SMR REGULATORS' FORUM

NEWSLETTER Issue 2 – March 2024

The Vice-Chairperson's Welcome

Welcome to the second issue of the Small Modular Reactor Regulators' Forum's (SMR RF) Newsletter! This year, the Forum celebrates its 10th anniversary! While the interest in advanced nuclear technologies, including SMRs, is constantly growing, it is also fairly recent. The Forum, however, has already worked for almost decade developing common positions based on identification and discussion of key safety issues that may challenge regulatory reviews associated with SMRs, including, if possible, approaches for their resolution.

In this issue, we highlight the Forum's latest Meeting held in December 2023, which marked the end of the Phase 3 of its work and the launch of the next phase of activities. In this regard, the Forum's Members are pleased to announce the publication of the Phase 3 reports, which can be found on the Forum's website. I would strongly encourage you to make good use of these and invite you to attend a series of webinars the Forum is organizing to promote them (please see relevant links on the website).

Other highlights in this issue of the Newsletter include regional educational workshops, news from the Forum's Members and an interview with the SMR RF Chairperson, Mr Brian W. Smith, in which he discusses his experience of regulation of advanced nuclear technologies and reflects on the relevant work carried out by the SMR RF and the IAEA.

I hope you will find this Newsletter informative. Please feel free to encourage others who might be interested to subscribe using the link at the end of the Newsletter.

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SMR RF Vice-Chairperson
Principal Inspector
Delivery Management Group Lead (DMGL)
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Latest SMR Regulators' Forum (SMR RF) Meetings

The 5th Nuclear Harmonization and Standardization Initiative's (NHSI) Regulatory Track Working Group 3 (WG3) Consultancy Meeting, 19 – 21 September 2023

This virtual meeting was held with the participation of nuclear regulatory authorities representatives from 20 IAEA Member States (Argentina, Belgium, Canada, the People's Republic of China, the Czech Republic, Finland, France, India, Japan, the Republic of Korea, the Netherlands, Poland, Romania, the Russian Federation, Slovenia, South Africa, Türkiye, United Arab Emirates, the United Kingdom and the United States of America) and the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA), as well as industry representatives and the World Nuclear Association (WNA) Cooperation in Reactor Design Evaluation and Licensing Working Group (CORDEL).

During the event, the participants discussed the latest comments from both the NHSI WG3 members and the industry on the draft IAEA technical document (TECDOC) "Enabling SMR Regulatory Reviews: Effective Leveraging and Cooperative Reviews". The remaining issues were identified, and a plan was agreed to finalize the document by the end of 2024.

The Combined SMR RF Steering Committee and Working Groups Meeting, including the 6th NHSI Regulatory Track WG3 Meeting, 11 – 15 December 2023

From 11 to 15 December 2023, the SMR RF held its regular biannual meeting in a hybrid format, with participants from regulatory bodies of 18 countries, as well as the OECD NEA and the WNA-CORDEL. A representative from Germany also took part as an Observer in the plenary sessions and in the Design and Safety Analysis (DSA) Working Group (WG) meetings.

In her opening remarks, Anna Hajduk Bradford, Director of Nuclear Installation Safety Division (NSNI) of the IAEA, highlighted the importance of international collaboration due to the increased interest in SMRs among the IAEA Member States and stated that the IAEA's "*partnership with the SMR RF continues to be of key importance in this respect*".

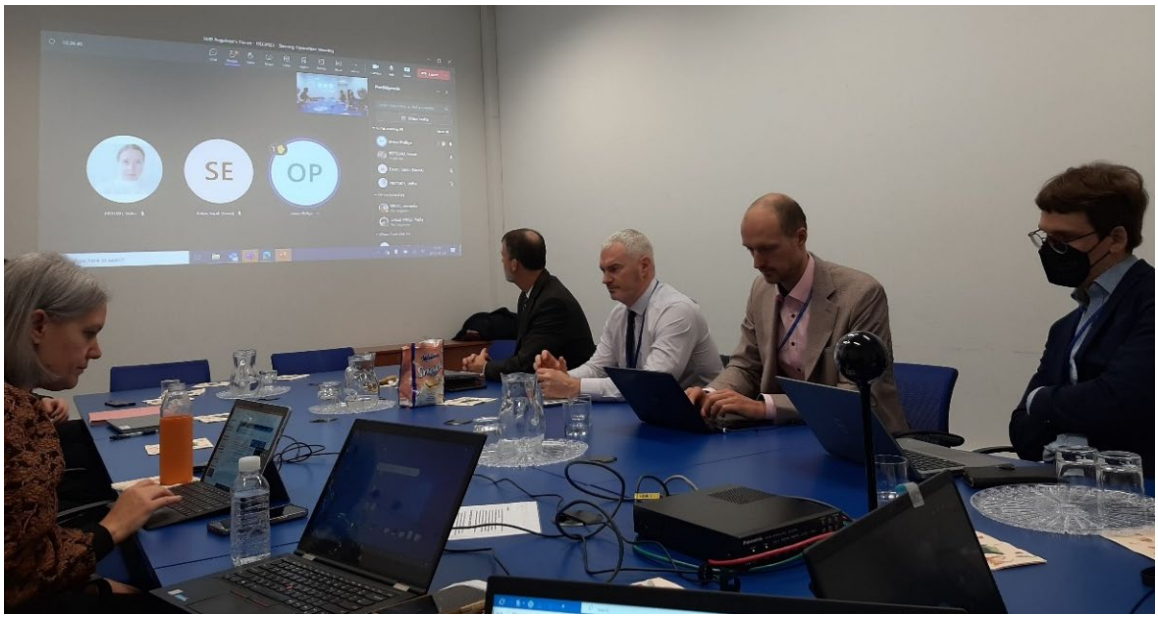
The opening plenary session consisted of presentations on the status of SMR-related activities from the Forum's Members, the WNA CORDEL and the NEA OECD, as well as updates from the IAEA on the NHSI Regulatory Track and Industry Track. In addition, the newly introduced topical session served to share helpful information related to the: collaboration between the U.S. Nuclear Regulatory Commission (US NRC) and the Canadian Nuclear Safety Commission (CNSC) on design reviews; progress from the UK with respect to SMR deployment; and the initiative of the French (Nuclear Safety Authority - ASN), Finnish (Radiation and Nuclear Safety Authority - STUK) and Czech (State Office for Nuclear Safety - SÚJB) regulatory bodies to conduct a joint early review of the NUWARD reactor preliminary design.


Opening Plenary – 11 December 2023 (Photo: IAEA)

SMR RF Opening Plenary – 11 December 2023 (Photo: IAEA)

The SMR RF Steering Committee (SC), WG Chairs and the Scientific Secretariat also discussed the following issues:

- Organization of webinars in 2024 to promote the SMR RF Phase 3 outputs to experts and general public interested in SMRs;
- Approval of the schedule for the production of Phase 4 Reports due by December 2026;
- Possible additional activities and/or alternatives with respect to the regional educational workshops aiming at an enhancing their capacity-building potential;
- Development of new cooperative arrangements with other international entities, such as the Regulatory Cooperation Forum (RCF), with a view to avoiding duplication of efforts and establishing possible synergies.



SMR RF Steering Committee Meeting – 12 December 2023 (Photo: IAEA)

This biannual meeting marked an important milestone in the Forum's history, as after three years of extensive discussions and reviews, the Forum's DSA and MCCO WGs finalized their Phase 3 reports and had them approved by the SMR RF SC. This paved the way for the publication of the 5 reports in February 2024 and the definitive launch of the Forum's Phase 4 with an agreed timetable (2024-2026) for the production of reports addressing the following topics: "Mechanistic source term" (DSA WG); "Continuation of 3S topics" (DSA WG); "Manufacturing and deployment in the absence of a licensee" (MCCO WG); "Construction oversight" (MCCO WG); and "Organizational capability of a new licensee (no prior nuclear experience)" (MCCO WG).

SMR RF MCCO Working Group – 15 December 2023 (Photo: IAEA)

During its 6th Meeting, the NHSI WG3, led by the Forum, thoroughly reviewed and discussed the draft TECDOC with the aim of completing the document sections/subsections and resolving internal and industry comments. The draft TECDOC is on track to be completed by the end of 2024.

The 6th NHSI Working Group 3 Meeting – 14 December 2023 (Photo: IAEA)

The 7th NHSI Regulatory Track WG3 Consultancy Meeting, 7 – 8 February 2024

In addition to the discussion of the editorial review of the draft TECDOC, this meeting had the goal of presenting to the industry participants how their comments had been dispositioned and reflected in the document. This virtual event included participants from 15 Member States (Argentina, Canada, the People's Republic of China, Finland, France, Germany, India, Japan, Republic of Korea, Poland, the Russian Federation, Slovenia, United Arab Emirates, the United Kingdom and the United States of America), as well as four industry representatives (Électricité de France (EDF), Nuclear Energy Institute (NEI), JSC-Afrikantov OKBM, and TÜV SÜD Energietechnick)), as well as the OECD NEA.

In Focus: The Regional Educational Workshops on Regulatory Challenges in SMRs

Rabat, Morocco, 9 -13 October 2023

The fourth SMR RF Regional Workshop, for the Africa region, was held in **Rabat, Morocco, from 9 to 13 October 2023,** with the participation of **17 representatives from nine IAEA Member States** (Burkina Faso, Chad, Comoros, Cote D'Ivoire, Madagascar, Mali, Mauritania, Morocco and Rwanda) and three invited lecturers from the SMR RF. The workshop was hosted by the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR) and included a visit to the TRIGA Mark II Research Reactor facility. This regional workshop was the first fully conducted in the French language.

Mr Saïd Mouline, Director General of AMSSNuR, delivering Opening remarks – 9 October 2023 (Photo: AMSSNuR)

The Morocco Workshop Participants, October 2023 (Photo: AMSSNuR)

Prague, the Czech Republic, 4 – 8 December 2023

The fifth Regional Workshop was the largest in terms of the number of participants and the participating IAEA Member States. Conducted mainly for the European region, it was held in **Prague**, **the Czech Republic**, from **4 to 8 December 2023**, with the participation of **36 representatives from 18 IAEA Member States** (Armenia, Belgium, Bulgaria, the Czech Republic, Estonia, Ghana, Hungary, Latvia, Lithuania, the Netherlands, Poland, Romania, Slovakia, Slovenia, Switzerland, Türkiye, the United Kingdom and Ukraine), and five invited lecturers from the SMR RF. The workshop was hosted by the Czech State Office for Nuclear Safety (SÚJB) and included a visit to the ÚJV Řež facilities.

The Czech Republic Workshop, December 2023 (Photo: IAEA)

The Czech Republic Workshop Participants, December 2023 (Photo: SÚJB)

Forthcoming SMR RF Events

Biannual SMR RF SC and WG Meetings, including NHSI WG3 Consultancy Meetings

The SMR RF and the Eighth NHSI Regulatory Track WG3 Meeting (hybrid, Vienna, Austria, 15-19 April 2024)

The SMR RF and the Tenth NHSI Regulatory Track WG3 Meeting (hybrid, Vienna, Austria, 11-15 November 2024)

Additional NHSI WG3 Consultancy Meetings

The Ninth NHSI Regulatory Track WG3 Meeting (virtual, Vienna, Austria, 10-12 September 2024)

Regional Educational Workshops on Regulatory Challenges in SMRs

The Latin America Region (in-person, **Rio de Janeiro, Brazil, 7-11 October 2024**)

The sixth educational workshop will be hosted by the Government of Brazil through the National Nuclear Energy Commission (CNEN). Presentations will be delivered in English.
Nomination deadline: **2 August 2024.**
For more information please visit: https://www.iaea.org/events/evt2303775

The Asia Region (in-person, **Mumbai, India, 9 – 13 December 2024**)

The seventh educational workshop on regulatory challenges in SMRs will be hosted by the Government of India through the Atomic Energy Regulatory Board (AERB). The event will be held in English.
Nomination deadline: **27 September 2024.**
For more information please visit: https://www.iaea.org/events/evt2303794

The SMR RF Phase 3 Reports Webinar Series

This webinar series is implemented with the aim to disseminate the main Phase 3 (2021 to 2023) findings from the SMR RF Working Groups on key challenges that may emerge in future SMR regulatory discussions, helping, consequently, regulators to enhance safety and efficiency in SMR regulation, including licensing.

This webinar series is open to the public, and participation is approved through an online registration.

The MCCO WG (virtual, Vienna, Austria, **5 April 2024, 13:00 – 14:30 CET**)

This webinar is based on the SMR RF Phase 3 reports produced by its MCCO WG: "*Regulatory Considerations in Pre-Licensing Engagement for Long-Lead Requests and Items*" and "Conduct of Authorised Activities: Impact on Stakeholders' Organisational Capabilities (Designers, Vendors, Manufacturers, Supply Chains, Operators)."
For more information, please click **here**.
Click **here** to register.

The DSA WG (virtual, Vienna, Austria, **3 May 2024, 13:00 – 14:30 CET**)

This webinar is based on the SMR RF Phase 3 reports produced by its DSA WG: "*Safety, Security and Safeguards from a Regulatory Perspective: An Integrated Approach"* and *"Containment Systems."*
For more information, please click **here**.
Click **here** to register.

The NHSI WG 3 (virtual, Vienna, Austria, **18 June 2024, 13:00 – 14:30 CET**)

This webinar is based on the draft TECDOC produced by the NHSI WG3, led by the SMR RF, "*Enabling SMR Regulatory Reviews: Effective Leveraging and Cooperative Reviews.*" It will focus on the main content and key considerations of the above document regarding the regulatory reviews carried out by Member States during the pre-licensing and licensing processes.
For more information, please click **here**.
Click **here** to register.

Recent and Forthcoming IAEA Events and Publications of Relevance

The NHSI Regulatory Track (RT) Working Group 1 and Working Group 2 Meetings

With the goal of finalizing the documents by the end of 2024, the NHSI RT Working Group 1 on Building a Framework for Sharing Information and the NHSI RT Working Group 2 on Multinational Pre-licensing Regulatory Design Review will meet three more times in 2024:

	8th Meeting (Face-to- Face)	**9th Meeting (Virtual)**	**10th Meeting (Face-to-Face)**
WG1	22-26 Apr. 2024	3-5 Sept. 2024	4-8 Nov. 2024
WG2	13-17 May 2024	25-27 Sept. 2024	2-6 Dec. 2024

For more information on NHSI, please click **here**.

International Conference on SMRs

International Conference on Small Modular Reactors and their Applications (Vienna, Austria, **21–25 October 2024**)

The conference will have plenary and panel discussions, in addition to topical sessions.

Themes and Topics:

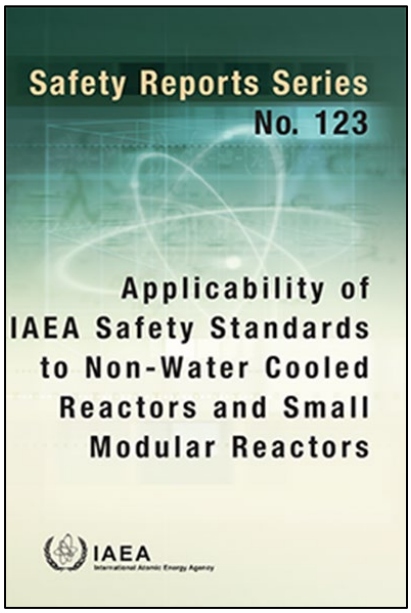
- Technology
- Legal frameworks
- Safety, Security, Safeguards
- Deployment Approach

Topical sessions will include oral and poster presentations. There will be also exhibitions and side events to present latest developments in various areas on SMRs.

Call for papers: abstract submission by **15 March 2024**
Submission acceptance: by **29 March 2024**
For more information, please click **here**.

Recent IAEA Safety Publications of Relevance

Applicability of IAEA Safety Standards to Non-Water Cooled Reactors and Small Modular Reactors (Safety Reports Series No. 123, 2023)



Covers evolutionary and innovative design (EID):

- Water cooled SMRs;
- High temperature gas cooled reactors;
- Sodium cooled fast reactors;
- Lead cooled fast reactors;
- Molten salt reactors;
- Transportable NPPs (considered partially).

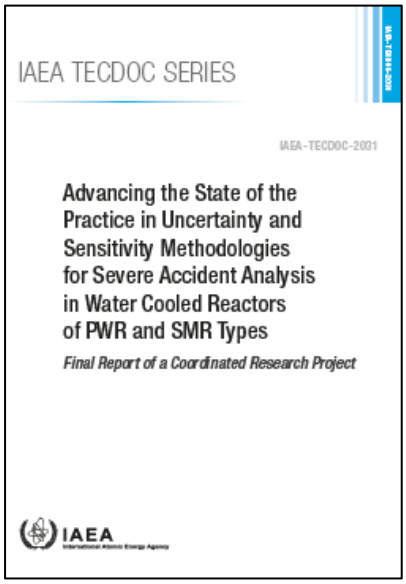
The impact of these areas of novelty on the applicability and completeness of the IAEA safety standards is assessed.

Gaps and areas for additional consideration are identified.

Considers the interface between safety, security, and safeguards in the design of these technologies.

Click **here** for more information.

Advancing the State of the Practice in Uncertainty and Sensitivity Methodologies for Severe Accident Analysis in Water Cooled Reactors of PWR and SMR Types (IAEA TECDOC Series nº 2031, 2023)



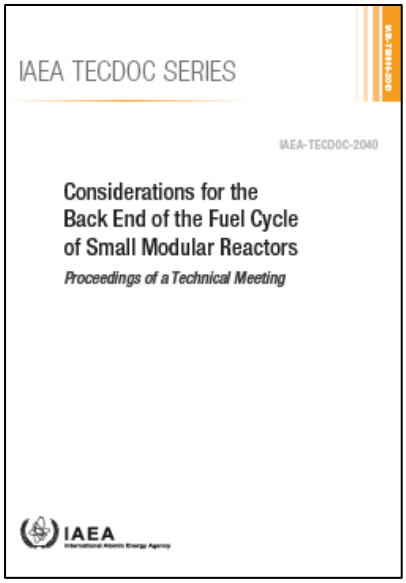
Brings together the current state-of-knowledge on uncertainty propagation and sensitivity methodologies in severe accident analyses that has been accumulated by experienced analysts.

This TECDOC highlights the results of the analysis developed under the Coordinated Research Project (CRP) plant application task applicable to PWRs and SMRs.

The insights gained from the plant application exercise lead towards newly generated knowledge to be referred on the uncertainty and sensitivity analysis and methods for severe accident codes with the intent of capturing the best practices and lessons learned.

Click **here** for more information.

Considerations for the Back End of the Fuel Cycle of Small Modular Reactors (IAEA TECDOC Series nº 2040, 2023)



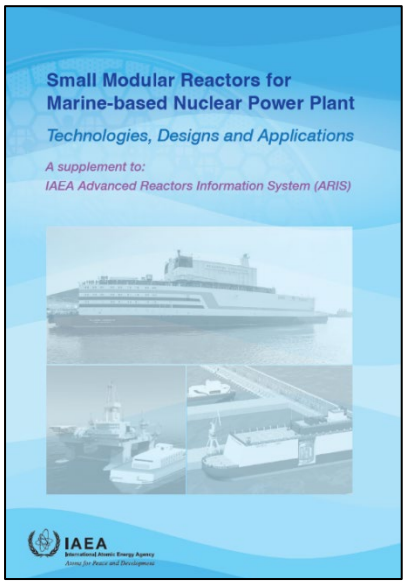
This publication presents the Proceedings of the Technical Meeting on Considerations for the Back End of the Fuel Cycle of SMRs held in September 2022.

It is focused on the management of the spent nuclear fuel, this TECDOC identifies:

- opportunities and challenges faced at all stages of the back end of the fuel cycle (e.g. storage, transportation, reprocessing and recycling, and disposal);
- the gaps in current infrastructure and the knowledge required to ensure an integrated approach to the overall spent fuel management strategy;
- the potential ways to move forward in addressing them in the near, medium and long terms.

Click **here** for more information.

Small Modular Reactors for Marine-based Nuclear Power Plant: Technologies, Designs and Applications (2023)



Public information on several marine based SMR designs and technologies that are in operation, under development for near term deployment as well as prospective designs for future deployment, is covered in this publication.

Its content highlights:

- Current status of 10 marine based SMR designs;
- Main technical parameters of these designs;
- Technical aspects of marine based SMRs;
- Potential applications and opportunities for the development and deployment of marine-based SMRs.

Click **here** for more IAEA Advanced Reactor Information System (ARIS) publications.

For more information on the IAEA publications related to the development, early deployment, and oversight of SMRs and their applications, please visit the IAEA Platform on Small Modular Reactors and their Applications (SMR Platform).

The IAEA publications of relevance expected to be finalized in 2024:

- TECDOC "Optimization of Protection against External Hazards for Facilities Other than NPPs".
- Handbook "Handbook for Site Survey and Site Evaluation for Nuclear Installations";
- Safety Report "Application of Graded Approach for Site Evaluation of Nuclear Installations including Small Modular Reactors";
- TECDOC "Siting and Design Aspects of SMRs in Relation to External Hazards: Special Issues in the Application of Safety Standards (on Seismic Isolation, Steel Plated Structures and EPZ)."

Subscribe **here** to the New IAEA Nuclear Safety and Security Publications Alert.

SMR RF Members' News and Events of Relevance

The U.S. Nuclear Regulatory Commission (U.S. NRC) News

The U.S. NRC's 36th Annual Regulatory Information Conference (RIC) - Adapting to a Changing Landscape (hybrid, Maryland, USA, took place 12-14 March 2024)

The Annual Regulatory Information Conference (RIC) is the largest public meeting the US NRC hosts, bringing together thousands of participants representing interested stakeholders from other government agencies, industry, international organizations, and the general public. It offers an open environment in which diverse groups of stakeholders may learn, share, and discuss information on significant and timely nuclear regulatory activities and emergent issues.

For more information, such as the Agenda, please click **here**.

The U.S. NRC Regulatory and Licensing activities

Several new and advanced reactor applications are under review by the U.S. NRC:

- The first Construction Permit review for the Kairos Hermes advanced test reactor was completed. The application for construction permit for Hermes 2 unity was submitted in July 2023 and the review by the concerned authorities is ongoing. For more information, click **here**.
- The review for the Abilene Christian University construction permit application for a 1 MW molten salt research reactor (MSRR) has commenced in 2023 and is ongoing. For more information, click **here**.
- NuScale Standard Design Approval (SDA) Application was submitted for an uprated 250 MWt (77 MWe) SMR design. NRC has accepted the SDA application and the technical review is ongoing.
- Carbon Free Power Project (CFPP) has been terminated and the NRC staff has suspended its review. For more information, click **here**.

New applications for construction permits that are expected in 2024:

- Tennessee Valley Authority Clinch River (GEH BWRX-300);
- PacifiCorp (TerraPower Natrium);
- Dow Chemical (X-energy Xe-100).

For more information on licensing activities for SMRs, please visit the New Reactors website.

Recently approved U.S. NRC publications

Performance-based Emergency Preparedness For Small Modular Reactors, Non-light-water Reactors, and Non-power Production or Utilization Facilities (Regulatory Guide 1.242 Rev 0, 2023). This Regulatory Guide (RG) identifies methods and procedures the staff of the US NRC considers acceptable for use by applicants and licensees for SMR, non-light-water reactors (non-LWRs), and non-power production or utilization facilities (NPUFs) to demonstrate compliance with performance - based emergency preparedness (EP) requirements in Title 10 of the Code of Federal Regulations (10 CFR).

Emergency Preparedness for Small Modular Reactors and Other New Technologies (Final Rule, 2023)
Through this final rule, the NRC is amending its regulations to create an alternative emergency preparedness (EP) framework for SMRs and other new technologies (ONTs).
For more information on this rule, click **here**.

The NRC staff has provided the draft proposed Part 53 "Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors" to the Commission in 2023 requesting approval to publish the draft proposed rule (Enclosure 1) in 10 CFR. This proposed rule offers a voluntary, performance-based alternative regulatory framework for licensing future commercial nuclear plants, including non-LWRs and LWRs.

The UK Office for Nuclear Regulation (ONR) News

Great British Nuclear
In 2023, Great British Nuclear was created to help drive the delivery of new nuclear projects in the UK. The UK has launched a competitive procurement to select the best SMR technologies and, currently, six companies have been selected to advance to the next phase of the SMR competition (Rolls-Royce SMR Ltd., Holtec, NuScale Voygr, EDF Nuward, Westinghouse AP300 and GE Hitachi BWRX300) and will be invited to bid for UK Government contracts with contracts awarded in 2024.

Rolls-Royce SMR Generic Design Acceptance
Rolls-Royce (RR) SMR entered into Generic Design Acceptance (GDA) with its 470 MWe PWR SMR in 2022. GDA Step 1 was completed in 2023, setting the scope of GDA. Step 2 GDA is currently ongoing. Step 2 is the fundamental assessment of the generic safety and security cases. It considers the overall design and safety and security claims.

UK has a goal setting nonprescriptive regulatory regime, but ONR's guidance and expectations are benchmarked against IAEA standards. RR SMR are providing submissions in accordance with IAEA SSG 61, and ONR is committed to expressing its regulatory conclusions against IAEA/WENRA standards as well as UK SAPs.

RR SMR will complete GDA step 2 in late spring 2024 and ONR will issue a step 2 statement summarizing the position it has reached.
For more information on RR SMR GDA, click **here**.

Holtec SMR GDA
Following a successful application to enter GDA, Holtec International has begun GDA late 2023 and has submitted its SMR-300 design for assessment. The GDA assessment will look to actively explore opportunities to maximise the value of international regulatory collaboration and identify efficiencies in processes.

The Korea Institute of Nuclear Safety (KINS) News

SMART100 Standard Design Approval
Regarding the SMART100 multi-purpose reactor, the review for the Standard Design Approval (SDA) is to be completed and it is planned to report to the Nuclear Safety and Security Commission in Q2 of 2024.

The Nuclear Regulation Authority of Japan (NRA) News

GX Promotion Strategy
The "Strategy for Promoting the Transition to a Decarbonized Growth-Oriented Economic Structure", based on the "GX Promotion Act", was approved by the Cabinet of Ministers of Japan on 28 July 2023. As a measure to replace the decommissioning nuclear power units, a plan for the deployment of innovative reactors within the existing sites will be developed, with safety assurance as a major premise. Other new build development and construction will be considered based on the future situation in each region, including the status of resumed operations etc.

While maintaining the current basic principle of limiting the operating period of nuclear power plants to 60 years (i.e. 40 years for the initial operating period plus 20 years for the extension period), additional extensions can be allowed considering the period for extended shutdown due to regulatory review, etc.
For more information about the GX Promotion Strategy, click **here**.

Japan Atomic Energy Agency HTGR
On 18 July 2023, the Japan Atomic Energy Agency (JAEA), together with the National Nuclear Laboratory (NNL) of the UK, was chosen by the UK Department for Business, Energy and Industrial Strategy (BEIS) as parties to participate in Phase B of Advanced Modular Reactor (AMR) Development Programme for undertaking FEED+ studies (Front End Engineering Design and supporting activities) until March 2025.
For more information, click **here**.

The French Nuclear Safety Authority (ASN) News

NUWARD SMR Joint Early Review
With respect to the NUWARD SMR Joint Early Review (JER), two reports were released in September 2023 to present the initiative and the associated outcomes and lessons learned:

- Regulators report
- Vendor report

The Phase 2 of the NUWARD SMR Joint Early Review (JER), with an extended membership (regulators from Sweden (Swedish Radiation Safety Authority - SSM), Poland (National Atomic Energy Agency - PAA) and the Netherlands (Authority for Nuclear Safety and Radiation Protection - ANVS) joined the initiative) was established on 14 November 2023.
For more information, click **here**.

NUWARD Assessment
In France, NUWARD submitted a Safety Options File in July 2023 (pre-licensing). According to French regulatory framework (R593-14 of Environmental Code), ASN/IRSN had discussions with NUWARD to define the scope and the format of the assessment. For the pre-licensing in France, the outcomes from the JER will be considered and particular attention will be paid to innovative features.

The Radiation and Nuclear Safety Authority in Finland (STUK) News

Fortum Feasibility Study
Fortum Feasibility Study investigates commercial, technological, legal and regulatory (among others) conditions both for SMRs and conventional large reactors. It has also initiated a pre-licensing dialogue with STUK to obtain feedback on new design features.

New regulation on Emergency Plan Zone
In a new regulation on Emergency Plan Zone (EPZ), some distance limits (such as Precautionary Action Zone (PAZ) and Urgent Protective Action Planning Zone (UPZ) and constraints have been revised. For more information, click **here**.

The State Office for the Nuclear Safety of the Czech Republic (SÚJB) News

The amendments to the Atomic Act (Act n. 263/2016 Coll., of July 14, 2016) are currently following the inter-ministerial comment procedure and are planned entry into force on 1 January 2025. The main changes are:

- Simplification of the licensing steps;
- Pre licensing information;
- Better implementation of the graded approach principle;
- General exemption from legal requirements.

With the aim of exchanging experiences in pre-licensing, SÚJB and other regulators (STUK, PAA, SSM and ANVS) are observing RR SMR GDA technical meetings in a collaboration arrangement with the UK ONR.

The Canadian Nuclear Safety Commission (CNSC) News

OPG's Darlington New Nuclear Project (DNNP) of up to four SMRs
OPG submitted a Licence to Construct application to construct one BWRX-300 in October 2023. This process requires Independent Commission Decision – 1st Public hearing was held on January 2024 for the Commission to determine whether the EA is valid for BWRX-300 reactors. The 2nd Public hearing is tentatively scheduled for October 2024.

- CNSC-NRC Joint Report on BWRX-300 Safety Strategy White Paper – published in July 2023;
- CNSC-NRC Joint Report on BWRX-300 Steel Plate Composite Containment Vessel and Reactor Building Structural Design White Paper – published in June 2023;
- Commission Member Document for Darlington New Nuclear Project Hearing 1 available.

For more information on DNPP, click **here**.

New Brunswick (NB) Power
NB Power is proposing to deploy one ARC-100, a 100 MWe sodium-cooled fast reactor, adjacent to existing CANDU unit at Point Lepreau Nuclear Generating Station. A Licence to Prepare Site for the proposed SMR was submitted in June 2023. CNSC staff, as members of the Technical Review Committee, are providing technical support to the Environmental Protection Review and Provincial Environmental Impact Assessment.
For more information, click **here**.

Interview with the SMR RF Chairperson, Mr Brian W. Smith

(this is an extended version of the interview conducted on 13 July 2023 for the article 'Regulating Innovative Reactor Designs', IAEA Bulletin, Nuclear Innovations for Net Zero, Vol. 64-3 (2023))

In this interview, the SMR RF Chair discusses his experience of regulation of advanced nuclear technologies and reflects on the work of relevance of the SMR RF and the IAEA.

Q.: How can regulators best prepare to meet the challenges associated with the deployment of the advanced nuclear technologies, including SMRs?
Brian W. Smith (BWS): They need to work on the appropriate regulatory framework being established in advance. This is a significant challenge. In the United States, for example, we have only had large light water reactors for over 50 years, and our regulations are based on those types of reactors, while some of the SMRs are completely different. Light water SMRs are one type that we are most familiar with because they are using light water as a coolant, and they are, in a way, scaled-down versions of the current power plants, but with some new passive features. And we have to take these passive features into account in our regulatory guidance. For some of the non-light water reactors, however, we have to come up with almost a whole brand-new framework, because the existing regulations and guidance were not developed with them in mind. So, now in the US we are developing a new set of requirements and guidance that are technology-neutral, risk-informed, and performance-based and can therefore be applied to any reactor technology.

Q.: While developing this new set of regulations, do you find that anything is missing in the regulator's own capacities and how do you address that?
BWS: Realistically speaking, it is going to take probably at least five years to develop this overall framework and to get it in place, as well as the guidance. Having the right technical staff in place has been a challenge as well, not only for the US NRC, but for all other regulators as well. It is a challenge, because we are dealing with new designs that are very different, and we must have nuclear engineers familiar with these different new technologies to be able to evaluate the safety aspects of the reactor itself, as well as experts on different materials used in a reactor, new digital instrumentation and controls, etc.

Q.: While the necessary framework is being developed, are there any other steps that can be undertaken to ensure regulatory readiness?
BWS: The IAEA conducted a review and has just published a Safety Report Applicability of IAEA Safety Standards to Non-Water-Cooled Reactors and SMRs, which maps areas of the safety standards that are technology neutral and applicable to all types of SMRs and identifies gaps in applicability. This applicability review covered everything from siting, design and construction to commissioning, operation, and decommissioning, and, based on the review findings, the IAEA are pursuing further safety-related activities with respect to evolutionary and innovative reactor designs, including SMRs.

Many countries have been engaged in this and similar processes of their own with a view to ensuring their readiness. For instance, when assessing applications for new types of reactors in the interim period before the new guidance is in place, we at the US NRC have reviewed the existing requirements to be able to inform the applicants which of those are applicable to them and for which they may wish to request an exemption to be able to do something different, but equivalent, and we have developed guidance documents for that. Furthermore, we also encourage what we call "pre-application engagement" (some other regulators who engage in similar activities use different terms for them, such as "vendor design reviews" in case of the CNSC and the GDA in case of the UK ONR). During this process, it is possible to work with the regulator to address the differences in the existing requirements and the proposed new technologies, so that, when an application is submitted to the

regulator, a clear understanding between the applicant and the regulator as to what's expected is already in place, which facilitates an effective and efficient review of the application.

Q.: Have you come across any specific challenges already while developing the new regulatory framework?

BWS: For example, in many proposed designs the reactors are smaller, in SMRs and even microreactors, and more reactor manufacturing is taking place in a factory as opposed to it being built and assembled on site. Some designs considered are those where the entire reactor will be fully assembled, even possibly fuelled, at a factory, maybe even tested in a factory and then transported to where it is going to be used and installed in place at this new site, and also potentially moved from one location to another. These are things that nobody had thought of with the existing large light water reactors and that the regulators should have the ability to address.

Q.: And will these issues have important implications for siting and for the emergency preparedness and response?

BWS: They will indeed. As the regulator, we are beginning to consider and adopt methodologies on how the safety of facilities with much smaller emergency planning zones (EPZ) can be demonstrated, including instances where it may be at the actual site boundary. And we believe that this can be possible, for example, with some of the new types of fuels, like the TRISO fuel that really does not release much material at all in case of an accident. If applicants are able to demonstrate that they can have an EPZ at the site boundary, they may be able to, from the siting perspective, locate their facilities closer to communities and closer to some of the industrial facilities for which their reactors will provide process heat or steam for various processes. And this is a significant difference when compared to the existing nuclear fleet and will present a challenge going forward in terms of the public trust. With facilities in those areas, much closer to the population, it would be a priority for regulators to contribute to developing public trust. The issue of trust will also be of paramount importance for the embarking countries, whereby this will be their first nuclear reactor, and it will be located closer to or in the population centres.

Q.: With respect to the embarking countries, many of whom are seriously considering new technologies, including SMRs, it is important to have access to the expertise from countries with established nuclear power programmes. What role, in your view, the SMR Regulators' Forum can play in this respect?

BWS: I agree that the more experienced regulators are able to support the emerging ones, and it is important that they do so. In terms of the bilateral assistance, for example, the US NRC, with over 50 years of experience, has been working with the Polish regulator, the National Atomic Energy Agency, with a view to assisting them with their preparations for their first nuclear power plant through training and capacity-building. Furthermore, when it comes to doing the actual review of applications, we may be able to provide embarking countries with assistance in conducting such reviews by either sharing with them the reviews that we have done already, or, if the design is new for both countries, by conducting a joint review. Of course, none of the regulators have unlimited resources, but we are trying to make sure that we support them as much as we can within the resources that we have available.

As far as the SMR Regulators' Forum is concerned, one of the most important activities of relevance are Forum's regional educational workshops (EWS). These workshops aim to enhance the knowledge of regulatory bodies on challenges identified by the Members of the SMR Regulators' Forum in regulating SMRs and to inform changes, if necessary, to the existing requirements and regulatory practices. These workshops also serve as an opportunity to stimulate exchange of information and experience between participants and lecturers from the Forum and from the IAEA, and, even more importantly, among the participants themselves. They are primarily targeted at regulatory bodies of

countries embarking on a nuclear power programme or those expanding their nuclear power programmes and considering deployment of SMRs. The first EWS was held in 2021 in Jordan, and two were delivered in 2022 (Australia and Argentina) and in 2023 (Morocco and Czechia). The latest EWS in Czechia was also the largest to-date, with almost 40 participants from 17 countries. Two further workshops, focused on the Forum's Phase 3 outputs, are planned for 2024: Brazil (October) and India (December).

The SMR RF, which is a regulator-to-regulator entity, currently has 11 Members, and one of its main objectives is developing common positions based on identification and discussion of key safety issues that may challenge regulatory reviews associated with SMRs, including, if possible, approaches to their resolution. These common positions, which form the basis of the Forum's reports, are presented at the regional educational workshops, but they are also used by the Forum's Members themselves to inform review and development of their own requirements and guidance.

Q.: The SMR Regulators' Forum is also co-operating with the IAEA within the framework of its Nuclear Harmonization and Standardization Initiative (NHSI). Could you please explain what role the Forum plays in this respect?
BWS: Given the Forum's previous work and the expertise and experience of its Members, in June 2022 the Forum was invited to lead the work of one of the working groups of the NHSI Regulatory Track. Since July 2022, the Forum has been leading the NHSI Working Group (WG) 3 tasked with developing processes for leveraging other regulatory bodies' reviews and for enabling regulators to work together during ongoing regulatory reviews. The Forum's Licensing Issues Working Group has served as the main organizational modality for the NHSI WG3, with its focus, membership and schedule adjusted accordingly. The main output of the WG3, in the form of a draft IAEA TECDOC, is expected by the end of 2024.

In general, harmonization and standardization can be helpful in a number of ways. While full harmonization of regulatory requirements is a goal that may not be achievable, countries can and do work together to resolve some of the differences in requirements thereby enabling a safe and secure deployment of the same design in several jurisdictions. The role of the pre-application engagement I have mentioned earlier is also important in this respect, as involvement with the regulator early in the process allows for clarity regarding the expectations for the application and for addressing some of the challenges associated with the new designs.

I believe that, ultimately, the regulators also need to see the bigger picture, that is, the potential role of the effective and efficient deployment of SMRs in addressing the climate change, and to recognize the need to innovate. They need to consider the ways in which their review processes can be made more effective and efficient too, the ways in which their policies and practices can change to further facilitate pre-licensing and licencing reviews while ensuring adequate levels of safety and security.

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