

## Editorial

It has only been six months since the kick-off meeting, yet EURAD-2 is already making significant progress toward key milestones. The delivery of the first major outputs: State-of-the-Art reports and Green papers has already begun, marking an important step in advancing our collective knowledge and collaboration.

This promising start is largely due to the valuable insights gained from EURAD-1. Several of newly developed State-of-the-Art reports build on previous work from EURAD-1 and PREDIS, and the solid governance structure established from the outset has ensured a stable and effective framework for EURAD-2 activities.

Looking ahead, preparations are well underway for the first annual event which will take place in Bologna, Italy, this September. This event will serve as a key opportunity for participants to exchange knowledge, discuss progress and shape future directions. [Registration](#) is now open to EURAD-2 participants and end-users!



In this second edition of our newsletter, you will find updates on the progress of the Work Packages and Interactions with Civil Society, insights from a WP Leader and a preview of what is coming in the next months.

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## WP Leader interview

Stéphane Brassinnes (ONDRAF/NIRAS, Belgium), DITUSC WP Leader



### **What are the main objectives of DITUSC WP and how will it contribute to the overall success of EURAD-2?**

The objective of this two-year Strategic Study is to evaluate the thermodynamic knowledge relevant to the safety cases relating to the disposal of radioactive waste and to adopt common positions on a series of related topics. This critical cross-disciplinary evaluation, based on the complementary perspectives of the three EURAD-2 Colleges, aims to assess the current limits of knowledge in terms of application of thermodynamic approaches in the Safety Case, to draw up a prioritised inventory of knowledge/data gaps deemed necessary in future safety analyses of radioactive waste disposal facilities, and to promote scientific approaches that would contribute to filling these gaps. The results of the multidisciplinary and transversal interactions that will be carried out over the course of these two years will be summarised in two authoritative (green and white) papers that should enable informed decision-making regarding future R&D actions to be carried out in support of the Safety Case.

### **What excites you the most about leading the WP?**

One of the most exciting aspects of being Work Package Leader in this Strategic Study is to be at the crossroads, ensuring that the respective needs and views of the three Colleges are taken into account in an equitable manner and enabling the development of a common transversal vision based on solid scientific foundations, while keeping an eye on the application in the Safety Case. This aspect is even more reinforced in the international context of EURAD-2, where a large number of partners from different countries interact to facilitate the implementation of a safe and sustainable solution for the long-term management of radioactive waste in Europe.

### **What are the biggest challenges encountered so far in leading the WP?**

The main challenges encountered so far in the WP DITUSC are related to the cross-cutting nature of the interactions and the difficulty in unifying the visions of the different EURAD-2 actors, which at first glance may seem conflicting but which in the end prove to be complementary. This apparent contradiction often stems from the difficulty of reconciling the aspirations of the scientific actors to understand the fundamental aspects in detail and the conservative pragmatic approaches as implemented in the Safety Case. This difficulty is amplified by the fact that thermodynamics is important for a multitude of topics relevant to the disposal of radioactive waste and requires the consultation of a large number of actors. The WP

DITUSC wishes to support the other EURAD-2 WPs as much as possible and include their specific thermodynamic data needs so that the current limits of thermodynamic knowledge do not constitute an insurmountable obstacle in their future modelling efforts.

**What are your hopes for the WP by the end of the first year?**

I look forward to the publication of the Green Paper, which will provide the overall framework for this strategic study, and to the adoption of common positions on key aspects of the use of thermodynamics in the safety case for the disposal of radioactive waste and on key aspects relevant to the sustainable long-term maintenance and development of know-how and related long-term data and knowledge management.

## First Interactions with Civil Society workshop

The first EURAD-2 annual workshop on Interactions with Civil Society (ICS), the so-called ICS workshop, was held on the 24th and 25th of March in Fontainebleau, France.

The workshop comes just on time after the constitution of the Civil Society Larger Group, that contributes to share CS views in addition to the presence of CS experts in WPs. It was the opportunity for the 26 CS members present and for the 11 EURAD-2 partners from all Colleges to meet and frame the different methodologies for ICS activities in EURAD-2, such as the PEP serious games that was very much appreciated at this occasion! This hybrid workshop was also the opportunity for CS members to contribute to the activities (documents or preparation of events) of the following WPs: ASTRA, FORSAFF, CLIMATE and OPTI. This workshop was hosted by the Ecole des Mines de Paris, offering a much-appreciated situation for such an event.



*PEP games*



*ICS participants*

## WP2 Knowledge Management – Recent Highlights

The EURAD-2 Knowledge Management (KM) Work Package has made strong progress in recent months. One of the most notable achievements was the launch of the EURAD-2 Mobility Programme in Month 4, aimed at enhancing knowledge exchange and capacity building across the community. The Mobility Platform officially opened in January 2025 (<https://9695.evalato.com>). The first application deadline was February 28, 2025. Ten complete applications were submitted by that time. The next upcoming application deadlines are April 30, 2025, and June 30, 2025.

Another important milestone was the launch of the EURAD-2 Lunch & Learn sessions, designed to promote knowledge-sharing across the broader community, including stakeholders. The first session, held on 20 March 2025, featured a presentation on “Nagra’s Safety Case for the General License application” and attracted over 220 online participants. This Lunch & Learn session’s recording was published [online](#) on March 26, 2025. The next sessions, planned for 2 and 9 April 2025, will showcase the winning posters from the Clay Conference 2024, highlighting contributions from early-career researchers.

The KM Board is actively collaborating with the Knowledge Ambassadors from all R&D and StSt WPs in EURAD-2, strengthening interactions to build a cohesive approach to knowledge transfer.

A mapping exercise was initiated to identify potential authors and reviewers for new Domain Insight (DI) documents, as well as current training needs across EURAD-2. A survey targeting the Knowledge Ambassadors ran from November to mid-December 2024. These topics were further discussed at the second Knowledge Ambassadors meeting on 28 January 2025, which focused on the production of knowledge documents (DI, SoK, and targeted guidance), the development of training activities, and the shaping of the EURAD-2 Data Management Plan (DMP) – key activities under Task 2.2. This followed the first Ambassadors meeting, which addressed the planning and development of the SotA reports and the Green & White Papers under Task 2.1. KM is targeting producing 10 DIs during the first year.

To support needs-driven guidance development, a second survey was distributed in February 2025 to EURAD-2 partners, stakeholders, and end users. Its goal is to identify priority topics for guidance, and preferred formats to address national programme needs. Over 50 responses have been received - many thanks for the strong engagement with this initiative! The collected input will serve as the basis for launching guidance development in at least two technical areas during the first 24 months of the programme.

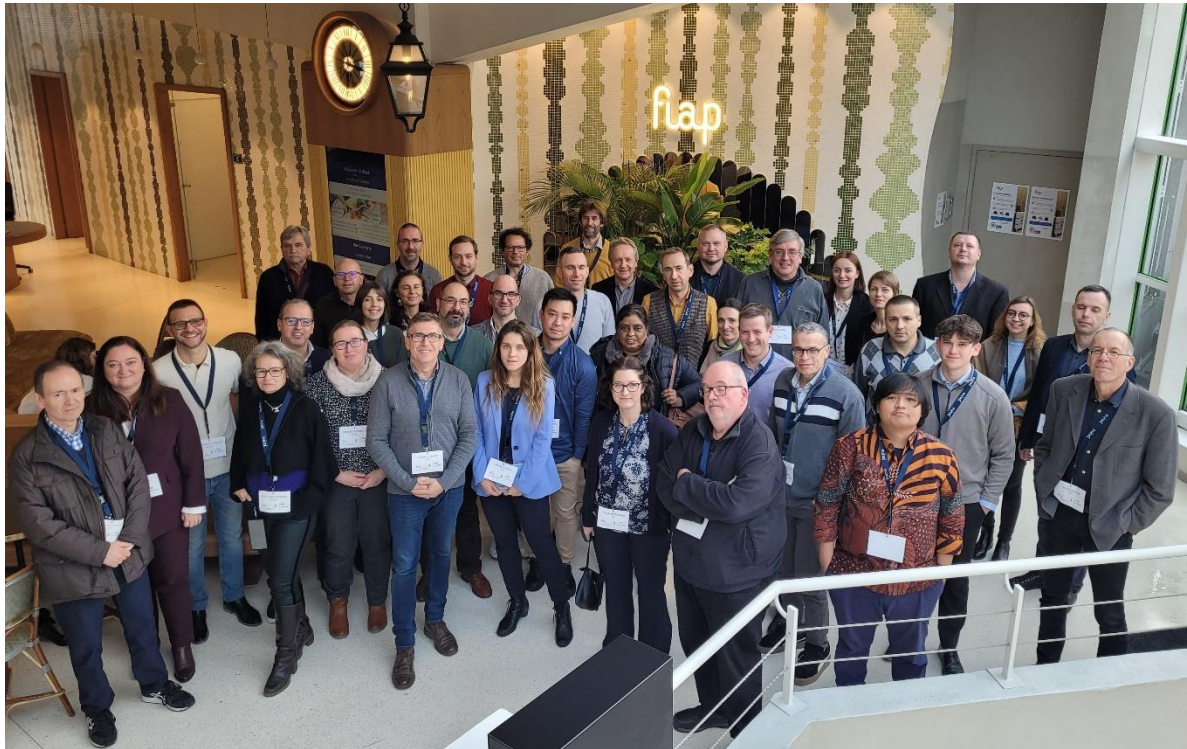
KM Task 5 worked closely with the PMO on drafting the EURAD-2 Data Management Plan, establishing a collective framework for the coordinated and structured management of all data produced within EURAD-2. The document, developed with input from EURAD-1 and PREDIS experience, was submitted for March General Assembly approval.

Last but not least, KM activities and achievements have been gaining international visibility. EURAD-2 was invited to present its KM programme at the 5th Plenary Meeting of the OECD NEA Working Party on Information, Data and Knowledge Management (IDKM), held in a hybrid format in Paris (January). This engagement opens doors for further collaboration with key international organisations in the field.

EURAD-2's KM activities are steadily building momentum and contributing to the long-term goals of building and maintaining competences in radioactive waste management. Looking ahead, the next steps include the third Knowledge Ambassadors meeting (2<sup>nd</sup> April), as well as the EURAD-2 KM Workshop, which will take place on Friday, 12 September 2025 at the EURAD-2 Annual Event.

## WP9 InCoManD: On the Right Tracks!

InCoManD focuses on identifying innovative material solutions for the manufacturing of containers designed for high-heat-generating waste in geological disposal facilities (GDFs). The main objectives of this WP are to identify innovative materials for managing such waste in GDFs, while also enhancing our understanding of more traditional reference materials.



The InCoManD kick-off meeting took place online in November 2024 (as detailed in the 1st EURAD-2 newsletter). During this event, key GDF concepts were presented by leading organisations, and the InCoManD partners shared their expertise and capabilities. The first face-to-face (f2f) meeting, organized by Andra, was held in Paris from January 20-22, 2025. This f2f meeting followed up directly on the kick-off event, allowing partners to present their work plans for the first two years of the project, which were developed based on the kick-off meeting's outcomes. These presentations sparked enriching scientific and technical discussions, fostering new collaborations and strengthening existing ones. Furthermore, members of the Expert Review Group provided valuable feedback to enhance the planned experiments and simulations, particularly concerning adaptations to specific geological disposal concepts.

This f2f meeting was not only a key milestone in the project's implementation, but also a great opportunity for partners to meet in-person. The event, attended by approximately 40 participants, included both technical sessions and informal moments, such as a dinner on the evening of January 21.

The next major event for the InCoManD project will be the annual event in Granada, Spain, scheduled for the fall of 2025, hosted by the University of Granada.

A big thank you to all participants for their dedication and contributions, which ensure the smooth and efficient progress of the project.





## Enhancing the Performance and Resilience of Bentonite Barriers: insights from the ANCHORS Initial State-of-the-Art

In a context of ensuring the long-term safety of deep geological repositories (DGRs) for radioactive waste, the initial state-of-the-art provides a review on the hydraulic, mechanical, and chemical (HMC) evolution of bentonite, aimed at optimizing its use in engineered barrier systems (EBS). As part of the ANCHORS Work Package, this research seeks to enhance the performance and resilience of bentonite barriers.

Bentonite is a key material in national waste disposal programs across Europe. Each National programme may have specific applications, such as:

- Finland, Sweden and Czech Republic: Concepts for spent fuel repositories in crystalline rock, using bentonite as buffer and backfill.
- France & Germany: Sealing and backfill materials in repositories with clay host rock.
- Spain & Switzerland: Bentonite for waste isolation and minimizing microbial activity.
- UK: Research on bentonite's performance in high-salinity environments.

The ANCHORS research aims to deepen the understanding of bentonite's HMC behavior, particularly the impact of alkaline and saline conditions on the hydro-mechanical properties of bentonite. To achieve this, both laboratory experiments and numerical modeling are being conducted at various scales to assess its long-term performance. Efforts are also focused on optimizing bentonite barriers, by addressing heterogeneity, quality control, and refining constitutive models used in performance assessments. Additionally, researchers are working to develop a comprehensive database of THMC(G) properties for different bentonite types and mixtures.

Building on previous research, the THMC(G) laboratory investigations will enable further developing the topic by evaluating long-term experiments and investigating systems with aggregates and chemical loading. A variety of materials using both established and innovative methods will be investigated. Confidence in numerical tools for safety case applications must be enhanced by focusing on large-scale bentonite barriers components. This includes investigating the sensitivity of parameters in the long-term evolution of bentonite barriers, its quantification and propagation of uncertainties carrying out cases that will evolve during the project.

The ANCHORS research initiative plays a critical role in optimizing bentonite barrier designs, ensuring the safe, long-term containment of radioactive waste, and reducing uncertainties in repository performance assessments.

The Initial State of the Art (deliverable 10.1) will be published next month and available on the EURAD-2 website!





SAVE THE DATE

## ANCHORS Summer School



27-29 August 2025



Liège, Belgium



Educational level: EQF Level 7: equivalent to Master degree, post graduate



Deadline for registration: **15 July 2025** Check [EURADSchool website](#) - Maximum of 80 participants – priority given to researchers involved in EURAD-2 until 1 July 2025

At the end of the school, participants will be able to:

- Understand the Thermo-hydro<sup>2</sup>-chemio-mechanical (multi-physical) couplings in geomaterials
- Catch the fundamentals on Constitutive modelling of the relevant phenomena
- Identify the challenges in numerical modelling of these physical processes
- Perceive the experimental evidence at the laboratory scale
- Figure out the physical processes thanks to in situ tests.

## WP11 CLIMATE

As the Ecole des Mines de Paris is involved in the CLIMATE WP, the first Task 5 workshop was organised in their Fontainebleau site on the 26th and 27th of March, just after the ICS workshop.

That articulation of the two events on the same site contributed to enhance Civil Society participation in the workshop. A technical visit regarding Climate change impacts on erosion rate for surface facilities was proposed on the first half-day in Nemours (CEREEP center).



*Technical visit*

The core methodology of the workshop was the presentation, analysis, cross-study of keynote papers prepared by the 3 colleges and civil society, leading the elaboration of shared viewpoints and outcomes regarding the prior topics to be considered about Climate Change impacts on RWM, as well as outcomes on the methodology to establish knowledge on these topics. The 41 participants all had the opportunity to work on all perspectives from keynote papers and to build a shared vision via working groups. Among those participants, 13 were from civil society, and 28 were partners from the 3 colleges and end-user group. The Ecole des Mines premises in Fontainebleau contributed to the fruitful achievement of this event, as an enabling environment.



*CLIMATE participants*

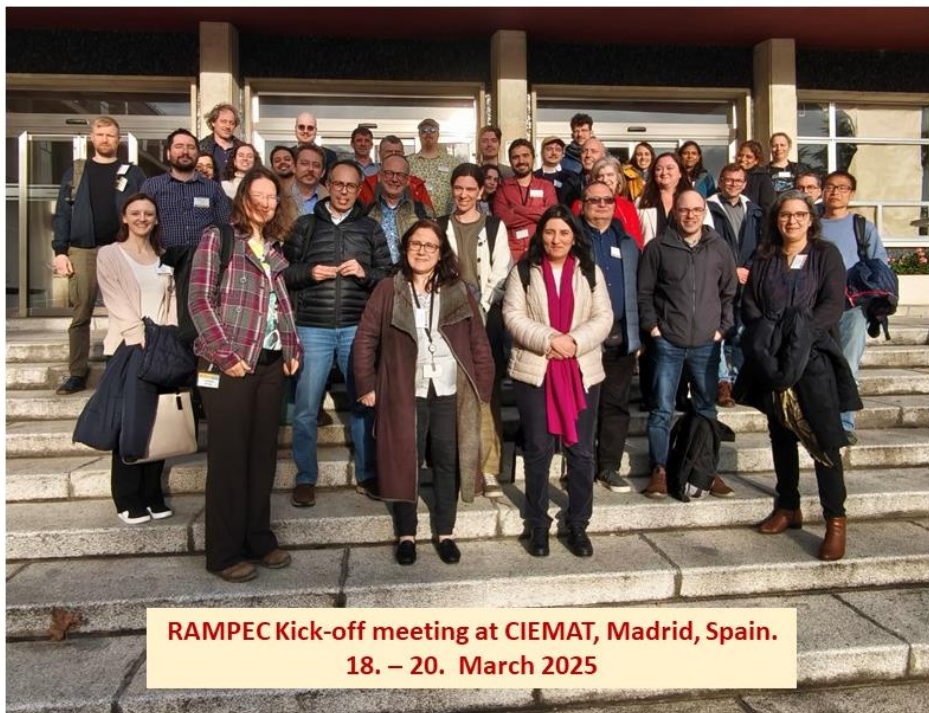


*Technical visit*



## WP12 RAMPEC – Kick-off meeting

The WP RAMPEC (radionuclide mobility under perturbed conditions) had its Kick-Off Meeting from 18<sup>th</sup> to 20<sup>th</sup> of March 2025 in Madrid, Spain, hosted by CIEMAT in its premises. On behalf of all RAMPEC partners, a big „Thank You !“ is going to the CIEMAT colleagues for organising the meeting in such a nice and efficient way. A total of 40 persons attended the meeting in person with about 15 additional persons taking the option to participate by video conferencing during the event. A heartfelt thank you to all attendees, participating onsite or online, for the respective contributions!



As RAMPEC has dedicated the first 6 months to discuss and detail the experimental planning, this joint event in RAMPEC marked the transition into the next phase in RAMPEC where the experimental programs and modelling studies will be performed. Accordingly, much time was allocated at the meeting to present the planning in RAMPEC on Task and Sub-Task level, also allowing partners to directly highlight their specific interests and research activities in RAMPEC. The meeting was also very important because it gave the researchers in RAMPEC the first opportunity to exchange directly in person and identify commonalities, complementarities and potential synergies. A specific session on the first day was dedicated to introduce experts (and their affiliations) who are participating in the End User and Stakeholder Group in RAMPEC. Interaction with the DITUSC WP in EURAD-2 was likewise initiated at the Workshop and will continue over the next months, especially feeding into the joint session organised by RAMPEC and DITUSC at the forthcoming EURAD-2 Annual Event.

## WP14 SUDOKU

The first face-to-face meeting of the SUDOKU project took place in Cordoba during February 4<sup>th</sup> – 5<sup>th</sup>, 2025. SUDOKU is focused on the behaviour and performances of engineered barriers of near-surface disposal facilities. Its main objectives are to improve the current state of knowledge on: (i) the processes that control water infiltration in multilayer covers with implications on cover effectiveness and its long-term performance, (ii) the mechanical and chemical consequences of steel reinforcement corrosion and degradation of the cementitious EBS on the transport of the long-lived radionuclides.



*31 participants attended the meeting in person*

For better framing the SUDOKU experimental and modeling activities, technical presentations and discussions on the activities carried out at the level of each SUDOKU tasks were complemented by presentations of some national concepts for near-surface repository (Belgium, Bulgaria, Czeck Republic, France, Lithuania, Romania, Slovenia, and Spain). Many thanks to the WMOs in these countries for their support and agreement to focus these presentations on the safety functions for engineered barriers and normal evolution scenario used for Safety Assessment.

The visit to El Cabril repository for very low, low and intermediate level radioactive waste, organized by ENRESA on February 5<sup>th</sup>, offered the participants an overview on the waste management in El Cabril facilities and the opportunity to see the multilayer cover mock-up installed on site.

A big thank you to ENRESA (the meeting host and organizer) and to all participants for their dedication and contribution to the success of this meeting!



## WP18 DEVELOPMENT AND IMPROVEMENT OF THERMODYNAMIC UNDERSTANDING FOR USE IN NUCLEAR WASTE DISPOSAL SAFETY CASE

### Key Highlights:

- **DITUSC Survey Launch:** The DITUSC Survey is now live, aiming to collect feedback from various EURAD-2 participants to guide the future development of thermodynamic databases and inform strategic documents. The survey is open until May 2025, and we eagerly await your valuable input.
- **Collaborative Meetings:** Interactions with other relevant EURAD-2 Work Packages have begun through dedicated meetings, helping identify common interests and specific needs.
- **Upcoming Workshop:** The second open workshop will be held in Nantes in fall 2025. This event will focus on establishing a consolidated and prioritized list of knowledge/data gaps to support the Safety Case, leveraging insights from the DITUSC Survey and scientific exchanges with key stakeholders.

A colorful poster for a workshop in Nantes, France, scheduled for Fall 2025. The poster features a stylized city skyline at the bottom with various buildings in shades of blue, green, orange, and purple. At the top left is the logo for IMT Atlantique, Bretagne - Pays de la Loire, Ecole Mines-Télécom. The word 'NANTES' is written in large, multi-colored letters. Below it, the text reads 'DEVELOPMENT AND IMPROVEMENT OF THERMODYNAMIC UNDERSTANDING FOR USE IN NUCLEAR WASTE DISPOSAL SAFETY CASE' and 'FALL 2025'. A yellow box on the right contains two bullet points: (i) Feedback survey and (ii) Prioritization of knowledge/data gaps in relation to the Safety Case. At the bottom left, there is a logo for DITUSC and the dates '14-15 November 2024 (Barcelona)'.

IMT Atlantique  
Bretagne - Pays de la Loire  
Ecole Mines-Télécom

# NANTES

DEVELOPMENT AND IMPROVEMENT OF THERMODYNAMIC UNDERSTANDING  
FOR USE IN NUCLEAR WASTE DISPOSAL SAFETY CASE

FALL 2025

- (i) Feedback survey
- (ii) Prioritization of knowledge/data gaps in relation to the Safety Case

DITUSC  
14-15 November 2024 (Barcelona)



SAVE THE DATE

### Joint IGD-TP / WP 17 (Criticality Safety) meeting



25-26 August 2025



Budapest, Hungary



Stay tuned for more information



Did you know?

EURADScience now has a public website: <https://euradscience.com/>





## Now published

WP8 SAREC Initial State-of-the-Art: [Link](#)

EURAD-2 Dissemination Strategy: [Link](#)

EURAD-2 Quality Management Plan: [Link](#)



## Upcoming events

### APRIL

02: Lunch&Learn [Automatic Identification of Fractures and Rock Mass Deformation in Clay Rocks Using Deep Learning](#)

09: Lunch&Learn: [Current status of the In-situ interaction experiment at the Bukov URF](#)

23-24: NEA Workshop on Digital Safety Case Integration for Radioactive Waste and Geological Disposal

27/04-02/05: EUG General Assembly 2025

### MAY

12-16: [FISA-EURADWASTE & SNETP FORUM](#) (Warsaw, Poland)

21-23: NUWCEM 2025

26-30: IAEA International Conference on Stakeholder engagement for nuclear power programmes





## A look back

A panel discussion session on the European-USA collaboration within EURAD-2 took place during WM Symposia 2025 (March 2025) in Phoenix, Arizona (USA).

An overview of the Partnership has been presented, followed by snapshot of 4 WPs planning cooperation: RAMPEC, ANCHORS, DITUSC and HERMES.



*Christophe Bruggeman, EURAD-2 Chief Scientific Officer*



*Jens Birkholzer (LBL, USA), Christophe Bruggeman (SCK CEN, CSOff), Erika Holt (VTT, PMO) and Anthony Banford (UKNNL, SNETP)*



We are out there



In the kickoff meeting of InCoManD working package under the EURAD-2, I am happy to discuss the experimental setups with **Natalia Jakus** regarding the effects of dry densities of bentonites on microbial growth in the Task 4.

Also congrats to **Mar Morales Hidalgo, PhD** joining this working package after her successful defence of her PhD thesis. She will be investigating the threshold in viability of native microbes in FEBEX bentonite under different doses of Gamma radiation exposure.

Let's not forget about the **Andressa T.** from VTT, the technical leader of Task 5. She will be investigating the joint effects of mechanical corrosion degradation modes with the focus on copper as a canister material for the KBS-3 concept.

Altogether, we are working on innovative and new COntainer/canister materials under disposal filled conditions: MANufacturing feasibility and improved Durability (InCoManD).

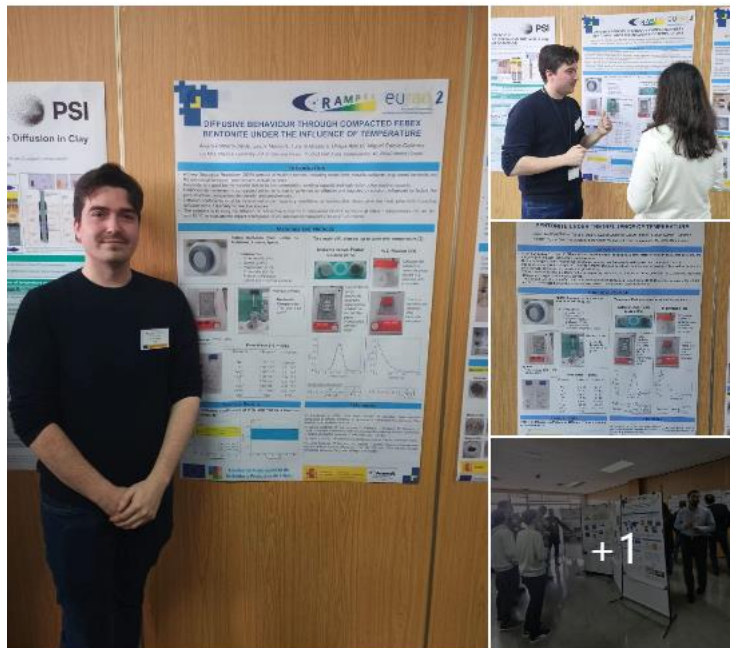
Afficher la traduction



**Álvaro Romero-Salido** · 2e  
Físico | Investigador predoctoral en CIEMAT Physicist | Predoctoral researcher at CI...

Today, I had the opportunity to actively participate in the preparation and presentation of posters at the Kick-off meeting of EURAD-2 WP12 #RAMPEC, a project funded by the **European Commission** focused on radionuclide ... plus

Afficher la traduction



Vous et 42 autres personnes

1 commentaire · 2 republications

**SCK CEN**  
16260 abonnés  
2 sem. ·

Take away 3 – #WMSym2025 by WM Symposia, Inc

SCK CEN is strongly involved in EURAD2, the European Partnership on ... plus

Afficher la traduction

Panel discussion on the European-USA collab within the Euratom partnership EURAD-2



sck cen

Vous et 101 autres personnes

3 republications

