

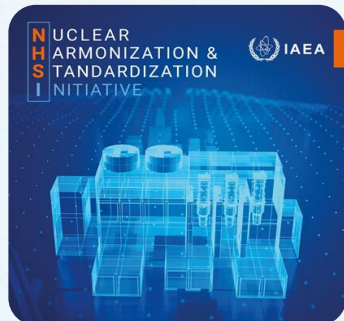
The Nuclear Harmonization and Standardization Initiative (NHSI)

Andrew R. Cartas

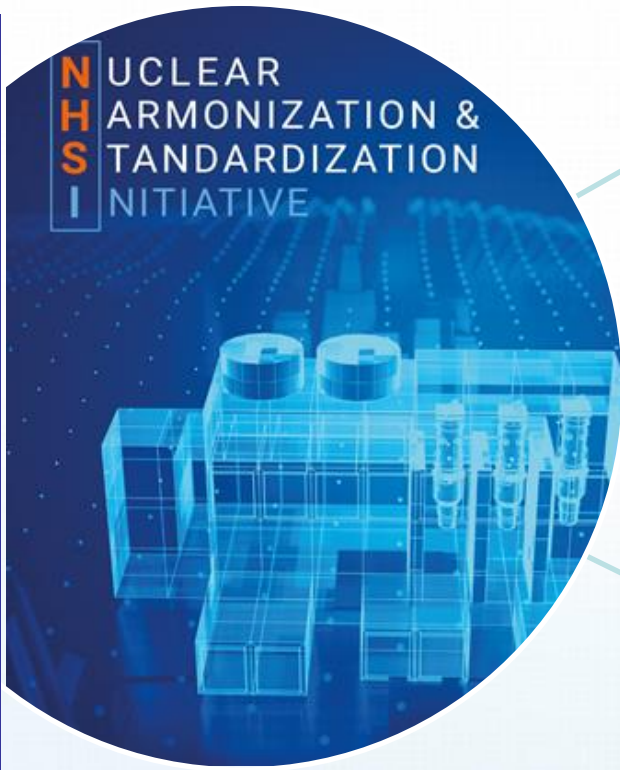
Nuclear Power and Technology Development Section

Department of Nuclear Energy

31st October 2023



Effective Global Deployment of
Safe and Secure Advanced
Nuclear Reactors



Harmonization
of **R**egulatory
Approaches
Track

- **WG1:** Framework for information sharing
- **WG2:** Towards harmonization - multinational pre-licensing review process
- **WG3:** Two processes increasing cooperation – building on current initiatives

Regulators

Governments

IAEA as facilitator

within and between the tracks

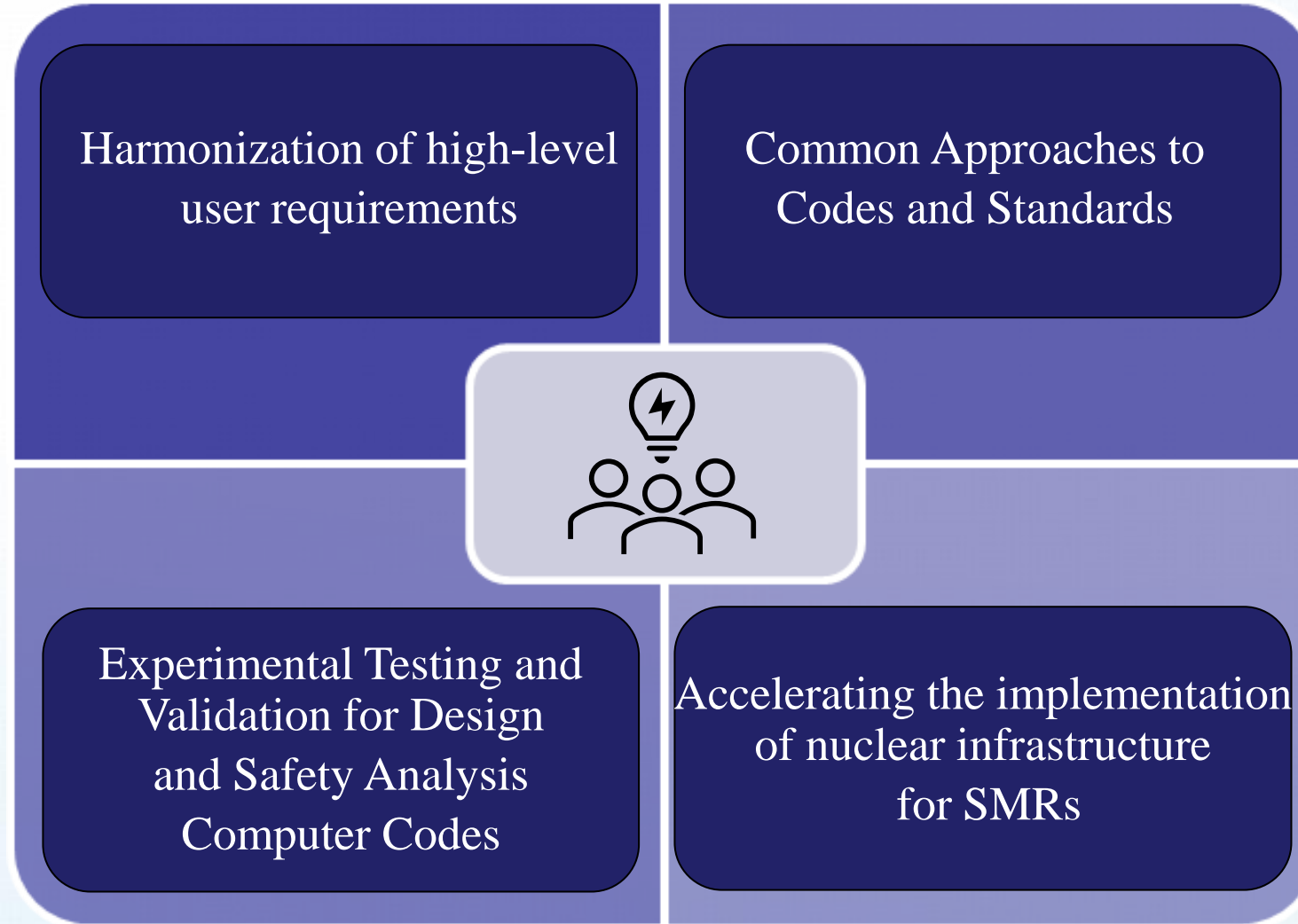
Harmonization
and
Standardization
of **I**ndustrial
Approaches
Track

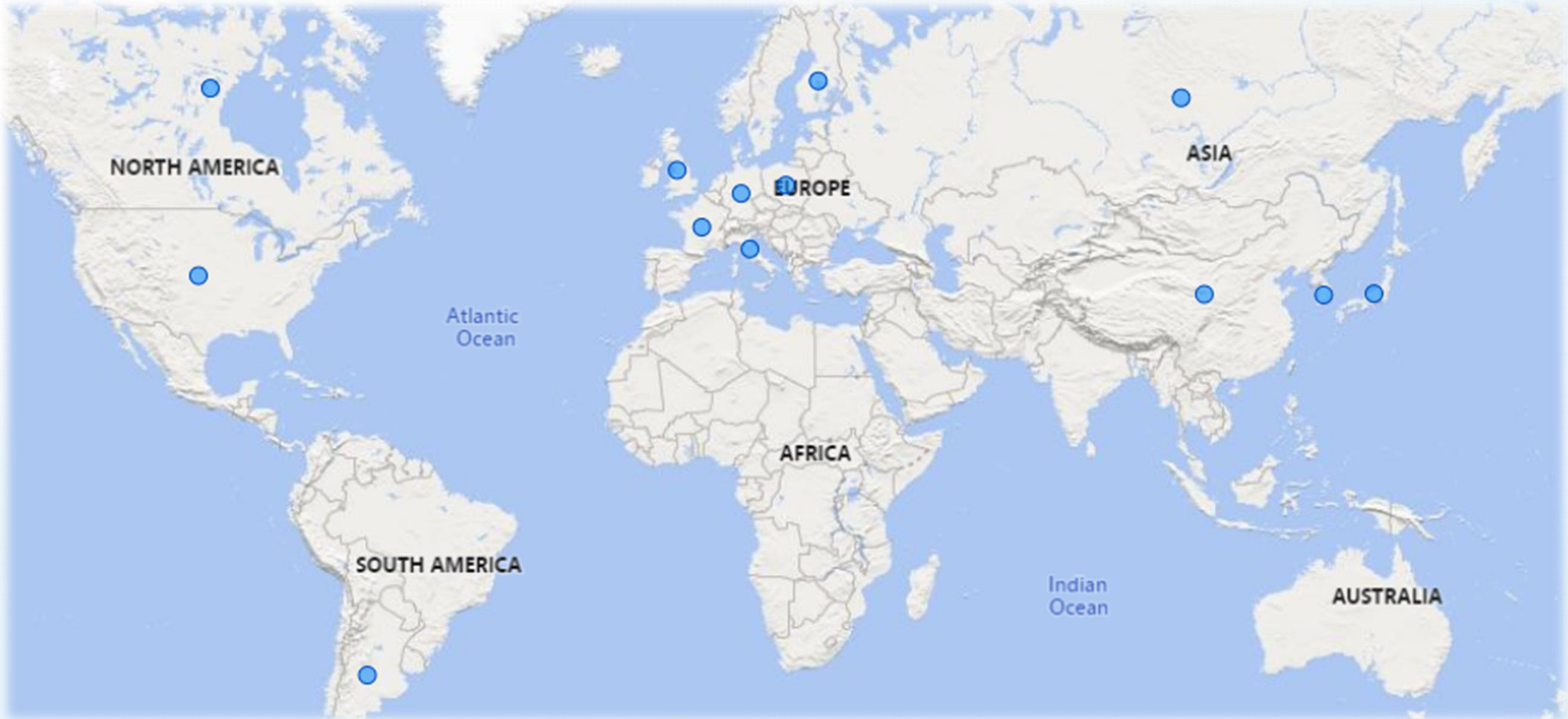
- **Topic 1:** Harmonization of high-level user requirements
- **Topic 2:** Common Approaches to Codes and Standards
- **Topic 3:** Experimental Testing and Validation for Design and Safety Analysis Computer Codes
- **Topic 4:** Accelerating the implementation of nuclear infrastructure for SMRs

Technology Holders

Operators and other end-users

International Organizations and Associations



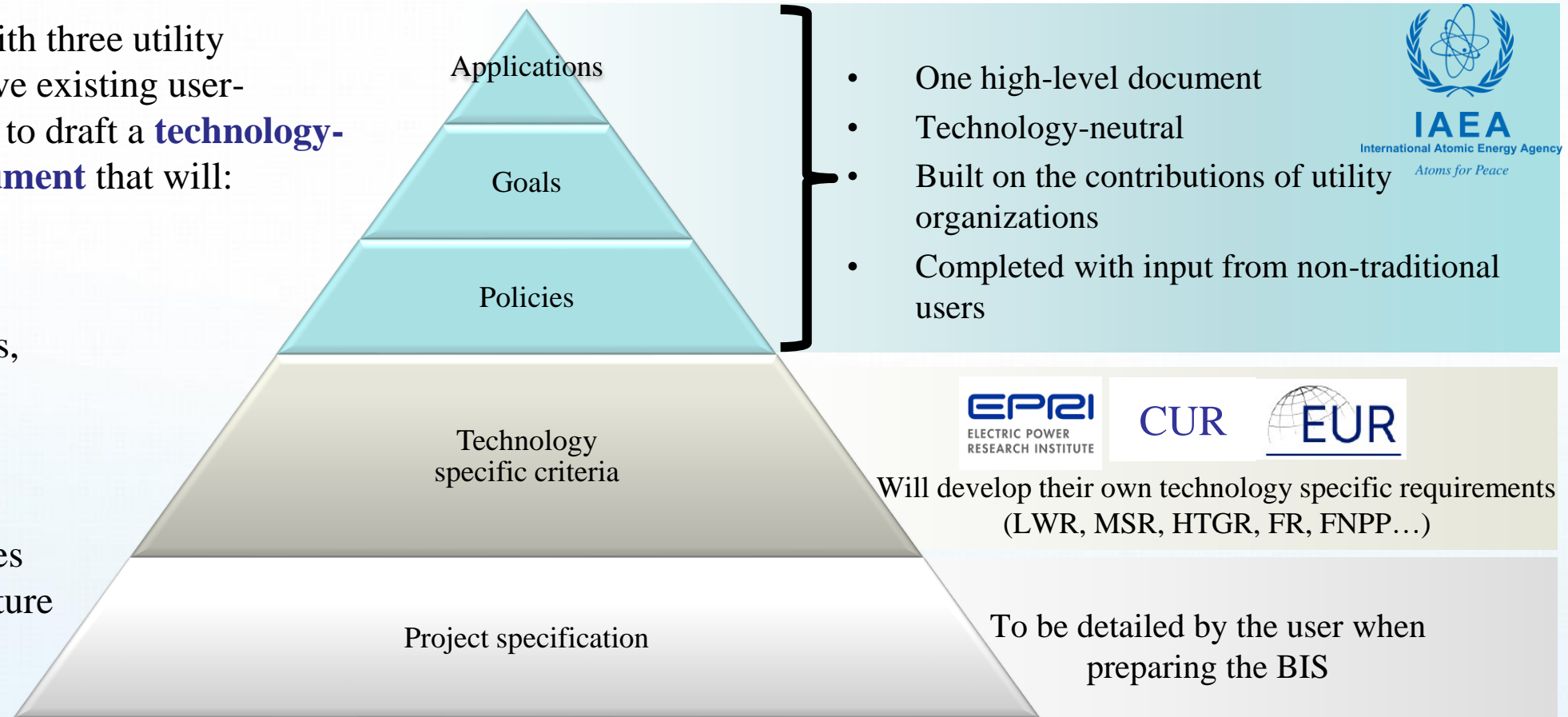


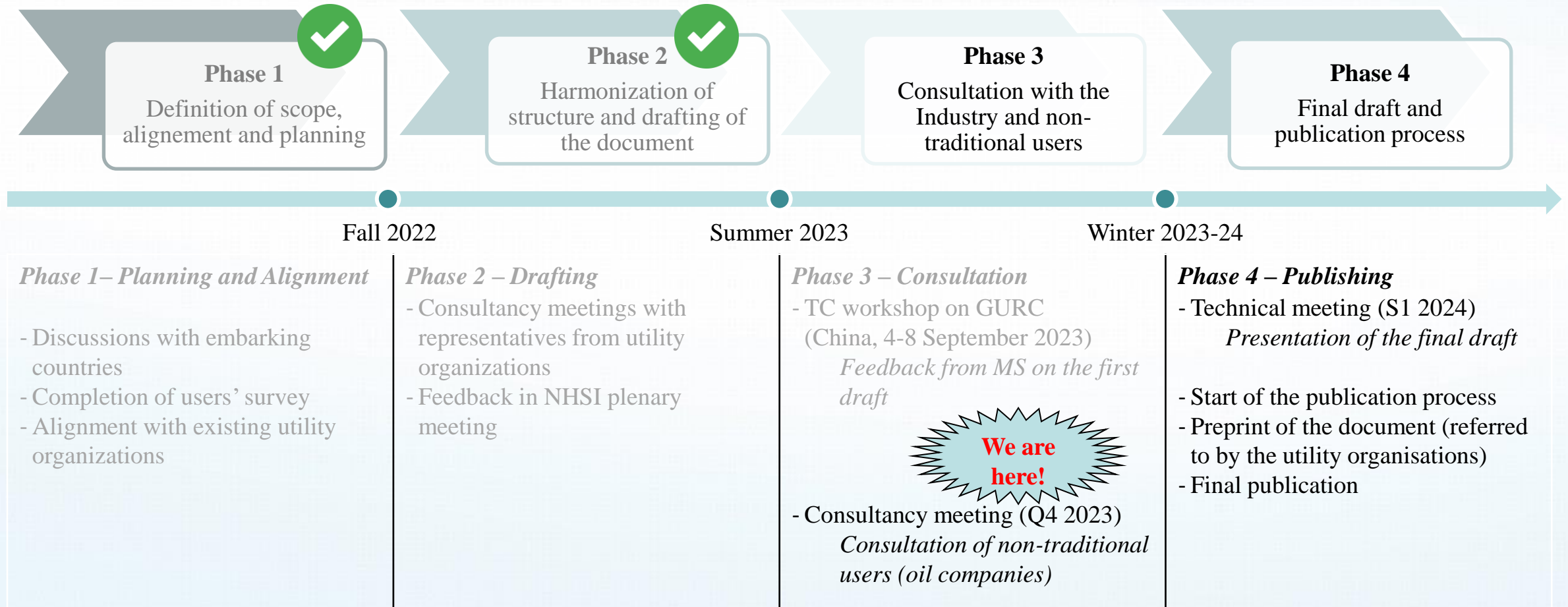
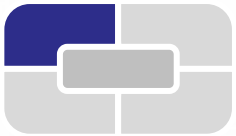
Topic 1 - Harmonisation of high-level user requirements



The IAEA is working with three utility organizations, which have existing user-requirements document, to draft a **technology-neutral high-level document** that will:

- be a **reference** when detailing technology specific requirements,
- help embarking and expanding countries **structure** their BIS,
- help regulatory bodies **understand** what future licensees expect.





We are here!

Topic 2 - Common Approaches on Codes and Standards

Mission & Vision with approaches on C&S:

- **Identify** similarities and differences
- **Understand** why they exist
- **Share** information on the findings
- **Develop** common approaches
- **Harmonize** where possible

25 companies from 12 Member States
WNA as a strategic partner



NHSI Topic 2 Scope

I. Codes & Standards

- A. QUALITY AND MANAGEMENT SYSTEM STANDARDS USED WIDELY IN THE MEMBER STATES (APPLICABLE TO SMRS)
- B. ENGINEERING STANDARDS FOR THE DESIGN AND CONSTRUCTION OF SMRS (WNA LEAD)
- C. EQUIPMENT QUALIFICATION STANDARDS FOR NUCLEAR (SMRS) FACILITIES
- D. C&S USED IN VARIOUS SMRS (AND THEIR PROJECTS)
- E. C&S FOR ADVANCE MANUFACTURING TO BE USED FOR SMRS (AND THEIR PROJECTS)

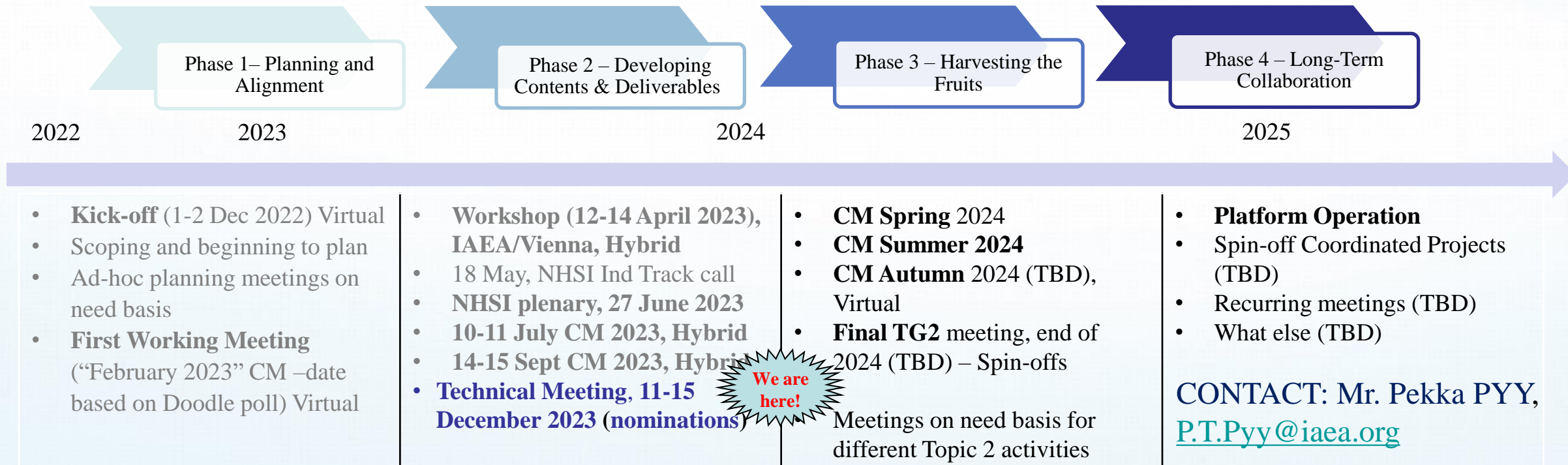
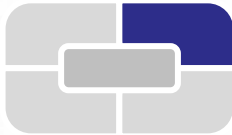
II. Oversight & Acceptance

- A. A USE OF STANDARD, PROVEN SERIALLY MANUFACTURED INDUSTRIAL GRADE ITEMS
- B. NON-NUCLEAR CODES, STANDARDS, LAW AND REGULATIONS RELEVANT TO SMR DEPLOYMENT
- C. OVERSIGHT ACTIVITIES REQUIRED BY CODES, STANDARDS, LAW AND REGULATIONS

Deliverables:

Publication(s), white paper(s), information sharing platform for the IAEA Member States

Topic 2 - Common Approaches on Codes and Standards



[Technical Meeting on the Harmonization and Use of Industrial Codes and Standards for Small Modular Reactors in December 2023](#)

[WHY SERIALY MANUFACTURED INDUSTRIAL PRODUCTS ARE CRUCIAL FOR RELIABLE DEPLOYMENT OF SMALL MODULAR REACTORS](#)



Topic 3 - Experimental Testing and Validation for Design and Safety Analysis Computer Codes - Global cooperation mechanism for experiments and code validation for SMRs, between experimental facilities, technology holders, International Organizations and TSOs.



Mission & Vision:

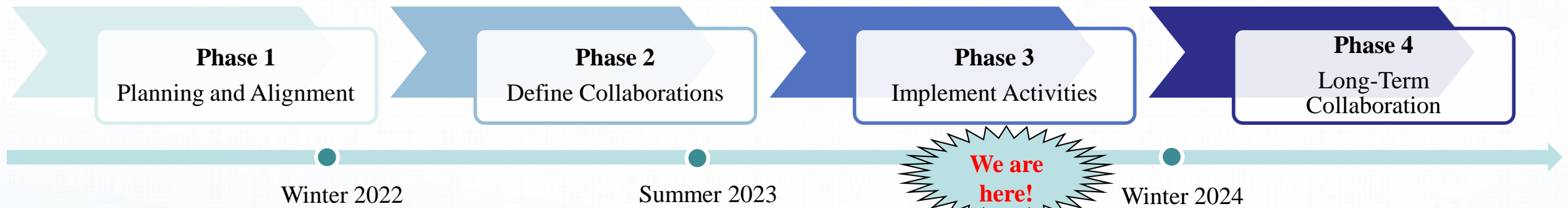
- Reduce costs and increase schedule certainty for experiments and code validation for SMRs.
- Provide greater reach and enhanced utilization of existing experimental facilities.
- Share information on experimental programs, and identify potentials for resource sharing.
- Establish best practices & common approaches in testing and code validation.

Programme of work:

- Setup the **NEXSHARE** (Network for Experiments Sharing) Network.
- Populate a database of experimental facilities for SMRs.
- Organizing a first Workshop (potential bi-annual event).
- Providing opportunity for sharing between Network members and early engagement with TSOs.
- Publications: Network brochure, experimental facilities for SMRs, and others based on the Network's needs.



Note: sharing information on experiment and code validation does not necessarily mean sharing data, but identifying what is available, what work is being conducted, what are the gaps and what facilities are currently available. Agreeable conditions for sharing (data or resource) are to be established between interested parties.



Phase 1 – Planning and Alignment

- Kick-off
- CM (7-9 Dec 2022)
- Gather inputs and needs
- Define the workplan

Phase 2 – Define Collaborations

- Network Terms of Reference
- Network Specifications
- CM (22-23 March 2022)
- Monthly progress meetings
- Mapping & Engagement of participating organizations
- CM (11-14 July 2023)

Phase 3 – Implement Activities

- Monthly progress meetings
- CM (5-7 Dec 2022)
- Ongoing engagement of participating organizations
- **Launch the Network** (Q2 2024)
- **Issue publication(s)** (Q2 2024)
- **Workshop (18-21 June 2024)**

Phase 4 – Long-Term Collaboration

- Mechanisms for long-term maintenance, update, etc

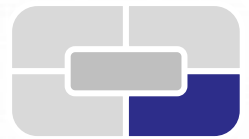


SHARE

Topic 4 - Acceleration of nuclear infrastructure implementation for SMRs

The focus is to bring together technology holders, owner/operators, International Organizations and other industry stakeholders to consider possible innovative approaches to support accelerated infrastructure implementation.

- Develop a TECDOC that will:
 - Provide a **forward-looking view** on how some infrastructure issues addressed in the Milestones Approach could be **graded in time or resources**.
 - Discuss earlier industry engagement needed to enable **accelerated deployment** of SMRs and Microreactors.
 - Identify obstacles to these new approaches.
- Inform the next update to the Milestones Approach document in the 2027/2028 timeframe.



Phase 1 Planning and Alignment

Winter 2022

- **1st CM Meeting** (8-10 November 2022) on Legal Frameworks for SMRs and MRs
- **Kick-off Meeting** (20 December 2022) Virtual meeting to Share Information on Infrastructure Development, discuss role and input to TECDOC, and Scope possible early engagement support to Member States

Phase 2 Align structure and drafting of the document

Summer 2023

- **2nd CM Meeting** (3-5 May 2023) Hybrid on Deployment models for SMRs and Microreactors with Vendors
- **3rd CM Meeting (1-3 August 2023)** Hybrid on Deployment models for SMRs and Microreactors with Owners/Operators
- **Develop Initial Draft** input of TECDOC
- **Internal meeting** on consolidate and review draft of TECDOC content (18-20 September 2023)

Phase 3 Meetings with Member States, Industry and other stakeholders



Winter 2024

- **Follow-up Discussion Meeting (Q4)** Virtual meeting with NHSI Participants to provide status update
- **End Q4 Virtual** with NHSI Participants - Status Update – *To be determined*
- **Q1 2024, Technical Meeting,** Hybrid meeting to collect Member States and experts feedback on the draft TECDOC

Phase 4 Final draft and publication process

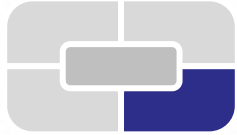
Q2/Q3 2024 - Meeting in Hybrid meeting on Regulatory framework & Capacity Building

Submit final draft in Q3/Q4 2024

Final draft circulated for internal review

*Start of the publication process
Preprint of the document (referred to by the utility organisations)
Final publication*

***Additional meetings for the TECDOC will be based on results and recommends from the CMs held*



Drivers that Support SMRs and Microreactors Deployment



Features and Implications of SMRs, Transportables (MRs), and FNPP



Readiness of Technology Recipients Countries (TRC)



Innovations and challenges in existing and future Deployment Models Accelerators



Enabling Tools for Acceleration

2022

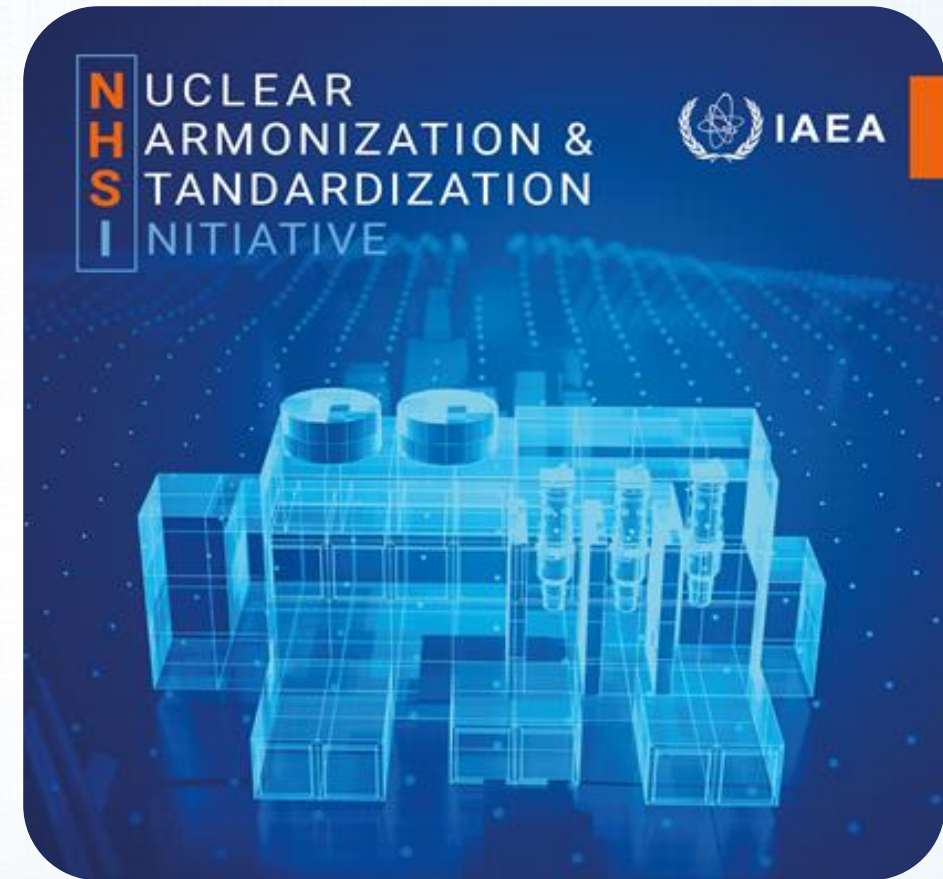
- Work plans and outline of publications for each working and topical group
- Key inputs, experience available, cooperation with ongoing projects
- Start development of publications
- Define interface between tracks

2023

- WG/TG meetings and continue developing publications
- NHSI Plenary June 2023
- Targeted interface meetings between tracks

2024

- Completion of draft publications
- NHSI Plenary June 2024
- Interface meetings between Industry and Regulatory Track
- Recommendations for future work



The success of this Initiative will require **clear commitment** and **support** from Governments, regulatory bodies and industry

International Symposium on the
**Deployment of Floating
Nuclear Power Plants**

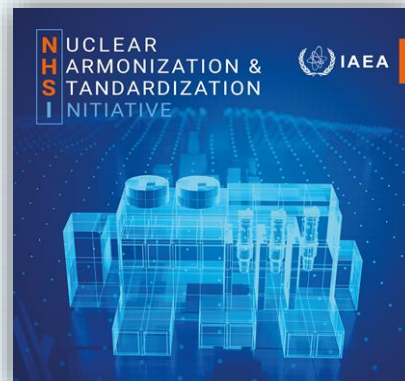
Benefits and Challenges

14–15 November 2023, Vienna, Austria



First IAEA International Conference on
Small Modular Reactors
and their Applications

Save the dates: 21-25 Oct 2024



Visit our [Portal](#) for up-to-date information on IAEA SMR related events and [its NHSI pages](#)

<https://smr.iaea.org>

Thank you!