Terms of Reference

Small Modular Reactor (SMR) Regulators' Forum

OCTOBER 2018

Purpose

To identify, enhance understanding of and address key regulatory challenges that may emerge in future SMR regulatory discussions. This will help enhance safety, efficiency in SMR regulation, including licensing, and enable regulators to inform changes, if necessary, to their requirements and regulatory practices.

Background

The idea of establishing an international forum for regulators to discuss issues associated with regulation of SMRs was first raised in mid-2012 after bilateral discussions between the U.S. and Canada. At the INPRO Dialogue Forum on Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs), held in Vienna in July/August 2013, there was explicit interest expressed by a number of IAEA Member States to evaluate and discuss the benefits of forming a regulators' forum which would specifically address regulatory issues in safety and licensing of SMRs.

The IAEA was considered to provide a long term vision to maximize member state participation and to provide an efficient means to apply lessons learned from discussion into the IAEA global safety framework. The intent was to work cooperatively with other regulatory forums investigating the impacts of new reactor technologies on regulation.

As a result, consultancy meetings, facilitated by the IAEA, were held in Vienna 18-20 February 2014, and 22-24 July 2014. The outcome of these consultancy meetings was an agreement to organize a Small Modular Reactor Regulators' Forum on a 2 year pilot basis. A draft Terms of Reference (ToR) and draft Pilot Project Plan, including the scope of the working groups, were also produced and were subsequently accepted by the members of the forum at the initial meeting.

From March 2015 to May 2017, a pilot phase of the forum was conducted, with the objectives of addressing the following issues for both light-water and non-light-water SMR designs:

- Emergency Planning Zone

  Examination of existing practices and strategies for understanding how flexible (i.e., risk informed) EPZs are established in Member States and discussion on the implications that SMR characteristics bring to these existing practices and strategies

- Defence-in-depth

  Discussions on applicability of DiD principles to SMRs.

- Graded approach

  Examination of existing practices employed by regulators for application of graded approach. Discussion on the implications that SMR characteristics bring to these existing practices. Recommendations on approaches to clarify the use of the Graded approach for SMRs

This ToR reflects the recommendations from the pilot phase.

Scope / Definitions

The scope of the forum is to identify, enhance understanding and address key regulatory challenges that may emerge in future SMR regulatory and licensing discussions to inform changes, if necessary, to their requirements and regulatory practices. The forum will distinguish itself from existing fora/organizations such as OECD/NEA (e.g. MDEP, GIF, GSAR, CNRA) and WNA/CORDEL, whose focus lies more on specific technical issues or particular designs. Issues covered by the working groups of this forum would be cross-cutting in nature, covering common issues of SMRs.

For the purposes of this forum, Small Modular Reactors are Nuclear Power Plants that typically have several of these features:

- Nuclear reactors typically <300 MWe or <1000 MWt per reactor;
- Designed for commercial use, i.e., electricity, production, desalination, process heat (as opposed to research and test reactors);
- Designed to allow addition of multiple reactors in close proximity to the same infrastructure (modular reactors);
- May be light or non-light water cooled;
- Use novel designs that have not been widely analysed or licensed by regulators.

The IAEA publications on SMR designs serve as references for the discussion.

When consensus is reached on common regulatory issues of interest to safety work being conducted by the IAEA, the forum will provide feedback and recommendations to the Safety Standards Committees on potential enhancements to the IAEA Safety Standards with regard to SMRs.

The forum will exclude safeguards issues.

Objectives and Outcomes

Objectives

Share SMR regulatory knowledge and experience among the members and other stakeholders to:

- Facilitate efficient, and robust and thorough regulatory decisions;
- Encourage enhanced nuclear safety;
- Facilitate international cooperation among regulators performing SMR-related assessments.

Identify and discuss common safety issues that may challenge regulatory reviews associated with SMRs and, if possible, recommend common approaches for resolution.

Outcomes

- Position[1] statements on regulatory (policy and technical) issues;
- Suggestions for revisions to or new IAEA documents;
- Generation and sharing of information that regulators may use to enhance their regulatory framework;
- Description of the regulatory challenges and discussion on paths forward;
- Suggestions for high level issues to be raised to international codes and standards organizations for dispositioning.

Guiding Principles

The output of this forum shall not replace national regulators' responsibility for making regulatory decisions.

- The forum is a regulator-to-regulator[2] forum driven by its members;
- Each member shall supply the appropriate expertise to contribute effectively to forum activities and ensure that the views of the regulatory body are represented;
- Each member will make best endeavours to share its regulatory experiences and lessons learned within the scope of the Forum;
- Within the scope of confidentiality agreements, information can be shared;
- The forum will appropriately control proprietary information;
- Members may, for the purposes of completing research, seek assistance from other members;
- The forum activities shall be periodically assessed for continuous improvement according to the project plan;
- The issues to be addressed in the forum may be proposed by any member;
- The forum will strive to maintain awareness of other organizations' work and align its own tasks accordingly;
- The forum will attempt to develop consensus-based documents on technical and regulatory issues of interest to forum members;
- The forum will take into account IAEA Safety Standards and safety objectives from other organizations such as WENRA for new reactor designs;
- The forum will strive to avoid duplication of work done by other organizations and fora;

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[1] They can take the form of reports or formal position statements as necessary.
[2] The regulator may choose to be represented by a TSO

- The forum will seek to draw information from existing sources where possible, including specific information discovered during design reviews by Member States and international organizations;
- This forum will establish and maintain relationships with other organizations such as the, IAEA, NEA (e.g. MDEP, GIF, GSAR, CNRA) and WNA/CORDEL. The forum may, on occasion, invite selected representatives of these organizations to participate in forum activities.

Membership

Membership to the forum was originally limited to the IAEA Member States who participated in the initial sessions of this forum: Canada, China, Finland, France, Republic of Korea, Russian Federation and United States. The United Kingdom joined during the second year of the pilot project.

For the forum work following the pilot phase, membership to the forum is open to IAEA Member States who are able to contribute in a meaningful manner to the work of the Working Groups. The work being conducted is generally of a complex nuclear safety nature with a focus on SMRs that requires experience in:

- Multidisciplinary technical assessment across multiple areas of safety;

- Application of defence in depth in design and safety analysis;

- Use of risk informed methodologies in regulatory decision making.

In particular, if a Member State is a SMR technology holder or developer, has operating experience or already has commitments[3] for new build or firm plans to have commitments for licensing in the near future, it may apply for membership with the forum, which will then be subject to an approval process.

Membership presupposes a commitment to devote adequate resources, with appropriate experience and knowledge base, to ensure that the forum's purpose and objectives can be fully accomplished.

International and regional organizations which expressed an interest may be granted the status of Observer by decision of the Steering Committee. Observers participate in the Working Groups and are granted a read-only access to the restricted Forum web site, however, their participation in Steering Committee activities is limited to observation only.

The list of forum Members and Observers shall be made publicly available.

Structure

The structure of this forum will be:

- Steering Committee
  - A chairperson and vice-chairperson will be selected from the Steering Committee membership;
  - As secretariat, the IAEA will be part of the Steering Committee;
  - Every member should provide a representative to the Steering Committee who is capable of fully representing their regulatory body's position in technical matters and decision making.

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[3] Commitments should be considered to be pre-licensing discussions between the regulator and the vendor.

- Task-specific Working Groups (one WG per issue)
    - There will be a working group chair and co-chair, who will coordinate the group's activities;
    - Any member may participate in the forum working groups; however, they should be capable of fully representing their regulatory body's position in technical matters.

Issues covered by the Working Groups will be cross-cutting in nature, covering common issues of selected technologies.

The Steering Committee will:

- Manage and approve the detailed programme of work including defining topics and working methods, establishment and closure of working groups and nomination of a lead country;
- Approve reports and position statements developed by the working groups;
- Establish interfaces with other international organizations to benefit from available work and avoid duplication;
- Review progress on a periodic basis to ensure that Working Groups and the forum as a whole are achieving their goals according to the programme plan;
- Approve membership and observer applications.

Decisions of the Steering Committee shall be adopted by consensus of the members present at the meeting.

The working groups will implement their specific portion of the project plan and report progress to the Steering Committee.

The working groups and potential areas of activity are as follows:

Licensing[4] Issues Working Group

- Explore the implications on the application of the graded approach in technical assessment and the overall regulatory inspection programme
- Examine the nature of evidence available and impacts on the use of a graded approach when supporting safety claims in decision making
- Discuss the impacts on licensing and regulatory approaches to address uncertainties associated with outsourcing of activities considering the modular design approach and the fact that significant decentralization of design and safety analysis activities is being seen in SMR development,

Human Factors Engineering (HFE) Subgroup (works under Licensing Issues Working Group)

- Compare the state of requirements against other industry HFE best practices (aerospace, chemical industry etc) and recommend enhancements to existing IAEA documents recognizing that operation and control of the plant can be different for SMRs
- Explore human factors impacts of intense I&C implementation, advanced displays and multiple module operation and maintenance on safety analysis
- Improve understanding of error-likely conditions (HF and organizational effectiveness) created by outsourcing of many design and development activities and their impacts on the determination of adequate plant staffing (i.e. minimum plant complement):

Design and Safety Analysis Issues Working Group

- Execute recommended follow up actions from the two-year pilot phase reports of the defence-in-depth WG
- Support forum input into drafting a new IAEA Safety Guide on use of the graded approach for nuclear power plants
- Provide graded approach expertise to the other working groups
- Discuss and document regulatory views around the concept of what "relevant good practices" are and mean when applied to SMRs.

Manufacturing, Commissioning and Operation Working Group

This WG will build on already existing body of knowledge being generated from new build power plant OPEX by further examining the implications that SMR characteristics present to manufacturing, construction, commissioning and operation

- *Construction*: Document regulatory views of SMR specific construction issues and implications in licensee oversight and regulatory inspection programs

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[4] In some member states, licensing includes the use of permissioning to perform authorizations for activities under a generic site licence

- *Commissioning*: Document regulatory views of expected SMR commissioning issues and implications in licensee oversight and regulatory inspections programs
- *Operation*: Document the implications on in service inspection programs from, for example, compact system design, sealed vessels or inaccessible systems

The forum will not focus on security issues, however, each working group will note the safety/security interface in their discussions. Security experts, including representatives from the IAEA Division of Nuclear Security will be invited to attend working group meetings, when appropriate.

Finances

This extra-budgetary effort will be financed by required annual contributions of approximately 30,000 – 40,000 euros/year from each member state. The annual contributions should be received by the Secretariat by 31 December of each year and the Steering Committee will follow up on those contributions.

Amednement 1: At the FALL 2018 meeting, the Steering Committee decided to extend, for one time only, the dead line for the 2018 contributions to March 231, 2019.

The IAEA will use these funds to provide the following support services:

- IAEA staff member costs, both salary and travel needed to participate in forum (both general and professional staff)
- Support for specific activities as necessary such as consultants from academia to support Working Group research.
- Support for communications including web site support required to maintain and update the forum's web site.

Forum members will finance their own participation in the forum.

Every three years, an evaluation should take place to assess the forum's performance and to determine its further financial support.

Communications (Internal / External)

A structured web space within the Global Nuclear Safety and Security Network (GNSSN) (currently maintained by the IAEA) will be used and shall include a restricted, password protected part to share information among the Steering Committee members or working group participants.

Dissemination of relevant information important to other stakeholders and the public will handled through the public IAEA web portal.

Acknowledging the importance of face-to-face meetings, it is envisioned that the Steering Committee meets on a regular basis. Working groups should meet prior to each Steering Committee meeting. Additionally, meetings may be held using online virtual meeting software such as Webex, whenever desired.

Representation of the forum at relevant international conferences and meetings will be handled as needed. The channels through which communications occur, is subject to a communications plan to be developed as part the project plan.

Organizations the forum expects to interface with include:

Regulator forums

- NEA – MDEP, GSAR, CNRA
- RCF
- ENSREG/WENRA

Industry forums

- GIF
- WNA/CORDEL
- INPRO

The forum may, on occasion, invite selected representatives of these organizations to participate in forum activities.

Role of IAEA

At the request of forum members, the IAEA will function as Scientific Secretary and, subject to the availability of extra-budgetary resources, promote and facilitate the forum. The IAEA will provide general and professional support staff to facilitate open collaborative meetings, develop and maintain a communication platform and provide advice on the IAEA Safety Standards.