

EURAD Final annual event

23-25 APRIL, HOTEL PULLMAN, BUCHAREST (ROMANIA)



The final annual event of EURAD was held last week, in Bucharest, from 23-25 April, gathering over 190 participants from more than 20 countries.

The first part of the event was dedicated to strategic and student sessions, highlighting how the joint programme helped not only the Member States, but also the students and organisations, regarding RWM. These sessions additionally emphasized the added value of the joint programme.

Cutting-edge scientific results were presented on a second part of the event, as well as a focus on specific technical achievements within EURAD.

Finally, all the different WPs of EURAD shared their key conclusions with the participants.

Furthermore, this final annual event of EURAD marked the announcement of EURAD-2, part of the EURATOM programme, as of next October.

38 presentations were held in 20 sessions, and 32 posters were displayed across these 3 days.

A look back:

[Training on Requirements management system](#) – p3

[MODATS final annual meeting](#) – p4

[Information & Discussion Session on IDKM](#) – p5

[ROUTES final meeting](#) – p7

[ICS final workshop](#) – p8

[MAGIC closure meeting](#) – p9

[GAS/HITEC Final workshop](#) – p10

[Now published](#) – p11

[Follow us](#) – p15

[EURAD-2 kick-off meeting](#) – p15



A big thank you to all the participants who attended the event, and to everyone who has contributed on the 5-year joint programme of EURAD!



A look back:

EURAD training on Requirements management system

16-18 JANUARY, BUDAPEST (HUNGARY)

Training Course on Requirements Management – successful involvement of end-users

EURAD WP 12 GUIDANCE is devoted to activities consisting of developing a comprehensive suite of instructional guidance documents that can be used by Member States with RWM programmes.

With the new course of work, WP12 involves interested end-users in the step of document production (common workshops, meetings with authors, training). In the frame of such interactions, end-users have the opportunity to ask questions, provide comments and try to implement received knowledge practically, which provides additional benefits.

In January 16-18, 2024, connected to the drafting process of three guidance documents on “requirements management”, the Hungarian WMO (PURAM) hosted a training course on the Application of Requirements Management System in Budapest. Trainers and trainees came from 15 countries with different levels of advancement on RWM programmes.

During the first day of the course, strategies, methods and tools on requirements management as well as the development, planning and use of requirements management were explained and illustrated.

Then, during the second day, the possible application of these strategies and methods was illustrated. Examples and lessons learnt on requirements management systems in Finland, Sweden and the UK were presented.

Finally, on the last day, a group discussion on the practical implementation of a stylised requirements management system was conducted.

The course enabled its participants to get a deeper insight to methodological and applied aspects. It should be noted that the proposed end-user engagement format has shown benefits in transferring knowledge and building a community of end-users. The feedback from the course participants was generally positive and some suggestions were made to further improve the course if it is organised in a future EURAD implementation phase.





A look back:

MODATS final annual meeting

19-22 MARCH, AIX-EN-PROVENCE (FRANCE)

The MODATS Final Annual Meeting was held from 19 to 21 March 2024 at the Le Grand Hôtel Roi René in Aix-en-Provence, France.

This meeting was held in person, although some participants joined and/or contributed remotely online. It included MODATS partners from Waste Management Organisations (WMOs), Technical Support Organisations (TSOs) and Research Entities (REs).

The meeting has been elaborated to work on the conclusions of the WP for each task and to discuss the synthesis report.

A field visit to ITER (International Thermonuclear Experimental Reactor) in Saint-Paul-les-Durance was held on the afternoon of 19 March. With a comprehensive presentation of this ambitious energy project, the present construction status of the world's largest tokamak was explained to the audience. ITER is an international collaboration of 35 countries and designed to demonstrate the feasibility of fusion at a large scale, with a reactor device, whose plasma is capable of producing a positive net energy for longer periods of time.



Regarding the main challenges of the physical process, the material science and the integrated technologies are enormous and require an impressive logistic for the construction of the buildings, the infrastructure, and the experimental device itself. After the outstanding presentation and an active Q&A discussion, the participants were invited to follow a tour of the whole worksite, visiting the Poloidal Magnetic Field Coils facility, the Assembly Hall, and the Tokamak itself. The construction site and the large scale of the components of the tokamak highly impressed the visitors, who could ask all their questions to a very competent guiding team composed of real ITER scientists.





A look back:

EURAD Information & Discussion Session on IDKM

8 APRIL

Successful Information and Discussion Session on the DI Document on Information, Data and Knowledge Management (Domain 7.2.2)

On April 8, 2024, EURAD hosted an insightful session on the Domain Insight (DI) document on *Information, Data, and Knowledge Management (IDKM)* ([Domain 7.2.2](#)). The event featured presentations by József I. Fekete (PURAM), Ulrich Noseck (GRS), and Vincent Maugis (Andra). Jointly organized by WP13 *Training and Mobility* and WP11 *State-of-Knowledge*, this session highlighted a significant collaboration between the EURAD KM programme and NEA's Working Party on Information, Data and Knowledge Management (WP-IDKM).



7.2.2 Information, Data and Knowledge Management, Domain Insight

Effective management of knowledge, information, and data is crucial in radioactive waste disposal and decommissioning. These processes generate vast amounts of information over long periods, necessitating that this data remains accessible and comprehensible across generations. The NEA's Radioactive Waste Management Committee (RWMC) established the WP-IDKM in 2019 to address these challenges. WP-IDKM includes experts from 26 organizations across 11 NEA member countries and the European Union.

The EURAD's information & discussion session (IDS) provided an overview of WP-IDKM's activities including:

- *Predecessor Initiatives*: Participants learned about past NEA efforts like the Preservation of Records, Knowledge, and Memory (RK&M) project and the Radioactive Waste Repository Metadata Management (RepMet) program.
- *Current Working Areas*: Insights were provided into the ongoing work of the Expert Groups on Knowledge Management (EGKM), Archiving (EGAR), and others. Attendees discovered the challenges and opportunities identified by the EGKM, along with their completed KM Guidance document. They also explored the EGAR's concept of a Set of Essential Records (SER) and how organizations are implementing it.
- *International Cooperation and Future Plans*: The session kept participants informed about WP-IDKM's future activities, conferences, and dissemination events.

Eighty participants registered, reflecting strong interest in improving knowledge management in radioactive waste management. The session included a one-hour presentation and a one-and-a-half-hour interactive discussion, enabling attendees to engage with the presenters and the expert panel for Q&A, which included Alyssa Clark Chardon (LANL), Alexander Carter (Nuclear Waste Services), Chris Russell Camphouse (Sandia), Stephan Hotzel (BASE), and Takeshi Ebashi (NUMO).

We extend our sincere gratitude to József I. Fekete, Ulrich Noseck, Vincent Maugis, and all participants for their active involvement, making the event a success.

The DI document on IDKM is available on the [EURAD webpage](#), EURAD wiki, [Zenodo](#), ProjectPlace, and the [INIS repository](#) from the IAEA. For those who missed the live session, the recording are available on the EURAD School website.



kA look back:

ROUTES final meeting

APRIL 9

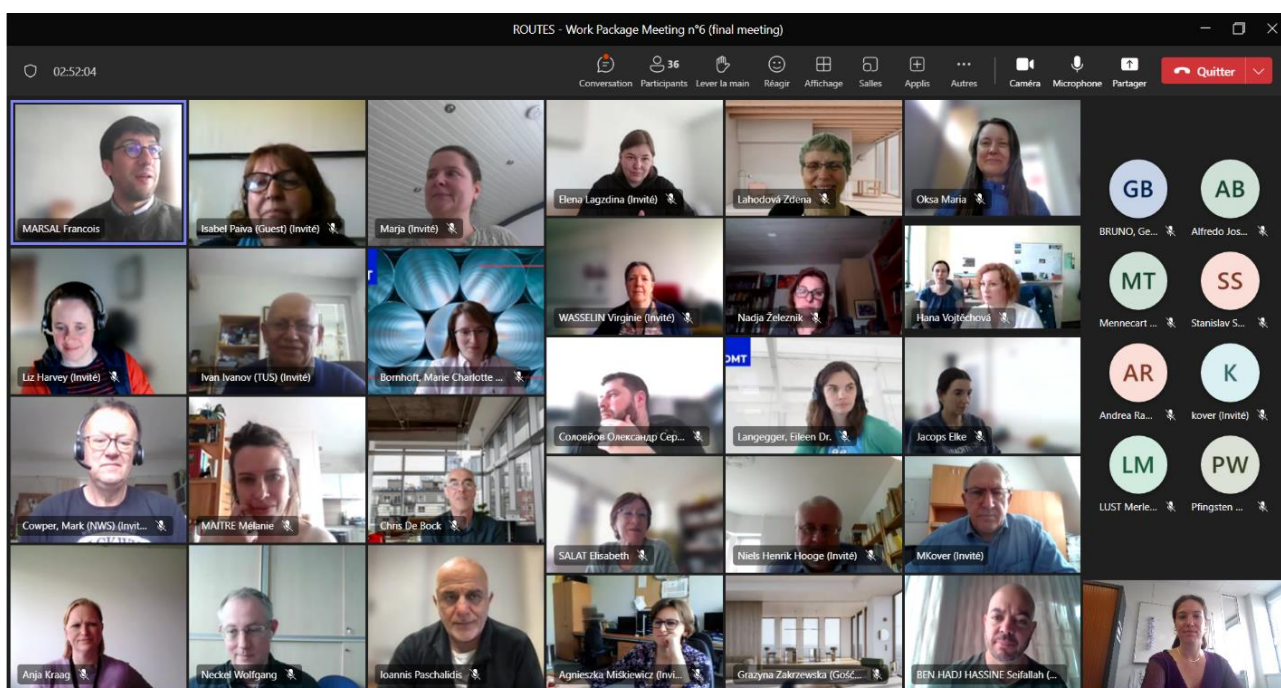
Waste management routes in Europe from cradle to grave (ROUTES)

On the 9th of April, ROUTES partners have gathered one last time to conclude this strategic study initiated five years ago.

In the area of addressing radioactive waste challenges in Europe, the ROUTES Work Package (WP) has produced significant results besides recommendations. It enabled a comprehensive understanding of challenges related to predisposal issues at the European level as well as enabled to facilitate the sharing of knowledge and technologies. It gave an opportunity for underrepresented voices to tackle their own challenges and access potential solutions, and offered civil society representatives to bring their own perspective. Through networking, valuable connections were built that emphasized the importance for Small Inventory Member States (SIMS) to work with Large Inventory Member States (LIMS). Moreover, the work has led to the identification on one hand of potential stakeholders who are tackling similar waste-related challenges, and, on another hand, the identification of potential customers interested in developing innovative treatment approaches for such waste.

Furthermore, the implemented initiatives have enhanced visibility on crucial topics, such as shared solutions. This visibility has created opportunities for partnerships, especially with countries that may lack the resources to join the European Repository Development Organization (ERDO) association, which focuses on advancing shared waste management options including disposals, to get up-to-date information on the latest developments in this field. By fostering these collaborations, the ROUTES WP aims to promote global cooperation in effectively addressing the complex issue of radioactive waste disposal.

Finally, the ROUTES WP enabled the identification of twenty-two recommendations on Research and Development, strategic studies, and knowledge management activities for future European collaboration, some of these recommendations will be pursued in the next phase of EURAD.





A look back:

ICS final workshop

APRIL 10-11, CELICA HOTEL, LJUBLJANA, SLOVENIA

The Task 8 of PMO Work Package n°1 has organised a 6th and last hybrid Interaction with Civil Society (ICS) workshop in Slovenia (Ljubljana) during April 2024. It was the opportunity for the participants to exchange on the results of ICS activities in EURAD. The ICS workshop n°6 gathered 23 participants, 10 online and 13 physically, including representatives from every EURAD colleges.

The workshop contributed to envision better ways to stimulate and dynamize the interactions with the civil society and technical partners in EURAD and to share the results in the fruitful and sustainable way. Using the lessons learned from the previous ICS workshop from EURAD the workshop was organised in a topical way using cross-cutting topics addressed in the different WPs.

Here is the list of topics addressed:

- [Intergenerational stewardship](#);
- [Digital visualisation](#);
- [Shared culture for safety and security](#);
- [Triple wing model](#);
- [Evaluation and charter for fruitful interactions](#).

Finally, in the afternoon of the last day some time was allocated to a visit of the following nuclear facilities: Central Interim Storage Facility (ARAO) and Information Centre (JSI) which helped the participants better understand the challenges of a so-called Small Inventory Member State (SIMS) such as Slovenia.





A look back:

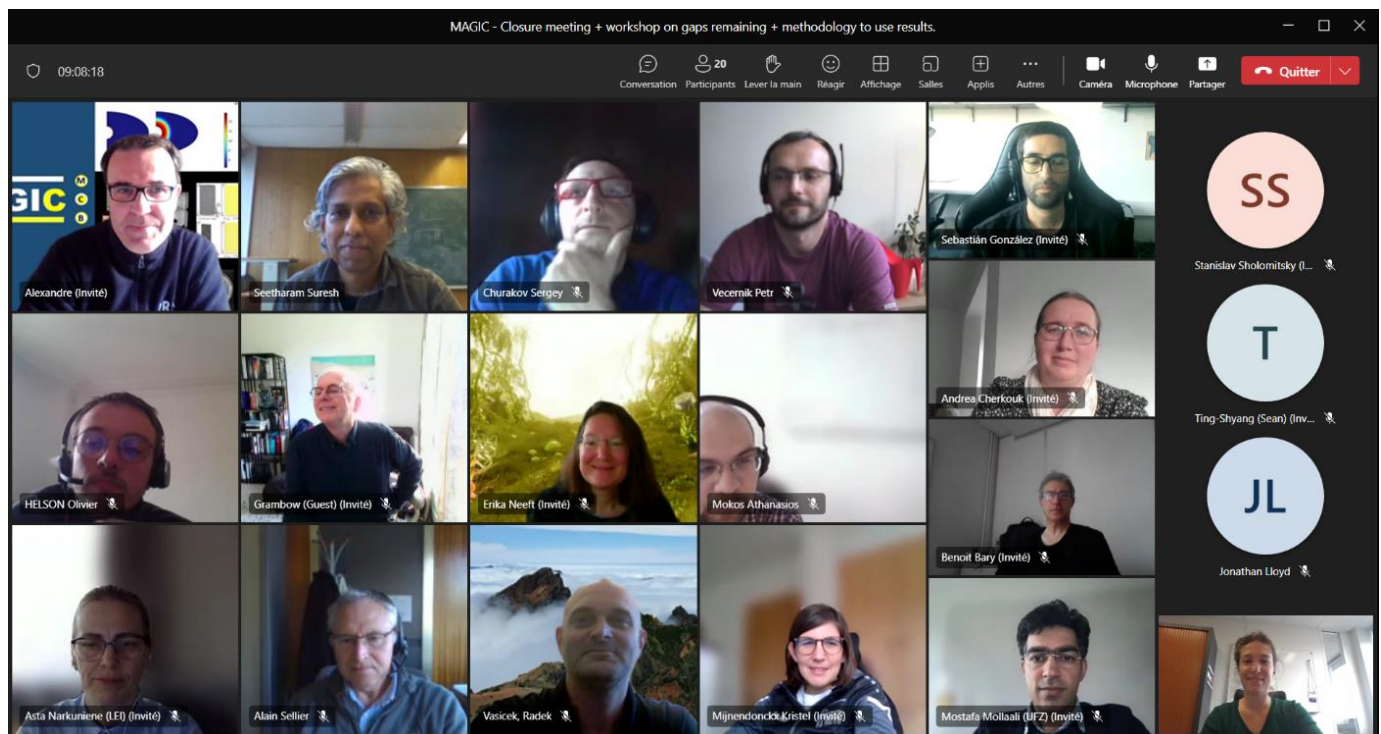
MAGIC closure meeting

11 APRIL

MAGIC aimed to assess the impact of all disturbances encountered by a cementitious structure throughout its lifecycle in a geological repository for radioactive waste disposal. The work package specifically focused on the chemo-mechanical aging of concrete under chemical and microbiological stress through experimental studies and modeling. This interdisciplinary approach, crossing multiple fields, was a first on the scale of an international project requiring the coordination of specialists who had often never worked together before.

The MAGIC community held its final meeting on April 11. This event enabled each task to highlight the key results achieved over the course of the work package. Discussions were also held on feedback from modelers on the use of the experimental data produced, and on the remaining gaps in our understanding of chemo-mechanical ageing of concrete, particularly in terms of modelling.

The results led to the production of 8 public deliverables, enabling real progress in understanding and modeling the chemo-mechanical aging of concrete. For example, these include the modeling of atmospheric carbonation and its consequences in terms of cracking via couplings between mechanical and geochemical codes, the potential fragility of low-pH concretes compared to Portland concrete in function to the conditions tested, the chemo-mechanical modeling at the scale of structures, and the identification of favorable conditions for microbial activity in cementitious materials in function to the environmental conditions.





A look back:

GAS/HITEC Final workshop

26 APRIL, HOTEL PULLMAN, BUCHAREST (ROMANIA)

On Friday 26 April 2024, EURAD-GAS and HITEC have organised their final workshop together after the last annual EURAD event in Bucharest. This workshop was a great success, with more than 50 participants in person and about 10 online.

During the workshop, participants presented the progress made during the five-year programme in the understanding of temperature and gas transport processes and their consequences in and around a geological repository. They also communicated key messages to the end users and explained how the results of the work packages could be integrated in repository design. Questions raised during the discussion helped to clarify some of the final conclusions.

The WP leaders would like to thank the European Commission for funding this project. EURAD has enabled people dealing with the same issues to collaborate and progress together. It has also allowed some of the tacit knowledge of experts in these fields to be captured in the deliverables generated, which are targeted at different types of end-users.

This spirit of collaboration will continue beyond EURAD.





Now published

ACED

- Updated State of the Art on the assessment of the chemical evolution of ILW and HLW disposal cells (D2.2) - [Link](#)
- Final technical report on the steel-clay material interactions (D2.7) - [Link](#)
- Final technical report on the steel-cement material interactions (D2.9) - [Link](#)
- Intermediate level radioactive waste packages (D2.13) - [Link](#)
- Results of modelling and recommendations for future experimental and numerical work (HLW disposal system) (D2.14) - [Link](#)
- Description of ILW modelling results and recommendations for future experiments and numerical work (D2.15) - [Link](#)
- Report on the integrated model for assessing the chemical evolution in a disposal cell on the simulations with a reactive transport model of the chemical evolution at the disposal cell scale (D2.17) - [Link](#)
- Model abstraction techniques for assessing the chemical evolution at the disposal cell scale and applications for sensitivity and uncertainty (D2.19) - [Link](#)

CORI

- SOTA Update on cement-organic-radionuclide interactions in the context of L-ILW disposal (D3.2) - [Link](#)
- Training materials update (D3.4) - [Link](#)

DONUT

- Updated State Of The Art report (D4.2) - [Link](#)
- Technical report describing numerical method improvement and their transferability in numerical tools as well as benchmark (D4.5) - [Link](#)
- Final report describing improvement and implementation of scale transition methods to model coupled processes (D4.6) - [Link](#)
- Report describing numerical improvement and developments and their application to treat uncertainty when dealing with coup (D4.7) - [Link](#)
- Report describing the result of the machine learning benchmark carried out during the WP DONUT (D4.8) - [Link](#)

FUTURE

- Updated State-of-the-art on the understanding of radionuclide retention in clay and crystalline rocks (D5.2) – [Link](#)
- Final technical report on radionuclide mobility in compacted clay systems and reversibility of sorption (D5.4) - [Link](#)
- Final technical report on radionuclide mobility in crystalline systems (D5.5) - [Link](#)
- Final technical report on reversibility of sorption (D5.6) - [Link](#)
- Final technical report on redox reactivity of radionuclides on mineral surfaces (D5.7) - [Link](#)



Now published

GAS

- State of the Art on Gas Transport in Clayey Materials - Update 2023 -D6.2) - [Link](#)
- Training materials of the 2nd GAS/HITEC Joint training course (D6.4) - [Link](#)
- Final workshop of GAS and HITEC - compilation of presentations (D6.5) - [Link](#)
- Achievements of EURAD-GAS (D6.6) - [Link](#)
- Gas transport mechanisms (D6.7) - [Link](#)
- Technical report on barrier integrity (D6.8) - [Link](#)
- Technical report on conceptualisation and evaluation at the repository scale (D6.9) - [Link](#)

HITEC

- Technical report on thermal effects on near field properties (D7.3) - [Link](#)
- Final technical report on effect of temperature on far field properties (D7.5) - [Link](#)
- Technical report on Material characterisation (D7.7) – [Link](#)
- Influence of temperature on clay-based material behaviour (D7.8) – [Link](#)
- Experimental works (small and mid-scale laboratory experiments) – final report (Results of the experimental works of T3.3) (D7.9) - [Link](#)
- Modelling (D7.10) – [Link](#)
- Guidance for safety case development and repository optimization (D7.11) - [Link](#)

SFC

- Summary of training materials produced during the SFC WP (D8.3) - [Link](#)
- Behaviour of doped UO₂-based model materials as analogues for spent nuclear fuel under interim storage conditions (D8.9) - [Link](#)
- Chemical and structural-crystallographic properties of simulated fuel pellets and irradiated fuel pellets at the cladding (D8.10) - [Link](#)

ROUTES

- ROUTES training materials (D9.1) - [Link](#)
- Recommendations for R&D, strategic study and KM activities (D9.3) - [Link](#)
- Review of characterisation of legacy and historical wastes (D9.8) - [Link](#)
- Suggestions for the management of challenging wastes while maintaining compatibility with options for disposal (D9.9) - [Link](#)
- Case studies on shared solution between Member states (D9.13) - [Link](#)
- Report on the feasibility of developing further European shared solutions for waste management from cradle to grave (D9.14) - [Link](#)
- Implementation of ROUTES ICS action plan second phase (D9.17) – [Link](#)
- Implementation of ROUTES action plan third phase (D9.18) - [Link](#)
- D9.19 Synthesis of Task 7 activities (D9.19) - [Link](#)
- Report on Evaluation of existing predisposal routes for SIMS with regard to disposal options (D9.21) - [Link](#)
- Summary report on analysis, assessment and evaluation of disposal options for SIMS (D9.22) - [Link](#)

Now published

UMAN

- Uncertainty identification, classification and quantification (10.3) - [Link](#)
- Methodological Approaches to Uncertainty and Sensitivity Analysis (D10.4) - [Link](#)
- Views of the different actors on the identification, characterization and potential significance of uncertainties related to human aspects (D10.8) - [Link](#)
- Study on management options for different types of uncertainties and programme phases (D10.11) - [Link](#)
- Identification, analysis and description of preferences of different actors on uncertainty management options (D10.12) - [Link](#)
- Understanding of uncertainty management by various stakeholders (D10.13) – [Link](#)
- Pluralistic analysis of site and geosphere uncertainty (D10.14) – [Link](#)
- Pluralistic analysis of uncertainty management related to human aspects (D10.15) - [Link](#)
- How to manage uncertainties in a pluralistic way and in a long-term perspective (D10.16) - [Link](#)
- Synthesis report of WP UMAN outcomes from a civil society point of view (D10.17) - [Link](#)
- Views of the different actors on the identification, characterization and potential significance of uncertainties on the near-field (D10.18) - [Link](#)
- Identification, analysis and description of preferences of different actors on options for managing uncertainties related to the near field (D10.19) - [Link](#)
- Application of the methods for a pluralistic assessment of uncertainties and their management to near-field uncertainties (D10.20) - [Link](#)

State-of-Knowledge

- Outcomes of the demonstration cases (D11.3) - [Link](#)
- Procedures to Involve Knowledge providers (D11.4) – [Link](#)

Guidance

- PLANMAN Guide - Updated version of the PLANDIS Guide consistent with the EJP Roadmap and including perspectives of the TSOs needs (PLANMAN Guide) (D12.1) - [Link](#)
- Guidance on Developing, Using and Modifying a Requirements Management System for a Generic Waste Management System (D12.6) - [Link](#)

Training & Mobility

- Update on mobility actions performed in EURAD (D13.10) - [Link](#)
- Overview of School of RWM training and mobility activities in EURAD-1 (D13.13) - [Link](#)

Now published

CONCORD

- Updated State-of-the-art of WP ConCorD (D15.2) - [Link](#)
- Updated Training materials (D15.4) - [Link](#)
- Link ovel materials and processes for the optimisation of long-term container performance (D15.6) – [Link](#)
- Elucidation of critical irradiation parameter (D15.7) – [Link](#)
- Synthesis of irradiation results under repository conditions (D15.8) - [Link](#)
- Integration of the findings on the impact of irradiation, dry density and particle size on the microbial community (D15.9) - [Link](#)
- Impact of bentonite-associated oxygen on microbial activity and viability (D15.10) - [Link](#)
- Effect of transient processes on corrosion (D15.12) - [Link](#)
- ConCorD Synthesis Report (D15.14) - [Link](#)

MAGIC

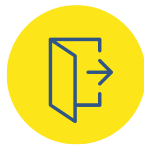
- Updated State-of-the-art report & Summary of major conclusions from the work package (D16.2) - [Link](#)
- Report on bio-chemical processes controlling the evolution of the microstructure and mechanical properties of cementitious materials (D16.4) - [Link](#)
- Initial synthesis of experimental data for calibration and validation of macroscopic models in Task 4 (D16.5) - [Link](#)
- T3-Report on micro scale chemo-mechanical modelling of leaching and carbonation and parameters upscaling (D16.7) - [Link](#)
- Chemo-mechanical numerical coupling development and up-scaling methods (D16.8) - [Link](#)
- Chemo-mechanical processes in safety structures (D16.9) - [Link](#)

MODATS

- Final State-of-the-Art on Monitoring in Radioactive Waste Repositories in Support of the Long-Term Safety Case (D17.2) - [Link](#)
- Advancements in Monitoring Data Management, Modelling and Visualisation (D17.6) - [Link](#)
- Guidance on Quality Assurance Project Plans (QAPPs) (D17.4) - [Link](#)
- Interaction of the MODATS WP with EURAD Knowledge Management Work Packages – Synthesis Report (D17.8) - [Link](#)
- MODATS synthesis: Confidence in Monitoring Data (D17.9) - [Link](#)

Domain Insights

- National radioactive waste inventory (1.4.1) - [Link](#)
- Requirements Management (1.2.6) – [Link](#)
- Technology section (2.1.3) - [Link](#)
- Characterisation (2.2.1) - [Link](#)
- Other wastefoms (3.1.4) - [Link](#)
- EURAD-PREDIS – Storage (2.2.4) - [Link](#)
- Assess the effects of future human actions (4.3.3) - [Link](#)
- Retrievability (5.5.3) – [Link](#)
- Site characterisation and site confirmation (6.2.2) - [Link](#)



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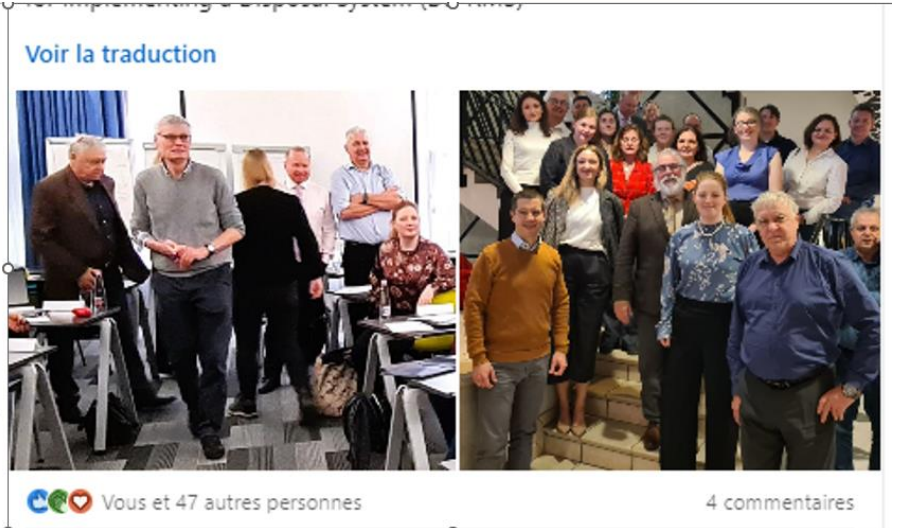
which brings together >1 organisations from 23 countries to discuss the long-term management of radioactive waste.

#ONDRAFIRAS #radioactivewastemanagement #researchanddevelopment #sciences #deepdisposalfacility



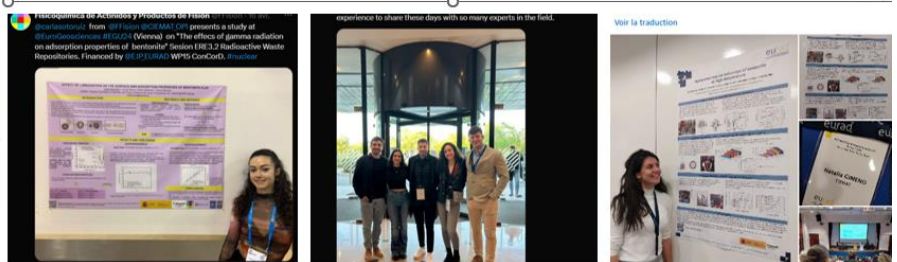
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A look forward:

Save the date for the kick-off meeting of EURAD-2

The kick-off meeting of EURAD-2 will take place near Brussels, in Belgium, during October!

The location and dates of this event will be communicated very soon...!