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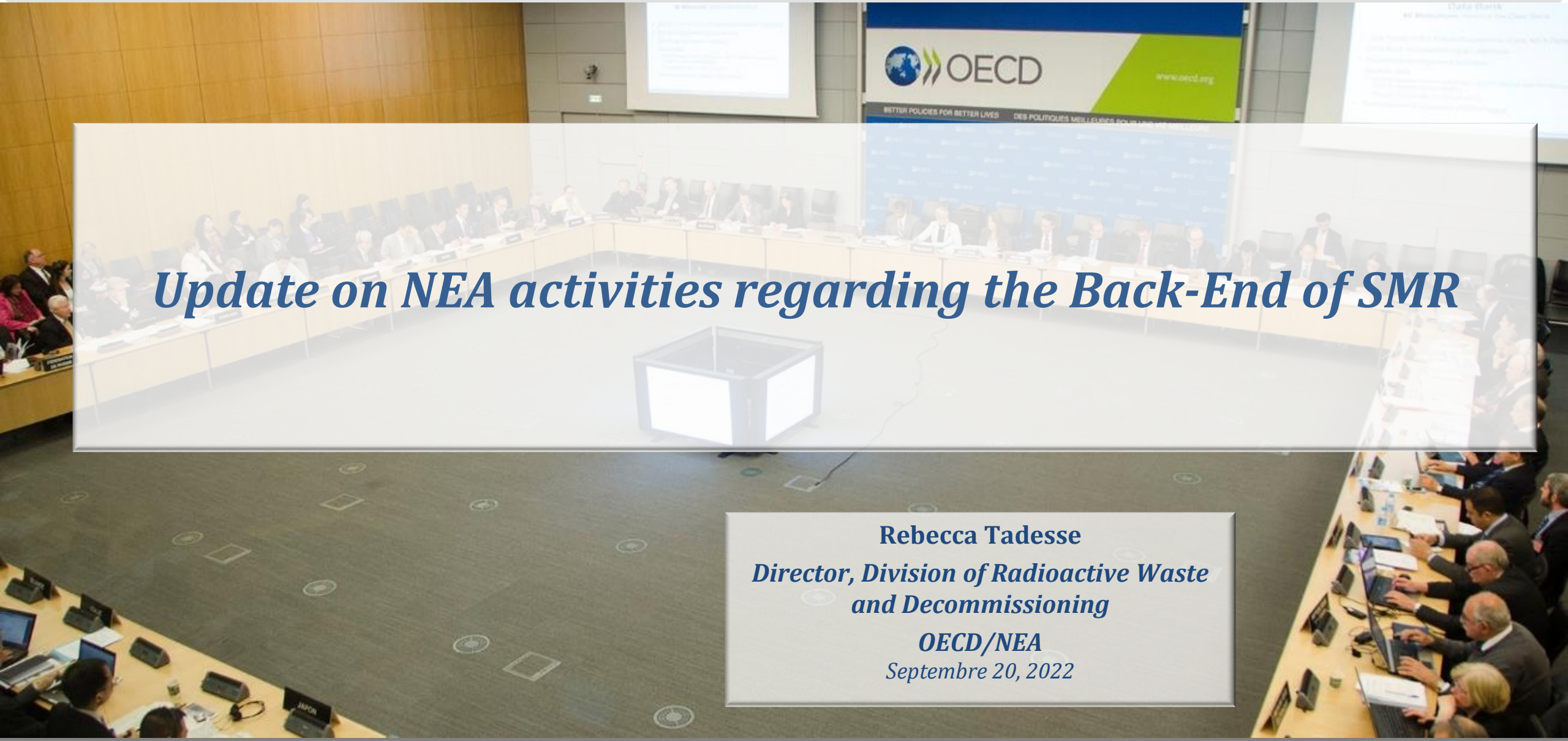
Nuclear Energy Agency

NEA
NUCLEAR ENERGY AGENCY



Update on NEA activities regarding the Back-End of SMR

Rebecca Tadesse

Director, Division of Radioactive Waste and Decommissioning

OECD/NEA

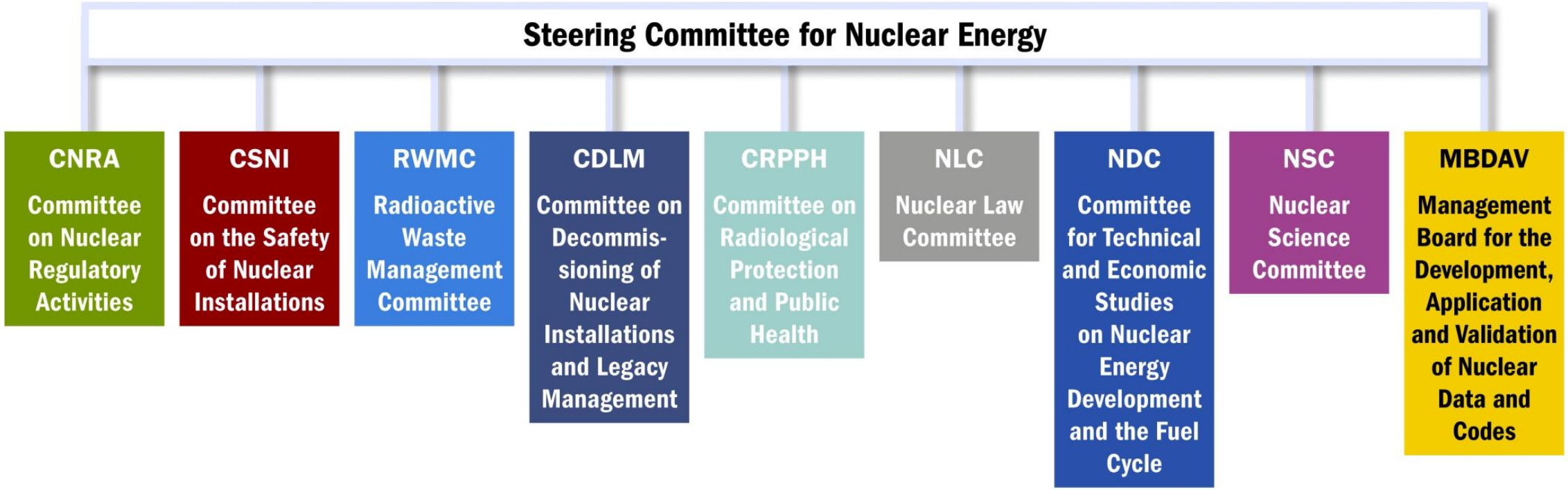
Septembre 20, 2022

The NEA: 34 Countries Seeking Excellence in Nuclear Safety, Technology, and Policy

- 34 member countries + strategic partners (e.g., China and India)
- 8 standing committees and 75 working parties and expert groups
- The NEA Data Bank - providing nuclear data, code, and verification services
- 23 international joint projects
- Growing global relationships with industry and universities

NEA countries operate about 84% of the world's installed nuclear capacity

NEA Standing Technical Committees



The NEA's committees bring together top governmental officials and technical specialists from NEA member countries and strategic partners to solve difficult problems, establish best practices and to promote international collaboration.

Recent Developments in the Division for Radioactive Waste Management and Decommissioning

Radioactive Waste Management Committee (RWMC)

- Regulators' Forum (RF)
- Forum on Stakeholder Confidence (FSC)

Integration Group for the Safety Case (IGSC)

- Working Group on the Characterisation, the Understanding and the Performance of Argillaceous Rocks as Repository Host Formations (Clay Club)
- Expert Group on Repositories in Rock Salt Formations (Salt Club)
- Expert Group on Geological Repositories in Crystalline Rock Formations – Crystalline Club (CRC)
- Expert Group on Operational Safety (EGOS)

Working Party on Information, Data and Knowledge Management (WP-IDKM)

- Expert Group on a Data and Information Management Strategy for the Safety Case (EGSSC)
- Expert Group on Knowledge Management for Radioactive Waste Management Programmes and Decommissioning (EGKM)
- Expert Group on Archiving for Radioactive Waste Management Activities (EGAR)
- Expert Group on Awareness Preservation after Repository Closure (EGAP)

Expert Group on the Application of Robotics and Remote Systems in the Nuclear Back-end (EGRRS)

Expert Group on Building Constructive Dialogues between Regulators and Implementers in Developing Disposal Solutions for Radioactive Waste (RIDD)

Committee on Decommissioning of Nuclear Installations and Legacy Management (CDLM)

Joint Project

CPD

Co-operative Programme for the Exchange of Scientific and Technical Information on Nuclear Installation De-commissioning Projects (CPD)

Working Party on Technical, Environmental and Safety Aspects (WPTES)

Working Party on Management and Organisational Aspects (WPMO)

- Expert Group on Costing for Decommissioning of Nuclear Installations and Legacy Management (EGCDL)

News

Expert Group on Holistic Process for Decision Making on Decommissioning and Management of Complex Sites (HDCS)

RWMC Ad-hoc Group on the Extended Storage and Transportation

- RWMC Ad-hoc Group on the Extended Storage and Transportation (AhGEST) was established by the RWMC in 2021

- Objectives:
  - Reviewing and analysis of available sources (reports, standards, articles, etc.);
  - Identification of gaps and topics to be elaborated;
  - Consideration of existing codes and models to predict RW and SF evolution during long-term storage as tools helping to meet the requirements of extended storage periods;
  - Development of proposals to the RWMC on further actions;
  - Consider issues related to the transport of RW/SF (within the site of storage, from the storage site to the next destination).

- Activity: Workshop on sustainability of the extended storage and transportation of RW/SF within the national RWM programme – *2023 (TBD);*

AhGEST Conclusions

Among the objectives identified for further investigation:

- There exists a wide range of specialised tools and analyses for certain areas of the fuel cycle (looking at optimised operation, optimised loading of final disposal canisters with respect to maximum heat per canisters, etc.).

  ❑ For a more advanced view on the whole life cycle, the development of tools for "whole-systems-analyses-and-optimisation" with integrated interfaces to established tools for "specialised-optimisation-problems" and including also economic viewpoints might be worthwhile.

- Need clarity in respect to the end-point of the storage. Storage (even extended) is an interim stage of RW/SF management and it is necessary to identify appropriate timescales and the purpose of RW/SF storage.

  ❑ Develop a criteria-based approach as an alternative or complementary description of the extended storage.

- From the point of view of organisational framework, need to ensure that the extended storage does not lead to the appearance of a new legacy.

Extended Storage and Transportation

- Among the objectives identified for further investigation:

  - ❑ consideration of existing codes and models to predict RW/SF (including new types of fuel and high burn-up levels) evolution during long-term storage to meet the requirements of extended storage periods

Current Subgroups, working on areas of interest to build up future collaboration:

1. SFCOMPO TRG (Technical Review Group for the International Assay Data of Spent Nuclear Fuel Database)
2. SG 10 on Nuclear Data Uncertainties Quantification on Spent Fuel Inventory
3. SG 12 on Decay Heat of Spent Nuclear Fuels

Other topics proposed

- Cross-disciplinary approach calling for broad, interagency collaboration

Technical/technological	1.1.	Facility conditions
	1.2.	Packages
	1.3.	Information – Data – Knowledge management in the long-term perspective
	1.4.	Transportation
Safety	2.1.	Regulating of extended storage and transportation
	2.2.	The safety case for storage and transport (interconnection of safety cases for stages of RWM)
	2.3.	Store
	2.4.	Package and content
	2.5.	Disposal solutions vs integrity of fuel (assembly vs container vs super-container disposal)
	2.6.	Retrievability/recoverability – (assembly-level vs container level) – common understanding is needed

Economics	3.1.	Cost of storage and relevant activities (repackaging, handling, etc.)
	3.2.	Robustness of the storage concept
	3.3.	Countries leaving the nuclear industry and extended storage
	3.4.	Insurance issues during transportation
Stakeholders' confidence	4.1.	Public acceptance/confidence of the extended storage
	4.2.	Consent-based siting of extended storage
The organisation of the RW management programme	5.1.	Avoiding the legacy situation appearance
	5.2.	Link with the next step (processing, disposal, etc.)
Policy and legal aspects	6.1.	Existence or absence management strategic solutions for some types of RW
	6.2.	The unknown endpoint of extended storage

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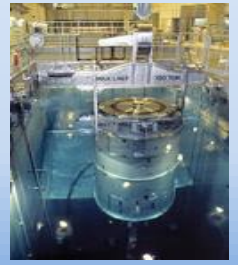
Workshop: on the Management of Spent fuel, Radioactive Waste, and Decommissioning in SMRs/Advanced Reactor Technologies

7 – 10 November 2022, Ottawa, Canada

- To better understand how radioactive waste management and decommissioning should be considered as part of a more comprehensive preparation for these reactors' deployment from the design stage.
- To understand unique features of SMR waste and the key questions that need to be answered to ensure a path to final disposal.
- To review current challenges in decommissioning and provide lessons learned to avoid similar challenges in the future.
- To better integrate educational institutions and engage with interested communities early in the processes.
- To better understand how the current regulatory framework should be considered in the early development of SMR and advanced reactor technologies.

SMR conceptual illustration, CANDU Group

NUWARD conceptual illustration, EDF



Workshop Programme Plan

Session 1: Understanding of the functioning of major SMR/ Advanced Reactor technologies and Fuel Cycles

Session 2: Storage and Transportation of spent fuel and Radwaste in SMR/Advance Reactor design

Session 3: Radioactive Waste and Decommissioning consideration in SMR and Advanced Reactor

Session 4: Key Considerations for Communities, Indigenous peoples and Stakeholder involvement

Session 5: Closing Remarks

- ✓ **Desired Outcome:** a guideline **document** that captures **key elements of considerations** that will need to be **considered early in the design phase** aiding in the licensing process and future decommissioning and waste management activities.

Additional Information: Visit our website: https://www.oecd-nea.org/jcms/pl_69716/

Session 1: Understanding of the functioning of major SMR/Advanced Reactor Technologies and Fuel Cycles

1.1 Overview of mature SMRs/Advanced Reactor Technologies and associated fuel type

1.2 Key Attributes of SMR/Advanced fuel type and design consideration and implications for decommissioning and radioactive waste management

- TRISO particles, gas cooled reactor
- TerraPower — Sodium cooled fast reactor
- Terrestrial Energy — Molten salt
- New Brunswick Power Plant (NBP)
- NUWARD
- Lead cooled fast reactors

1.3 Perspectives from students/young generation

1.4 Panel discussion on key takeaways and recommendations

Session 2: Storage and Transportation of spent fuel and Radioactive Waste in SMR/Advanced Reactor design

2.1 Overview of work activities on Fuel Storage and Transportation

2.2 Technical and economic feasibility of radioactive waste, as well as storage and transport of reprocessed fuel based on reactor type (closed-loop fuel cycle)

2.3 Perspectives from students/young generation

2.4 Panel discussion on key takeaways and recommendations

Session 3: Radioactive Waste and Decommissioning in SMRs/Advanced Reactors

3.1 Licensing and Regulatory requirements of Spent Fuel and waste management for SMRs/Advanced Reactors

3.2 Operational and design optimization consideration related to Decommissioning and Radioactive waste management for SMRs/Advanced Reactors

- **Roundtable Discussion** related to waste implication from deployment of SMRs/Advanced Reactor Technologies

3.3 Operational feedback on managing and disposal of existing waste streams and how some of these concepts can be applied in future endeavors, such as SMRs/Advanced Reactors

3.4 Perspectives from students/young generation

3.5 Panel discussion on key takeaways and recommendations

Session 4: Key Considerations for Communities, Indigenous Peoples and Stakeholder involvement

4.1 Indigenous community/Tribal Nation perspectives on the potential deployment of SMR and Advanced Reactor Technologies

4.2 Good practices on stakeholder engagement and dialogue including the intergenerational aspect of SMRs/Advanced Reactors

4.3 Perspectives from students/young generation

4.4 Panel discussion on key takeaways and recommendations

Session 5: Summary and Closing Remarks

Site visit to Chalk River

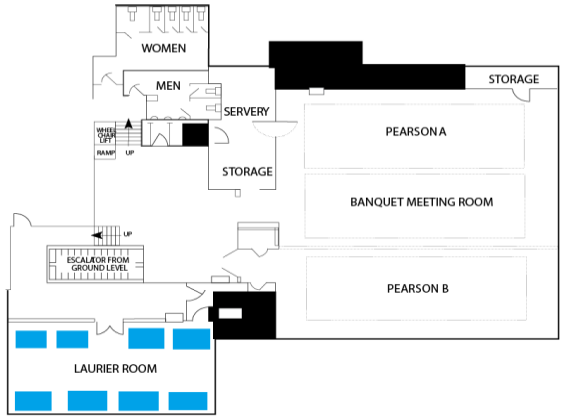
– Last day, 10 November 2022

Additional Information: Visit our website

Workshop Sponsorship/ Exhibition Details

- The exhibition space includes **one table and two chairs** in the Laurier Room next to workshop room
- Exhibition booths available during the workshop **starting on 7 November 2022**
- The exhibitor fee:
  - **EUR 5,000** - exhibition booth and the sponsor's logo on all printed material
  - **EUR 2,000** - logos on the printed material only

LORD ELGIN Hotel - Ottawa



Please get in touch before **25 September 2022** if you are interested in having your logo included in the workshop materials.

❑ smr-workshop Email address: smr-workshop@oecd-nea.org

Thank you for your attention

More information @ **www.oecd-nea.org**

All NEA reports are available for download free of charge.

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