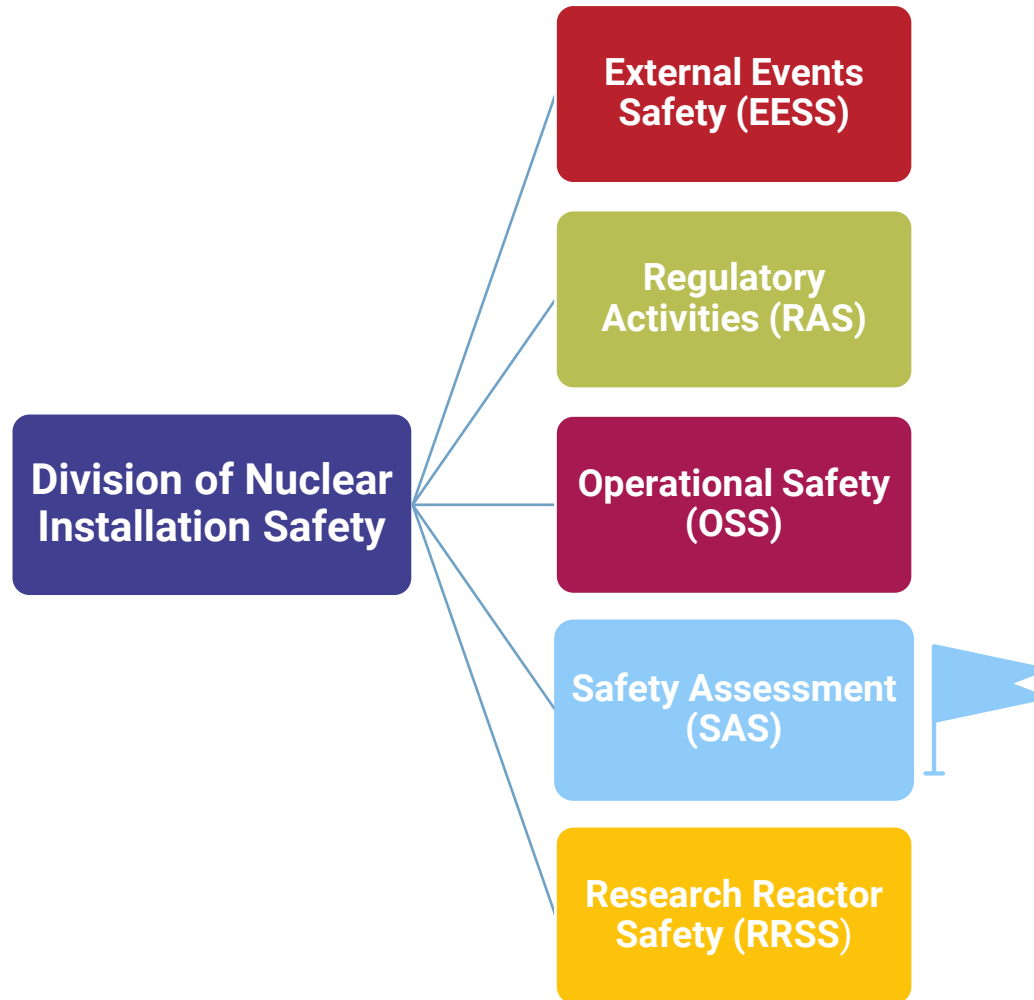
Management

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY (NS)

- The protection of people, society and the environment from the harmful effects of ionizing radiation is at the heart of the Department of Nuclear Safety and Security's work
- The Department supports Member States in their national efforts to further strengthen nuclear safety and nuclear security



DIVISION OF NUCLEAR INSTALLATION SAFETY (NSNI)

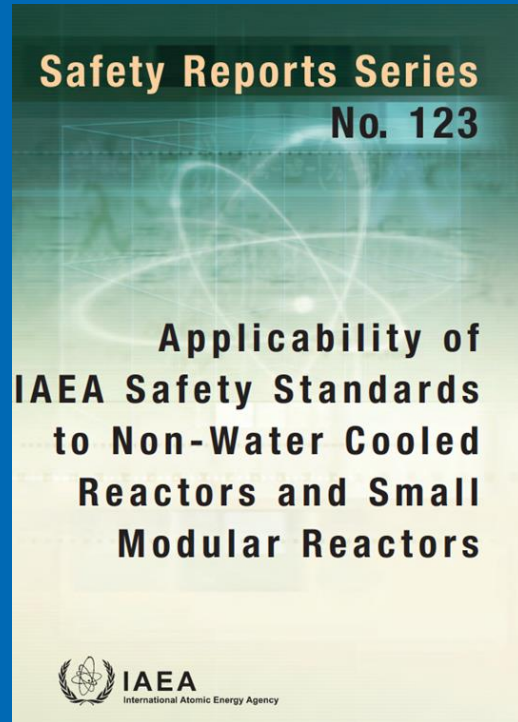


- Development of **safety standards** for nuclear installations
- Provision of **safety reviews and advisory services** to support the effective application of the safety standards
- Support to Member States in building and sustaining **capability and capacity** in nuclear safety



OUR PROGRAMME OF WORK

OUR PROGRAMME OF WORK



- New technical documents
- Compilation of inputs to future revision of relevant safety standards
- Enhancement of our training efforts
- Strengthen our Technical Safety Review services
- Plan our future work

Ensuring that we always respond to the needs of our Member States!

NEW SAFETY GUIDE IN DEVELOPMENT



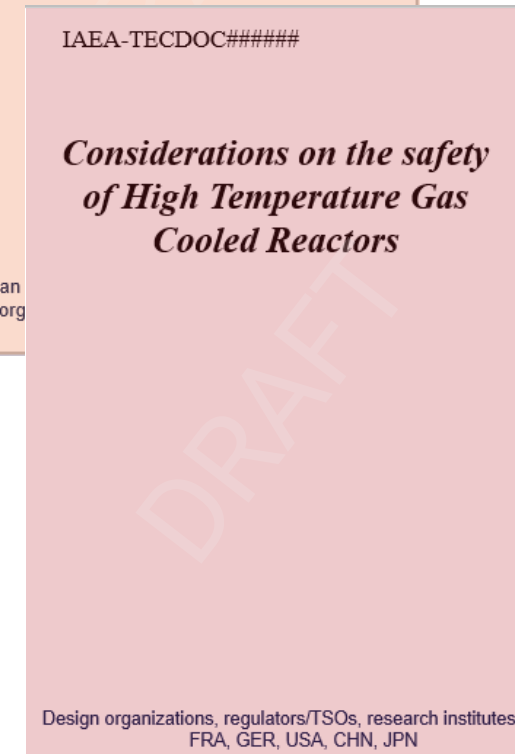
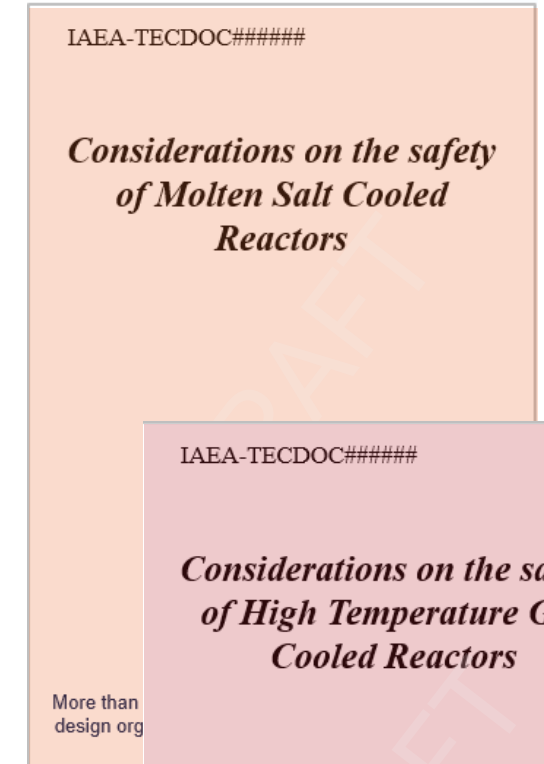
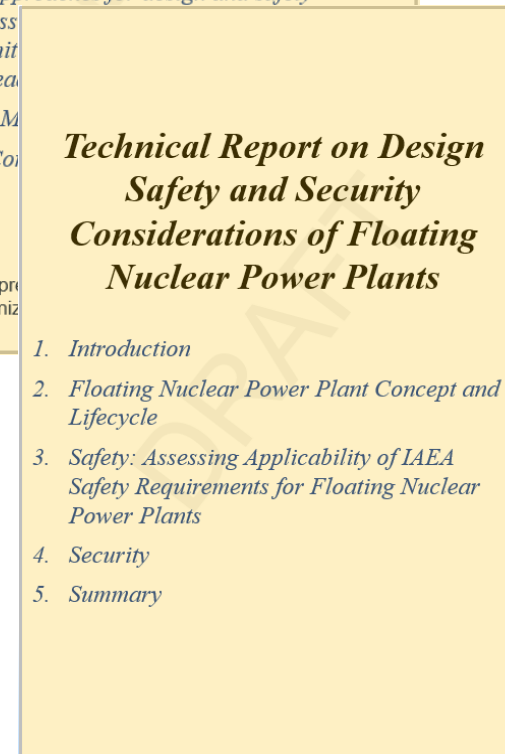
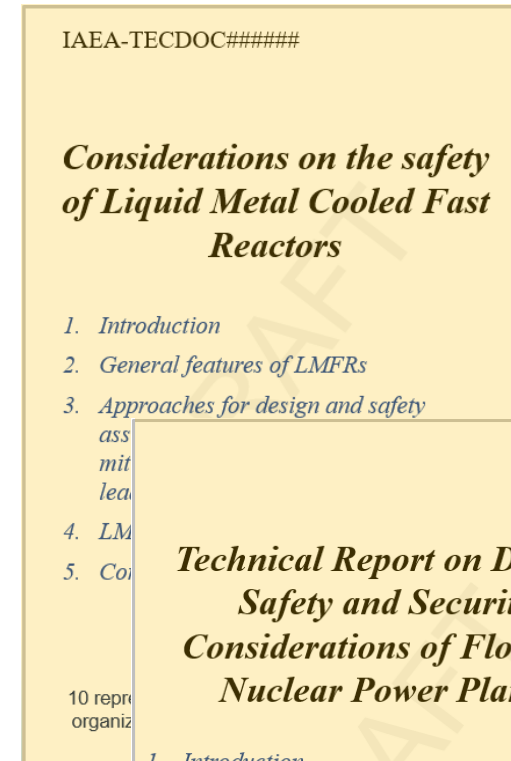
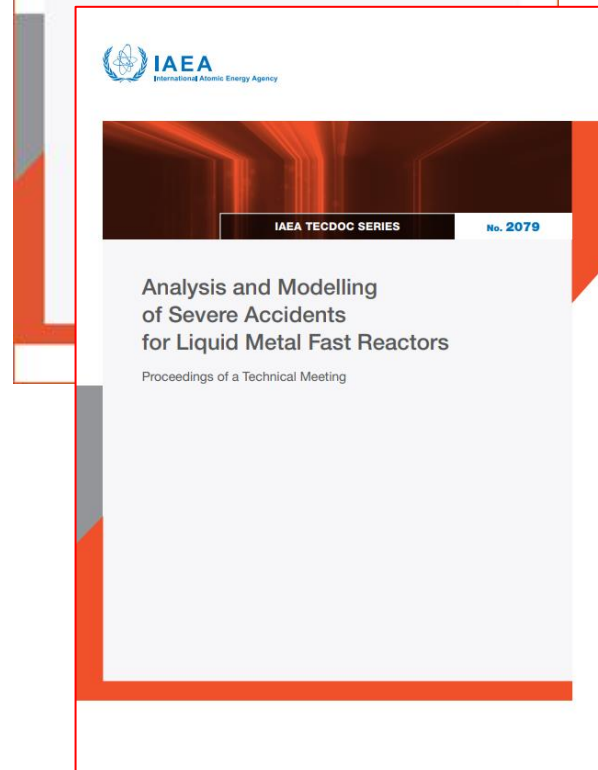
Why?

Because it's not enough to
state that a reactor is safe....

... it has to be demonstrated!

SAFETY OF ADVANCED TECHNOLOGIES

TECHNOLOGIES



SAFETY OF ADVANCED TECHNOLOGIES

...and more

CROSS CUTTING TOPICS

Design Safety
&
Safety
Assessment



IAEA Safety Report#####

*Safety Assessment for Small
Modular Reactors and Non-
Water-Cooled Reactors*

*Deterministic Safety Analysis for
Operational States and Accident
Conditions at Nuclear Power Plants*

(Rev. 1 of Safety Series Report No 23)

IAEA-TECDOC#####

*Safety Considerations in
Non-Water-Cooled Reactor
Core Design*

IAEA-TECDOC#####

*Demonstration of DiD
Implementation using
Deterministic and
Probabilistic Approaches*

IAEA-TECDOC#####

*Progress in the Performance
Assessment and Regulation
of Passive Safety Features in
Advanced Nuclear Power
Plant Designs*

IAEA-TECDOC#####

*Safety Implications of the
Use of Artificial Intelligence
in Nuclear Power Plants*

SAFETY OF ADVANCED TECHNOLOGIES

...and
more

2025 EVENTS



Technical Meeting on
Demonstration of DiD
Implementation Using
Probabilistic and Deterministic
Approaches for NPPs

2025

Mar 14-18

Technical Meeting on Progress
in the Performance
Assessment and Regulation of
Passive Safety Features in
Advanced NPPs Designs

2025

Mar 14-18

Joint IAEA-GIF Workshop
on the Safety of Non-Water
Cooled Reactors

2025

June 30-Jul 4

TM on the application of
Defence in Depth and
Practical Elimination

2025

Jul 15-18

Technical Meeting on Safety
Considerations in Non Water
Cooled Reactors Fuel and Core
Design

2025

Aug 25-29

TM on Deterministic Safety
Analysis for Operational
States and Accident
Conditions for NPPs

2025

Sept 30-Oct 3

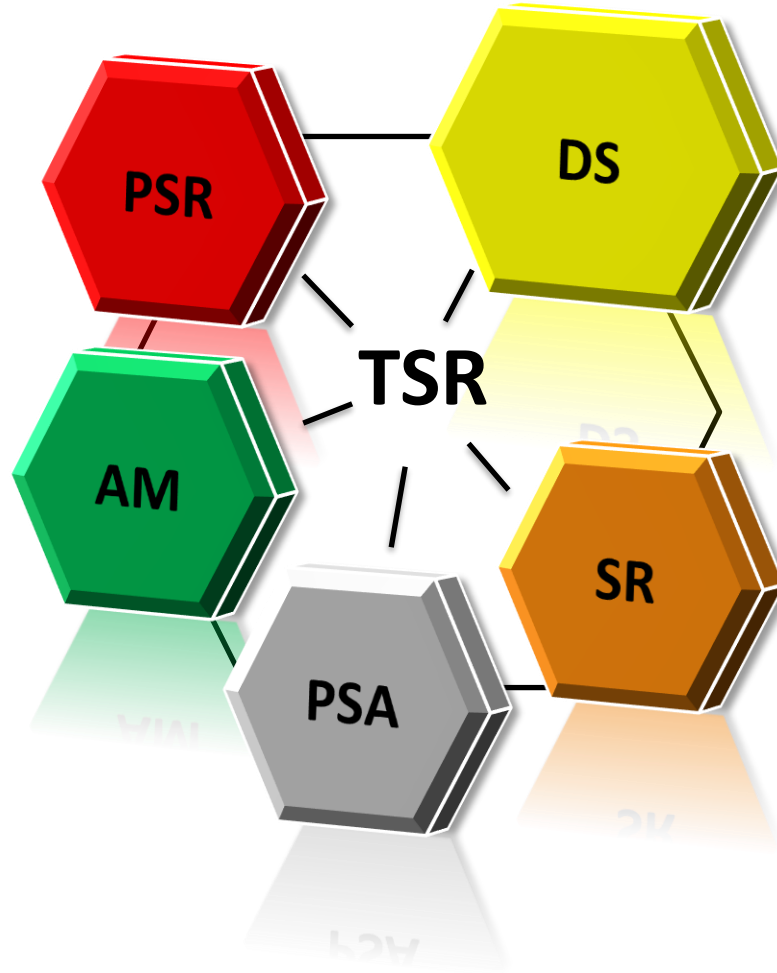


PEER REVIEWS

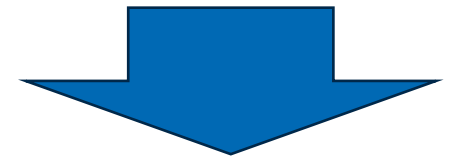
TECHNICAL SAFETY REVIEW (TSR)

IAEA's TSR Service:

- To address the needs of Member States at most stages of development and implementation of a nuclear power programme
- Encompasses safety reviews of the totality of the safety analysis report (SAR), or targeted aspects of the SAR
- Level of detail of the review is aligned with the needs of the Requesting Party

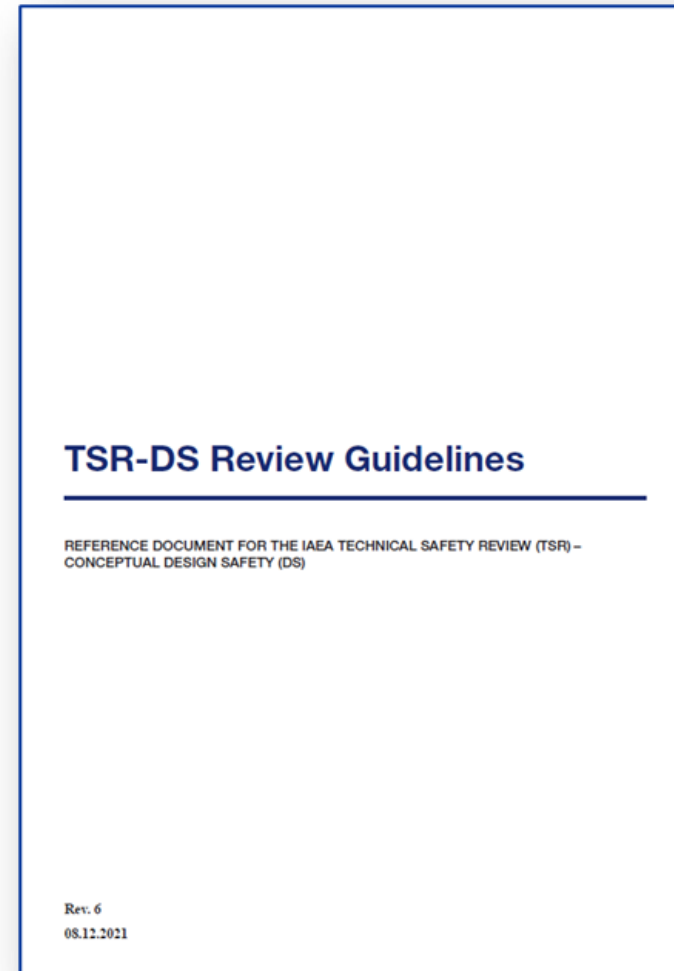
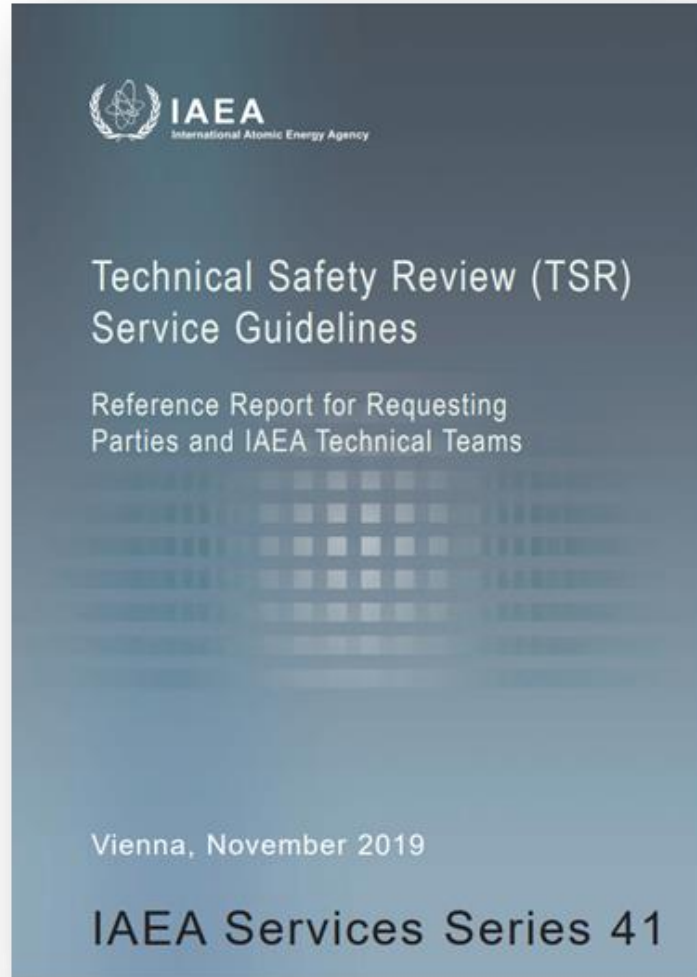


- Design Safety
- Accident Management
- Periodic Safety Review
- National Safety Requirements
- Probabilistic Safety Assessment



Reference: IAEA Safety Standards

TECHNICAL SAFETY REVIEW (TSR)



[Technical Safety Review \(TSR\) | IAEA](#)

TECHNICAL SAFETY REVIEW (TSR)

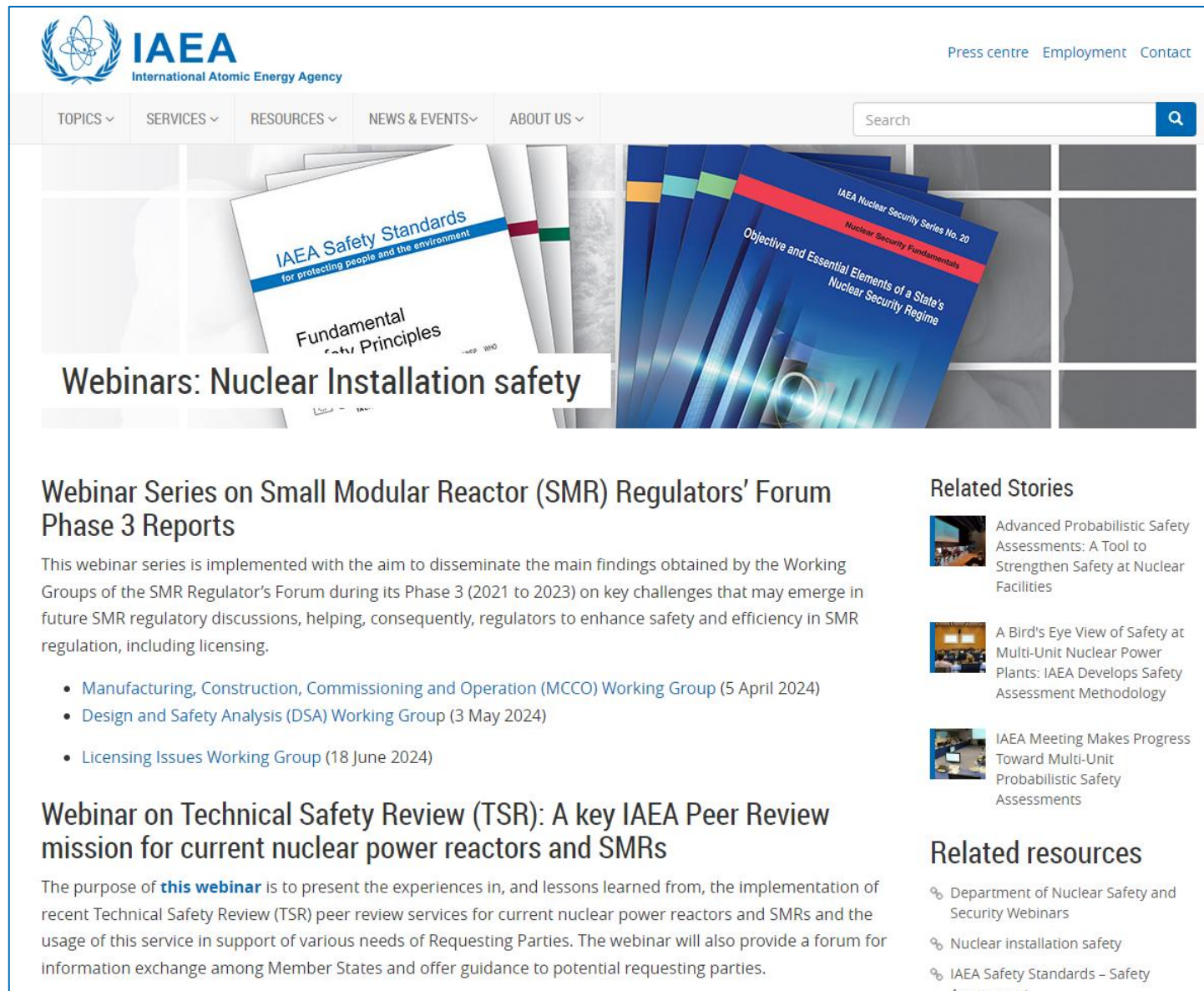




CAPACITY BUILDING

We organize workshops, training events and webinars to support regulators and operators to build their capabilities in design safety and safety assessment of nuclear power plants

[Webinars: Nuclear Installation safety | IAEA](#)



The screenshot displays the IAEA website's homepage. At the top, the IAEA logo and name are visible, along with navigation links for 'Press centre', 'Employment', and 'Contact'. Below the header is a navigation bar with dropdown menus for 'TOPICS', 'SERVICES', 'RESOURCES', 'NEWS & EVENTS', and 'ABOUT US'. A search bar is located on the right side of the navigation bar. The main banner features a stack of IAEA publications, including 'IAEA Safety Standards for protecting people and the environment' and 'Objective and Essential Elements of a State's Nuclear Security Regime'. Below the banner, the headline reads 'Webinars: Nuclear Installation safety'. The main content area includes a section for 'Webinar Series on Small Modular Reactor (SMR) Regulators' Forum Phase 3 Reports', which describes the webinar series' purpose and lists three working groups: Manufacturing, Construction, Commissioning and Operation (MCCO) Working Group (5 April 2024), Design and Safety Analysis (DSA) Working Group (3 May 2024), and Licensing Issues Working Group (18 June 2024). Below this is a section for 'Webinar on Technical Safety Review (TSR): A key IAEA Peer Review mission for current nuclear power reactors and SMRs', which describes the webinar's purpose and the information exchange among Member States. On the right side, there are two sections: 'Related Stories' with three articles and 'Related resources' with three links.

Webinars: Nuclear Installation safety

Webinar Series on Small Modular Reactor (SMR) Regulators' Forum Phase 3 Reports

This webinar series is implemented with the aim to disseminate the main findings obtained by the Working Groups of the SMR Regulator's Forum during its Phase 3 (2021 to 2023) on key challenges that may emerge in future SMR regulatory discussions, helping, consequently, regulators to enhance safety and efficiency in SMR regulation, including licensing.

- Manufacturing, Construction, Commissioning and Operation (MCCO) Working Group (5 April 2024)
- Design and Safety Analysis (DSA) Working Group (3 May 2024)
- Licensing Issues Working Group (18 June 2024)

Webinar on Technical Safety Review (TSR): A key IAEA Peer Review mission for current nuclear power reactors and SMRs

The purpose of [this webinar](#) is to present the experiences in, and lessons learned from, the implementation of recent Technical Safety Review (TSR) peer review services for current nuclear power reactors and SMRs and the usage of this service in support of various needs of Requesting Parties. The webinar will also provide a forum for information exchange among Member States and offer guidance to potential requesting parties.

Related Stories

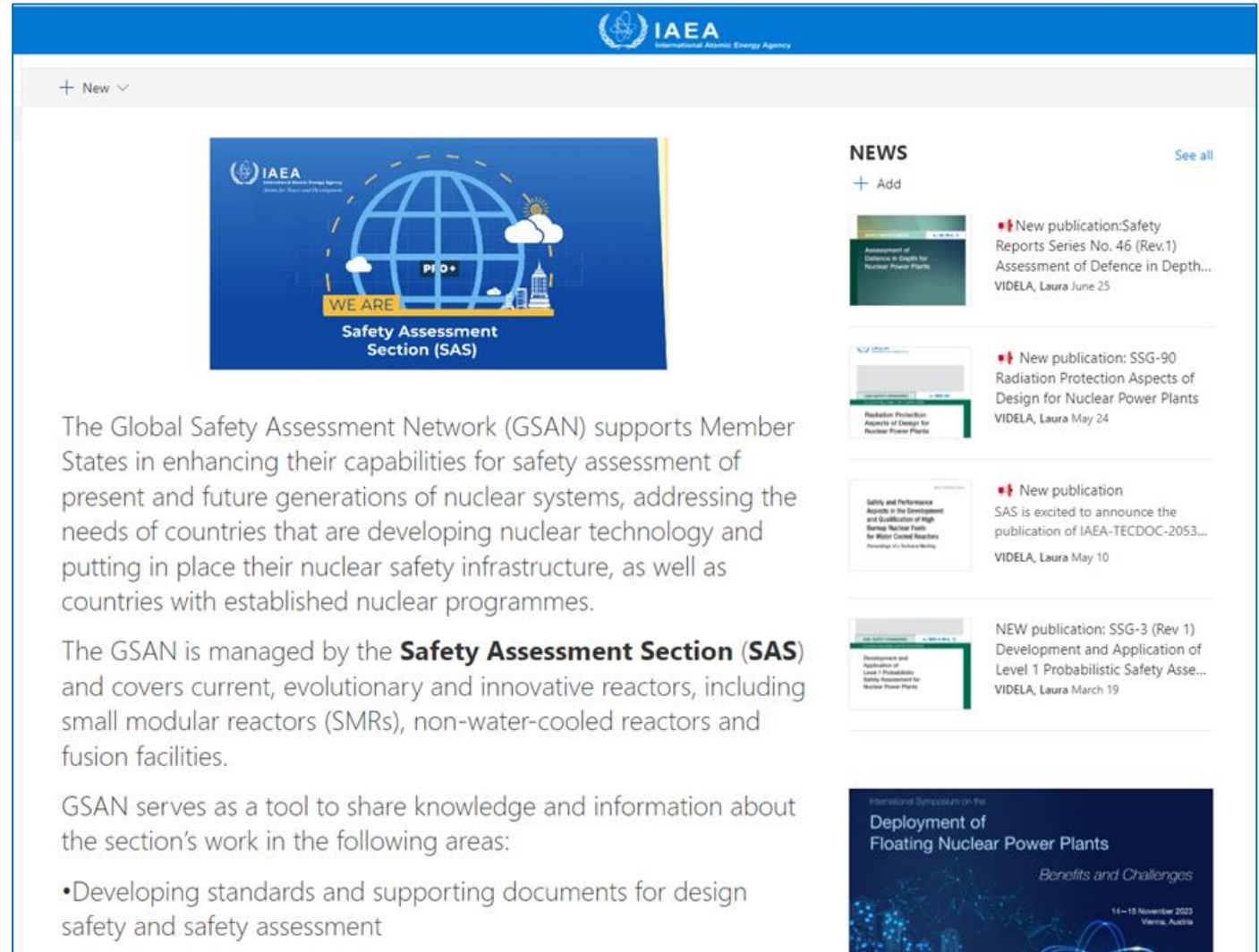
- Advanced Probabilistic Safety Assessments: A Tool to Strengthen Safety at Nuclear Facilities
- A Bird's Eye View of Safety at Multi-Unit Nuclear Power Plants: IAEA Develops Safety Assessment Methodology
- IAEA Meeting Makes Progress Toward Multi-Unit Probabilistic Safety Assessments

Related resources

- Department of Nuclear Safety and Security Webinars
- Nuclear installation safety
- IAEA Safety Standards – Safety Assessment

GLOBAL SAFETY ASSESSMENT NETWORK (GSAN)

[Welcome to the Global
Safety Assessment
Network - Home \(iaea.org\)](https://www.iaea.org/)



 **IAEA**
International Atomic Energy Agency
Safety and Security

WE ARE
Safety Assessment
Section (SAS)

The Global Safety Assessment Network (GSAN) supports Member States in enhancing their capabilities for safety assessment of present and future generations of nuclear systems, addressing the needs of countries that are developing nuclear technology and putting in place their nuclear safety infrastructure, as well as countries with established nuclear programmes.

The GSAN is managed by the **Safety Assessment Section (SAS)** and covers current, evolutionary and innovative reactors, including small modular reactors (SMRs), non-water-cooled reactors and fusion facilities.

GSAN serves as a tool to share knowledge and information about the section's work in the following areas:

- Developing standards and supporting documents for design safety and safety assessment

NEWS [See all](#)

+ Add

 **New publication: Safety Reports Series No. 46 (Rev.1) Assessment of Defence in Depth...**
VIDELA, Laura June 25

 **New publication: SSG-90 Radiation Protection Aspects of Design for Nuclear Power Plants**
VIDELA, Laura May 24

 **New publication**
SAS is excited to announce the publication of IAEA-TECDOC-2053...
VIDELA, Laura May 10

 **NEW publication: SSG-3 (Rev 1) Development and Application of Level 1 Probabilistic Safety Asse...**
VIDELA, Laura March 19


Deployment of Floating Nuclear Power Plants
Benefits and Challenges
14-18 November 2023
Vienna, Austria

NPP SAFETY ACADEMIES

Safety Assessment Academy

Week 1 Safety Assessment, DiD, safety classifications, system design

Week 2 Deterministic Safety Analysis

Week 3 Level 1 Probabilistic Safety Assessment

Week 4 Level 2 Probabilistic Safety Assessment

Introduction to IAEA safety standards requirements and recommendations relevant to SMRs

Module 1

Overview of technology aspects and safety considerations of WC-SMRs, HTGRs, SFRs, LFRs, MSR. Each technology type has a dedicated module.

Module 2-6

Participants will work in groups and address questions on Modules 1-6.

In-class work

SMR Safety Academy

PHASE 1: SMR SAFETY ACADEMY

Introduction to IAEA safety standards requirements and recommendations relevant to SMRs

Module 1

Overview of technology aspects and safety considerations of WC-SMRs, HTGRs, SFRs, LFRs, MSR.
Each technology type has a dedicated module.

Module 2-6

Participants will work in groups and address questions on Modules 1-6.

In-class work

PHASE 2: SMR SAFETY & REGULATION ACADEMY

Week 1: Technology Safety

Improve participants practical knowledge on advanced reactor (inc. SMRs) safety characteristics and challenges

Week 2: Design Safety Reviews

Improve participants practical knowledge on how to conduct design safety reviews of advanced reactors (inc. SMRs)

Week 3: Advanced Module: improve participants' practical knowledge on advanced licensing challenges for SMRs based on the SMR Regulators' Forum's work and common positions

WORKING WITH TC



Interregional Workshop
on Design Safety of
SMRs, Chengdu,
October 2023



Interregional Training Course
on Safety Aspects of SMRs
and other Advanced Reactor
Technologies, Vienna,
February 2024



Interregional Training Course
on Applicability of IAEA
Safety Standards to SMRs,
Lowell, October 2023

Interregional Training
Course on Safety of SMRs
St Petersburg,
October 2023



Interregional Workshop on 3S by design in SMRs,
Idaho National Laboratory, September 2023

Interregional Workshop on
Safety Analysis for SMRs,
Ottawa, October 2023



NHSI Regulatory Track Phase I Products (2022-24)

Publication of three Technical Documents expected in 2025

WG-1: Information Sharing Framework for Regulatory Reviews of Advanced Reactors

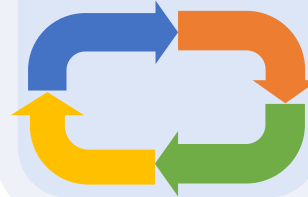
Contributing to the implementation of the NHSI Regulatory Track goals by supporting the establishment of a framework that will enable the sharing of information among regulators during pre-licensing and licensing reviews of advanced reactors.

Specifically, it describes the information that needs to be shared, potential impediments to the information sharing, and presents possible solutions to overcome these impediments.



WG-2: Multinational Pre-Licensing Joint Regulatory Review

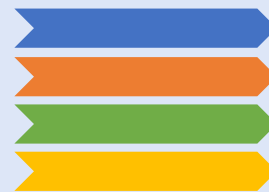
Joint Review



Describes a joint review process and provides guidance on the recommended technical topics and expectations of such a review for those aspects of an SMR or advanced reactor design that can be treated generically.

WG-3: Collaborative Reviews and Effective Leveraging

Collaborative Review



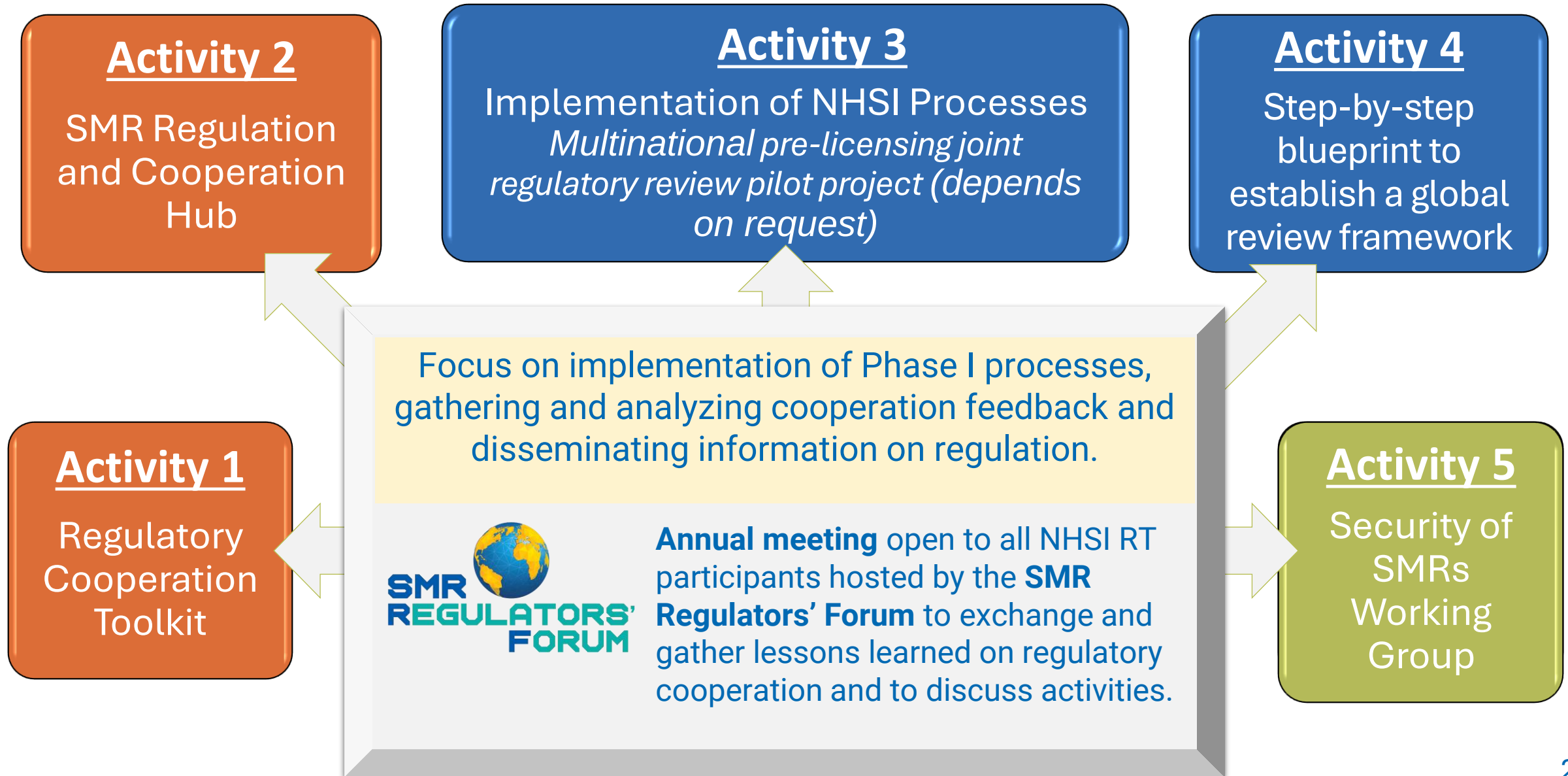
Describes possible approaches to collaboration between regulators from different Member States during pre-licensing and licensing reviews of advanced reactor designs (especially SMRs).

A particular focus is on:

- ❖ **Collaborative review:** How regulators can cooperate when reviewing a design, in parallel, against their national frameworks.
- ❖ **Leveraging review:** How to leverage pre-licensing and licensing reviews already completed by regulators in other Member States.

Leveraging Review

NHSI RT Phase II Activities (2025-end 2026)



The SMR Regulators Forum



The SMR RF Topics by Phases of Work

Phase 1 (2015 – 2017)

- Graded Approach
- Defence-in-Depth
- EPZ Size

Phase 2 (2018 – 2020)

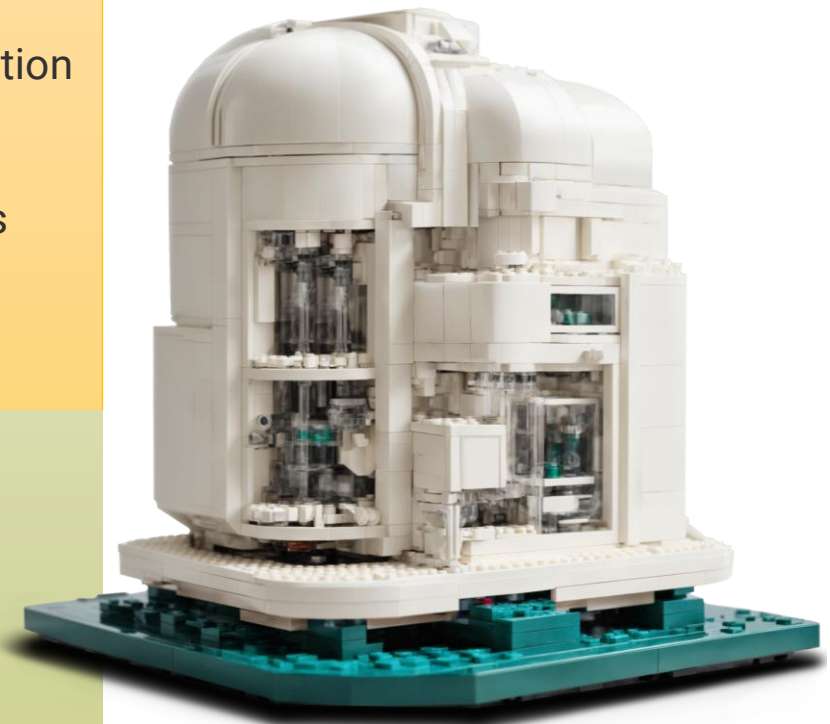
- Licensing Issues
- Design and Safety Analysis
- Manufacturing, Commissioning and Operation

Phase 3 (2021 – 2023)

- Mutual recognition of regulators' assessments/Joint assessments/Collaboration
- Safety, Security and Safeguards from a regulatory perspective
- Containment/confinement
- Regulatory considerations in pre-licensing engagement for long-lead requests and items
- Conduct of authorised activities: Impact on stakeholders' organisational capabilities

Phase 4 (2024 – 2026) – current phase

- Leveraging other regulators' reviews (NHISI WG3)
- Mechanistic source term (DSA)
- Continuation of 3S topics (DSA)
- Manufacturing and deployment in the absence of a licensee (MCCO)
- Construction oversight (MCCO)
- Organizational capability of a new licensee (no prior nuclear experience) (MCCO)



SMR RF Phase 4 Progress

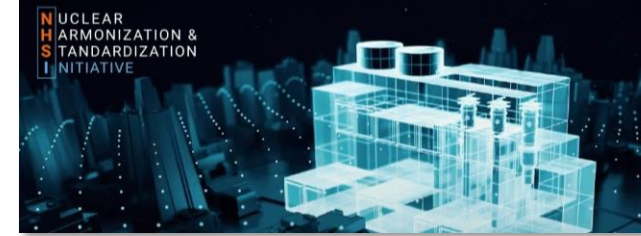
DSA WG

- Continuation of 3S topics just started focusing on remote locations
- Mechanistic source term work advanced, questionnaire responses received, the common positions include consideration of:
 - Scenario Identification
 - Phenomena Identification and Ranking
 - Source Term Calculation – Code Qualification
 - Sensitivity and Uncertainty Analysis
 - Existing IAEA Guidance

MCCO WG

- Manufacturing and deployment in the absence of a Licensee, examples of topics under consideration:
 - Codes and standards
 - Standardization of supply chain
 - Manufacturing in the absence of licensee
 - Fleet Approach
 - Need for third party accredited oversight bodies
 - Maintenance once on the shelf
- Construction oversight
 - Focus on how licensee will reconcile quality documents that were produced without their involvement
 - Innovative construction techniques
 - Licensee capability to oversee main contractor and rest of the supply chain
- Organisational capability of a new licensee (no prior nuclear experience)
 - Definition of capability and how it is assessed
 - Safety Culture
 - Shared services model and intelligent customer
 - Vendor organisation's capability

SMR RF and NHSI Partnership



Expected Outputs

- ❖ Proven practical guidelines and tools for using leveraging approaches and for drafting regulatory reviews that can be more easily leveraged.
- ❖ Proven approaches to reach regulatory equivalency, focusing on areas of regulatory difference with examples of application.

The toolkit is not a publication, specific tools and examples will be available electronically complementing the publications developed in NHSI phase I.

Benefits

- ❖ Increase global regulatory efficiency and consistency by rapid implementation of leveraging processes.
- ❖ Regulatory review reports that are more widely used and understood by regulatory bodies in different Member States.
- ❖ Regulatory bodies can accept alternative approaches used in other Member States.

Delivery Plan

- ❖ **End of 2024:** Scope, workplan and identification of application examples.
- ❖ **Q2 2026:** Development of guidelines and tools based on application examples.
- ❖ **Q3 2026:** Review and finalization of the work.

SMR RF Educational Workshops



The Australia Workshop (Source: IAEA)

Region	Host	Dates
West Asia/ Africa	Jordan	December 2021
Asia-Pacific	Australia	November 2022
Latin America	Argentina	December 2022
Africa	Morocco	October 2023
Europe	Czechia	December 2023
Latin America	Brazil	October 2024
Asia	India	December 2024
Africa	South Africa	June 2025



The Argentina Workshop (Source: ARN)



The Morocco Workshop (Source: AMSSNuR)



The Czechia Workshop (Source: IAEA)



The Brazil Workshop (Source: CNEN)



IAEA

THANK YOU