



# ERDO Association Annual Report 2023

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## Introduction

The ERDO Association was established in Vlissingen, the Netherlands, by Dekom (Denmark), NND (Norway) and COVRA (Netherlands). The ERDO Association continues the work of the ERDO Working Group, following the preparatory work based on the outcome of the SAPIERR projects, organised by the Arius Association and funded by the European Commission. Arius Association was dissolved 2023; however, all the IP developed in Arius is available to ERDO.

The ERDO Association was founded to allow organizations to work more closely together on the common challenges in managing radioactive waste safely by sharing knowledge, implementing joint projects and promoting multinational waste management solutions internationally.

## Organization

### Board and Secretariat

The Board members are: Ewoud Verhoef (COVRA, President), Ole Kastbjerg Nielsen (Dekom, Vice President) and Nils Bøhmer (NND, Treasurer).

The Secretariat is located in the COVRA offices in Nieuwdorp and its work is performed principally by Marja Vuorio (COVRA), who is also responsible for maintaining the ERDO website ([www.ERDO.org](http://www.ERDO.org)). Independent consultants Charles McCombie and Neil Chapman act as advisors to ERDO, and with the support of Jake Kinghorn-Mills from MCM<sup>1</sup>, assist the Secretariat.

### Members

Entering 2023, the ERDO Members were ARAO (Slovenia), COVRA (Netherlands), Dekom (Denmark), ENEA (Italy), Fund (Croatia), NND (Norway) and ONDRAF/NIRAS (Belgium) with IFE (Norway) as an associate member. In 2023, one new organisation - the Netherlands Organisation for Applied Scientific Research (TNO), joined ERDO as an associate member.

### Meetings

Three Association meetings were organized during 2023. Virtual meetings were held on the 10<sup>th</sup> February and 16<sup>th</sup> November along with a face-to-face meeting in Roskilde, Denmark from 29<sup>th</sup> to 30<sup>th</sup> June. Minutes were sent to participants after the meetings and digital versions are saved in COVRA's documentation system.

In addition, the Board Members met 3 times by video conference.

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<sup>1</sup> MCM Environmental Services Ltd. is a team of radioactive waste management experts, see <https://mcmenvironmental.co.uk/>.

## ERDO Projects

### Legacy Waste Characterization (LWC)

The high-level objective of the ERDO Legacy Waste Characterization project (ERDO LWC Project) is to share state-of-the-art knowledge (i.e., information, techniques, methodologies, and experiences) that is necessary for a thorough characterization of legacy waste, in view of future possible shared management activities or even multinational repositories, following the dual-track approach recognised by the EC Directive 2011/70/EURATOM.

During 2023, the final report<sup>2</sup>, summarizing the results, of the project was published, it is available on the ERDO webpage.

### ERDO-USDOE SMR Study

ERDO and the USDOE work together to promote cooperative activities in a number of areas related to multinational solutions for the management of spent nuclear fuel and radioactive wastes.

An ERDO-USDOE joint study on the potential impacts of Small Modular Reactors (SMRs) on multinational cooperation at the back end of the fuel cycle was kicked off in September 2021. The project research and analysis components are funded directly by the USDOE with support and in-kind contributions provided by ERDO members who provide information and review activities. MCM is the prime contractor carrying out this project. A final report was completed on 31<sup>st</sup> December 2023 and issued to ERDO and USDOE stakeholders for review and comment.

The report considers the multinational aspects of the potential technical, strategic, political and commercial impacts of SMR commercialization on the back end of the nuclear fuel cycle, focusing on Spent Nuclear Fuel (SNF). Using credible SMR designs and hypothetical, but representative, countries, the report explores the potential impact of SMR deployment on opportunities for multinational RWM and Deep Geological Repository (DGR) collaboration. By defining varied Multinational DGR (MNR) models and scenarios, the report explores the potential impact of SMR deployment on the feasibility of a multinational collaborative approach to SNF disposal and upstream enabling activities. The report concludes that widespread deployment of SMRs is likely in the near-term and that SMR deployment is likely to generate increased interest in MNR initiatives. A partnered approach to MNR development is compared with a commercial approach: the former is more likely to involve international SMR technology alignment, requiring strategic engagement prior to SMR deployment; the latter will likely need to allow for the acceptance of multiple SNF types into the MNR design process, thereby introducing additional technical challenges. The greater number and geographical distribution of reactors resulting from SMR deployment will introduce new logistical RWM challenges and raise SNF security and safeguards concerns. However, novel challenges resulting from widespread SMR deployment are not seen as significant blockers to MNR realization. The alignment of upstream activities, the scheduling of waste transports, the varied regulatory regimes, and the legal status of importing or exporting radioactive waste for disposal are key topics requiring further study.

A final version of the report will be published on both the ERDO and USDOE websites.

### ERDO-NEA MIRA Project

In late 2022, ERDO initiated efforts to establish a project focusing on A Multinational Infrastructure for Managing Radioactive Waste (MIRA). A project proposal was shared with the NEA in spring 2023, with follow-up engagement. In summer 2023, ERDO drafted a 'flyer' to generate interest and communicate

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<sup>2</sup> <https://www.erdo.org/app/uploads/2023/01/ERDO-LWC-Final-Report-Sogin.pdf>



the scope as widely as possible. This led to the establishment of an NEA-led meeting with interested parties on 10<sup>th</sup> January 2024 to progress the project.

### DG-ENER Project

In 2023, the European Commission Directorate-General for Energy (DG ENER) initiated steps towards establishing a strategic project aimed at evaluating European Union Member State positions on the feasibility of the dual-track approach to geological disposal. Throughout 2023, ERDO communicated requests to be involved and engaged as part of the specification development and/or assignment of contract/delivery organization and/or delivery of the project. ERDO's view was referenced in specification documents prior to a closed set of organizations being invited to tender in January 2024.

## Collaboration

### USDOE

A meeting between the ERDO Board, ERDO Secretariat and USDOE took place on 19<sup>th</sup> December to discuss the ongoing ERDO-USDOE Joint SMR Project and to consider potential new projects. Through this session, the close-out process for the SMR Project final report was outlined, in addition to USDOE interest in becoming a contributor to the NEA MIRA project. Follow-ons to the ERDO-USDOE Joint SMR Project were discussed, with proposals shared, but no specific action for a path to initiation has been yet agreed.

### Deep Geo

Following the interest of Deep Geo in becoming a member of the ERDO Association, a meeting between the ERDO Secretariat and Deep Geo took place on 23<sup>rd</sup> October to discuss potential opportunities for collaboration. Through this session, Deep Geo's siting approach and active ERDO projects were discussed in addition to Deep Geo interest in becoming a contributor to the NEA MIRA project. It was agreed that, whereas continued ERDO-Deep Geo communication would continue, membership in ERDO would be inappropriate given the commercial goals of Deep GEO.

### EURAD

ERDO Members are involved in different Work Packages under the European Commission's EURAD Program. In the EURAD Annual Event March 14<sup>th</sup> to 16<sup>th</sup> 2023, Ole Kastbjerg Nielsen gave a talk about "shared solutions, needs and challenges for SIMS" in a panel session on benefits of joint programming.<sup>3</sup> On day two of the event, Marja Vuorio and Ole Kastbjerg Nielsen participated in a breakout session about improving cross-border cooperation – "How can more advanced and early-stage programs work together towards a common goal?" Marja Vuorio participated in Topical sessions on Waste Acceptance Criteria and gave end-user feedback on the results. In addition, Marja Vuorio gave presentation about ERDO in WP ROUTES meeting in November.

### IGD-TP

As a member of Executive Group (EG) of IGD-TP, COVRA kept the EG up to date on ERDO's interests and activities and provided information on IGD-TP's activities to ERDO members.

### Deep Borehole Disposal Center (DBDC)

DBDC an independent, nonprofit organization that aims to advance the maturity of the safety case for deep borehole disposal and the technical readiness levels of the disposal concept was launched 2023.<sup>4</sup> COVRA, DEKOM and NND decided to participate DBDC work and share the costs of the membership fee.

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<sup>3</sup> <https://www.ejp-eurad.eu/sites/default/files/2023-05/Summary%20EURAD%20third%20annual%20event.pdf>

<sup>4</sup> <https://www.deepisolation.com/press/the-deep-borehole-demonstration-center-launches-today-at-waste-management-symposia-in-phoenix-arizona/>



## Papers and Presentations

To publicize the ERDO-USDOE Joint SMR Project paper was submitted and a presented:

- Jake Kinghorn-Mills, Neil Chapman, Leon Kegel, Charles McCombie, Sean Tyson, *How Will Backend Issues Affect The Global Deployment Of SMRs?*, NENE Conference, Slovenia, 2023

Publication of paper about MNRs was sponsored by ERDO:

- Chapman N., McCombie C., *Multinational repositories (MNRs) highlight the need for transnational information management in geological disposal*, *Frontiers in Nuclear Science* article June 2023, <https://www.frontiersin.org/articles/10.3389/fnuen.2023.1208524/full>

ERDO was represented through members of the ERDO Board and ERDO Secretariat at the IAEA International Conference on the Safety of Radioactive Waste Management, Decommissioning, Environmental Protection and Remediation from 5<sup>th</sup> to 11<sup>th</sup> November. ERDO was represented through two presentations:

- “The ERDO Programme for Enhancing International Cooperation at the Back-End of the Fuel Cycle”, M. Vuorio, N. A. Chapman, C. McCombie, E. Verhoef.
- “Multinational Disposal Solutions Require Alignment of Policies, Strategies, Legislation and Regulations”, C. McCombie, N. A. Chapman, L. Kegel, E. Verhoef, M. Vuorio.

World Nuclear Association’s Sustainable Used Fuel Management Working Group invited ERDO to give a presentation about our activities on used fuel management work in their meeting in Hague on April 17. Marja Vuorio gave the presentation.