

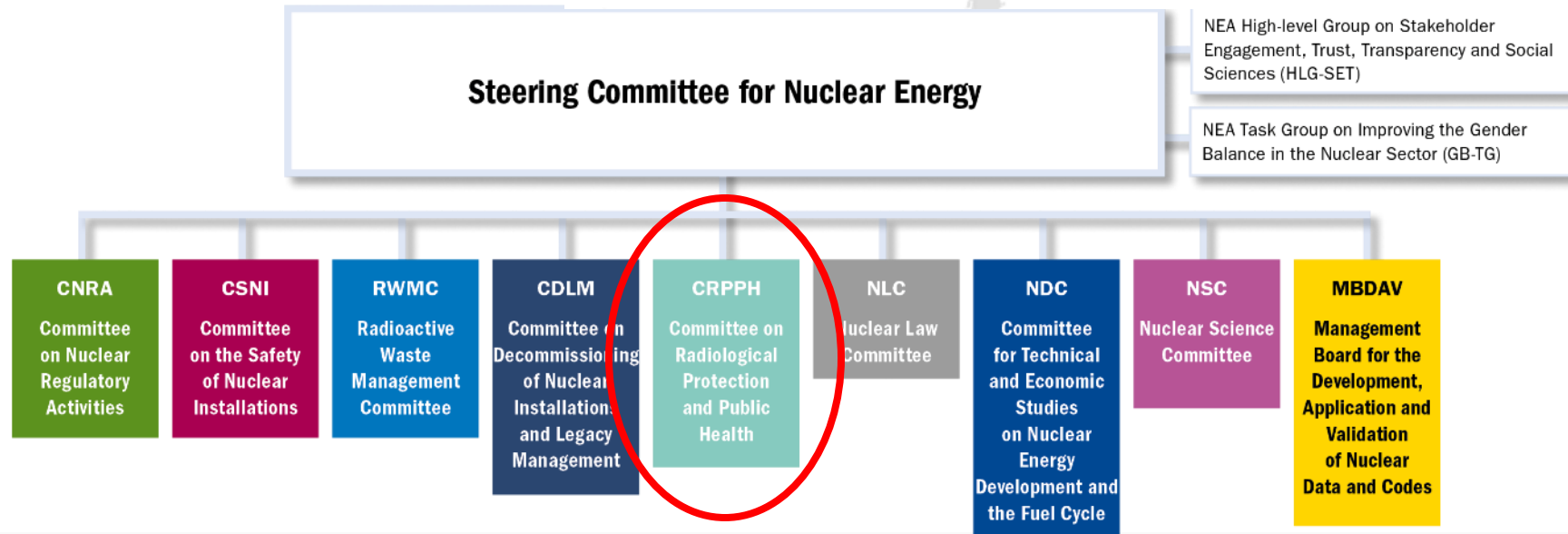
Enhancing Emergency Preparedness for Small Modular Reactors: A Graded Approach

Mike Webley – Radiological Protection Specialist / NEA Secretariat



NEA: A Global Platform for Nuclear Collaboration

- Founded in 1958
- 34 member countries
- 8 standing technical committees and 1 management board
- ≈ 74 working parties and expert groups
- ≈ 18 international joint projects



Background: Governance and mandate for SMR EPR work



WPNEM-49 Meeting, London (UK), 15–17 October 2024

TFSMR Recommendations

Considering prioritisation and insights from international SMR initiatives, ten RP challenges were analysed by TFSMR to develop recommendations.

Tasks

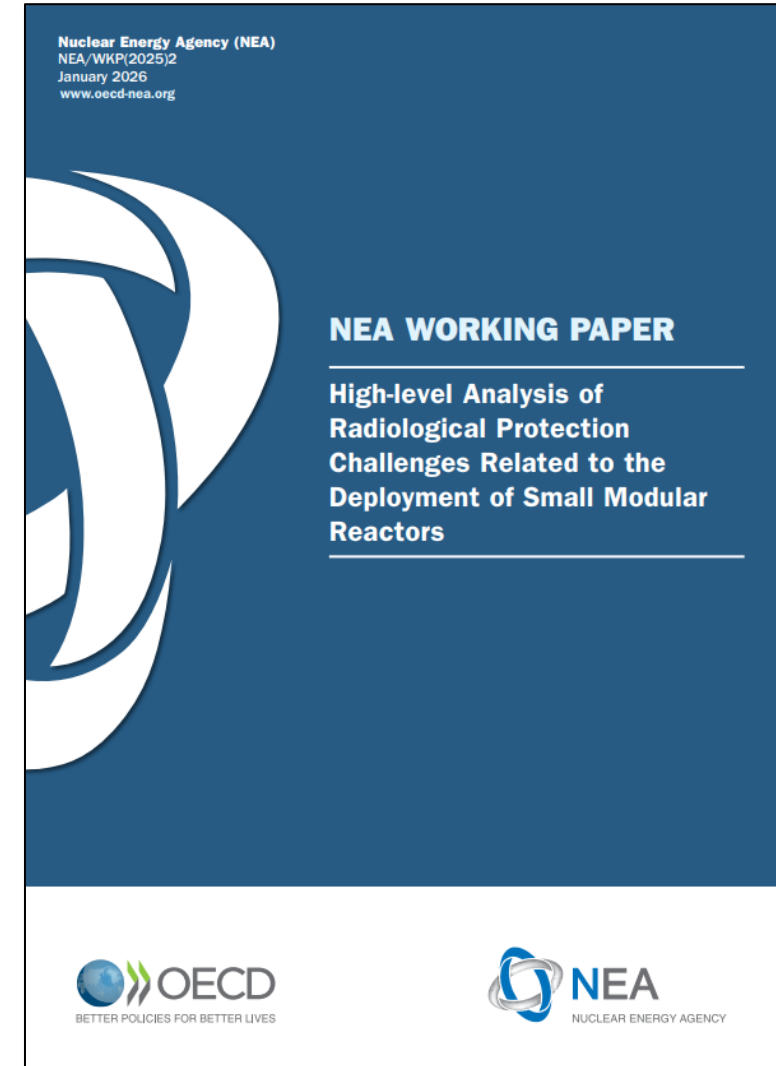
- Study **EP and protection strategies for SMRs**, including regulatory graded approaches.
- Develop a **risk-informed RP approach** for exposure optimisation in SMR design, licensing, and operation, considering different operating and maintenance regimes.
- **Develop guidance** for public communication of SMRs, addressing technology novelty, unconventional siting, and stakeholder engagement.

Supporting activities

- Publish **TFSMR High-Level Analysis Report**.
- Organise a **workshop for RP experts and SMR stakeholders (designers, operators, regulators) to share outcomes and raise RP awareness**.
- Enhance exchange with **EGSMR and FG-BEAR** and share information from the **SMR Regulators' Forum and NHSI** with NEA expert groups to improve RP issue awareness.

CRPPH-82 Agreement and Working Paper

- CRPPH **acknowledged** the Task Force efforts in suggesting actions for more in-depth analysis and highlighted the importance of integrating RP considerations early in the design phase, fostering collaboration among stakeholders
- **Approved** the publication of High-Level Analysis Working Paper
 - Published on NEA website January 2026
- **WPNEM Approved** the creation of a new Expert Group to address graded approaches for EP and SMR protective strategies → EGEPsMR kicked off in February 2025

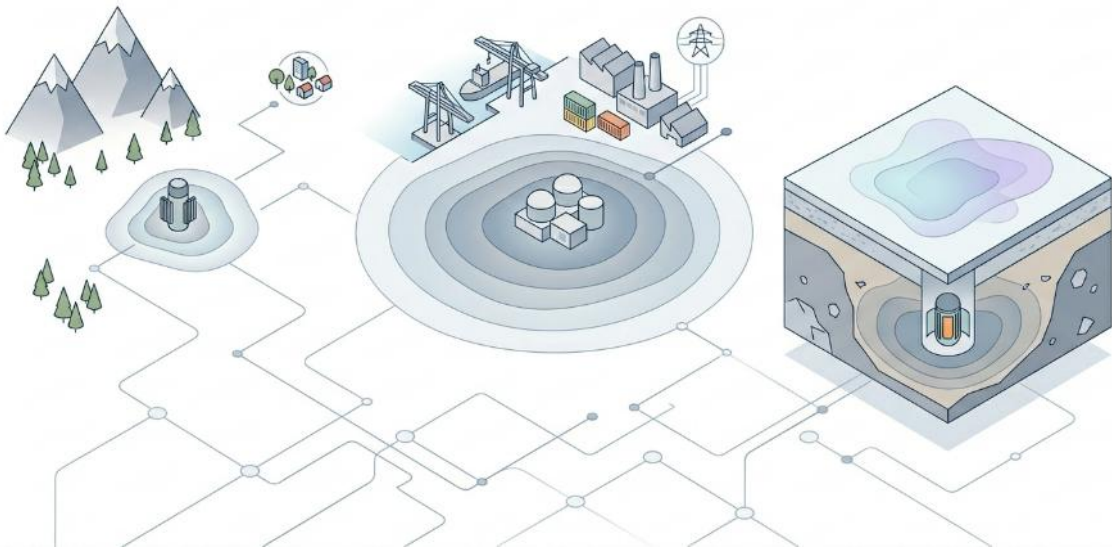


Collaboration with other NEA Divisions



- Supported the EGSMR's **"SMR Safety Assessment: From Challenges to Achievements"** workshop in November 2025
- Organised and hosted a breakout session on **'SMR siting plans: proximity to population and industrial processes'**
- Feedback includes risk acceptance is not just scientific; it needs to be acceptable by society. It is a constant conflict between what is desirable and what is possible
- **Draft EGSMR report** in production

Why SMRs challenge classical EPR assumptions



SMRs challenge several foundational assumptions underlying traditional emergency preparedness and response:

- **Design diversity**
- **New siting concepts**
- **Variable consequence profiles**

Example:

- **Fukushima:** fixed EPZs may not fully capture accident complexity
- **SMRs:** tailored EPZs and response timelines

Graded approach framework translated into practice

Graded approach as an analytical lens

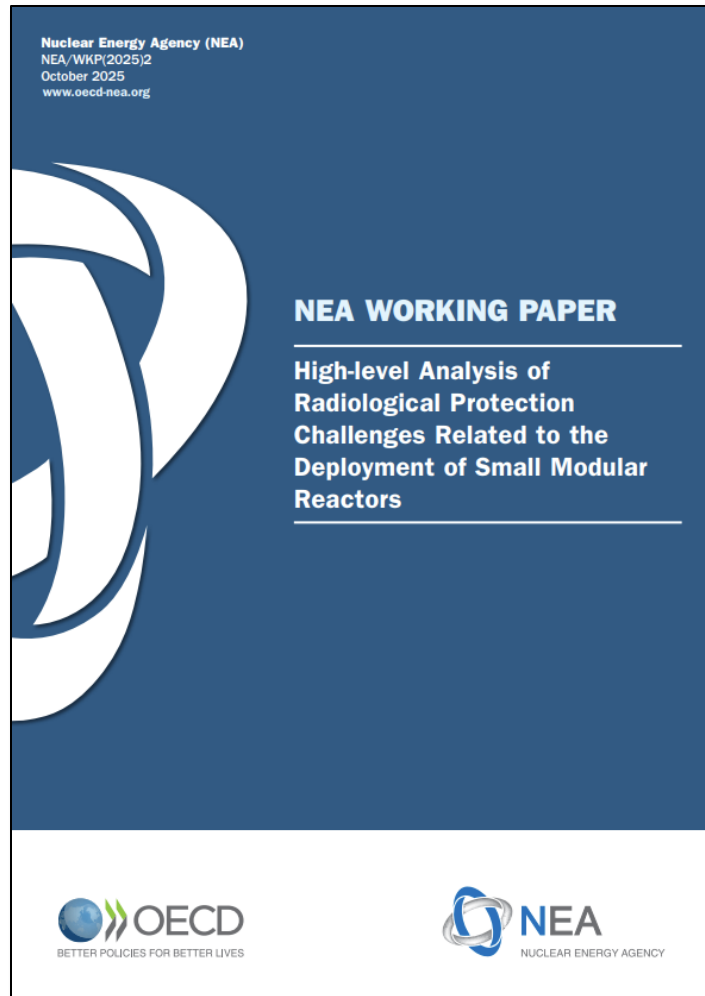
- **Not simplification, but differentiation**
- **Risk-informed, evidence-based**
- **Applicable across technical and organisational layers**

How graded approach shapes this survey

- **Parallel question sets**
- **Focus on scaling logic**
- **Capturing patterns, not compliance**



Backbone of the Survey



4.7. Emergency preparedness and response (EPR)

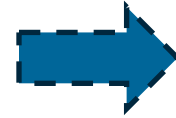
EPR has been identified by other international SMR initiatives, but the TFSMR considers that sizing EPZs is overly emphasised. The TFSMR considers the actual RP-related challenge for SMRs to be the management of accident scenarios. Attention should be put on effectively addressing accident situations where protection strategies different from those in place for large reactors (LRs) may be required. Canada, the United Kingdom and the United States presented their graded approaches to EP at the WPNEM annual meeting in November 2023, so comparing regulatory approaches to EP for SMRs is beneficial.

The TFSMR also discussed:

- There is a lack of educational materials about SMRs that are targeted at emergency managers, public officials and the general public.
- An overview report on graded approaches to EP in various countries is necessary.
- Conceptualising high-level approaches to protective action is valuable.

Objectives per EGEPSMR Mandate

- **To identify and define the technical basis dedicated to EPR for SMRs.** The survey should determine whether the implementation of existing EPR requirements adequately covers SMRs.
- **To collect information on protection strategies for emergencies.** The survey should allow for the identification and implementation of a graded approach.



To understand how EP looks like today, and how it will be applied for SMRs

To understand how the accident characteristics were considered to establish protection strategies and how it will be for SMRs

Refined Objectives for the Survey

- **To understand** existing regulatory framework and its graded approach for EPR on different types of nuclear facilities and/or activities
- **To examine** the extent of a graded approach in use for existing commercial nuclear power plants in consideration with their safety enhancements and technological advancements
- **To explore** current and future national plans and strategies on EPR for SMRs

Scope *but, don't worry!*

EPR Requirements

- General information on NPP/SMR deployment

Planning basis

- Legal basis for EPR
- Hazard assessment incl. EPZ determination

National Protection Strategy

- Reference levels/Does limits/Generic criteria/Operational criteria
- Predetermination of protective actions
- Emergency classification

Emergency Planning

- EROs and staffing/Emergency facilities, equipment and resources
- Accident assessment
- Notification and communication
- Implementation of protective actions
- Training

Verification

- Review and approval of E-Plan
- Inspection programme

Graded Approach for Large NPPs

Survey Structure

- Structured as a **multiple choice, checkbox survey** with an option to provide free text responses where appropriate
- Designed to allow participants to respond **easily and quickly**

It asks how emergency preparedness looks.

No specific examples, values, procedures, methods, or technical data are requested.

EPR Requirements

Planning basis

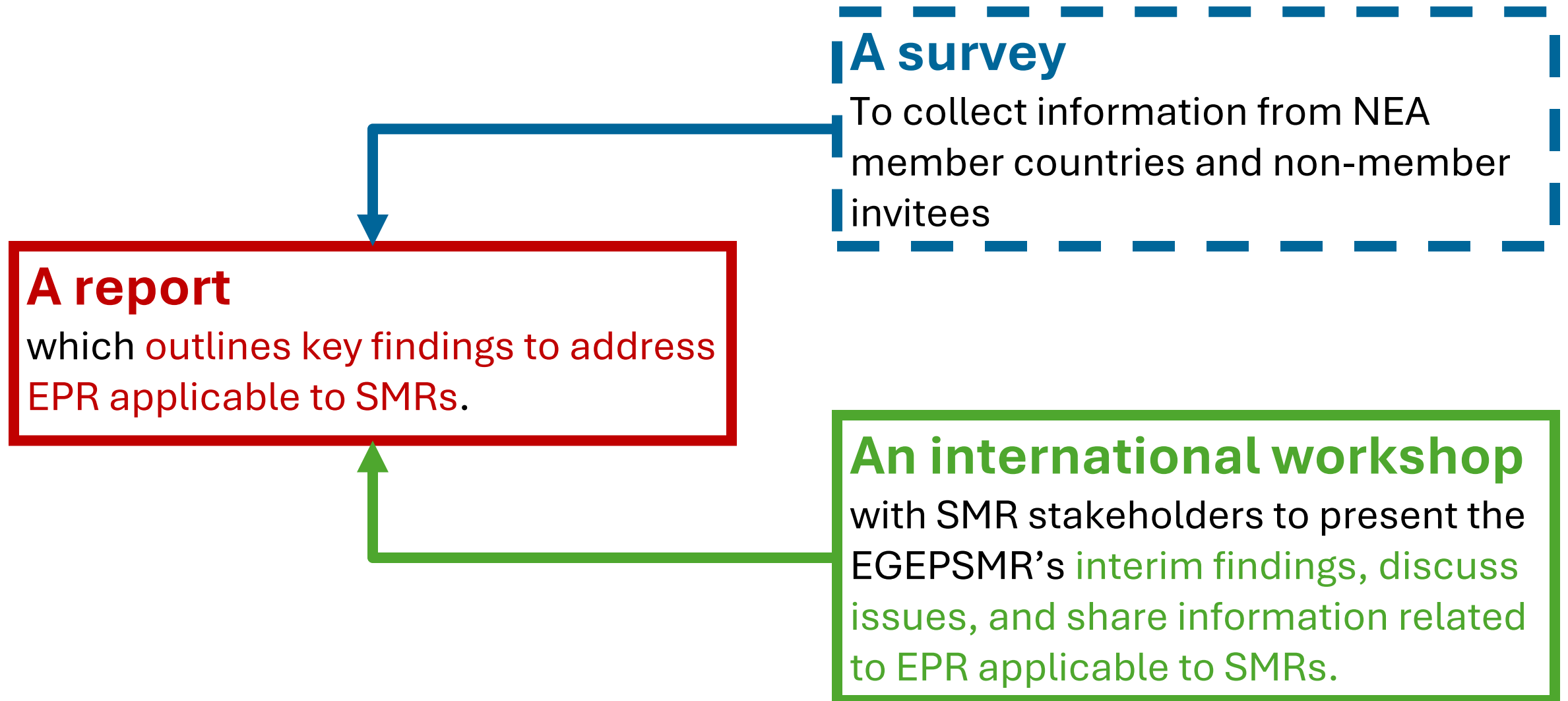
National Protection Strategy

Emergency Planning

Verification

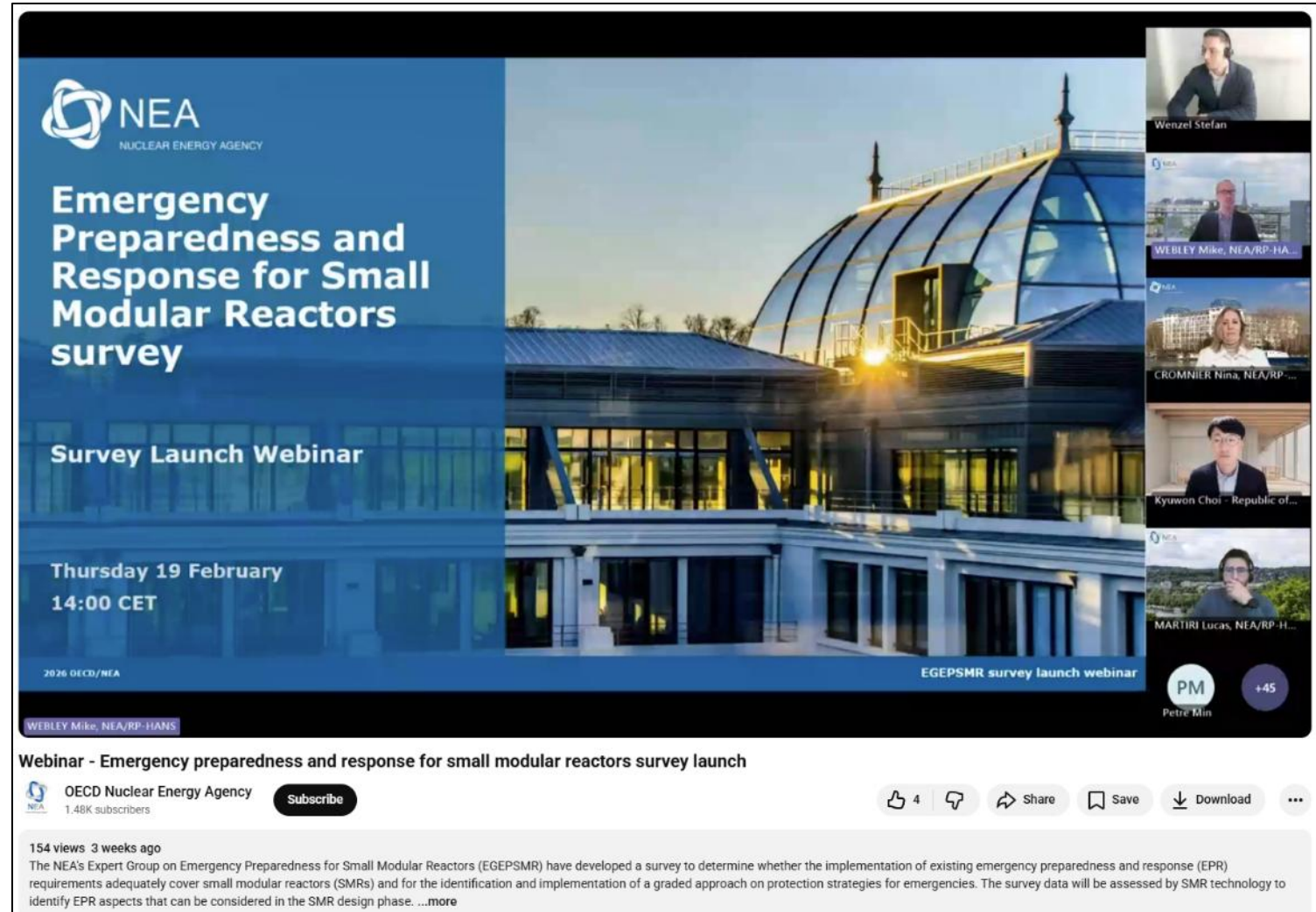
Graded Approach for Large NPPs

Deliverables



Survey launch webinar

- **Launch webinar** on 19 February:
 - 105 registrants
 - **80 attendees**
- The **recording** from the webinar is on the survey host webpage and the [NEA OECD YouTube channel](#):
 - **180+ views**



Survey webpage



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Published date: 19 February 2026 |

Emergency preparedness and response Radiological protection Radiological protection in nuclear or radiological emergencies ...



Contact

press@oecd-nea.org



The NEA has launched a survey to determine whether the implementation of existing emergency preparedness and response (EPR) requirements adequately cover small modular reactors (SMRs).

The survey has been designed with the following objectives:

1. To understand existing regulatory frameworks and their graded approach for emergency preparedness and response for different types of nuclear facilities and/or activities;

Responses and analysis

- Responses from **25** countries
- NEA Member and Invited Countries
- Closed on **20 March 2026**
- **Current EGEPSMR activities:**
 - Analysis of the responses
 - Development of the report
 - Planning for an international workshop



Survey analysis

- **Key questions to be addressed**

- **Current EPR Frameworks vs. SMR Application**

- ❖ Facility/activity categorisation for a graded approach.
- ❖ Emergency planning standards (i.e. regulated areas) and methods for application (i.e. prescriptive vs. performance-based)
- ❖ Roadmaps for EPR for SMRs

- **Planning basis (i.e., EPZ, time, material) & Protection Strategies**

- ❖ Planning basis for existing facilities/activities and roadmaps for SMRs

- **Approach to analysis:** Adapted to type of question and nature of responses

- **Noting trends** in EPR for SMRs in member countries and non-member invitees
- **Analytical interpretation** on complex areas (e.g., protection strategies, application of a graded approach)

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Graded Approach for Large NPPs

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Workshop - Palace of the Parliament, Bucharest, Romania



- **4 to 6 November 2026 following WPNEM-51.**

- **Day 1:**

- International Framework for EPR: Set the global policy and regulatory context.
- National Approaches to the Graded Approach: Share experience with graded emergency planning.
- Survey Results – Key EPR Elements: Structured findings from the survey.
- From Large Reactors to SMRs – What Changes? Identify key technical and regulatory shifts - Panel discussion.

- **Day 2:**

- SMR Technologies and EPR Implications: Link SMR design characteristics to EPR needs.
- Risk Communication and Stakeholder Engagement: Address the role of communication and trust in right-sized emergency planning.
- Case Study Breakout Sessions - Unique EPR challenges associated with SMRs.
- Towards Recommendations: Develop preliminary conclusions for EGEPSMR work.

- **Day 3:**

- Optional site visit, subject to confirmation.





Thank you for your attention

Please contact mike.webley@oecd-nea.org if you have any questions or comments.