Deliverable 1.4: Annual Work Programme Y2

Work Package 1

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Disclaimer

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Executive Summary

This deliverable presents the activities planned for the second year of the EURAD-2 Partnership for each established Work Package. It outlines the specific objectives per tasks and general timeline associated with each WP, in alignment with the strategic goals of the Partnership. The Annual Work Programme serves as a roadmap for implementation, provisional resource allocation, and coordination across partners. It also highlights the deliverables and milestones planned in year 2. This document contributes to effective programme governance.

Keywords

Radioactive Waste Management, Second Wave, Planning

Table of content

1. Objectives

This Annual Work Programme – Year 2 (AWP2) provides a detailed description of activities for the initial twelve-month period (from Month 13 to Month 24) of the European Partnership on Radioactive Waste Management in line with the objectives and description of work presented under proposal Part B.

This document defines the objectives and expected impact of AWP2 and their correspondence with the description of work provided in Proposal Part B. It contains the details of the implementation of the action with regard to set of activities to be carried out in full or simply initiated during Period 2, deliverables, specific resources and costs of the participants.

The main objectives of the Annual Work Programme of Year 2 are:

- Implementing a faire, robust and transparent process of selection for the second wave work packages
- Delivering the planned work in the 18 established WPs
- Promote the Partnership at the international level

2. Expected impacts

The project's impacts are guided by the six drivers, as established in EURAD(-1) 2023 SRA, which
are to: implement safe long-term waste management solutions, develop tailored solutions, gain scientific insight, support innovation for optimization, enhance societal engagement and build a strong and robust knowledge management. Each of these is further explained in the table below.

Driver Shorthand	**Driver Explanation**
Implementation Safety	Contributing to the safe construction, operation and closure of deep geological repositories (and other disposal facilities), ensuring long-term safety.
Tailored Solutions	Supporting the development of tailored solutions for the management of various radioactive waste types in Europe: • Working together on scientific, technical, managerial, societal and regulatory issues of common interest and considering the full range of potential disposal solutions and waste groups accounting for IAEA's graded approach and taking economic aspects into consideration. • Increasing robustness of approaches by addressing cross-correlations, path dependencies and potential pitfalls in the RWM strategy.
Scientific Insight	Advancing state of the art science in waste management and disposal throughout the waste management chain: • Exploratory research in areas with significant uncertainty or in areas with high
Innovation for Optimisation	Supporting RWM innovation for optimisation: • Continuously managing uncertainty, improving robustness, reducing complexity, costs and other resources and optimising RWM routes and advancing technology and solutions to meet the needs of Member States.
Societal Engagement	Helping to engage with and maintain mutual trust with stakeholders, and awareness in RWM: • Fostering transparency and fruitful interactions with Civil Society along the different phases of a RWM programme.

3. Correspondence with part B of the proposal

The EURAD-2 Description of Action (Annex 1 of the Grant Agreement) is broken down into eighteen separate Work Packages (WPs) - ten RD&D WPs, six Strategic Studies WPs, one Knowledge Management WP and one WP dedicated to the activities of the Programme Management Office.
Each of which is split into a number of tasks and subtasks.

The Annual Work Programme keeps the same Work Package breakdown structure and the same task and subtask structure.
The section 4.3 describes task per task and subtask how the proposed activities implement the Work Packages constituting the action.

The proposal submitted in November 2023 targeted a European Commission grant of minimum 40 M€ over the 5 years of the programme (2024-2029). This was assuming 20 M€ in the EURATOM 2023 Call and assuming at least 20M€ available in the 2025 Call. The programme presented in Part B was therefore built on 66,7 M€ eligible costs (40 M€ European Commission grant + 26,7M€ co- funding by the partners). The activities described below are the ones for the second year of the programme presented in Part B (i.e 66,7 M€ eligible costs). It must be stated that the Consortium will not be able to complete the activities described in Part B without at least a top-up budget of 20 M€. If the top-up budget is lower than this amount, the Consortium will modify the programme and description of Action.

It must be noted that Strategic Studies are not affected by this change, as they are planned for 2 years. The decrease of budget has been applied to all other WPs (PMO, KM and R&D).

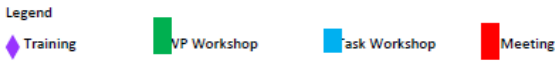
The person.months presented below are a pro-rata of this „new" budget (20M€ EC Grant) based on the duration of each WP.

4. Annual Work Programme Activities – Year 2

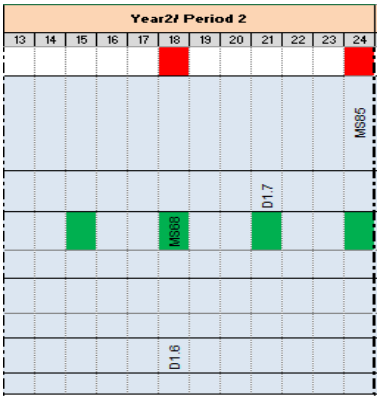
4.1 Structure of the AWP2

Activity No	Activity Title	Lead Participant No	Short name of lead participant	Person-Months	Start Month	End month
1	PMO	1	ANDRA	43,3	1	60
2	KM	25.2	Amphos 21	21,9	1	60
3	ASTRA	10	COVRA	36,03	1	24
4	FORSAFF	51	VTT	54,9	1	24
5	ICARUS	14.3	POLIMI	43,02	1	60
6	STREAM	40	SOGIN	76,15	1	60
7	L'OPERA	37	SCK CEN	36,57	1	60
8	SAREC	39	SKB	43 ,52	1	60
9	InCoMand	1	Andra	60,33	1	60
10	ANCHORS	20	IRSN	48,12	1	60
11	CLIMATE	25.2	Amphos 21	53,63	1	24
12	RAMPEC	25	KIT	43,12	1	60
13	OPTI	6	BGE	43,75	1	24
14	SUDOKU	36	RATEN	50,08	1	60
15	DITOCO2030	56	IFE	22,28	1	24
16	HERMES	64	PSI	58,38	1	48
17	CSFD	61	NAGRA	20,4	1	60
18	DITUSC	30	NIRAS	21,25	1	24
				776,73		

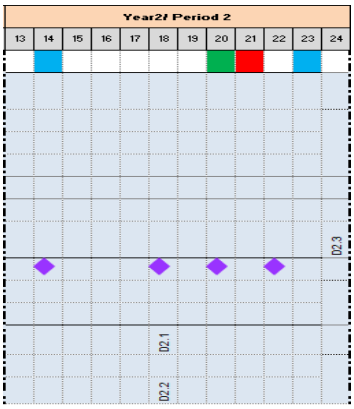
4.2 Timing of the different programme activities



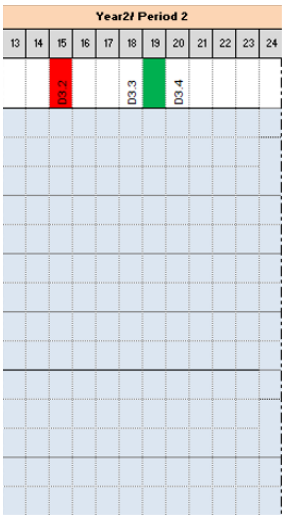
WP1 - PMO



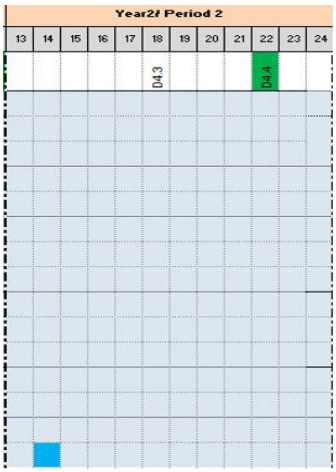
WP2 – KM



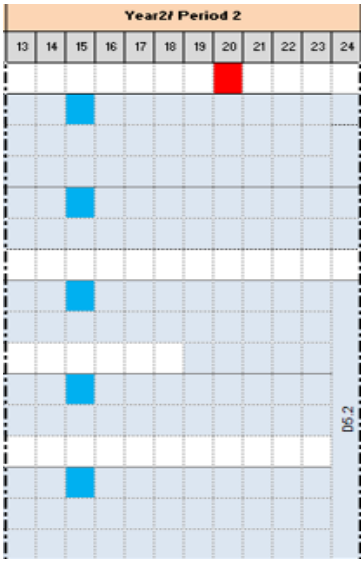
WP3 – ASTRA



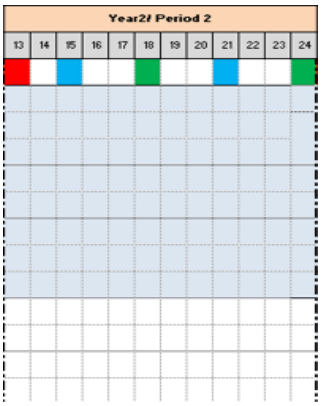
WP4 - FORSAFF



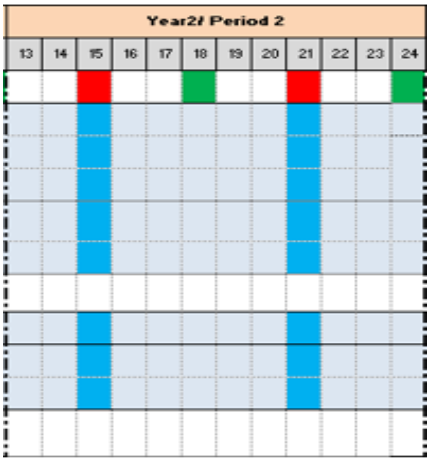
WP5 – ICARUS



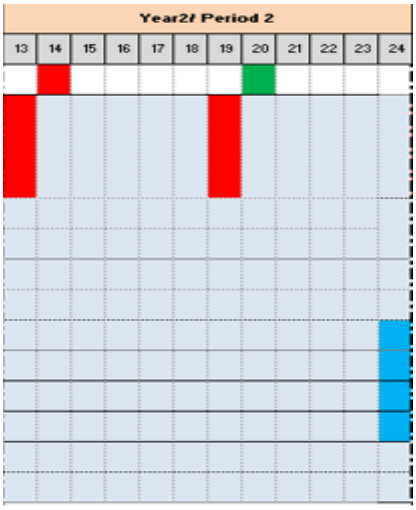
WP6 - STREAM



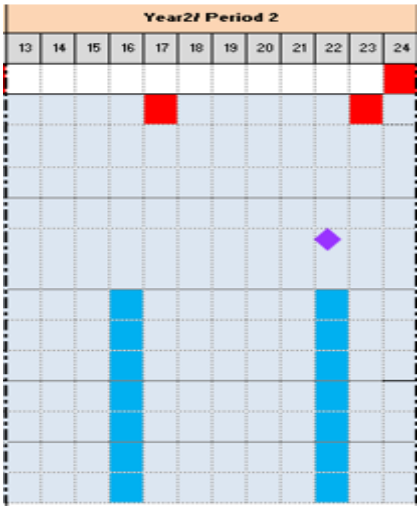
WP7 – L'OPERA



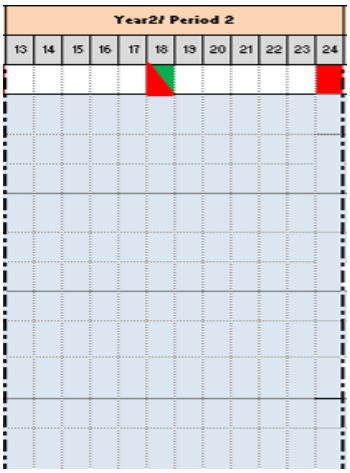
WP8 – SAREC



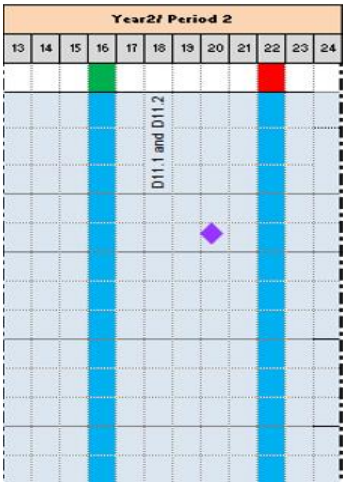
WP9 - InCoManD



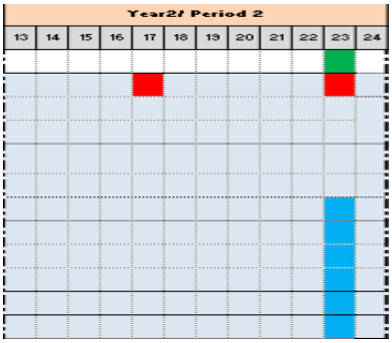
WP10 - ANCHORS



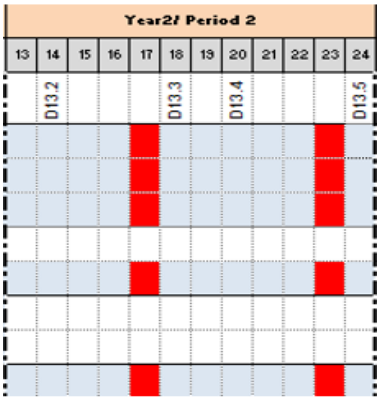
WP11 – CLIMATE



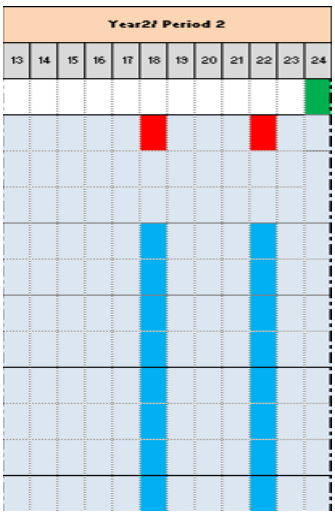
W¨P12 – RAMPEC



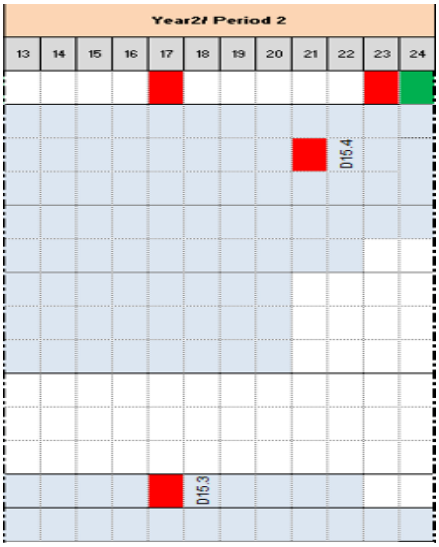
WP13 – OPTI



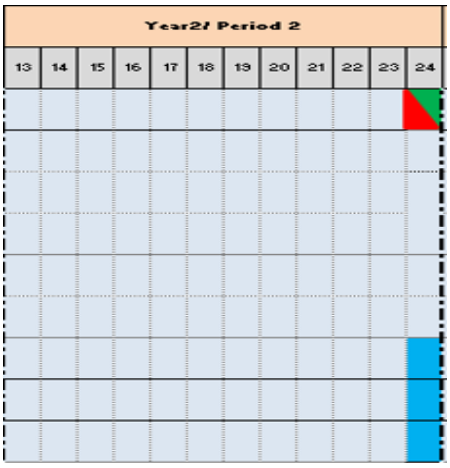
WP14 – SUDOKU



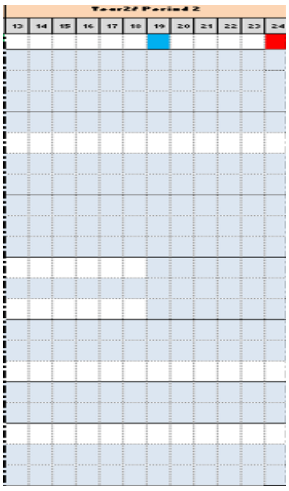
WP15 – DITOCO2030



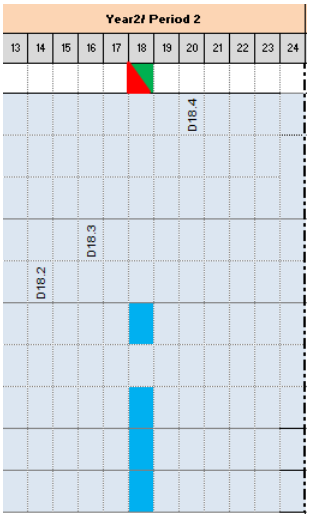
WP16 – HERMES



WP17 – CSFD



WP18 – DITUSC



4.3 Detailed AWP2 activities

4.3.1 WP1 – PMO

Set of Activities Number	1		**Start Date**			October 2024	
Set of Activities Title	Programme Management Office						
Participant Number	**1**	**5**	**6**	**7**	**14.3**	**17**	**20**
Short name of participant	**ANDRA**	**BELV**	**BGE**	**CEA**	**POLIMI**	**FZJ**	**IRSN**
Person-months per participant:	10,3	0,6	0,75	0,75	0,3	0,7	4,56
Participant Number	**20.3**	**25**	**25.2**	**29**	**34.1**	**35**	**36**
Short name of participant	**NTW**	**KIT**	**AMPHOS21**	**NES**	**TVO**	**PURAM**	**RATEN**
Person-months per participant:	1,46	0,75	5,85	0,55	0,95	6,75	0,75
Participant Number	**37**	**39**	**42**	**49.3**	**51**		
Short name of participant	**SCK CEN**	**SKB**	**SSTC NRS**	**MITTA**	**VTT**		
Person-months per participant:	1,3	0,75	2,25	0,7	3,2		
Start month	1			**End month**	60		

Objectives

The 'Programme Management Office' (PMO) has a strategic role in ensuring the overall coordination of the deployment of EURAD-2. More specifically, the PMO ensures:

- Day-to-day management of the administrative, legal and financial aspects;
- Internal communication between EURAD-2 Beneficiaries (Mandated Actors);
- Reporting to and interfaces with EC;
- Scientific and technical coordination of the overall programme of activities (RD&D, Strategic Studies, Knowledge Management, Interaction with Civil Society);
- Dissemination of EURAD-2 progress and overall results (of RD&D WPs, Strategic Studies WPs and KM WPs) and outreach activities.

Activity No	Activity title	Lead participant	Start month	End month
Task 1	**Management and coordination of the administrative, legal and financial aspects**	**ANDRA**	**1**	**60**
	During AWP2, the main activities will be to: - Maintain the Quality Management Plan that was developed in year 1 of the Partnership - Manage any Amendments to the Grant Agreement or the Consortium Agreement if any - Coordinate the preparation and submission to EC of the second periodic report - Coordinate the preparation and submission to EC of the Annual Work Programme for Year 3 - Monitor the budget at the Partnership level after first financial report - Provide assistance to the Consortium for administrative, legal and financial aspects - Maintain and monitor the risk register			
Task 2	**Overall scientific and technical coordination/integration (R&D, Strategic Studies and KM)**	**ANDRA**	**1**	**60**
	During AWP2, the main activities will be to: - Review the contributions to the Periodic Report (technical) - Review the contributions to the Annual Work Programme for Year 3 - Review the deliverables before submission - Monitor the implementation of the KPIs - Enhance the activities at interfaces among WPs - Ensure effective internal scientific/technical communication and transfer of results from WPs to WPs, and effective coordination of the communities of practice - Ensure scientific oversight of each WPs (Chief Scientific Officers together with PMO representatives) - Participate to any EC reviews			
Task 3	**Bureau activities**	**ANDRA**	**1**	**60**
	During AWP2, the main activities of the Bureau will be to: - Implement the 2nd wave WP selection process closely together with the PMO and the colleges - Ensure an adequate integration of and exchange between the colleges and foster consensus-oriented solutions Follow continuously the progress of the consortium and give floor to and foster the discussion of aspects of interest between the GA members			
Task 4	**Internal communication and meetings of the Consortium**	**ANDRA**	**1**	**60**
	During AWP2, the main activities will be to prepare the organisation for:			

	- General Assembly n°4 - Annual event n°2 and General Assembly n°5 - 4 Bureau / PMO meetings - Monthly WP Leaders meetings - Bi-monthly PMO meetings - 2 meetings of the External Advisory Board			
Task 5	**Dissemination**	**ANDRA**	**1**	**60**
	During AWP2, the main activities will be to: - Organise the second annual event to disseminate the on-going activities and results, especially of the Strategic Studies WPs - Issue 4 newsletters in order to keep all interested parties informed on EURAD-2 activities - Maintain the website and internal project management tool (Planview – ProjectPlace) - Present EURAD-2 at various events / conferences - Organise webinars to highlight present knowledge, challenges and possible solutions that EURAD-2 is facing			
Task 6	**EURAD-2 in the international arena**	**ANDRA**	**1**	**60**
	The PMO will ensure interfaces and interactions with IGD-TP, SITEX, EURADSCIENCE, IAEA, OECD/NEA, organisations abroad and any other relevant organisations. This can include the formulation of MoU or any other joint agreements, to be validated by the General Assembly and in agreement with EC rules.			
Task 7	**Interactions with Civil Society**	**NTW**	**1**	**60**
	During the second year, the coordination of the ICS activities will continue, including PMO ICS coordination meetings and CS experts meetings. The main event planned for all CS members will be the ICS workshop n°2, planned for month 16. The organisation of this event will rely on CS experts. Dissemination activities will take place, in order to share information related to EURAD-2 activities to the CS larger group and members of the Third-Wing. An important contribution of this will be the organisation of a Third-Wing event jointly organised with EESC, planned for the same month as the second EURAD annual event. One deliverable will be produced this year, the D1.6 regarding the evaluation of ICS activities.			
Task 8	**Management of the R&D WPs**	**ANDRA**	**1**	**60**
	This task is dedicated to finance part of the management role of each R&D WP leader. It will cover the activities of reporting and assistance to the partners within the work package for Year 2.			

Deliverables

- D1.7 Annual Work Programme Y3 – Month 21

4.3.2 WP2 – KM

Set of Activities Number	2	**Start Date**			October 2024		
Set of Activities Title	Knowledge Management						
Participant Number	**6**	**8**	**10.1**	**12**	**17**	**17.1**	**20**
Short name of participant	**BGE**	**CIEMAT**	**TUDELFT**	**DEKOM**	**FZJ**	**HZDR**	**IRSN**
Person-months per Participant:	2,62	2,1	0,46	1,27	0,24	1,16	1,51
Participant Number	**23.2**	**25.2**	**37**	**39**	**40**	**42**	
Short name of participant	**EIMV**	**AMPHOS21**	**SCK CEN**	**SKB**	**SOGIN**	**SSTC NRS**	
Person-months per Participant:	0,60	2,14	6,21	1,16	0,93	1,48	
Start month	1			**End month**	60		

Objectives

The overarching goal is to establish an EURAD-2 Knowledge Management (KM) programme which is intended to become sustainable over 10 to 20 or more years. The programme not only focusses on different aspect in the building and maintaining of competences in the field but complementing those actions which are already present on national and international (IAEA, NEA) level.

The overall objectives of the KM programme are to overcome the competence generation gap by making sure resources are effectively aligned to maintain a sufficient, competent and qualified radioactive waste management workforce. Furthermore, the KM programme will support Member States at different levels of progress in implementing the waste directive (2011/70/Euratom) within the realms of EURAD-2 by boosting knowledge transfer from more advanced to less advanced programmes. Another general objective is effective implementation of the KM programme by establishing an inclusive collaborative framework that feeds and keeps up to date the EURAD Roadmap, enabling users to access existing information and knowledge and active work or future plans related to all phases of a radioactive waste management programme.

Activity No	**Activity title**	**Lead participant**	**Start month**	**End month**
Task 1	**Management / Coordination of the WP**	**BGE**	**1**	**60**
	During Year 2, the main focus will be on establishing the foundation for knowledge management (KM) activities by defining protocols, strategies, and guidance documents.			

Subtask 1.1	**WP coordination**			
	Year 2 coordination activities will include: • Day-to-day management of administrative aspects, including interactions with the PMO and other WPs • Ensuring timely reporting and fostering effective internal communication • Planning and organising monthly KM Board meetings • Coordinating the implementation of KM activities within the work-package and together with the Task leaders to be performed during the last year of the first stage of the programme • Defining a clear strategy and protocols for the selection of the activities that will be funded by KM. A key milestone, MS69, on needs for additional KM actions where gaps are significant (in line with SRA priorities), is scheduled for month 18.			
Subtask 1.2	**Outreach**			
	During Year 2, structured meetings with KM representatives from international organisations, such as the IAEA, or NEA are planned to align the activities and encourage mutual support. Participation in international conferences and events (e.g. OECD-NEA IDKM) will be pursued to ensure knowledge exchange and strategic positioning of EURAD-2 KM.			
Subtask 1.3	**Quality control**			
	During Year 2, it is envisaged that the WPL and KM Board will review all the documents generated by other WPs (especially Task 2) that contribute to KM ensuring the conformity to the Grant Agreement and with the objectives of the WP and the overall programme.			
Subtask 1.4	**WPs Task 2 Coordination and networking**			
	Progress monitoring of KM activities within the framework of the Tasks 2 of the R&D and StSt WPs will be a priority during Year 2. A combination of joint and individual meetings with Task 2 leaders and the KM Board will be organised to support and oversee the implementation of KM activities as outlined in the respective work plans. A detailed list of activities to be performed by R&D and StSt Task 2 will be reported in Milestone MS24 (Month 12).			
Task 2	**Knowledge Capture**	**BGE**	**1**	**60**
	Task 2 activities during Year 2 will focus on the production and finalisation of KM documents through continuous collaboration with the KM Ambassadors/Task 2 leaders (refer to subtask 1.4), i.e. (SotA reports, Green & White Papers within Task 2.1 and Domain Insights and or State-of-Knowledge documents within Task 2.2). Efforts will include identifying potential authors for pending domain insights and supporting them in the document creation and finalisation.			

	The production of DI documents will continue in Year 2. Although, no SoK documents have been initiated by any R&D or StSt. WPs, this opportunity remains open and will be further explored. A particular emphasis will be placed on enhancing signposting to existing KM documents. The methodology for soliciting calls for production of KM documents will be set into place (based on M20), tested and refined. This includes criteria for selecting contributors (individuals or groups), distributing budgets and workload, and documenting decision-making processes. Needs assessments and priority setting for new KM documents in alignment with the EURAD Roadmap will be performed on an ongoing basis. It is expected that by the end of year 2, 16 DI will be finalised. Feedback from end-users and knowledge providers (authors, reviewers) on the DI documents and other aspects of knowledge capture and transfer will be systematically collected to improve both the content and processes. Making the knowledge captured available is a crucial task. Together with Task 4, structured knowledge-sharing activities (e.g. Lunch and Learn sessions, webinars, and workshops) will be co-organised to encourage stakeholder engagement. Produced KM documents will be disseminated through multiple platforms including the EURAD homepage, the EURAD wiki, Zenodo, and the IAEA's INIS repository. Further efforts will be made to strengthen the accessibility and discoverability of the knowledge (i.e. knowledge captured in the Knowledge documents), particularly through improved utilisation of the KM platform and other supporting digital tools (in collaboration with Task 5).			
Task 3	**Knowledge application & Know-how development**	**DEKOM**	**1**	**60**
	Task 3 activities during Year 2 will build on initial activities under Tasks 3.1 and 3.2 during Year 1. With respect to guidance, based on scoping activities conducted in Year 1, it is anticipated that Year 2 efforts will focus on raising awareness of guidance already available across a range of technical topics. Efforts relating to European infrastructures will shift from the Year 1 focus on updating lists of existing infrastructures in support of mobility activities to an analysis of existing capabilities and longer term needs for radioactive waste management.			
Subtask 3.1	**Guidance**			
	Activities during Year 2 will focus on implementing plans for guidance delivery during the first 24 months of EURAD-2, building on the learning obtained from information gathering activities conducted in Year 1, i.e., from a review to identify potential guidance topics; a survey of end users and partners to explore priority topics; and from engagement with IAEA representatives to explore synergies and complementary of EURAD-2 guidance development efforts. At the outset of Year 1 it was envisaged that guidance would be developed covering two technical topics during the first 24 months of the programme. The information gathered and recorded in MS21 (List of guidance) indicates that it may be more appropriate for Task 3.1 to focus instead on signposting end users and partners towards existing guidance and guide-like documents, rather than developing new guidance. In Year 2, we will select and implement suitable methods for such signposting on a case-by-case basis; these could include short written overviews and/or training webinars. We expect to involve subject matter experts in the delivery of guidance signposting, via budgeting provisions under WP2 (KM) Task 6.			

	Consideration will also be given to future sampling of ongoing and emerging guidance needs, particularly with respect to new EURAD-2 end users and in light of EURAD-2 strategic studies drawing towards their conclusion, and the outcomes recorded in associated green papers.			
Subtask 3.2	**European infrastructures on RWM**			
	Task 3.2 activities during Year 2 will focus on performing a gap analysis to explore current and emerging critical infrastructure needs for radioactive waste management and how these might be expected to change in the coming years/decades. It is anticipated that a workshop involving end users will be organised in late autumn '25 / winter '26 to inform this analysis and the subsequent development of recommendations feeding into Deliverable D2.3 (Report on recommendations for the long-term maintenance of critical infrastructure for RWM at the European level), which will be delivered by Month 24.			
Task 4	**Competence building (School of RWM)**	**SCK·CEN**	**1**	**60**
	Competence building will be achieved through continuing to operate the School of Radioactive Waste Management, which was established during EURAD(-1) and which was merged with PREDIS' competence building activities at the start of EURAD-2. The School's objective is to contribute to continued availability of competent staff in the field of RWM. Thereby, a key objective is to contribute to closing the generational competence gap through training of the next generation of experts. Therefore, a broad set of tools are applied with the aim of responding to the learning and work-life needs of the next generation. Another important objective is to contribute to filling the competence gap by supporting knowledge transfer to experts from other areas. For that purpose, tools responding to the needs of such "external experts" are also implemented. Additionally, the objectives include application of the tools and methods developed for experts in the field of RWM to inform themselves about other areas of expertise within the realm of RWM. Finally, development and integration of different tools and methods for competence building will be explored, aiming to make the best use of available resources.			
Subtask 4.1	**Training**			
	In Year 2, WP2 Task 4.1 will continue to organise training courses (in total approx. 7) based on feedback and priorities from the end-users (which was gathered via Task 2 Leaders in Y1). Based on the type of training, this will be online or face-to-face sessions. When looking at online sessions, WP2 Subtask 4.1 will also continue investigating the option to produce e-learning materials in collaboration with Task 2 Leaders, should the need for these materials exist. In parallel, the organisation of Lunch & Learn sessions will continue in close collaboration with WP1 PMO. The aim is to host at least 6 Lunch & Learn sessions in Y2. These are streamed, recorded and distributed via the School's webpage: https://euradschool.eu/events/category/eurad-webinar/list/?eventDisplay=past			

Subtask 4.2	**Mobility**			
	In Year 2, WP2 Subtask 4.2 will continue to host and monitor EURAD-2's Mobility Programme (the aim is that at least 30 mobility actions will be awarded). The focus will mainly be on maintaining high quality and adjusting the application platform/process based on end-users' feedback, which was gathered from applicants and evaluators by the end of Y1. There will be at least three rounds of mobility applications and reviews, and awarding of grants. Follow up on reporting of awards granted from year 1 will be documented, as a basis for funding. The criteria for mobility screening will be adjusted. It is envisioned that at least 30 mobilities will be awarded based on suitable candidates. Promotion of the mobility programme will be done through newsletters and emails to the partners, targeting at least 50 applications submitted.			
Subtask 4.3	**Mentoring & Networking**			
	In Year 2, WP2 Subtask 4.3 will focus on implementing (initially on a small scale) a mentoring programme in EURAD-2, based on the framework described in Milestone MS26 and preparatory work performed in Y1. This is a new action, compared to EURAD-1 (and PREDIS) based on community feedback. The main aim is to launch four calls throughout the year to gather potential mentors and mentees. The mentors will be volunteers from the technical WPs. Mentees are PhD candidates or early-career researchers and/or newcomers to the field. They will be matched based on their preferences and the goal is to have formed the five first successful mentor-mentee couples in the first half of Year 2. After an internal evaluation, this process will be expanded on in the latter half of Year 2 and the remaining years of EURAD-2. The baseline document describing the mentoring programme was produced in year 1, but will be revised as needed based on activities of year 2.			
Task 5	**KM programme tools and methods**	**ASNR**	**1**	**60**
	The objectives of the Task are to further build on the KM platform specifications developed in EURAD(-1), to keep knowledge available over the long term, manage access to possible lost knowledge, and to test new and innovative tools and methods.			
Subtask 5.1	**KM-platform**			
	The coordination for implementing the KM-Platform will start, with two parallel activities: defining in collaboration with secretariat of EURAD-2 and EC the sustainable and long-term solution to host IT tools to ensure wide public access to KM documents. The review of the work done in EURAD-1 through prototype will be done with Task 5 partners and will lead , to determine how to develop and operate, in efficient manner, the final KM-Platform. The findings are to be reported in Milestone MS 22.			

Subtask 5.2	**Data Management**
	The Data management plan (DMP) was created in year 1, and now recommendations will be implemented by all WPs and feedback through KM Ambassadors will be organised to be able to update DMP document every year. The subtask will continue to seek feedback and share best practices between the other WPs, for efficient data handling, archiving and sharing.
Subtask 5.3	**Innovative & alternative methods**
	Activities in Year 2 will focus on collecting ideas and feedback from the EURAD-2 community, including a survey targeting methods and tools that could enhance the capability to find, access, and apply knowledge more efficiently. The aim is to assess the potential of innovative approaches and prepare for their implementation in the second wave of EURAD-2 (2026–2029), subject to available funding. The outcomes of this work will be used to define clear guidance for proposing and evaluating ideas, ensuring transparency and alignment with stakeholder needs. The activities in this subtask should address primarily Knowledge Management (KM) challenges. A summary and assessment of the collected methods will be reported in Deliverable D2.2 – Report on the implementation of innovative and alternative methods (ASNR – WP2 – Month 18). Implementation of selected methods will follow during the second wave of EURAD-2, depending on available financial resources. The findings are to be reported in Milestone MS 25 - Methodology memo on proposing innovative methods

Deliverables

- D2.1 Report on the KM platform specifications – Month 18
- D2.2 Report on the implementation of innovative and alternative methods – Month 18
- D2.3 Report on recommendations for the long-term maintenance of critical infrastructure for RWM at the European level – Month 24

4.3.3 WP3 – ASTRA

Set of Activities Number	3	**Start Date**			October 2024		
Set of Activities Title	Alternatives RWM strategies (ASTRA)						
Participant Number	**1**	**3**	**10**	**10.1**	**12**	**19**	**20**
Short name of participant	**ANDRA**	**ARAO**	**COVRA**	**EGIS**	**DEKOM**	**INCT**	**IRSN**
Person-months per Participant:	0,87	1,5	1,62	3,25	1,27	2	1
Participant Number	**20.3**	**21**	**23.2**	**24.1**	**28**	**28.1**	**29**
Short name of participant	**NTW**	**IST-ID**	**EIMV**	**ENERGO RISK**	**NCSRD**	**DMT**	**NES**
Person-months per Participant:	2,25	0,72	3,62	1,5	0,75	3	0,5
Participant Number	**32**	**42**	**45**	**46**	**48**	**50**	**51**
Short name of participant	**NRG**	**SSTC NRS**	**SURO**	**TNO**	**TUS**	**UTARTU**	**VTT**
Person-months per Participant:	1,75	3,87	1,75	0,7	1,5	0,87	1,7
Start month	1			**End month**	24		

Objectives

Analysis of readiness, feasibility and challenges of alternative RWM solutions needed by many countries, in particular SIMS, but also larger programmes due to new requests accruing in national programmes to safely manage and dispose of their waste.

KPIs for ASTRA second year are listed in the table below.

EURATOM Call objective	SRA Drivers	KPI at the WP level	Target (should be a number)	Month
Help build or maintain public confidence and awareness in radioactive waste management;	Societal Engagement	Number of news / Post / Blog per year	1 Entry on NTW website on ASTRA pluralistic workshop	21
		Number of events per year where public or civil society is invited to participate	1 ASTRA pluralistic workshop	21
		Number of non-scientific issues published		
Boost knowledge transfer to early-stage programmes;	Tailored solutions	Number of KM documents produced	1 Minutes of the last annual meeting summarizing ASTRA results with input from participants on impact of ASTRA results on their work	23
		Number of IAEA listed early stage programmes participants registered to events / workshops / webinars		
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of PhD/postdocs/ students		
		Number of trainings lectures provided + number of participants	1 Live discussion forums on selected topics (Task 5) of management of small amounts of waste	e.g. month 13

Activity No	Activity title	Lead participant	Start month	End month
Task 1	**Management / Coordination of the WP**	**COVRA**	**1**	**24**
	The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results.			
Subtask 1.1	**S/T coordination**			
	The WP Board continues monthly meetings (minimum of 12 for the second year) to ensure that the WP is progressing according to the agreed planning, milestones and deliverables. The Board also coordinates links with other WPs.			
Subtask 1.2	**Dissemination / outreach / impact**			
	The WP Board will also organise the WP Annual Meeting, which will be arranged to allow for information exchange, monitoring of work progress, dissemination of results and collecting impact of the result for the participants (this KPI provides input from participants on impact of ASTRA on their work). A synthesis document will be produced during the last year of the WP implementation. It will analyse and integrate the WP results into a comprehensive report. An abstract for a wider audience will also be produced.			
Subtask 1.3	**Quality control**			
	The WP Board will address quality control of the work package implementation, specifically for the review of milestones and deliverables, as well as assessing how the WP is achieving the KPI targets.			
Task 2	**Knowledge Management**	**PSI**	**1**	**24**
	The main goal of the Task 2 is to capture knowledge relevant for the ASTRA WP and, to contribute to knowledge transfer to the EURAD-2 community and, possibly outside, in accordance with the EURAD-2 KM programme. KM topics are included in ASTRA Board meetings (minimum of 12 for the second year). Contribution to the Task 2 from countries at different stages of their RWM programmes implementation with different inventories/volumes of waste will foster a mutually beneficial knowledge exchange. Use tools developed with and within KM WP for an efficient data management within ASTRA and for exchange with other WPs.			
Subtask 2.1	**Development of documentation materials (SotA, gap analysis, white/green position papers)**			

	Continue knowledge capture from ASTRA participants and stakeholders/end users gained by surveys, their analysis and related discussions in workshops, use developed exchange and communication structures and procedures for exchange, identify specific needs of participants and support mutually beneficial knowledge exchange. A white paper will be prepared with the aim to propose an ASTRA 2nd wave follow up based on common views on stakeholder needs on long term storage, deep borehole disposal and promising alternatives for SIMS. Know-how sharing and discussions of common challenging issues will yield a valuable input to EURAD KM activities.			
Subtask 2.2	**Training materials**			
	Continue cooperation on knowledge management within ASTRA WP and between ASTRA WP and all relevant parties involved in KM activities in EURAD-2. ASTRA Task 2 will coordinate contributions to relevant DMP, DI production, when we have available resources and exchange in between EURAD-2 WPs. Inform ASTRA participants about relevant dissemination events (conferences, workshop, webinar and meetings) and trainings organised within EURAD-2 during ASTRA (bi)-annual meetings and/or by emails. Identify student exchange options, needs for trainings, online courses, webinars, workshops within ASTRA and within other EURAD-2 WPs.			
Task 3	**RW long term storage**	**SSTC NRS**	**1**	**24**
	The main goal of Task 3 is to study alternative RWM strategies for situations in which RW is stored for periods that exceed the design lifetime of the container and/or storage facilities. Alternative RWM paths will be considered, including RW disposal depending on the timing of the creation of disposal facility, predicted compliance / non-compliance of RW packages for storage, WAC (Waste Acceptance Criteria) of disposal facility, as well as a number of safety, technical and financial factors.			
Subtask 3.1	**Data collecting and building mutual understanding of RWM strategies for long-term storage exceeding the design lifetime**			
	The results of data collection and analysis conducted during the first year—focusing on the situations and possible ways of management of RW packages and storage facilities for which the design lifetime is exceeded—along with the outcomes of the workshop held in month 8 aimed at building mutual understanding among subtask partners and end users, will contribute to the development: 1) The White Paper, D3.3, (M 18). The Impact report, D3.4, (M 20), which will summarise the outcomes and impacts for Member States and end users.			
Subtask 3.2	**Alternative RWM strategies for long-term storage exceeding the design lifetime**			
	Alternative RWM strategies will continue to be explored for cases in which the design lifetime of long-term storage facilities has been exceeded, taking into account safety, technical, and financial factors. These alternative strategies, along with the data collected and analysed under Subtask 3.1, will serve as a foundation for further discussions with different categories of actors (WMO, RE, TSO, CSO) during the second workshop (scheduled for month 15).			

	1) WS aimed at sharing findings and collecting feedback to refine the study results (MS60, month 15). The workshop outcomes will contribute to the development of 2) the White Paper (D3.3, due in month 18) and the reporting document outlining impacts for Member States and end users (D3.4, due in month 20).			
Task 4	**Deep borehole disposal (DBD)**	**EGIS**	**1**	**24**
	Task 4 has two interlinked objectives, which will form the basis of two subtasks: Preparation of a state-of-the art report on technology readiness levels (TRLs) for DBD and identification of stakeholder concerns and R&D needed to build confidence in the implementation of DBD.			
Subtask 4.1	**TRLs for DBD**			
	Subtask 4.1 activities were carried out during year 1, there are no actions on Subtask 4.1.			
Subtask 4.2	**Stakeholder needs and R&D requirements for DBD**			
	Finalise note of second Task 4 workshop. The workshop will have included sessions on the perspectives of different stakeholders (industry, WMO, TSO, RE), R&D work in progress, and proposed R&D and uncertainties. Combine notes from first and second Task 4 workshops to produce a State-of-the-art assessment of TRLs and R&D requirements for deep borehole disposal of radioactive wastes. The R&D requirements could form the basis for a further WP in EURAD Wave 2.			
Task 5	**Alternative waste management solutions for SIMS**	**EIMV**	**1**	**24**
	In Task 5, the objective to analyse management strategies for small amounts of often diverse and challenging wastes will continue with live discussion forums (which replaced the forum for community of practice on ASTRA platform) between LIMS (Large Inventory Member States) and SIMS, disposal strategies and waste management solutions for specific challenging wastes that do not meet existing WAC will be further explored, and shared solutions for different RW (sharing of predisposal & disposal activities and facilities) will be investigated.			
Subtask 5.1	**Analysis of management strategies for small amount of waste**			
	Through monthly live discussion forum events (which result KPI in Knowledge Management, first one in M13) on the topics selected through the survey by the Task 5 partners, this subtask will analyse management strategies for small amounts of waste. Management strategies will be: 1) further explored at the last workshop planned for the 1st wave, which has been moved from M16 to M14 (responsible EIMV), 2) presented in the report Milestone 70 (M18, responsible DMT),			

	3) part of the contribution from Task 5 to the D3.3 white paper (M18, responsible DMT), summarised and highlighted in an impact report (M20, responsible EIMV).			
Subtask 5.2	**Investigation of shared solutions for different RW**			
	Within this subtask, partners will further investigate the potential for sharing of predisposal & disposal activities and facilities, including the possible mobile solution. Focus will remain on the strategic issues not addressed in previous projects (e.g. governance, maintenance competencies, safety on a longer-term basis). Discussion will be deepened at the workshop, which has been moved from M16 to M14 (responsible SURO). The findings from all workshops and the live discussion forum will be 1) reported in the Milestone 70 (report Management strategies for small amounts of waste, M18, responsible EIMV), 2) part of Task 5 contribution to D3.3 white paper (M18, responsible DMT), 3) summarised and highlighted in an impact report (M20, responsible ARAO).			
Subtask 5.3	**Evaluation of RWM strategies for the disposal of waste bearing naturally occurring long-lived radionuclides**			
	The objective of the subtask is to gain insight into the current inventory of waste bearing naturally occurring long-lived radionuclides in member states and the current state of their disposal programme for dealing with such waste. The last event for Task 5.3, according to the Grant agreement, is a meeting in M12. However, results will be presented at the Subtasks 5.1 and 5.2 joint workshop in M14, to present insight into areas where further research and development are required and will be used as input for the development of future work and in the report MS 61 (M15, responsible NRG).			
Task 6	**Interaction with Civil Society (ICS)**	**NTW**	**1**	**24**
	This task aims at enabling specific processes of interactions between technical partners of ASTRA and members of the civil society present in EURAD2 (CS experts and CS larger group members).			
Subtask 6.1	**Coordination of ICS**			
	The Task 6 team will continue to cooperate with the other ASTRA tasks by taking part in task board meetings, in task workshops and other task activities. The topics of interest for CS that were identified in the first year will be further developed through the cooperation with the other tasks. Task 6 will prepare a contribution to the white paper.			
Subtask 6.2	**ICS activities with larger groups**			
	A pluralistic ASTRA workshop will be organized in the second year. This workshop will focus on fruitful interaction between the technical colleges and the civil society participants by using methods like the PEP serious game. The workshop (WS) will be documented in MS 81 (M 21, responsible NTW),			

	including views of the CS larger group on ASTRA topics. This WS will result 2 KPIs in Societal Engagement; the WS itself and an entry on NTW website about the WS.

Deliverables

- D3.2 State-of-the-art assessment of TRLs and R&D requirements for deep borehole disposal of radioactive wastes – Month 15
- D3.3 White Paper WP3 – Month 18
- D3.4 Outcome/impacts report to Member States and End Users WP3 – Month 20

4.3.4 WP4 – FORSAFF

Set of Activities Number	4	**Start Date**				October 2024	
Set of Activities Title	WM for SMRs and future fuels (FORSAFF)						
Participant Number	**1**	**5**	**7**	**8**	**8.6**	**11**	**11.6**
Short name of participant	**ANDRA**	**BEL V**	**CEA**	**CIEMAT**	**MERIENCE**	**CVR**	**UJV**
Person-months per Participant:	2,5	0,5	3	2	0,75	2,5	2,25
Participant Number	**14.3**	**19**	**20**	**20.2**	**20.3**	**23.2**	**25.2**
Short name of participant	**POLIMI**	**INCT**	**IRSN**	**CEPN**	**NTW**	**EIMV**	**AMPHOS21**
Person-months per Participant:	3,5	3	1,25	0,5	1,5	2,75	3,5
Participant Number	**27**	**32**	**34.1**	**36**	**37**	**38**	**42**
Short name of participant	**LEI**	**NRG**	**TVO**	**RATEN**	**SCK CEN**	**SIEEG NASU**	**SSTC NRS**
Person-months per Participant:	1,5	1,25	1	2,5	1,5	2	3,5
Participant Number	**45**	**48**	**50**	**51**			
Short name of participant	**SURO**	**TUS**	**UTARTU**	**VTT**			
Person-months per Participant:	2,5	1,5	2,75	5,4			
Start month	1			**End month**	24		

Objectives

Develop understanding and provide recommendations on SMR deployment and supplier options, with respect to nuclear waste management.

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**VTT**	**1**	**24**
	Task 1 will continue pursuing its main goal of overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work			

	plan and dissemination / outreach of the results. As in year 1, significant interactions with all other tasks of the WP are expected in year 2.			
Subtask 1.1	**S/T coordination**			
	This subtask will continue in year 2 ensuring that the WP is progressing according to agreed planning, milestones and deliverables. Work progress will be reported to the PMO. Communication with other WP stakeholders in EURAD-2 and beyond will continue. WP Board meeting minutes will be distributed.			
Subtask 1.2	**Dissemination / outreach / impact**			
	WP annual meetings with all partners will be organized in year 2 to exchange information, monitor work progress, disseminate results and interact with End Users and other SHs. Content will be contributed to EURAD-2 newsletters and website. Planned external dissemination activities (in line with the planned KPI's) include: Participation and contribution of paper on FORSAFF to IAEA Technical Meeting on the Management of Spent Fuel (Pebbles and Compacts) from High Temperature Reactors (July 7-11, 2025). The meeting is aimed at practitioners (e.g. operators, regulators, research, etc) in Member States who are responsible for, or actively involved in, the management o spent HTR fuels; Participation and presentation on FORSAFF at the Finnish Nuclear Science and Technology Symposium 2025 (October 21-22, 2025); Participation and presentation on FORSAFF at the IGD-TP Exchange Forum (November 25-27, 2025).			
Subtask 1.3	**Quality control**			
	Milestones and deliverables will be reviewed. Meeting of KPI targets will be assessed. Conformity to the GA, achieving high quality outcomes and meeting objectives of the WP and overall programme will be ensured. Risk management of the WP regarding task actions, budget, schedule and outcomes will be attended to.			
Task 2	**Knowledge Management**	**SSTC NRS**	**1**	**24**
	The main goals of Task 2 are to capture knowledge relevant for the SRA topic of this WP and to contribute to knowledge transfer to the EURAD-2 community and beyond through the EURAD-2 KM programme, establish cooperation with other tasks within the WP and develop a network for collaboration with other WPs as well as disseminate in WP information on KM activities, updates, and collaboration opportunities, including participation in training sessions, dissemination events, the mobility program, and the mentoring initiatives.			

Subtask 2.1	**Knowledge capture**			
	The efforts within Subtask will be focused on capturing knowledge relevant to the WP and preparation of the WP D4.3 White paper based on outcomes of Tasks 3, 4, 5 and 6 of the WP, knowledge consolidated or generated through know-how sharing and discussions of common challenging issues.			
Subtask 2.2	**Knowledge transfer**			
	Identification and further implementation of specific knowledge transferring activities will continue in Year 2. In cooperation with the KM WP, WP experts will participate in specific activities aimed at transferring knowledge to interested parties (e.g. Domain Insight documents production, creating material for training, e-learning, workshops, videos, social media posts and guidance).			
Task 3	**Waste Generation**	**POLIMI**	**1**	**24**
	The efforts within Task 3 will be devoted to completing the waste stream assessment for the four reactor families which have been identified (light-water reactors – LWR; high-temperature gas-graphite reactors – HTGR; liquid metal cooled fast reactors – LMFR; molten salt reactors – MSR).			
Subtask 3.1	**Methodology for waste stream identification**			
	The Methodology for waste stream identification was developed in Year 1 and is described in the corresponding Milestone document (MS28). No major activities are planned in Year 2 for the present subtask, as its main objectives will have been achieved in Year 1. The Methodology and associated waste descriptors can be revised Year 2 as deemed necessary based on, e.g., stakeholder feedback.			
Subtask 3.2	**Waste inventory and main characteristics**			
	The main objective of subtask 3.2 for Year 2 will consist in applying the Methodology developed in subtask 3.1 to gather information about waste streams associated to the four SMR families. Due to the different design advancement status and operational knowledge between LWR and models belonging to the other three families, different approaches will be adopted: • For the LWR family, a more quantitative description of waste streams will be pursued, with the possibility of reserving dedicated efforts to some specific SMR models for which a deeper knowledge is available. • For the other three families, mainly semi-quantitative high-level considerations will be drafted, aimed at identifying principal waste stream characteristics.			

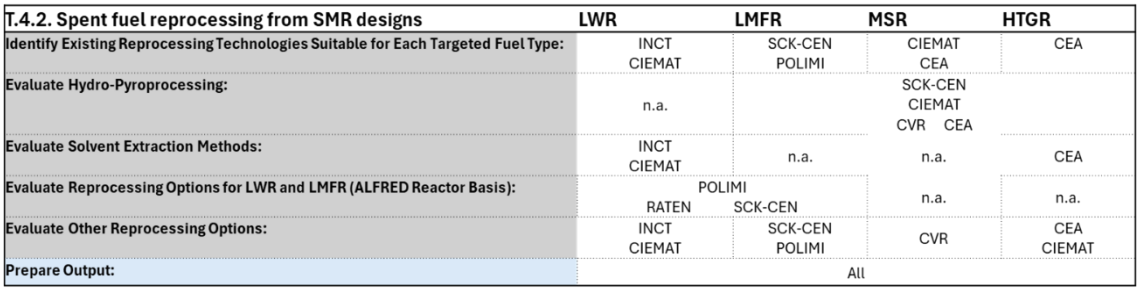
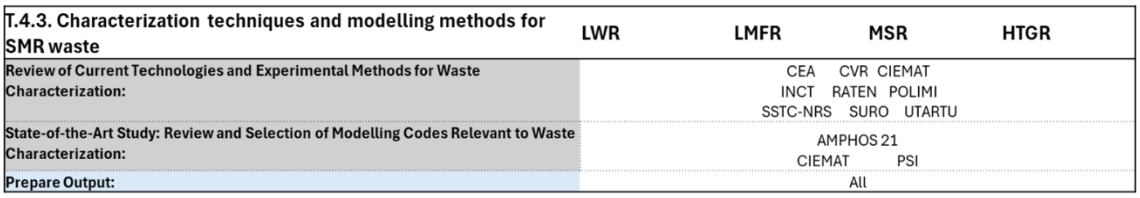
<table>
<tr><td></td><td colspan="4">Output from this subtask will contribute to the drafting of the FORSAFF White Paper. Additionally, cooperation with Task 6 is foreseen to develop materials for Seminar 2.</td></tr>
<tr><td>Subtask 3.3</td><td colspan="4">Spent fuel inventory and management</td></tr>
<tr><td></td><td colspan="4">Similarly to subtask 3.2, subtask 3.3 will pursue the application of the subtask 3.1 methodology to identify the main spent fuel characteristics. Separate considerations will be performed for each reactor family and associated fuel type (e.g., TRISO, HALEU, UOX, MOX, …), as the corresponding characteristics are quite diverse from the physical, chemical and radiological points of view. Where applicable, waste streams deriving from spent fuel reprocessing will be described, as well as corresponding recovered nuclear materials. Advanced reprocessing methods will also be considered, even if not yet implemented at an industrial scale. As previously, waste stream descriptions pertaining to the LWR fuel cycle will be presented in greater detail thanks to a higher data availability and operational knowledge.

Output from this subtask will contribute to the drafting of the FORSAFF White Paper. Additionally, cooperation with Task 6 is foreseen to develop materials for Seminar 2.</td></tr>
<tr><td>Task 4</td><td>Waste Management</td><td>Amphos 21</td><td>1</td><td>24</td></tr>
<tr><td></td><td colspan="4">In year 2 Task 4 will continue its activities on assessing predisposal (treatment, conditioning, storage, transport) approaches and development needs, spent fuel reprocessing options in the backend of the fuel cycle for SMRs and advanced reactors, as well as to examine disposal routes for SMR and advanced reactor wastes across a range of end-user needs considering conventional as well as more novel concepts.</td></tr>
<tr><td>Subtask 4.1</td><td colspan="4">SMR waste predisposal and disposal</td></tr>
<tr><td></td><td colspan="4">Based on the identification of waste streams of the reactor system under study in Task 3, for each concept, the partners responsible for the analysis (Figure 1) will examine each stage, from predisposal to disposal, in order to identify waste management challenges.

Figure 1. Sub-Task 4.1 SMR/AMR design distribution

<table>
<tr><th>T.4.1. SMR Waste Predisposal and disposal</th><th>LWR</th><th>LMFR</th><th>MSR</th><th>HTGR</th></tr>
<tr><td>Investigate Waste Streams:</td><td rowspan="5">CVR
INCT
NWS
LEI
POLIMI
RATEN
SSTC-NRS
SURO
TVO VTT
UTARTU</td><td rowspan="5">CIEMAT
GLS
NWS
POLIMI
RATEN
SCK-CEN</td><td rowspan="5">AMPHOS 21
CVR
GLS
POLIMI
SSTC-NRS</td><td rowspan="5">AMPHOS 21
ANDRA
CEA
CIEMAT
INCT
NWS</td></tr>
<tr><td>Additional Features of Waste Regarding Predisposal and Disposal Needs:</td></tr>
<tr><td>Select Specific Predisposal and Disposal Approaches:</td></tr>
<tr><td>Match/Suggest Identified Waste Streams with Selected Predisposal and Disposal Options:</td></tr>
<tr><td>Assess Infrastructure and Research Needs for Newest Waste Materials:</td></tr>
<tr><td>Prepare Output:</td><td colspan="4">All</td></tr>
</table>

The outcomes of this sub-task will feed the WP FORSAFF Deliverables.</td></tr>
<tr><td>Subtask 4.2</td><td colspan="4">Spent fuel reprocessing from SMR designs</td></tr>
</table>

	In sub-Task 4.2, common matrix of analysis (Figure 2) will be prepared for each type of spent fuel associated with a given reactor concept identified in sub-Task 4.1. Reprocessing technologies compatibility or difficulties will be then identified. Figure 2. Sub-Task 4.2 SMR/AMR design distribution  The outcomes of this sub-task will feed the WP FORSAFF Deliverables.
Subtask 4.3	**Characterisation techniques and modelling methods for SMR waste**
	Using the identified waste streams from Task 3 and the generic waste acceptance criteria for both predisposal and disposal facilities, contributors (Figure 3) will assess the experimental methods suitable for characterizing SMR waste. The findings of this evaluation will be organized into a comprehensive matrix, highlighting gaps and identifying research and development (R&D) needs based on predetermined criteria. Figure 3. Sub-Task 4.3 SMR/AMR design distribution  The outcomes of this sub-task will feed the WP FORSAFF Deliverables.
Task 5	**Policy and Regulatory Framework** — **SURO** — **1** — **24**
	In year 2, Task 5 will continue its activities on survey and evaluation of current policy and regulatory framework documents and requirements from national RWM programmes, scientific papers, documents and recommendations by international bodies and organisations on the topic of RWM for SMRs.
Subtask 5.1	**Insight to the policy and regulatory framework related to SMR waste, M2-13**
	The summary analysis of selected documents issued by international organizations (IAEA, WENRA, NEA, etc.), binding legal documents and relevant scientific publications related to RMW

	regulations for SMRs will be completed. Brief descriptions of the current situation in the development of SMRs in selected EU member states will be produced.			
Subtask 5.2	**Evaluation of existing policy and regulatory framework related to SMRs, M10-24**			
	Based on the survey performed within Subtask 5.1 and taking into account results from other Tasks, the evaluation of existing regulations and readiness of national policy and regulatory framework will be focused on: • Determine the need to adjust national policies and regulatory frameworks to support SMR fuel cycle and waste management. • Identify gaps and needs for harmonization of legislation related to SMR implementation as well as SMR waste management across EU countries Contribute to the identification of main gaps and needs on SMR waste management issues and possibly foster a list of needs and requirements for future activities and research needs.			
Task 6	**Stakeholder Engagement**	**EIMV**	**1**	**24**
	The main goal of Task 6 also continues in year 2 with the aim to assess stakeholder perceptions and concerns regarding SMR waste management, and to develop recommendations for transparent information sharing and dialogue, with a focus on enhancing communication with the public.			
Subtask 6.1	**Identification and documentation of stakeholders' perceptions and concerns**			
	Through a joint effort of all Task 6 partners, this subtask will: • Develop the material for seminar 2 to cover the most relevant topics with inclusion of national development in several participating countries, which will be selected based on the interactions with all tasks. Several working meetings will be organised to assure the exchanges between involved partners and to define important topics. • Contribute and participate to multiparty dialogue seminar 2 (3 colleges + Civil society) on the topics of Task 3 and 4. • Based on findings from seminar 2, implement additional investigations with stakeholders as needed (e.g., interviews/focus groups). • Integrate positions from the larger CS group and end-users in the Task 6 Milestone report on stakeholder dialogue regarding SMR WM. The outcomes and recommendations from the aforementioned actions will be collected and included as input to the WP deliverables.			

Subtask 6.2	**Multiparty dialogue seminars and associated results**
	Within this subtask, the partners will: • Engage in a multiparty dialogue seminar in Estonia (around M14 engaging Task 6 participants and FORSAFF partners (3 colleges, Civil Society, larger CS group and end-users). The focus of Semina2 will stem directly from the topics of Task 3 and 4. • Prepare the Milestone report on Stakeholder Dialogue regarding SMR WM based on the outcomes of the two seminars. The Milestone report after seminar 2 will provide input for the FORSAFF White Paper. The outcomes and recommendations from the aforementioned actions will be collected and included as input to the WP deliverables.

Deliverables

- D4.3 White Paper WP4 – Month 18
- D4.4 Outcome/impacts report to Member States and End Users WP4 – Month 22

4.3.5 WP5 – ICARUS

Set of Activities Number	5	**Start Date**			October 2024		
Set of Activities Title	Innovative characterisation techniques for large volumes (ICARUS)						
Participant Number	**3**	**7.2**	**8**	**8.5**	**9**	**9.1**	**11.2**
Short name of participant	**ARAO**	**ORANO**	**CIEMAT**	**CSIC**	**CNRS**	**IMT ATLANTIQUE**	**CVUT**
Person-months per Participant:	0,48	0,8	2,56	3,136	0,56	0,76	1,6
Participant Number	**12.1**	**13.1**	**14**	**14.2**	**14.3**	**14.4**	**15**
Short name of participant	**DTU**	**SORC**	**ENEA**	**CAEN**	**POLIMI**	**UNIPI**	**ENRESA**
Person-months per Participant:	2,24	0,64	1,84	4,16	2,88	1,2	0,8
Participant Number	**15.5**	**15.6**	**16**	**23**	**24.1**	**28**	**32**
Short name of participant	**IIDP**	**US**	**FTMC**	**JSI**	**ENERGORISK**	**NCSRD**	**NRG**
Person-months per Participant:	0,52	2,56	0,96	2,08	2,08	2,08	1,44
Participant Number	**33**	**36**	**37**	**37.1**	**39**	**42**	**51**
Short name of participant	**NTUA**	**RATEN**	**SCK CEN**	**TRACTEBEL**	**SKB**	**SSTC NRS**	**VTT**
Person-months per Participant:	0,8	1,6	2,08	0,6	0,64	1,2	0,72
Start month	1			**End month**	60		

Objectives

Further development, optimization and harmonization of innovative techniques for characterizing radiological, physical and chemical properties of LLW/ILW-mixed waste which could be critical for the safe implementation of radioactive waste management programmes, including destructive techniques (DT) on laboratory scale and its relation to non-destructive techniques (NDT) and scaling factors (SF) at the raw waste and package scale user cases

EURATOM Call objective	**SRA Drivers**	**KPI at the WP level**	**Target by end of Y2 (number)**
Help build or maintain public confidence and awareness in radioactive waste management;	Societal Engagement	Number of news / Post / Blog per year	3
	Scientific Insight	Number of State-of-the-Arts published	1

Contribute to addressing scientific/technical challenges;		Number of open access publications accepted	2
		Number of presentations at scientific conferences done	6
Boost knowledge transfer to early-stage programmes;	Tailored solutions	Number of KM documents produced	1
Encourage the efficient use of R&D resources at EU level;	Knowledge Management	Number of interactions between WPs (sharing of samples ..)	2
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of PhD/postdocs/ students	5
		Number of networking events allowing cross-disciplinary sharing	2

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**POLIMI**	**1**	**60**
	The management and coordination of the WP will be performed by the WP Leader [POLIMI] in collaboration with the Task Leaders [SSTC NRS], [NRG], [DTU], [ENRESA] and the subtask leaders constituting the WP Board. The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results. In this respect there are significant interactions with all other tasks of the WP and other WPs.			
Subtask 1.1	**S/T coordination**			
	The WP Board will ensure that the WP is progressing according to the agreed planning in prosecution of the preliminary results achieved in the first year. The monitoring of WP activities will be accomplished with periodic WP board and task co-leaders meetings (on-line), with minutes to be distributed to partners and PMO. The WP Board will also communicate and coordinate the activities with other WPs stakeholders in EURAD and beyond. [**POLIMI**, SSTC NRS, ARAO, NRG, CAEN, SCK CEN, DTU, VTT, JSI, ENRESA, FTMC]			
Subtask 1.2	**Dissemination / outreach / impact**			
	The WP Board will organise the annual and biannual meetings (on-line or in hybrid mode), which will be arranged with all partners to properly coordinate and implement the work programme and engage fruitful interaction with End Users and other stakeholders. The WP Board will contribute to EURAD-2 newsletters, website by providing at least bi-annual news. The dissemination mission will be pursued by presenting the outcomes of the WP in national and international			

	conferences and producing papers to be published in peer-reviewed journals. Possible conferences of interest for the WP are the 20th Radiochemical Conference (https://www.radchem.cz/) and the 12th International Conference on Isotopes (https://agenda.infn.it/event/41820). Examples of peer-reviewed journals for WP results dissemination are the Journal of Radioanalytical and Nuclear Chemistry, Radiochimica Acta, Analytical Chemistry, EPJ Nuclear Sciences and Technologies, Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, Nuclear Engineering and Design, Applied Radiation and Isotopes, Journal of Analytical Atomic Spectrometry, Analytica Chimica Acta, Talanta. [**POLIMI**, SSTC NRS, NRG, DTU, ENRESA]			
Subtask 1.3	**Quality control**			
	The WP Board will address quality control of the 2nd year WP implementation, specifically monitoring KPI and reviewing the activities carried out by the partners in agreement with the work programme. The WP Board will assess the quality of the scientific products submitted for publication in peer-reviewed journals (open access) and for presentation in national and international conferences. Data management will be performed through cloud storage, following the guidelines from WP2. [POLIMI, SSTC NRS, NRG, DTU, ENRESA, **UNIPI**]			
Task 2	**Knowledge Management**	**SSTC NRS**	**1**	**60**
	The main goal of Task 2 is to make knowledge gathered within this WP accessible and applicable for the EURAD-2 KM system. Throughout the 2nd year, Task 2 aims at: - Promoting, where applicable, individual student involvement in the WP5 R&D activities; - Encouraging participation in relevant dissemination events (conferences, workshops, webinars, meetings) and trainings organised at the WP level or centrally by the EURAD KM WP; Supporting internal, cross-WP, and external mobility actions, as well as networking and mentoring initiatives as relevant opportunities arise.			
Subtask 2.1	**Development of documentation materials (SotA, gap analysis, white/green position papers)**			
	Activities will focus on the continuous capture and consolidation of knowledge emerging from the ongoing R&D tasks within WP5. The initial State-of-the-Art (SotA) report (D5.1), developed in the 1st year will serve as the foundational knowledge base. Work in 2nd year will involve maintaining and potentially updating the associated knowledge base derived from the initial SotA, incorporating early findings from the R&D tasks. This ongoing capture work forms the basis for future synthesis in the Deliverable D5.6 “Extending the SotA on innovative NDT, DT, SF for current and new use cases report”.			

	Relevant captured knowledge will be prepared for integration into the broader EURAD-2 KM activities and repository, coordinated by WP2.			
Subtask 2.2	**Development of training materials**			
	Based on the initial SotA and the first R&D results, Year 2 will commence the development of specific knowledge transfer materials, planning of knowledge transfer activities (e.g., future workshops, contributions to EURAD-2 events, potential online training content), aligning with the KM WP (WP2) strategy. While specific large-scale workshops under Task 2 might be planned for later years, coordination activities will ensure WP5 knowledge is shared effectively through EURAD-2 channels (e.g., annual meetings, potential contributions to KM WP workshops and trainings).			
Subtask 2.3	**Demonstration and workshops**			
	The main work for this subtask (implementing specific workshops and demonstrations on prototypes) will commence at the beginning of the third year (Month 25). Therefore, no direct execution of demonstration/workshop activities under this specific subtask is planned for Year 2.			
Task 3	**NDT design for industrial implementation.**	**NRG**	**1**	**60**
	This task aims to develop innovative operational devices for the radiological, chemical and physical characterization of large volumes of raw waste into packages (metallic boxes, containers) by NDT (T3.2), including innovation to the waste management approach by integrating other potential in-situ information collected before and during decommissioning via centralized data processing, focused on WAC (T3.1). The result will be a fast, cheap and accurate enough approach to determine standardized volume values within large waste packages for a real decommissioning case T3.3).			
Subtask 3.1	**Raw waste management innovations with data management for comprehensive decommissioning characterization.**			
	In the second year, efforts will shift toward consolidating early developments into a fully functional, interoperable platform. The Django-based backend for metadata and data handling will be finalized and validated, ensuring compatibility with partner tools, including those utilizing ML/AI techniques. A standardized data model will be derived from partner mappings, and initial real-world datasets will be used to populate the system through pilot data collection. To prepare for scalable, AI-ready characterization workflows, test data templates and scopes—also drawing from Tasks 4 and 5—will be developed and deployed on the main platform and partner clones. This phase will emphasize architecture refinement and enable real-time ingestion, processing, and analysis. [**UNIPI**, NRG, SCK CEN, TRACTEBEL, ENEA, CSIC, CAEN, NTUA, NCSRD, ARAO]			

Subtask 3.2	**Exploring the Options into Non-Destructive Technology (NDT) Prototype Implementations for Comprehensive Decommissioning**
	The initial phase of the task entails compiling a comprehensive list of all partners' current progress and identifying potential synergies. During the second year, the most promising techniques that warrant further development during the project will be prioritized. These techniques must possess the capability to comprehensively investigate various properties, including physical, chemical, and radiological aspects. This comprehensive characterization will be crucial to ensure the highest safety standards and provide a holistic understanding of the waste packages from all possible perspectives. Of course, the connection with Subtask 3.1 is clear and will be implemented as deeply as possible from year one and taken into account during the whole project. Physical condition properties Starting to setup a Tomographic Gamma Scanner (TGS) as state-of-the-art reference system for benchmarking other radiological and physical NDA techniques and adopt other non-tomographic gamma techniques according to expected EURAD-2 objectives. [**ENEA**, CSIC, SCK CEN, Tractebel, CIEMAT] Radiation detection Start collaboration with other EURAD-2 WP5 T3 partners testing their own gamma techniques (benchmarked to TGS). Testing will include uncertainty and sensitivity analyses on ENEA and other partners' non-tomographic techniques using MCNP simulations to scale up from the reduced-scale experimental case, constrained by TGS dimensions, to larger volumes.. [**CAEN**, NRG, UNIPI, FTMC, SSTC NRS, SCK CEN, CIEMAT, CSIC, NTUA, ORANO, NCSRD, ENEA] Chemical composition For the chemical- and radiolysis-modelling on longer time scale related WAC, the condition of the raw waste into the packages will be addressed. Including external sources to excite the physical, chemical, and radiological state of the waste temporally and locally for more detection options, including multi energy XR to explore in this project as NDT for chemicals. [**SCK CEN**, TRACTEBEL, PSI]
Subtask 3.3	**Modelling prototype implementations of NDT in best-fit decommissioning approaches**
	This Subtask will collaborate with subtasks 3.1 and 3.2 to prepare the integration into decommissioning strategies and explore the best options to show-case the added value. Work with real waste streams and real decommissioning examples to fit promising techniques from 3.2. Work with Task 4 & 5 to know if NDT can replace or supplement their current solutions. Setup a schema of added value in each step of the decommissioning workflow's, waste streams and storage solutions, using the latest decommissioning strategic insights within EURAD-2.

	[**NRG**, CAEN, ORANO, UNIPI, FTMC, SCK CEN, NCSRD, ENEA, CIEMAT]			
Task 4	**Design of Destructive Techniques for DTM radionuclides**	**DTU**	**1**	**60**
	This task focuses on the development of sensitive and accurate techniques for completing the radiological inventory estimation of waste and packages by the quantification of long-lived DTM radionuclides usually present in low activity concentrations. The aim is developing sensitive and reliable analytical methods to improve the detection limits and to replace the conventional expensive and time-consuming radiochemical analysis. The impact of radiochemical separation and purification will be focused on the effective removal of the interferences in the measurement of target radionuclides by radiometric or mass spectrometry methods. [**DTU**, JSI, SORC, POLIMI, RATEN, VTT, UNIVERSITY OF SEVILLE, SCK CEN, CVUT, IMT ATLANTIQUE, ENEA, CIEMAT, IFE]			
Subtask 4.1	**Development of new radiochemical methods**			
	This subtask aims to develop rapid and effective methods to extract DTM analyte radionuclides from the sample matrix and purify them from all interfering elements and isotopes. Radionuclides which are important for radioactive waste repository, including C-14, Cl-36, Ca-41, Zr-93, Mo-93, Tc-99, Pd-107, Cs-135, Cm-243 and Cm-244, have been selected as DTM radionuclides in this work, driven by the lack of reliable analytical methods (Zr-93, Pd-107), or by the availability of methods excessively time consuming (C-14, Cl-36, Tc-99) or difficult to be standardized (Ca-41, Mo-93, Cs-135). Alloys, metals, concrete, graphite, and ion exchange resin have been selected as relevant samples for analysis because these materials are major and difficult to handle radioactive materials from decommissioning or operation of nuclear facilities. Innovative sample decomposition and pre-concentration methods will be investigated to effectively extract target radionuclides from each type of matrix by different digestion, fusion or volatilization, and rapidly concentrated using co-precipitation or extraction. Sequential separation methods will be designed and investigated to achieve rapid and effective separation of selected radionuclides from the extracted solution to achieve optimal recovery yields and decontamination factors for all possible interfering nuclides. Working groups (WGs) for Cl-36, Ca-41, Tc-99 have been formed and will continue to foster knowledge sharing and inspiration through hands-on experiences thanks to periodic meetings among the partners. Shared documents will be continuously updated to summarize the main achievements, issues, and possible solutions. Inter-laboratory comparison exercises will be organized for Tc-99 in spent ion exchange resins, Ca-41 and Cl-36 in concrete. [DTU, **JSI**, SORC, POLIMI, RATEN, VTT, UNIVERSITY OF SEVILLE, SCK CEN, CVUT, IMT ATLANTIQUE, ENEA, CIEMAT, IFE]			
Subtask 4.2	**Development of new measurement methods**			
	The main objective of this task is the development of quick, sensitive, and accurate methods for measurement of long-lived DTM radionuclides (e.g., C-14, Cl-36, Ca-41, Tc-99, Zr-93, Mo-93, Cs-135, Pd-107, Cm-243, Cm-244). Methods with liquid scintillation counting (LSC) and mass			

	spectrometry (QQQ-ICP-MS, AMS and MC-ICP-MS) will be developed, optimized and compared when relevant to identify the optimal approach with respect to detection limits, measurement time, as well as costs for analysis. Challenges in applying different measurement techniques will be addressed and tackled collaboratively through WGs for LSC and MS. Also these WGs will periodically meet and update the shared documents to report the main advances. Rapid method for C-14 activity analysis in small size samples will be developed, using combustion with on-line purification, trapping and radiometric measurement for C-14. [**DTU**, SORC, POLIMI, FTMC, UNIVERSITY OF SEVILLE, SCK CEN, IMT ATLANTIQUE, ENEA, CIEMAT, VTT, CVUT]			
Subtask 4.3	**Implementation of destructive techniques on real waste**			
	The work for this subtask will start during the third year of the project.			
Task 5	**Scaling Factor optimization**	**ENRESA**	**1**	**60**
	This task aims to investigate the way of improving the Scaling Factor Accuracy, trueness and precision and their impacts in activity packages and inventory.			
Subtask 5.1	**Theoretical analysis of waste streams and identification of conducive parameters**			
	The main objective of this task is the development of pure theoretical models of Scaling Factors (SF). The aim is to produce a report that theoretically describes the production mechanisms of radioactive isotopes in a nuclear reactor, including both activation and fission products, from their origin in the reactor coolant to their transfer into the various waste streams. The document will consider properties such as solubility, radionuclide transport through the different media involved, chemical processes associated with exchange/interaction mechanisms, and ultimately demonstrate the correlation between Difficult-to-Measure (DTM) and Easy-to-Measure (ETM) radionuclides. The document will be continuously updated and will serve as basis for drafting the deliverables D5.4 (SF optimized demonstrations, due to Month 48). This activity is entirely new in the sense that there is no international documentation that develops a theoretical SF model; what currently exists is a statistical approach. This document will aim to present the essential aspects in the theoretical development of SF, which will be the main task to be completed in the second year. [INGECID, SSTC NRS, **FTMC**, TRACTEBEL, SKB]			
Subtask 5.2	**Sampling design for accuracy improvement: trueness/precision**			
	The objective is to describe the statistical models for Scaling Factors (SF) based on the sampling or collection of samples from each waste stream. It must be demonstrated that the sampling is representative of the stream, meaning that it reflects the radiological classification of the waste			

	being assessed. Additionally, both bias, if present, and the uncertainty of the applied model will be taken into account. Once the process is defined, methods for optimizing the sampling strategy will be identified in order to minimize both the uncertainty and the bias of the SF to be applied. What is new, compared to standard statistical SF models, is that this approach proposes pathways for minimizing sampling efforts that not only lead to savings in time and budget, but also optimize key parameters; specifically, the reduction of uncertainty and bias, as well as the derivation of an SF applicable to the various radiological categories for which it was developed. Finally, an analysis of both models (5.1 and 5.2) will be carried out with the aim of identifying improvements that optimize the effort required to obtain a representative SF. [INGECID, SSTC NRS, **FTMC**, TRACTEBEL]
Subtask 5.3	**Accurate inventory for storage/disposal packages**
	Once the parameters of the model, whether statistical or theoretical, have been determined, the next step is to transfer them to a waste package, whose support differs significantly from that of the model's sampling base. It will be established how to transfer not only the mean value, but also the associated uncertainty and bias, to the waste package. This process has never been developed; instead, the parameters of the sampling model have traditionally been maintained when determining DTM in waste packages after measuring the ETM The ways to control the inventory and the related uncertainty for storage/disposal will be defined. The inventory quantification methodology will be established by using the proper statistical models. [**INGECID**, UNIVERSITY OF PISA, SSTC NRS]
Subtask 5.4	**Analysis of optimized scaling factors on real waste**
	The work for this subtask will start during the third year of the project.

Deliverables

- No deliverables for Year 2 (D5.2 will be postponed to the end of Y3).
- M5.2: Selection of specific use cases to test the developed NDT and methods in relevant industrial conditions (CAEN, Month 18).
- M5.3: First 2 years results on new NDT, DT and SF (NRG, Month 24).

4.3.6 WP6 – STREAM

Set of Activities Number	6	**Start Date**			October 2024		
Set of Activities Title	Sustainable treatment and immobilisation of challenging waste (STREAM)						
Participant Number	**7**	**7.2**	**8**	**8.1**	**8.5**	**9**	**9.1**
Short name of participant	**CEA**	**ORANO**	**CIEMAT**	**UAM**	**CSIC**	**CNRS**	**IMT ATLANTIQUE**
Person-months per Participant:	6,96	0	7	6	8,695	4,44	0
Participant Number	**14.3**	**14.4**	**15**	**19**	**23.1**	**23.2**	**24**
Short name of participant	**POLIMI**	**UNIPI**	**ENRESA**	**INCT**	**ZAG**	**EIMV**	**KIPT**
Person-months per Participant:	4,32	0	0,32	5,688	5,01	0,4	6
Participant Number	**36**	**37**	**38**	**40**	**50**	**51**	**74**
Short name of participant	**RATEN**	**SCK CEN**	**SIIEG NASU**	**SOGIN**	**UTARTU**	**VTT**	**IAE**
Person-months per Participant:	4,8	5,88	5,6	1,6	0,64	2,64	0,16
Start month	1			**End month**	60		

Objectives

Innovative and sustainable design, optimization and upscaling of treatments and conditioning materials for the predisposal of problematic waste

EURATOM Call objective	**SRA Drivers**	**KPI at the WP level**	STREAM
Support radioactive waste management innovation and optimisation;	Innovation for Optimisation	Improvement of a process or a method statement (written document)	1
Contribute to addressing scientific/technical challenges;	Scientific Insight	Number of State-of-the-Arts published	1
		Number of open access publications accepted	3
		Number of presentation at scientific conferences done	4

Encourage the efficient use of R&D resources at EU level;		Number of mobility actions (undertake interships/exchange programmes) + learner satisfaction (define a rate)	
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of PhD/postdocs/ students	5
		Number of trainings lectures provided + number of participants	1
		Number of mobility actions (visits, trainings courses, conferences)	1

Activity No	Activity Title	Lead participant	Start Month	End month
Task 1	**Management / Coordination of the WP**	**SOGIN**	**1**	**60**
	The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results.			
Subtask 1.1	**S/T coordination**			
	Regular bimonthly Management Board meetings will be conducted with the aim of ensuring that the WP is progressing according to the agreed planning. Management Board will be responsible for communications with other WPs and external Stakeholders and End Users.			
Subtask 1.2	**Dissemination / outreach / impact**			
	The WP Board will organise two WP Annual Meetings, which will be arranged with all partners to allow for information exchange, monitoring of work progress, dissemination of results, and interaction with End Users and other stakeholders. The WP Board will contribute to EURAD-2 newsletters, website by providing relevant news and will propose initiatives for dissemination in conference or other international events. Four contributions are expected for Year 2			
Subtask 1.3	**Quality control**			

	The WP Board will address quality control of the work package implementation to ensure the conformity to the Grant Agreement and high-quality outcomes that meet the objectives of the WP and overall programme. No Deliverables are foreseen for Year 2, but two Milestones (MS62 and MS63) are planned for M15. WP board will review and validate the two milestones. This task also covers implementing data management and open access requirements and addresses risk management of the WP, for task actions, budget, schedule and outcomes.			
Task 2	**Knowledge Management**	**CIEMAT**	**1**	**6**
	Knowledge Management activities in the second year of the project will be mainly focused on subtask 2.2. Knowledge Transfer, with a special emphasis on dissemination and training actions.			
Subtask 2.1	**Knowledge capture**			
	Subtask 2.1. Knowledge capture will continue with the work initiated during the first year of project on the collection and analysis of available information from national and international projects and R&D activities in the field of Treatment and Conditioning.			
Subtask 2.2	**Knowledge transfer**			
	In this second year of project, training activities and materials will be developed in close collaboration with WP5 ICARUS and WP7 L'OPERA, on the basis of knowledge management needs identified from the interaction with partners and Endusers of the Predisposal-Community. It is expected to provide one training lecture in Year 2 Internal, cross-WP and external mobility actions, as well as networking activities, will be supported by task 2 in coordination with WP2. It is expected one mobility action for Year 2Mentoring initiatives are planned to be initiated during this second year of project.			
Task 3	**Study of treatment and conditioning methods**	**CSIC**	**6**	**48**
	The main goal of Task 3 compromises three different aspects: i) The optimisation of the decontamination treatments; ii) The development of low-carbon matrices to encapsulate several types of waste and iii) the study the waste-matrix interaction. T3 has initiated activity 1st of March 2025. The coordinator (CSIC) has distributed a questionnaire to the partners to collect their info on the different subtasks and to identify			

	synergies and the final distribution of activities. A KoM was held on 8th April, where partners presented preliminary planning of activity and different aspects of the task were discussed. Task 3 meetings with all the partners will be planned at different intervals of time following the advances of the activities during the second year. Moreover, internal meetings with T3 identified reference partners' collaborators (CNRS, CEA and UAM) are scheduled regularly to follow the progress of the different activities.
Subtask 3.1	**Optimization of available treatment technologies and conditioning matrices based on alternative binders**
	Subtask 3.1 is focused on the optimisation of available treatment technologies and conditioning matrices based on alternative binders. In this sense, several approaches are proposed and the experimental activities, already started on Year 1, will continue on Year 2. As for optimisation treatment technologies: Four main waste technologies will be under study: 1) Fenton wet oxidation processes to limit potential loss of contaminants and minimize the footprint of the process, 2) IER Incineration ashes, 3) metal powder oxidation, molten salt or wet oxidation and process performance comparison, 4) liquid scintillation cocktails, solvents As for matrices optimisation, two main binders are considered:The optimisation of geopolymers and alkali-activated materials for the conditioning: Non-treated IER surrogates and with real radioactive, optimised previous treated wastes, metal waste (Be, Mg and Pb) and other types of waste, as liquid waste decontamination, evaporators concentrates and ion exchange sludges.The optimisation of phosphate-based matrices for the conditioning of IER and Al. One Improvement of a process / method statement is expected in Year 2 Two milestones related to this subtask will be prepared and delivered for month 15**MS62:** Intermediate report on the selection of the most promising available treatment processes **(POLIMI)** **MS63:** Intermediate report on the selection of the most promising conditioning matrices **(CSIC)**
Subtask 3.2	**Investigation of physico-chemical interactions between low-carbon binders and challenging waste**
	Subtask 3.2 is focused on the development of alternative low-carbon binders (LCB) to encapsulate challenging waste, with special attention to the study of the physico-chemical interaction in the waste form. Before the development of low-carbon conditioning matrices, the chemical compatibility of these cements with selected waste streams currently stabilised with binders having a high carbon footprint will be evaluated. The focus in this task is placed on the influence of the waste components on the cement hydration rate and on the products formed using both experimental and modelling approaches.

	Experimental work, started on Year 1 will continue on Year 2 on the following low carbon binders and challenging waste. Type of LCB selected: LC3: CEM II/CM Q (limestone + calcined clay), 2) calcium sulphate aluminate (CSA), 3) Clinker with content < 40-50% and BFS and/or MK, 4) OPC with vitrified bauxite waste (VBR). Waste immobilisation in the LCB selected IER non-treated, 2) Incineration ashes, 3) concentrated electrolytes, 4) Sludges, and 5) Metallic waste (Pb, Bi alloys) Preliminary results obtained in the second Year will be the basis for the future research activities with the aim of providing a guide for the selection of the most appropriate low-carbon binder according to the composition of the waste.			
Subtask 3.3	**Design and characterization of low-carbon binder-based mortars**			
	Subtask 3.3 is focused on the design and characterization of low-carbon binder-based mortars for conditioning matrices and backfill materials, considering the incorporation of recycled or secondary aggregates based on the use of low-carbon binders as Portland with supplementary cementitious materials or CSA. Preliminary studies, initiated on Year 1, will continue on Year 2.			
Task 4	**Scaling-up of treatment and conditioning processes**	**SCKCEN**	**25**	**60**
	The main objective of this task is to demonstrate the upscaling feasibility of treatment and conditioning processes developed in task 3 by a combination of large scale testing. This task also includes the development of numerical models to simulate the large-scale experiments.			
Subtask 4.1	**Scale 1 test /minimizing the secondary effluents/data for numerical models**			
	As this subtask will be only started in year 3, no specific activities are foreseen for Year 2.			
Subtask 4.2	**Development of numerical models to simulate the large-scale experiments**			
	As this subtask will be only started in year 3, no specific activities are foreseen for Year 2.			
Task 5	**Deploying safe solutions achieving cost and environmental performances following the principles of circular economy**	**UKNNL**	**6**	**55**

	The main objective of this task in the second Year is to agree protocols for LCA /LCC (based on PREDIS) and disposability assessment and define data requirements and engage with tasks 3 and 4.
Subtask 5.1	**LCA/LCC analysis / WAC**
	Initial discussions will start to define with the tasks leaders (3 and 4) the case studies that will be considered (pre-treatments process and candidate matrices)
Subtask 5.2	**Evaluation of fulfilments of WACs and disposability assessment according to disposal facilities features (near-surface and/or intermediate-depth and/or geological**
	Initial discussions will start for the analysis of the disposal/WAC fulfilments of the relevant waste forms developed in tasks 3 and 4. The objective of analysing the suitability of existing WACs for materials based on the developed novel binders will be defined.

Deliverables

None for Year 2

4.3.7 WP7 – L'OPERA

Set of Activities Number	7	**Start Date**			October 2024		
Set of Activities Title	Long-term performance of waste matrices (L'OPERA)						
Participant Number	**1**	**7**	**7.2**	**8**	**8.1**	**8.5**	**9**
Short name of participant	**ANDRA**	**CEA**	**ORANO**	**CIEMAT**	**UAM**	**CSIC**	**CNRS**
Person-months per Participant:	0,668	0,936	0,164	2,512	1,88	2,192	5,618
Participant Number	**9.2**	**9.7**	**9.8**	**11**	**11.2**	**11.6**	**14**
Short name of participant	**ULILLE**	**ENSAM**	**CENTRAL E LILLE**	**CVR**	**CVUT**	**UJV**	**ENEA**
Person-months per Participant:	0,516	1,72	1,408	2,12	0,608	0,516	1,72
Participant Number	**14.3**	**14.4**	**14.5**	**15**	**19**	**20**	**32**
Short name of participant	**POLIMI**	**UNIPI**	**UNIROMA**	**UDC**	**INCT**	**IRSN**	**NRG**
Person-months per Participant:	1,6	0,864	0,792		1,8	1,656	0
Participant Number	**36**	**37**	**38**	**40**	**44**	**51**	
Short name of participant	**RATEN**	**SCK CEN**	**SIIEG NASU**	**SOGIN**	**SURAO**	**VTT**	
Person-months per Participant:	1,904	1,336	5,24	0,16	0,24	0,64	
Start month	1			**End month**	60		

Objectives

Demonstrate long term behaviour and durability of matrices and final wasteforms.

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**SCK CEN**	**1**	**60**
	The coordination of the work package is ensured by the WP board constituted by SCK CEN as WP leader, and by ANDRA, CIEMAT, SOGIN, UNIPI and VTT as task leaders.			

	During the second year, the WP board will continue to check that work in progress is carried as planned, and that research activities are in line with the Grant Agreement. Keeping the same occurrence, we aim to hold a monthly WP Board meeting to ensure proper monitoring of the WP. Already organised in the first year, a joint exchange meeting related to Predisposal activities (WP5, WP6 and WP7) will be organised, and will be open to the End-Users and Stakeholders.			
Subtask 1.1	**S/T coordination**			
	Particular attention will be paid to coordinating work and ensuring consistency between tasks. During the second year, only one milestone is planned at WP level, nevertheless the WP board will contribute to several milestones and deliverables that will be derived from the general management of EURAD2 (annual report, IPR2, ...). Regular updating of the documents on the WP7-Project Place will be performed.			
Subtask 1.2	**Dissemination / outreach / impact**			
	Annual workshops will be organised on-line, and/or in person if feasible with WP partners to exchange information, discuss experimental results and WP status, but also to identify gaps and remedy them if necessary. In principle, these workshops are limited to the WP partners, therefore specific exchange meeting with End-Users and Stakeholders will be arranged, likely in collaboration with WP5 and WP6. The WP board will also contribute to the newsletters, and expects to communicate the WP activities at international events. WP7 activities were presented at the EURADWASTE-FISA 2025 conference (poster), thus fulfilling one of the KPIs targeted for the first two years of the project. Further technical presentations are expected during the 2025-2026 period at workshops or conferences such as RADCHEM, but contributors have not yet been identified.			
Subtask 1.3	**Quality control**			
	WP board will pay attention in the quality of reports and documents produced in WP7. Work and budget will be monitored closely to ensure compliance with the grant agreement.			
Task 2	**Knowledge Management**	**SOGIN**	**1**	**58**
	Activities for Year 2 will be mainly focused on subtask 2.2 Knowledge Transfer. In close collaboration with WP2 KM and with WP5 ICARUS and WP6 STREAM specific activities to transfer knowledge to interested parties will be implemented.			

Subtask 2.1	**Knowledge capture**			
	Following delivery of the initial state-of-the-art report, knowledge capture activities will be minimal until production of the final state-of-the-art report in the last year of the program. The Deliverable D7.1 – State-of-the-Art on novel matrices for LILW immobilisation will be one of the KPIs identified during the first two years of the project.			
Subtask 2.2	**Knowledge transfer**			
	The interested parties and the specific topics will be defined based on the outcomes of the preliminary interactions with Partners and End Users, initiated (in collaboration with WP5 and WP6) during the first Year, to identify training need and training possibilities in the pre-disposal domain. In the second year of the project, we aim to organize at least one training session on Predisposal activities, in collaboration with WP5 and WP6. In addition, internal, cross-WP and external mobility actions as well as networking activities will be supported and encouraged by Task 2 leader. We expected around five mobility actions to be completed by the end of the second year.			
Task 3	**Boundary conditions**	**VTT**	**1**	**9**
	The main activities related to the definition of boundary conditions were conducted during the first year of the program, and ended with the delivery of the deliverable D7.2, subsequently used in tasks 4 and 5.			
Task 4	**Inventory of the conditioned materials and complete characterisation**	**CIEMAT**	**1**	**48**
	Activities in the second year of the project will be focused on the physic-chemical and mechanical characterization of waste forms included in the initial inventory defined during this first year. Characterization and short-term stability results from waste forms produced in WP7 and WP6 will be consolidated in the Task 4 database, together with data from previous national and international projects, in which the conditioning matrices have been developed. For homogeneity of the gathered information and to ensure correct comparison of waste matrices, we intend to provide a standard protocol for waste characterization. During year 2, the inventory of the different immobilization matrices and waste forms to be investigated in WP7 will be completed, including the ones produced within WP6 task 3. This inventory will provide detailed information about the physic-chemical characteristics of the wastes and the different matrix formulations. An initial evaluation of robustness of waste forms will be performed in order to evaluate the compatibility of the different waste streams and conditioning systems under study. Special emphasis will be placed on the study of the waste-matrix interactions for each type of waste and immobilisation materials to assess the stability of the waste-matrix system. These			

	initial results will be gathered in *Milestone MS65. Intermediate report on characterisation,* that is foreseen to be delivered by month 16. Quarterly meetings are scheduled to ensure proper management of the task and assessment of progress, as well as to identify weak points or needs that can be remedied through collaboration. Additional meetings can be scheduled if necessary.			
Task 5	**Wasteforms durability and stability testing**	**ANDRA**	**6**	**55**
	After the definition of ageing and leaching condition in the first year of the project, the second year will focus on the ageing of samples and acquisition of first results. Leaching will be also initiated for systems that are not pre-aged. The main outcomes of this year will be characterisation of aged samples, first understanding of degradation and parameters that would influence the durability. A large amount of data is expected to be generated under Task 5, as about 100 leaching experiments are expected to be carried out from the second year of the project onwards. The dissemination of these results, including the characterization data from Task 4, should give the opportunity for several oral presentations and publications. However, given the duration of the tests, only preliminary results could be presented, and we anticipate no more than three oral presentations during this period. This would meet the targeted KPI for dissemination.			
Subtask 5.1	**Material evolution after artificial degradation**			
	Evolution of the materials regarding the effect of gamma irradiation to simulate the presence of radionuclides in the waste in the long term will be carry out by: • CIEMAT/CSIC/UAM and ENSAM/ORANO/ANDRA for Nochar/oil wasteforms • CIEMAT/CSIC/UAM, CVRez/UJV/CTU/SURAO, POLIMI and INCT for geopolymer/ion exchange resins wasteforms • CSIC/UAM for MKPC/ion exchange resins wasteforms • CIEMAT/CSIC/UAM and RATEN for geopolymer/incineration ashes wasteforms • POLIMI and ENEA for geopolymer/RLOWs wasteforms Thermal ageing or thermoxydation will be studied will be performed by: • CIEMAT/CSIC/UAM and ENSAM/ORANO/ANDRA for Nochar/oil wasteforms Thermal cycling will be performed by: • CIEMAT/CSIC/UAM for geopolymer/ion exchange resins wasteforms • CSIC/UAM for MKPC/ion exchange resins wasteforms • ENEA, POLIMI, UNIROMA, UNIPI and SIIEG for geopolymer/RLOWs wasteforms • CVRez/UJV/CTU/SURAO for geopolymer/ion exchange resins wasteforms After definition of conditions and experimental ageing plan, the samples will be submitted to radiation or thermal ageing. Aged samples will be characterized and results compared to initial characteristics/properties.			

Subtask 5.2	**Long-term leaching**			
	After definition of protocol, long term leaching will be initiated for the matrices/wasteforms namely for the samples that will not pre-aged by radiation or thermal ageing: • SCK CEN and VTT for geopolymer/incineration ashes wasteforms • EMPA/ASNR for geopolymer/ RLOWs wasteforms • CEA for geopolymer/MgZr alloy wasteforms • PSI for geopolymer/sludges wasteforms Characterisation of leaching solution will be performed periodically. The leaching of pre-aged systems (indicated in subtask 5.1) will start later. In addition to aged samples, samples without ageing treatment will be also submitted to leaching in order to be used as reference sample.			
Task 6	**Implementation**	**UniPi**	**30**	**56**
	The Task 6 activities are not yet started			

Deliverables

None for Year 2

4.3.8 WP8 – SAREC

Set of Activities Number	8	**Start Date**			October 2024	
Set of Activities Title	Release of safety relevant radionuclides from spent nuclear fuel under deep disposal conditions (SAREC)					
Participant Number	**7**	**8**	**9**	**9.9**	**15.2**	**15.4**	**17**
Short name of participant	**CEA**	**CIEMAT**	**CNRS**	**UMONTPELLIER**	**EUT**	**UPC**	**FZJ**
Person-months per Participant:	7,6	2,52	2,6	0,4	1,44	0,72	2,4
Participant Number	**17.1**	**20**	**20.1**	**14.1**	**25**	**25.2**	**26**
Short name of participant	**HZDR**	**IRSN**	**ENSMP**	**ENERGORISK**	**KIT**	**AMPHOS21**	**KTH**
Person-months per Participant:	2,08	0,16	1,04	2,16	3,8	2,12	2,52
Participant Number	**30**	**36**	**37**	**39**	**49**	**51**	
Short name of participant	**ONDRAF**	**RATEN**	**SCK CEN**	**SKB**	**UHELSINKI**	**VTT**	
Person-months per Participant:	0,44	2,08	5	0,76	1,28	2,4	
Start month	1			**End month**	60		

Objectives

Improved quantification and mechanistic understanding of the release of safety relevant radionuclides covering most representative types of spent nuclear fuel (SNF) and of the fuel evolution both prior and posterior to contact with ground water to better predict the radionuclide source term for post-closure safety assessment.

EURATOM Call objective	**SRA Drivers**	**KPI at the WP level**	**Target**
Contribute to addressing scientific/technical challenges;	Scientific Insight	Number of State-of-the-Arts published	1
		Number of open access publications accepted	3
		Number of presentation at scientific conferences done	6

Contribute to addressing the evolving regulatory concerns;	Implementation Safety	Number of events per year where regulators are invited to participate	1
Encourage the efficient use of R&D resources at EU level;		Number of interactions between WPs (sharing of samples, ..)	2
		Number of mobility actions	1
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of PhD/postdocs/ students	3
		Number of trainings lectures provided + number of participants	1 (one training course ie several lectures) 20 participants)
		Number of events where non-EURAD-2 students can participate	1
		Number of mobility actions (visits, trainings courses, conferences)	1

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**SKB**	**1**	**60**
	The management and coordination will be performed by the WP Leader **[SKB]** in collaboration with the Task Leaders **[Amphos 21]**, **[CIEMAT]**, **[KIT]**, **[KTH]** and **[ONDRAF/NIRAS]** constituting the WP Board. The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results. In this respect there are significant interactions with all other tasks of the WP and other WPs, in particular WP CSFD and WP Ditusc.			
Subtask 1.1	**S/T coordination**			
	The WP Board will have two meetings during the second year of the program. The progress of the WP will facilitated and monitored via follow-up of the four milestones expected during the second year, focusing on the sample preparation, initiation of experiments and as well as the structue for the data base. The progress of the WP will be reported to the PMO representative.			

Subtask 1.2	**Dissemination / outreach / impact**			
	The WP Board will organise the first annual WP meeting which will be arranged with all partners to allow for information exchange, planning and monitoring of work progress and interaction with End Users. The WP Board will contribute to EURAD-2 newsletters and website by providing bi-annual news.			
Subtask 1.3	**Quality control**			
	The WP Board review planning, milestones and deliverables within the WP. The WP board will assess how the WP is achieving the KPI targets relevant for the WP, specifically scientific publications, presentations and training occurences.			
Task 2	**Knowledge Management**	**Amphos 21**	**1**	**60**
	The main objective of Task 2 is to capture knowledge relevant to the Strategic Research Agenda (SRA) topic of this Work Package (WP) and to contribute to knowledge transfer within the EURAD-2 community and beyond, through the EURAD-2 Knowledge Management (KM) programme. The Task 2 Leader will coordinate cooperation between the WP and all relevant stakeholders involved in KM activities across EURAD-2 (including representatives from KM WPs, task leaders within the current WP, and other WPs). In addition, the Task 2 Leader will actively promote, where applicable: • the involvement of individual students in WP R&D activities • the involvement of SAREC partners to knowledge transfers activities such as writing DI's and SoK • promoting training activities organized by SAREC partners at the WP level or centrally through the EURAD KM WP. The T2L will also support internal, cross-WP, and external mobility initiatives, as well as networking activities.			
Subtask 2.1	**Knowledge capture**			
	The Initial SotA (D8.1) has been duly delivered and organization of Final SotA will be started with the selection of the external reviewers.			
Subtask 2.2	**Knowledge transfer**			
	Organization of iCP (interface Comsol PhreeqC code) training course has been approved by KM WP and it will be organized during year 2. This training event is planned for April 2026 and i			

	twill have a capacity of 20 participants, potentially allowing for student/participant mobility grants to support attendance.			
Subtask 2.3	**Database and Training Materials**			
	Implementation of a web interactive interface for the SNF dissolution database developed within First-Nuclides and Disco projects.			
Task 3	**IRF/FGR Performance of Spent Nuclear Fuel**	**KIT**	**1**	**54**
	All SNF leaching experiments will be started and the first results on the IRF/FGR will become available. A task 3 (online) workshop will be organized to discuss the ongoing autoclave experiments and results. One presentation is planned for the 20th Radiochemical Conference in May 2026. One open access scientific article is foreseen to be submitted during year 2.			
Task 4	**Role of Grain Boundaries in Spent Fuel Corrosion**	**ONDRAF/NIRAS**	**1**	**54**
	Samples will be prepared and characterised by all participants, in order to achieve milestone 88. Some leaching tests will be started. The work will be presented at the first annual meeting in Madrid. One Post Doc is planned to start in January 2026.			
Task 5	**Studies on Model Materials**	**CIEMAT**	**1**	**54**
	The objective is to deepen the study and parametrization of the factors influencing the dissolution of spent nuclear fuel, as well as the associated release of safety-relevant radionuclides, under repository conditions and through the use of model materials. All partners will contribute to: - Doped samples will be obtained and characterized in terms of microstructure (MS89) (CIEMAT, KTH, IMT, VTT, FZJ, Lancaster, NWS). - Installation of experimental set-up (CIEMAT, KTH, IMT, VTT, FZJ, Lancaster, NWS). - Starting of irradiation (external gamma) and H2O2-experiments will be conducted (CIEMAT, KTH, IMT). - Starting of dissolution experiments and measurements of U release (CIEMAT, KTH, IMT, VTT, Lancaster). Contribution to the first annual meeting at CIEMAT and second task 5 workshop. A presentation at the Migration conference 2025 is planned. One open access scientific article is foreseen to be submitted during year 2. One planned mobility action for a PhD student. Interaction with WP Ditusc is planned.			
Task 6	**Mechanistic modelling**	**KTH**	**1**	**54**
	The objectives of task 6 are to improve and develop mechanistic models related to the release of safety relevant radionuclides from SNF, to include for example; i) to account for the release of matrix, grain boundary and gap (at scale of SNF pellet) ii) to integrate the effect of different			

	amount of epsilon particles on the release of AP, FP and matrix dissolution. iii) interpretation or transposition at the DGR scale: which process(es) prevail in the different phases expected in repository conditions (e. g. Fe/H2 effect). The aim is also to acquire data supporting the evaluation and interpretation of SNF leaching studies. In 2026, a presentation is planned for the International Conference on Ionizing Processes. One open access scientific article is foreseen to be submitted during year 2. One Post Doc is planned to start in autumn 2025 and continue on through year 2.
Subtask 6.1	**Radionuclide release modelling**
	Model development will be initiated and first set of input parameters defined. One (digital) task workshop will be organised. In addition, intermodel comparisons will be conducted for models that share common features (e.g., models based on water radiolysis and models accounting for grain boundaries). Grounds for comparisons will be defined and agreed upon.
Subtask 6.2	**Source term and FGR modelling**
	Model development will be initiated, first set of input parameters and comparison of the output parameters defined. One digital task workshop will be organised.

Deliverables

None for Year 2

4.3.9 WP9 - InCoManD

Set of Activities Number	9	**Start Date**			October 2024	
Set of Activities Title	Innovative and new container/canister materials under disposal fields conditions: manufacturing feasibility and improved durability (InCoManD)					
Participant Number	**1**	**1.2**	**1.3**	**4**	**6.1**	**8**	**8.3**
Short name of participant	**ANDRA**	**EMSE**	**GALTENCO**	**BASE**	**GNS**	**CIEMAT**	**UGR**
Person-months per Participant:	1,36	2,8	0,88	2,4	0,4	3,92	1,6
Participant Number	**8.4**	**9**	**9.1**	**11.1**	**11.4**	**11.6**	**17.1**
Short name of participant	**UPM**	**CNRS**	**IMT ATLANTIQUE**	**VSCHT**	**TUL**	**UJV**	**HZDR**
Person-months per Participant:	3,84	6,72	0,52	0,96	1,92	0,96	2,828
Participant Number	**19.1**	**23.1**	**24**	**25**	**25.3**	**25.4**	**25.5**
Short name of participant	**UW**	**ZAG**	**KIPT**	**KIT**	**BAM**	**LUH**	**GRS**
Person-months per Participant:	0,48	5,06	7,2	1,28	0,32	3,6	0,64
Participant Number	**30**	**34**	**38**	**44**	**51**		
Short name of participant	**ONDRAF**	**POSIVA**	**SIIEG NASU**	**SURAO**	**VTT**		
Person-months per Participant:	0,16	0,32	8	0,16	2		
Start month	1			**End month**	60		

Objectives

The WP aims at identifying and qualifying novel materials for the HLW containers/canisters, as well as providing a deeper knowledge of both traditional and novel materials long-term durability in, as realistic as possible, field conditions.

EURATOM Call objective	**SRA Drivers**	**KPI at the WP level**	**Target**	**InCoManD**
Support radioactive waste management innovation and optimisation;	Innovation for Optimisation	Improvement of a process or a method statement (written document)	2	1
		Number of State-of-the-Arts published	1	1

Contribute to addressing scientific/technical challenges;	Scientific Insight	Number of open access publications accepted	2	2
		Number of presentations at scientific conferences done	10	10
Boost knowledge transfer to early-stage programmes;	Tailored solutions	Number of KM documents produced	1	1
		Number of IAEA listed early stage programmes participants registered to events / workshops / webinars	1	2
Encourage the efficient use of R&D resources at EU level;		Number of interactions between WPs (sharing of samples, ..)	2	1
		Number of mobility actions (undertake internships/exchange programmes) + learner satisfaction (define a rate)	0	2
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of PhD/postdocs/ students	9	4
		Number of trainings lectures provided + number of participants	2	2
		Number of events where non-EURAD-2 students can participate	1	0
		Number of mobility actions (visits, trainings courses, conferences)	3	2

Activity No	Activity Title	Lead participant	Start Month	End month
Task 1	**Management / Coordination of the WP**	**Andra**	**1**	**60**

	Monthly board meetings (BMs) are organised to address any topic or issue related to the WP life such as activities of the partners, EURAD-2 news, calls, interactions with other WPs (including WP2), etc.			
Subtask 1.1	**S&T coordination**			
	Monthly BMs, as scheduled since the beginning of the project, allow to quickly identify and address any potential issue or concern within the consortium. Starting from Y2, an update will be made during each BM on the S&T activity planned in the AWP; for this purpose, TLs will organise regular online meetings with the partners involved in their task. WPLs			
Subtask 1.2	**Dissemination / outreach / impact**			
	The second annual event will be organized by the board and is scheduled in Fall 2026. As for the kick-off and 1st annual event, a LinkedIn post will be created, and a note will be prepared for the newsletter.			
Subtask 1.3	**Quality control**			
	Quality is controlled by the WP board in line with the EURAD-2 QMP. Additionally, the Expert Review Group (ERG), as a unique body within the EURAD-2 Partnership, makes sure S&T activities are consistent, sound and in agreement with at least one DGR concept, and helps/guides partners.			
Task 2	**Knowledge Management**	**HZDR/BAM**	**1**	**60**
	Task 2 leaders (T2Ls), in addition to their role of KM ambassadors between WP2 KM and WP9 InCoManD board, will keep on promoting the InCoManD partners' activities and informing the partners of relevant conferences and workshops. They will take part in all WP2 KM board – T2L meetings and forward relevant information to the InCoManD partners and collect requested feedback to the WP2 KM board. They will also prepare notes about the DITUSC/InCoManD interaction meetings. They will continuously update the list of participations and contributions to conferences from InCoManD fellows. To finish, they will assist in preparing the MSs number 76 and 77.			
Subtask 2.1	**Knowledge capture**			
	T2Ls ensure quality check of the KM activities delivered by partners within WP09 and ensure that WP data management is in line with EURAD-2 DMP.			

Subtask 2.2	**Knowledge transfer**			
	T2Ls will assist InCoManD partners to give lunch-and-learn session; at least one topic is already identified, which is "The impact of microbial processes on the safety of different DGR barriers: multidisciplinary characterization approach", that shall be given by M. Merroun from UGR. T2Ls will also continue to inform InCoManD partners about relevant international conferences to present major outcomes of InCoManD.			
Subtask 2.3	**Additional activities**			
	Supporting early preparation of the planned summer school, organized by ZAG (programme, schedule, contributions), that should take place in 2028 in Ljubljana. By the end of Y2, exact dates will be defined, and a first draft agenda will be prepared.			
Task 3	**Innovative HLW container materials**	**IRCER**	**2**	**55**
	Bulk ceramics: **Galtenco** and **Andra** will work to optimise the first steps of the alumina gelcasting elaboration process, *i.e.*, the gel and the green body, by varying the slurry composition. In parallel, **IRCER** and **EMSE** will develop specific formulations of a sealing material based on intimate blends of alumino-silicate powders; this material shall be melt using a microwave device. **KIPT** will continue to improve the SiC-based material containing Cr additive as a candidate for waste containers. More representative conditions will be considered to evaluate the corrosion resistance of this material. In parallel, ceramic fillers will be tested for the sealing. Coatings: **KIPT** will prepare CrN/CrON and Ti/TiO_2 multilayer coatings to address several issues at the same time (corrosion and wear resistance for instance). **UW** will prepare Cu-Ni/Sn coatings using electrochemical deposition. **EMSE** will work on improving cold spray deposited Cu/Al_2O_3 coatings performing thermal treatments. Mechanical tensile testing will be performed to assess the improvement.			
Subtask 3.1	**Identification / improvement of innovative materials**			
	Bulk ceramics: **Galtenco** and **Andra** will work to optimise the first steps of the alumina gelcasting elaboration process, *i.e.*, the gel and the green body, by varying the slurry composition. In parallel, **IRCER** and **EMSE** will develop specific formulations of a sealing material based on intimate blends of alumino-silicate powders; this material shall be melt using a microwave device. **KIPT** will continue to improve the SiC-based material containing Cr additive as a candidate for waste containers. More representative conditions will be considered to evaluate the corrosion resistance of this material. In parallel, ceramic fillers will be tested for the sealing. Coatings: **KIPT** will prepare CrN/CrON and Ti/TiO_2 multilayer coatings to address several issues at the same time (corrosion and wear resistance for instance). **UW** will prepare Cu-Ni/Sn coatings using electrochemical deposition. **EMSE** will work on improving cold spray deposited Cu/Al_2O_3 coatings performing thermal treatments. Mechanical tensile testing will be performed to assess the improvement.			

Subtask 3.2	**Development of fabrication methods**			
	Sealing methods: **EMSE** will keep on developing its heating device (in addition to working on the sealing material as described in 3.1.) for the sealing of the ceramics using microwaves and focusing on an innovative approach combining an ad hoc sealing material and SiC fibres as a susceptor. **KIPT** will test sealing process parameters (composition, temperature, time) for (bulk) SiC, while **LUH** will carry out a systematic study of various sealing materials (e.g., mild steels and Cu) to assess the potential of the arc welding processes to seal waste containers.			
Subtask 3.3	**Life Cycle Assessment and Life Cycle Costing (LCA/LCC) approaches**			
	No activity planned before Y4 at best, as described in the Grant Agreement.			
Task 4	**Evaluation of materials durability**	**CIEMAT**	**2**	**55**
	In Task 4, *the durability assessment will*, principally, *focus on the corrosion resistance of materials identified and developed in Task 3* (Al_2O_3, SiC, Ti/TiO_2, Cu/Al_2O_3...). The experiments proposed in subtask 4.1 will deal with materials immerged in solutions relevant for at least one DGR concept, or in devices where the relative humidity is controlled; consecutive solicitations (for instance, leaching + irradiation) will also be realised. In subtask 4.2, more complex experiments are considered, designed to simulate accelerated field conditions combining several types of solicitations (notably, leaching solution at high pH and temperature with irradiation, or irradiation and microbial activity…).			
Subtask 4.1	**Corrosion of materials**			
	Cu-based materials: **BASE** and **KIT-INE** will investigate the corrosion susceptibility of oxygen-free Cu-OFP friction stir welded coupons and compared it to that of non-welded specimens, while **Subatech** will work with NWMO and **EMSE** to evaluate the behaviour of copper coatings from the Canadian concept and composite Cu/Al_2O_3 cold spray coatings, respectively under various doses of gamma irradiation and under various relative humidity levels (from 66% to 99%). Beforehand, corrosion and stress corrosion tests will be performed at **EMSE** in groundwater at 90°C**. UW** will conduct preliminary experiments to evaluate the behaviour of electrochemically deposited Cu-Ni/Sn coatings in close to pure and neutral water with the attempt to determine the real surface area of analysed materials using a combination of electrochemical techniques. Coatings: **GRS**, **KIPT**, **LUH** and **Subatech** will evaluate the corrosion resistance of Ti, Cu, and Cr PVD coatings and multilayers of those in passive oxide and anoxic Opalinus Clay water and its slurry with Wyoming bentonite at 50 °C. Additionally, coatings will be irradiated to evaluate the interfacial chemistry evolution similarly to what the outer wall container will be subjected to. Ceramics: **CIEMAT** will conduct leaching experiments on Al_2O_3 provided by **Galtenco**, in conditions relevant to the French (**Andra**) DGR concept (~90 °C, pH 12.5). Additional preliminary irradiation tests will also be carried out at 10 Gy/h up to the maximum achievable dose that will correspond to a few decades			

	of in-service irradiation time (note that it is envisaged to cumulate this dose with another one during a subsequent irradiation campaign). Fe-based materials: **GNS**, **LUH**, **GRS** and **KIT** will evaluate the corrosion resistance of standard materials including soldered samples consisting of corrosion resistant steel (such as Cr-steel and Cr-Ni-steel) under conditions relevant for the German DGR concept, that are pH 7,5 – 8,5, aerobic and anaerobic conditions with porewater containing chloride, sulphate, hydrogen…			
Subtask 4.2	**Development of ad hoc experiments to mimic accelerated field conditions**			
	For Y2, bentonite as the material defining the near-field conditions will be the focus of the partners activities in sub-task 4.2. Environmental conditions (except microorganisms): At **CIEMAT**, in collaboration with **Nagra** and **SKB**, Cu-OFP and C-steel will be monitored in contact with bentonite upon combined temperature (up to 80 ºC) and gamma irradiation. **SIIEG NASU** will investigate Cu and carbon steel corrosion processes in contact with bentonite at temperature up to 130 °C. **ZAG**, in collaboration with **CIEMAT**, will study localised corrosion of copper in contact with compacted bentonite under decreasing [O_2] transient. The consortium made of **VSCHT**, **UJV**, **TUL** and **SURAO** will study the mechanical pressure evolution exerted on the container material in compacted bentonites due to corrosion product formation and limitation of stress raisers growth. Environmental conditions – microorganisms: **EPFL**, in collaboration with **Nagra** and **HZDR**, will conduct both laboratory experiments and in-situ experiments (namely, Iron-Corrosion Experiment (IC-A) at the Mont Terri URL) on microbial growth inhibition in bentonite considering C-steel and Cu as well; in this framework, **HZDR** will particularly investigate the microbially influenced corrosion on carbon steel in a Calcigel bentonite slurry. **UGR, in collaboration with CIEMAT,** will seek to establish the viability threshold of bentonite microorganisms under gamma radiation exposure, and to determine the survival limit of microorganisms under different compaction densities; FEBEX bentonite and Cu will be here considered. Additionally, the corrosion products will be characterised.			
Task 5	**Experimental and modelling assessment of degradation mechanisms**	**VTT**	**2**	**55**
	The main objective of Task 5 is to evaluate and to analyse the interplay between mechanical and corrosion degradation modes, with a focus on determining threshold stresses and stress intensity factors in relation to material properties and the corrosive environment.			
Subtask 5.1	**Experimental evaluation for the joint effects of deformation and corrosion**			
	VTT, while working at reducing the potential-pH range in which stress corrosion cracking (SCC) agents (e.g., nitrates) can initiate cracking on Cu- OFE+P and Cu-HCP in the presence or not of chlorides, will investigate (i) microstructure, (ii) effect of cold work and (iii) hardness on the susceptibility to crack initiation and propagation in materials, in collaboration with **UPM** (which will work on steels) and **ZAG**; at **UPM**, a particular interest will be given to the role of residual stresses on SCC, while **ZAG** will perform SSRT/creep testing.			

Subtask 5.2	**Modelling for geochemistry and time-dependent transformations**
	TUL, in collaboration with **VSCHT**, **UJV** and **SURAO**, will use stress experimental data (Task 4) as input data to improve their current reactive transport modelling, the purpose of this model being to more accurately infer the corrosion rate with time. A moving corrosion interface will be implemented; in a first approach, homogenous materials and uniform radial stress will be considered. **PSI** will work on the modelling of transport geochemical reactions, at the microscale, occurring at the carbon/stainless steel-clay/cement interface. Surrogate models of the system will be produced with the required resolution to be coupled later with the transport solvers. Machine learning will be used to accelerate the calculations. Experimental data provided by Nagra and **EPFL** will be used as input data for the model. In this framework, **UniBern** will work on reactive transport modelling of experiments performed within Task 4.2. A conceptual model to mimic the experimental system will be developed, including microbial activity and their effect on the corrosion rate, considering first bentonite saturation and transient redox conditions (as in IC-A Mont Terri experiments). **Nagra** and **EPFL** will also contribute to this work.

Deliverables

None for Year 2

4.3.10 WP10 – ANCHORS

Set of Activities Number	10		**Start Date**		October 2024		
Set of Activities Title	Hydraulic mechanical chemical evolution of bentonite for barriers optimization (ANCHORS)						
Participant Number	**1**	**1.1**	**6**	**8**	**8.2**	**9**	**9.5**
Short name of participant	**ANDRA**	**BRGM**	**BGE**	**CIEMAT**	**UCLM**	**CNRS**	**ENPC**
Person-months per Participant:	0,56	1,05	1,28	2,76	2,43	1,44	1,89
Participant Number	**9.6**	**10.1**	**11.2**	**11.3**	**11.5**	**11.6**	**13**
Short name of participant	**ULORRAINE**	**TUDELFT**	**CVUT**	**IGN**	**CUNI**	**UJV**	**EK**
Person-months per Participant:	1,6	0,54	3,57	1,71	2,75	0,88	1,272
Participant Number	**15**	**15.1**	**17.3**	**18**	**20**	**25.1**	**25.2**
Short name of participant	**ENRESA**	**CIMNE**	**UFZ**	**GI-BAS**	**IRSN**	**BGR**	**AMPHOS21**
Person-months per Participant:	0,13	2,17	0,90	2,96	2,93	1,16	0,75
Participant Number	**25.5**	**25.6**	**27**	**30.1**	**34**	**39**	**39.1**
Short name of participant	**GRS**	**TUBAF**	**LEI**	**ULIEGE**	**POSIVA**	**SKB**	**CLAYTECH**
Person-months per Participant:	1,29	1,40	0,81	1,93	0,35	0,6	1,80
Participant Number	**49.1**	**49.3**	**51**				
Short name of participant	**JYU**	**MITTA**	**VTT**				
Person-months per Participant:	2,42	1,64	1,04				
Start month	1			**End month**	60		

Objectives

The objective of this WP is to increase the optimisation potential of bentonite barrier systems: buffer, backfill and seals, and the Safety Case resilience 1) by qualifying the Hydro Mechanical (HM) behaviour of various kind of bentonite types and mixtures through laboratory experimental programme focused on heterogeneity, chemical effects and friction at different scales and 2) by improving the numerical tools that are necessary to carry out performance assessment of bentonite barriers in a Thermo Hydro Mechanical Chemical (Gas) (THMC(G)) repository environment.

Activity No	Activity Title	Lead participant	Start Month	End month
Task 1	**Management / Coordination of the WP**	**IRSN**	**1**	**60**
	The S/T coordination is performed by the WP Leader [IRSN] in collaboration with the Task Leaders [MITTA], [BGE], [SKB] constituting the WP Board. Subtask leaders are also invited to attend the board meetings. The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results. In this respect there are significant interactions with all other tasks of the WP and other WPs.			
Subtask 1.1	**S/T coordination**			
	The work package (WP) coordination team will organize three or four board meetings and prepare comprehensive meeting reports to ensure the WP progresses in alignment with the agreed planning, milestones, and deliverables. The WP leader, responsible for reporting work progress and deliverables, will actively participate in technical and follow-up meetings to be organized by the technical tasks.			
Subtask 1.2	**Dissemination / outreach / impact**			
	The WP coordination team will organize the WP Annual Meetings, bringing together all partners to facilitate information exchange, monitor work progress, disseminate results, and engage with End Users and other stakeholders. The locations for Work Package Meetings n°3 (Month 18) and n°4 (Month 24) have been discussed with the board members: n°3 is tentatively planned for March 2026 in Prague, Czech Republic, in collaboration with CVUT. This meeting will likely take the form of a workshop, potentially co-organized with OPTI, and the regulators will be invited in line with the KPI related to events per year where regulator are invited. Annual meeting n° 4 is expected to take place in Barcelona, Spain, in collaboration with CIMNE/UPC around September 2026. Additionally, dedicated technical meetings at the task level will be arranged to ensure focused discussions and coordination. Contributions to the EURAD-2 newsletters will also be made and news will be shared with SITEX network as a contribution to the KPI on news to regulators. An open access publication will be submitted by Month 24, in line with the KPI related to the number of open access publications. The work will also be presented at a minimum of one conference by Month 24, contributing to the KPI on conference presentations.			
Subtask 1.3	**Quality control**			

	The WP coordination team is responsible for addressing the quality control of WP implementation, with a particular focus on reviewing milestones and deliverables. Milestones MS72, MS92 will undergo a thorough review during Year 2. Also, 12 Key Performance Indicators (KPIs) are planned, necessitating close monitoring to ensure their successful achievement. Additionally, the WP coordination team will ensure the implementation of the data management plan and manage risks related to task actions, budget, schedule, and expected outcomes.			
Task 2	**Knowledge Management**	**SKB**	**1**	**60**
	Task 2 Leader will organise cooperation between the WP and all relevant parties involved in KM activities in EURAD-2 (representatives of KM WP(s), Task Leaders of current WP, other WPs, etc.).			
Subtask 2.1	**Knowledge capture**			
	The initial SOTA was published in Year 1 of the WP (KPI: number of states of the arts published), the final SOTA is planned in Year 5; no deliverable is foreseen in Year 2.			
Subtask 2.2	**Knowledge transfer**			
	The first training of the WP is organized in Year 1 (M11) in Liege university achieving the KPIs related to mobility actions, training sessions, and events open to participants beyond the EURAD-2 student community.The second one will be organized in Year 5. No training foreseen in Year 2.			
Subtask 2.3	**Development of a database**			
	During the first year the structure of the database has been defined, with continuous review and feedback from users. A beta version of the user manual has been developed. In addition, the feeding of the database was initiated, thus fulfilling milestone MS53. During the second year, the curation and ingestion of data will continue, with the maintenance of the feedback of the users. The beta version of the manual will be improved, leading to a tutorial. The database and tutorial will be described in a report according to milestone MS92 (Month 24).			
Task 3	**Laboratory testing**	**MITTA**	**1**	**60**
	To achieve the main objective of ANCHORS concerning optimization, several types of bentonite were selected by the Board: granular and powdered BCV Ca-Mg bentonite, Wyoming Na-bentonite (in powder, and two granule sizes), Calcigel Ca-bentonite (powder), Georgian Na-bentonite (in powder and granules), and Italian Ca-bentonite in powder. All selected bentonites, sourced from the same production batches, were distributed to the partners in Month 7. These materials will be characterized through oedometer and swelling pressure tests as part of the			

	experimental benchmark (Month 7 to Month 24). Additionally, each partner will adapt its experimental program to include the characterization of one supplementary bentonite proposed by the Board, in addition to the initially selected material. Micro scale investigations and laboratory tests including oedometers under various mechanical boundary conditions and mock up started on Month 7 and will continue in Year 2. These tests focus on chemical loadings, heterogeneity, role of friction in link with scale effects and mixture optimization. In terms of chemical effects, testing will be performed using deionized/distilled water, saline water, and alkaline solutions. Some synthetic waters have been specifically defined. Moreover, additional tests will be conducted using Mont Terri (Pearson), Bure, and Boda site waters. The KPI related to the number of interactions with other WPs has already been achieved. Interaction webinars focusing on establishing the modalities for collaboration. were organized with WPs OPTI and HERMES in Month 8.
Subtask 3.1	**Microscale testing**
	With the materials described above, the partners are going to perform tests for characterization of the porosity by MIP and BET techniques. Analytical and structural investigations in various length scales are going to be performed using X-ray (both imaging and scattering) and SEM (imaging and EDS) methods. Finally, chemical analysis mainly for estimating the cation exchange and the dissolution/precipitation of accessory minerals are also going to be performed. In-situ tests in cells compatible with X-ray imaging will be in progress. Tests in transparent oedometetric cells compatible with techniques like WAX and other scanning techniques that follow the hydration process are going to be discussed during the second annual meeting planned in Month 11 and will be running during Year 2. In the second year, the tests performed in deionized/distilled water as part of the benchmark in Subtask 3.2 will be dismantled. Post-mortem characterization of the dismantled samples will begin starting from Month 18, using the techniques mentioned above.
Subtask 3.2	THMC(G) Laboratory testing
	The benchmark defined the first year will continue. It is expected to start dismantling tests performed in DI/distilled water starting of Month 18 and the rest of the tests starting of Month 22. These tests will contribute to improvement/development of constitutive models in Subtask 4.1 and parametrization of models in Subtask 4.2 for carrying out the performance assessment. Oedometer tests will be conducted on various bentonites and bentonite mixtures (with sand and/or crushed claystones), under isochoric or free swelling conditions, with either controlled axial stress or displacement. Each partner will be testing at least two different bentonites. The optimization of the mixtures (crushed claystone-sand and water content) will be assessed with compaction tests (e.g. Proctor test) or water/gas permeability tests. Mock-up tests in isochoric conditions carried out on granular bentonites will start in Month 10 and will continue during the second year. Part of these tests will have finished by Month 18 and the results will be compared between cells of different sizes for assessing the scale effect. In parallel, the study of friction will continue with small scale tests. Mock-up tests will also provide information concerning this parameter. Isostatic compaction followed by shearing paths are going to be performed for models' development. Suction controlled tests combining relative humidity and osmotic methods will be ongoing. Finally, some partners have tests ongoing that started some years ago. The

	dismantling and post-mortem analysis was planned to be performed in ANCHORS. This process has already started and will continue during the second year.			
Subtask 3.3	**Assessment of measures for better quality control and testing of bentonite.**			
	The assessment of the quality control and testing of bentonite will continue. A report fulfilling Milestone MS72 (Month 18) will be produced of the current state of quality control and related knowledge of participating WMOs (KPI: improvement of a process or a method). Focus is on quality control of clay/mixture materials all the way from excavation to processing into final EBS component. Report may be expanded to consider analyses for material selection and quality control of emplaced components as well.			
Task 4	**Bentonite Barrier modelling and Performance assessment**	**BGE**	**1**	**60**
	The first objective of this task is the improvement of existing constitutive models for bentonite materials based on experimental evidence that will be gained in the project (Task 3) and from previous projects. The development of numerical tools that enable the modelling of THMCG processes in bentonite materials forms the second objective. The use of the constitutive models in the numerical codes in the framework of performance assessment of bentonite barriers marks the third objective. Beside the development work mentioned above, the activities in the task are organised in benchmark modelling exercises. In the first year of the project, we designed benchmark exercises from which the model and codes subject to development in the task can be tested. The realisation of this benchmark modelling exercises forms the core of the activities in Year 2.			
Subtask 4.1	**Enhancement of existing constitutive models and numerical tools**			
	In Task 4.1, the focus of activities in the Year 2 will be to continue in the modelling of benchmark exercises defined in the first year and described in Milestone MS33. Each partner is expected to select at least five exercises from a list of eleven. The completion of all exercises is expected at the end of the second year. At defined time interval, the results of the benchmark modelling will be discussed among the partners. The benchmark exercise will be updated, and a new milestone will be delivered to reflect these updates by Month 12. A total of 16 models are included in task 4.1 and will be further developed also based on the results of the benchmarking initiative. The development work is being carry out in this subtask in parallel to the benchmark modelling.			
Subtask 4.2	**Application to assessment cases**			
	In Task 4.2, assessment case applications inspired by national programmes are being selected during the first year for analysis by the participating partners and will be described in milestone MS52 (Month 12). In year 2, the modelling of the first assessment case will be performed. The results will be discussed among the partners. The experience gained from this modelling exercise will help to assess the predictive capabilities of the constitutive models and numerical			

	codes. The modelling results will help to establish a feedback loop to the development in Task 4.1 by providing area of improvement for better performance assessment.

Deliverables

None for Year 2

4.3.11 WP11 – CLIMATE

Set of Activities Number	11		**Start Date**		October 2024		
Set of Activities Title	Impact of climate change on nuclear waste management (CLIMATE)						
Participant Number	**1**	**1.1**	**6**	**11.4**	**14**	**16**	**18**
Short name of participant	**ANDRA**	**BRGM**	**BGE**	**TUL**	**ENEA**	**FTMC**	**GI-BAS**
Person-months per Participant:	1,87	2,12	3,12	1,5	1,87	1	5,87
Participant Number	**20**	**20.1**	**20.3**	**23.2**	**25.2**	**25.5**	**37**
Short name of participant	**IRSN**	**ENSMP**	**NTW**	**EIMV**	**AMPHOS 21**	**GRS**	**SCK CEN**
Person-months per Participant:	2,62	2,37	3,87	2,12	5,62	1,25	3,12
Participant Number	**42**	**44**	**48**	**49.2**	**49.3**	**49.4**	**51**
Short name of participant	**SSTC NRS**	**SURAO**	**TUS**	**GTK**	**MITTA**	**UT**	**VTT**
Person-months per Participant:	3,87	2,37	2,12	1,25	0,75	1	3,87
Start month	1			**End month**	24		

Objectives

Identify knowledge gaps and provide recommendations for future research needs on the impact of climate change on radioactive waste management facilities and sites (predisposal; shallow and near surface low level waste, LLW; deep geological repositories, DGR, for low and intermediate level waste LILW, and high-level waste HLW) during construction, operation and post-closure phases.

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**AMPHOS 21**	**1**	**24**
	The WP11 Board will coordinate WP activities through internal monthly meetings and continuous collaboration with the PMO and WP1, ensuring alignment with other EURAD-2 Work Packages. Interaction with WP3 ASTRA and WP18 SUDOKU will be promoted, including joint sessions at the Annual Event in Bologna. The CLIMATE WP Board will continue working to maximise the impact of the WP both within and beyond the EURAD-2 partnership, through active dissemination activities, engagement with Civil			

Society, organisation of workshops and trainings and contributions to EURAD-2 communication channels. Internally, the WP Board will organise semi-annual meetings to monitor progress, shape future actions, and foster interaction among participants.

Key outputs include D11.2 Synthesis report (due by M18) and D11.3 Outcomes to Member States report (due by M24). The WP Board will ensure quality control, compliance with deadlines, and efficient data sharing via Project Place.

EURATOM Call objective	**SRA Drivers**	**KPI at the WP level**	**During Y2 of project**	Event
Help build or maintain public confidence and awareness in radioactive waste management;	Societal Engagement	Number of news / Post / Blog per year	1	
		Number of events per year where public or civil society is invited to participate	2	Civil Society workshop and Online Training both in M16
Contribute to addressing scientific/technical challenges	Scientific Insight	Number of presentation at scientific conferences done	1	IAEA
Contribute to addressing the evolving regulatory concerns;	Implementation Safety	Number of events per year where regulators are invited to participate	2	2 WP Meetings
Encourage the efficient use of R&D resources at EU level;		Number of interactions between WPs (sharing of samples, ..)	2	With Astra and SUDOKU (tbd)
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of trainings lectures provided + number of participants	1 (30 participants aprox)	Online training on M16
		Number of networking events allowing cross-disciplinary sharing	2	

Subtask 1.1 — **S/T coordination**

The WP11 Board will continue to collaborate closely with the PMO and WP1 team on the alignment across all Work Packages within the EURAD-2 partnership. This will involve active participation in monthly WP Leader meetings and contributions to the preparation of all deliverables.

	The WP Board will maintain the coordination of WP11 activities, meeting monthly to review updates from the EURAD-2 Secretariat, monitor the progress of each Task within CLIMATE, and ensure the ongoing relevance and coherence of the work. Efforts will be made to strengthen collaboration with other Work Packages, particularly WP3 ASTRA and WP18 SUDOKU. A joint technical session with WP18 will be organised during the Annual EURAD-2 Event in Bologna to foster synergies and exchange between the WPs. The possibility of a joint meeting with WP3 during the Annual Event in Bologna is currently being explored.
Subtask 1.2	**Dissemination / outreach / impact**
	The CLIMATE WP Board will continue the work aiming to maximise the impact of the WP beyond EURAD-2 through dissemination and outreach activities. This will include active participation in at least one scientific conference, engagement with Civil Society in two workshops and trainings organised within CLIMATE, and regular contribution to the EURAD-2 newsletter and website, providing content based on the outcomes from the CLIMATE technical tasks, meetings, workshops and trainings. The WP Board will organise two annual meetings, one online and one in person. This approach will maximise participation while fostering strong interaction among all CLIMATE participants. These meetings will serve both to report on ongoing WP activities, to discuss findings and to help define future actions. The WP Board will ensure regular interaction with CLIMATE end-users and stakeholders, keeping them informed about WP activities and outcomes, sharing key information and outcomes. The active participation of end-users will be promoted by requesting their feedback on the programme, encouraging their involvement in workshops and meetings, and inviting them to review draft documents. Moreover, regulators will be invited to participate in two CLIMATE events that will address key aspects of climate change impacts on radioactive waste repositories. Two deliverables will be produced: a Synthesis Report (M18) and an Outcomes to Member States report (M24). The Synthesis Report will be a comprehensive report that analyses and integrates the WP results. The Outcomes to Member States will present the relevant conclusions of the WP studies for the EURAD Member States.
Subtask 1.3	**Quality control**
	The WP Board will oversee the quality of the work, specifically the milestones and deliverables, ensuring compliance with the quality standards set by the EURAD-2 partnership. In cases where external review is required, the WP Board will collaborate closely with the appointed expert to guarantee the highest quality of the results. Moreover, the WP Board will ensure compliance with deadlines. The WP Board will also ensure alignment with the Grant Agreement through continuous interaction with the Task leaders, the EURAD-2 Secretariat, and the PMO. The WP Board will also oversee data exchange among participants, facilitating it through the effective management of the Project Place platform. A clear and organised structure—already

	introduced at the start of the project—will be maintained and promoted to ensure easy and consistent access to information at all times.			
Task 2	**Knowledge Management**	**BGE**	**1**	**24**
	The main goal of Task 2 is to capture knowledge relevant for the SRA topic of this WP and to contribute to knowledge transfer to the EURAD-2 community and beyond through the EURAD-2 KM programme. Task 2 Leader will organise cooperation between the WP and all relevant parties involved in KM activities in EURAD-2 (representatives of WP02 KM, Task Leaders of current WP, other WPs, etc.). Furthermore, Task 2 Leader will promote, when applicable, individual students involvement to the WPs R&D activities, participation to relevant dissemination events (conferences, workshops, webinars and meetings) and trainings organised on WP level or centrally on EURAD-2 KM level. Finally, the leader will support internal, cross-WP and external mobility actions as well as networking activities. Mentoring initiatives should be encouraged.			
Subtask 2.1	**Knowledge capture**			
	The main outcome of Subtask 2.1 is the White Paper (D11.1, M18) on climate change impacts on nuclear waste management facilities, which includes a gap analysis and a set of recommendations and proposals for actions to address the identified gaps in data management, protocols, methodologies, and practices for robust climate risk assessment on nuclear waste storage and disposal facilities (including required surface facilities for deep geological repositories) in different climate regions, and both in the short and long term based on selected study cases representing the variety of disposal concepts/facilities and sites across Europe. The main contributions to the White Paper come from the outcomes of tasks 3, 4 and 5, that will be finalised and collated by Subtask 2.1 in the first quarter of the second year of EURAD-2. The deliverable D11.1 will be reviewed in the second quarter of Y2 and submitted for formal publication.			
Subtask 2.2	**Knowledge transfer**			
	In close cooperation with WP02 KM, specific training materials on topics addressed by the WP CLIMATE, will be prepared, building upon the expertise of the different partners involved in Subtask 2.2. The WP will organise a training consisting of an online one-day workshop on climate modelling methodologies directed towards radioactive waste and climate change experts. With guidance of WP02 KM, subtask leader coordinates the production of the DI 4.3.2 (Assess the nature of future climate change and landscape evolution and its potential impacts on THMC conditions in the repository host rock (including the repository) and surrounding formations (Climate change)) throughout Y2.			

Task 3	**Construction and operational phases climate impacts**	**VTT**	**1**	**24**
	The main outcome of Task 3 is to collect and to assess the climate impacts, modelling, and methodology on the representative RWM facilities and sites in various European climate zones, with a focus on the construction and operational periods. Through the collection and assessment, the gap identifications and recommendations for future research will be addressed as major inputs of WP deliverables. These inputs will include the necessities for future management regarding the regulatory and institutional framework, climate scenarios, natural analogues, climate change hazards, and risk assessment methodologies. Furthermore, Task 3 will improve the understanding of perspectives and visions from the scientific community and stakeholders regarding the impact of climate change during the construction and operational phases of European RWM facilities.			
Subtask 3.1	**Regulatory and institutional framework**			
	Participants of Task 3 will collect the current European and national regulatory and institutional frameworks on climate change impacts on RWM facilities and sites during the construction and operational phases. The partners will identify gaps and needs and will provide recommendations for its future development within the European framework in the WP deliverables D11.1 and D11.2.			
Subtask 3.2	**Assessment of climate scenarios, sites, and natural analogues**			
	The outcome of Year 1 will be addressed Annual meeting (M12) and the feedbacks will be added at Annual report (M14), Interim progress report (M18) and White Paper (D11.1, M18) in the first quarter of Year 2. For the improvement of understanding, the outcome of subtask 3.2 will be presented at the basic training course (M20)			
Subtask 3.3	**Methodologies for risk assessment**			
	Task 3 will collect and assess the physical hazard screening, hazard identification, scoring methodologies, climate modeling, and risk assessment methodologies for more than nine representative RWM facilities and sites in the first quarter of Year 2. The result will be updated and presented during the basic training course (M20) and will contribute to the deliverables of the WP (Synthesis report, White paper and Outcomes to Member States).			
Task 4	**Post-closure phase climate impacts**	**SCK·CEN**	**1**	**24**

	As much of the technical work is expected to be finalized in Year 1, activities in Year 2 will mostly be focussing on writing relevant documents (deliverables), i.e., the Synthesis Report (D11.2, M18), and providing input to the White Paper (D11.1, M18). Materials from this task will also feed into the online training course (M20) and the Outcomes to Member States (M24). In order to succesful complete Task 4 during Year 2, close interaction with Task 2, Task 3 and Task 5 is foreseen.			
Subtask 4.1.	**Regulatory and institutional framework**			
	This task is supposed to be finalized already after Year 1. Some editing and focussing may be needed in Year 2 to align the outcome of this task with the other tasks, in preparation of the final deliverables (D11.1 and 11.2)			
Subtask 4.2.	**Assessment of climate scenarios, sites, and natural analogues**			
	Subtask 4.2 is expected to be finalized by the end of Year 1. From there on the obtained information will be processed in such a way that it can be used for input in deliverables D11.1 and D11.2. The deadline for these deliverables is M18, but the first draft should be ready by M15-M16. Materials from subtask 4.2 will serve as input for the online training course in M20.			
Subtask 4.3.	**Methodologies for risk assessment**			
	Subtask 4.3 will run until the end of 2025, i.e. it will continue during the first three months of Project Year 2. Nevertheless, the outcomes will have to be included in deliverables D11.1 and D11.2 (first draft M15-M16). Materials from subtask 4.3 will serve as input for the online training course in M20.			
Task 5	**Interaction with Civil Society**	**NTW**	**1**	**24**
	The main goal of Task 5 is to coordinate the interaction with Civil Society members on socio-technical challenges linked to climate change impacts on RWM and associated uncertainties, foster an efficient collaboration between WP partners, and develop means and recommendations for transparent information exchange and dialogue with civil society.			
Subtask 5.1.	**Coordination of Interactions with Civil Society**			
	Partners will oversee the coordination between WP and the Civil Society experts and other stakeholders, promoting transparent information exchange. A second workshop will be prepared by the subtask, having in mind the attendance to the workshop of: WP partners, end-users, Civil Society experts, members of the CS larger group and other stakeholders. For that purpose of preparation, the partners will elaborate adapted methodologies for socio-technical scenarios			

	assessments, based on the outcomes of the first workshop and on the outputs of tasks 2, 3 and 4.
Subtask 5.2.	**Interactions and dissemination activities with Civil Society**
	Partners will deliver a participative pluralistic workshop using innovative participation methodologies and involving different actors and maintain relationships with participants, potentially including them in future research activities. They will also take care of results dissemination through EURAD's communication channels.

Deliverables

- D11.1 White Paper WP11 – Month 18
- D11.2 Synthesis report WP11 – Month 18
- D11.3 Outcome to Member States WP11 – Month 24

4.3.12 WP12 – RAMPEC

Set of Activities Number	12		**Start Date**		October 2024		
Set of Activities Title	Radionuclide mobility under perturbed conditions (RAMPEC)						
Participant Number	**1**	**1.1**	**7**	**7.1**	**8**	**9**	**9.3**
Short name of participant	**ANDRA**	**BRGM**	**CEA**	**EDF**	**CIEMAT**	**CNRS**	**UORLEANS**
Person-months per Participant:	1,08	1,4	2,88	0,4	3,96	3,16	0,536
Participant Number	**9.4**	**10**	**11.2**	**11.4**	**11.6**	**13**	**17**
Short name of participant	**UPOITIERS**	**COVRA**	**CVUT**	**TUL**	**UJV**	**EK**	**FZJ**
Person-months per Participant:	0,424	0,28	1	1,24	2,52	2,32	1,16
Participant Number	**17.1**	**20**	**25**	**25.2**	**25.5**	**27**	**32**
Short name of participant	**HZDR**	**IRSN**	**KIT**	**AMPHOS21**	**GRS**	**LEI**	**NRG**
Person-months per Participant:	2,16	1,84	3,08	3,04	1,32	0,96	1,48
Participant Number	**37**	**42**	**44**	**49**	**49.2**	**49.5**	
Short name of participant	**SCK CEN**	**SSTC NRS**	**SURAO**	**UHELSINKI**	**GTK**	**CTH**	
Person-months per Participant:	1,64	0,76	0,24	2,24	1,2	0,8	
Start month	1			**End month**	60		

Objectives

Improve the predictive capacity of models of disposal system chemistry and radionuclide mobility under perturbed conditions based on a combination of new experimental and modelling studies up to the cell scale.

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**[KIT]**	**1**	**60**
	Task 1 will continue throughout the second year of EURAD-2 as initially foreseen. Details are provided in the respective Subtask descriptions below. The S/T coordination of RAMPEC will involve the WP and Task 1 Leader [KIT] and the Task and Subtask leaders, [CIEMAT] for Task 2, [SCK CEN] [GRS] [CEA] for Task 3 and its Subtasks, [NRG] [PSI] for Task 4, and [Andra]			

[Amphos21] for Task 5. Together this group constitutes the RAMPEC Board with meetings organised on a bi-monthly basis or as required.

The S/T coordination in Subtask 1 will include support to activities related to the intended KPI, which are detailed for the end of year 2 as follows.

EURATOM Call objective	SRA Drivers	KPI at the WP level	Target by end of Y2 (number)
Contribute to addressing scientific/technical challenges;	Scientific Insight	Number of State-of-the-Arts published	1
		Number of open access publications accepted	5
		Number of presentations at scientific conferences	15
Contribute to addressing the evolving regulatory concerns;	Implementation Safety	Number of events where regulators are invited to participate	2
Encourage the efficient use of R&D resources at EU level;	Knowledge Management	Number of interactions between WPs	2
		Number of mobility actions (undertake internships/exchange programmes)	3
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of PhD/postdocs/ students	4
		Number of trainings lectures provided	2
		Number of events where non-EURAD-2 students can participate	2
		Number of mobility actions (visits, trainings courses, conferences)	3
		Number of networking events allowing cross-disciplinary sharing	1

The KPIs directly reflecting the technical progress in the R&D program will be realized by a significant number of contributions to scientific conferences and related publications. An overarching perspective on RAMPEC topics is given via the SOTA prepared in RAMPEC. The interaction with regulators are mainly foreseen within events organised at EURAD-2 level, e.g. the Annual Events, or within the EUG frame in RAMPEC. Knowledge Management is a key topic in RAMPEC and is reflected in several activities. Interactions with DITUSC will be continued and interactions with SUDOKU further developed. RAMPEC aims to use the Mobility tool implemented in EURAD-2 both in support of the technical studies and regarding meeting participation of young researchers. This is especially important reflecting the high number of PhD and young PostDoc researchers in RAMPEC. Specific training lectures can be integrated in the RAMPEC Annual WP Meetings and offered within EURAD-2, e.g. in the Lunch and Learn Sessions in EURAD-2, or at Annual in-person events. Video-based communication facilitates integration of non-EU students and cross-disciplinary sharing. The meeting organised in RAMPEC relating to M94 - *Organisation of Training Event focusing on young researchers in RAMPEC on "Radionuclide retention – experimental investigations, modelling and relevance to PA"* clearly targets several KM related aspects of the KPIs listed above.

Subtask 1.1 — **S/T coordination**

Coordination activities during year 2 of RAMPEC focus on the contribution from RAMPEC to the EURAD-2 Annual Event, several progress and coordination meetings to be held on Task levels, the preparation and organisation of the Annual RAMPEC Meeting and the IPR2 reporting. Throughout year 2, a continuous communication with the RAMPEC partners and the Programme Management Office (PMO) will be maintained, including monthly meetings between the WP leader and the EURAD-2 Secretariat and PMO.

The activities included under Subtask 1.1 will ensure that Milestones and Deliverables will be reached in time. In year 2 of RAMPEC, no Deliverables are scheduled. The following Milestones are focus of activities.

No.	Milestone name	Lead participant	Delivery date (in months)	Means of verification
M45	Documentation of R&D status and EUG exchange (with pdf including status summaries from each partner), with annual updates.	[KIT]	23 (update from 11)	Document
M73	Documentation of data inflow process from previous projects to Tasks 4 + 5.	[ANDRA]	18	Document
M93	Workshop on Sorption Database activity including exchange with external experts	[CIEMAT]	24	Document
M94	Organisation of Training Event focusing on young researchers in RAMPEC on "Radionuclide retention – experimental investigations, modelling and relevance to PA".	[PSI]	24	Meeting minutes

Subtask 1.2 — **Dissemination / outreach / impact**

Subtask 1.2 will support the dissemination of results generated in RAMPEC. This will include presentations at national and international conferences (e.g. Migration, Goldschmidt, NUWCEM…) and may extend to interactions with other stakeholders, e.g. general public. The dissemination and communication activities will be developed in order to enhance visibility of RAMPEC research and impact. Subtask 1.2 will continue direct exchange with the End User and Stakeholder group in RAMPEC and contribute to the interactions foreseen with other EURAD-2 WPs, namely DITUSC and SUDOKU.

The preparation of milestone M45 - *Documentation of R&D status and EUG Exchange* – is scheduled for month 23.

Task 1 will contribute to M94 - *Organisation of Training Event focusing on young researchers in RAMPEC on "Radionuclide retention – experimental investigations, modelling and relevance to PA"* scheduled for month 24 together with other Tasks in RAMPEC.

Subtask 1.3 — **Quality control**

Subtask 1.3 will ensure that work in RAMPEC is following the EURAD-2 approach outlined in Deliverable 1.2 – Quality Management Plan. Quality control will also be achieved via Task-level meetings and discussions on the scientific progress of the R&D activities with a link to M45.

Task 2	**Knowledge Management**	**[KIT]**	**1**	**60**

The main goal of Task 2 is to capture knowledge relevant for the SRA topic of this WP and to contribute to knowledge transfer to the EURAD-2 community and beyond through the EURAD-2

	KM programme. The activities detailed in the following Subtasks are relevant for year 2 in RAMPEC.			
Subtask 2.1	**Knowledge capture**			
	The objective of this Task is to capture knowledge relevant to the WP RAMPEC, gained prior to EURAD-2 and extended during this WPs progress. In Year 2, as experimental results are being produced, the most significant findings will be collected to inform the definition of the final State of the Art (SotA). Subject matter experts will be consulted to explore the possibility of drafting documents such as thematic overviews, domain insights, and state-of-knowledge reports. Efforts will focus on identifying experimental or modelling difficulties gaps and prioritizing key topics for further development.			
Subtask 2.2	**Knowledge transfer**			
	Activities in Subtask 2.2 will include the coordination of the cooperation between RAMPEC and other Work Packages (WPs). The analysis of potential training needs within RAMPEC based on the work conducted in Tasks 3, 4, and 5 will be carried out after a survey to all RAMPEC participants. Where necessary, appropriate training sessions or supporting training materials will be defined and developed. Follow-up of the Data Management Plan's application is included in Subtask 2.2 activities. Task 2 will contribute to M94 - *Organisation of Training Event focusing on young researchers in RAMPEC on "Radionuclide retention – experimental investigations, modelling and relevance to PA"* – together with other Tasks in RAMPEC.			
Subtask 2.3	**Retention/Transport Parameters Database (RTP-D)**			
	The goal of this Subtask is to develop a proof of concept for a Retention/Transport Parameters (RTP) database—systematically relating RTP values to key physico-chemical properties of solid materials and equilibrium water chemistry, using a generalized framework. In Year 1, relevant case studies were identified across three thematic areas: (i) sorption of caesium (Cs) in granite and its constituent minerals, (ii) sorption of anions in clay materials, and (iii) sorption processes in cement in the presence of isosaccharinic acid. In Year 2, data collection and analysis will focus on the first case study and the results will be analysed and discussed. As part of Subtask 2.3 the Milestone M93 - Workshop on Sorption Database activity including exchange with external experts – will be organised and completed. This activity is projected to include exchange with other WPs in EURAD as appropriate and will be detailed after the interactions with other WPs at the EURAD-2 Annual Event in Bologna (September 2025).			
Task 3	**RAMPEC experimental program**	**[SCK CEN]**	**1**	**54**
	In year 2, Task 3 will continue the experimental program started in months 7 with the aim to improve the knowledge of radionuclide transport behaviour in the presence of different (combined) perturbations specific to each analysed systems clay / crystalline rock / cementitious			

	materials. The work carried out in the related three Subtasks detailed below will feature new experimental studies on several sub-systems. Activities will include the setting up of new experiments, detailed analytical characterisation of the studied systems, as well as in depth data evaluation. Interaction meetings with WP4 (modelling) will be held to enable a good collaboration between experimental and modelling teams and exploit synergies. All three Subtasks in Task 3 will contribute to M94 - *Organisation of Training Event focusing on young researchers in RAMPEC on "Radionuclide retention – experimental investigations, modelling and relevance to PA"* – together with other Tasks in RAMPEC.
Subtask 3.1	**Experimental studies in the clay system**
	Experimental activities started in year 1 will continue for Subtask 3.1 in year 2. The main results to be produced in year 2 concern the collection of data related to sorption and transport in clays under perturbing conditions, considering influence of (i) temperature changes, (ii) chemical gradients (pH, salinity, organic complexants) and (iii) partially saturated conditions. The established working groups in Subtask 3.1 that contributed to the fine-tuning of the experimental programme in year 1 and the related milestone MS35 will continue and now be used in year 2 to foster regular information exchange and to strengthen collaboration and enhance synergies between teams.
Subtask 3.2	**Experimental studies in the granitic system**
	The experimental programm started in year 1 will continue in year 2 for Subtask 3.2. Work will focus on (radio)nuclide transport in granitic systems with perturbations such as (i) sulfate concentration, (ii) groundwater composition, (iii) pH conditions, (IV) grain size and structure, etc.. A benchmark exercise will be carried out in Subtask 3.2 to guarantee high comparability of experimental results between the partners. The benchmark will focus on batch experiments and will likely comprise a simple 1:1 background electrolyte system, identically prepared samples provided by the Czech colleagues (Bukov material), a pH edge with approx. 6 – 8 data points using Cs and potentially Ba. A more detailed experimental set up will be developed within upcoming subtask meetings later in 2025. Established focus groups in Subtask 3.2 will continue in year 2 and contribute to coordinate the experimental work with respect to sample preparation/distribution, crushed and intact rock experiments. It is planned to further intensify the exchange between Subtask 3.2 and Task 4.
Subtask 3.3	**Experimental studies in the cement system**
	Experimental activities started in year 1 will continue for Subtask 3.3 also in year 2. Main results expected in year 2 concern the preparation and characterisation of cementitious systems before and after saline plume perturbation. Work includes the experimental analysis of the cement materials as well as main material parameter and chemical properties in contact with aqueous solutions. In year 2, increasing efforts will be dedicated to work with radionuclides. A dedicated technical meeting is planned in Subtask 3.3 to evaluate the quantity of reference cement paste to be prepared and shared with RAMPEC Subtask 3.3 partners.

	In year 2, exchange between RAMPEC and the WP SUDOKU will be continued, with Subtask 3.3 taking the main lead in RAMPEC.			
Task 4	**Development of macroscopic/mechanistic models**	**[PSI]**	**7**	**54**
	In Year 2, Task 4 will continue developing and implementing models, in close partnership with Task 3 and mirroring the Sub-Task structure of that Task, with research lines focused variously on clay, granitic, and cement systems. Any shortcomings of existing models (e.g. theoretical foundations, databases, implementations) in dealing with chemical and thermal perturbations, and opportunities for their advancement in this regard, will be assessed in detail, and pathways for their improvement will be identified. Initial work in Year 2 will focus on ensuring sufficiency of the available databases (both for phase formation and sorption processes) to underpin modelling work, which has been identified during the preparation the relevant sections of the RAMPEC State of the Art as being a key requirement. New experimental data from Task 3 will be used to develop and advance the modelling approaches to fill these shortcomings and improve beyond the state of the art. Collaboration with Task 5 will enable the use of the new model outcomes and theoretical advancements in upscaling. Task 4 will contribute to the Milestone M73 - *Documentation of data inflow process from previous projects to Tasks 4 + 5*". M73 will be achieved in close exchange with Task 5. In addition, Task 4 will contribute to M94 - *Organisation of Training Event focusing on young researchers in RAMPEC on "Radionuclide retention – experimental investigations, modelling and relevance to PA"* – together with other Tasks in RAMPEC.			
Task 5	**Upscaling of data and models – benchmarking**	**[ANDRA]**	**7**	**54**
	In year 2, Task 5 will continue the modelling programme. Following the definition of the benchmark in year 1, the first calculations at the scale of a waste cell will be performed at the start of year 2, without perturbation, to validate the implementation of the geometry/design and solute transfer processes. The differences between the modelling results will be analysed. The first simulations in Task 5 involving perturbations (organic substances prioritised) are expected during year 2. The up-scaling modelling (from the macroscopic scale to cell scale) will continue in year 2 as planned. Input and discussion from Task 4 will start to be integrated into Task 5 during this period. Task 5 will contribute to the Milestone M73 - *Documentation of data inflow process from previous projects to Tasks 4 + 5*". M73 will be achieved in close exchange with Task 4. In addition, Task 5 will contribute to M94 - *Organisation of Training Event focusing on young researchers in RAMPEC on "Radionuclide retention – experimental investigations, modelling and relevance to PA*" – together with other Tasks in RAMPEC.			

Deliverables

Non for Year 2

4.3.13 WP13 - OPTI

Set of Activities Number	13			**Start Date**						October 2024	
Set of Activities Title	HLW repository optimisation including closure (OPTI)										
Participant Number	**1**	**5**	**6**	**9**	**10**	**10.1**	**11.2**	**11.6**	**20**	**20.3**	**23.2**	**25**
Short name of participant	**Andra**	**Bel-V**	**BGE**	**CNRS**	**COVRA**	**TUDELEFT**	**CVUT**	**UJV**	**IRSN**	**NTW**	**EIMV**	**KIT**
Person-months per Participant:	0,75	2,75	4,25	1,25	1	4	5,25	2,75	1,5	3	1,25	1,25
Participant Number	**30**	**30.1**	**30.2**	**34**	**35**	**37**	**39**	**42**	**44**	**45**	**50**	**51**
Short name of participant	**ONDRAF**	**ULiège**	**Euridice**	**Posiva**	**PURAM**	**SCKCEN**	**SKB**	**SSTCNRS**	**SURAO**	**SURO**	**UTartu**	**VTT**
Person-months per Participant:	1,25	1,25	1,25	0,5	0,5	1,5	1	2,25	0,5	1,25	1,5	2
Start month	1						**End month**	24				

Objectives

Develop a mutual understanding and provide recommendations about methodologies and further activities for design and optimization of specific HLW deep geological repository systems, structures and components (SSCs) and procedures.

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**BGE**	**1**	**24**
	The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results. In this respect, there are significant interactions with all other tasks of the WP and other WPs.			

Subtask 1.1	**S/T coordination**			
	The WP Board will ensure that the WP is progressing according to the agreed planning, milestones and deliverables. The WP Leader is responsible for reporting the work progress, the WP deliverables and any modifications of the WP work plan to the PMO. This will be done in close consultation with the WP Board. The WP Board will also be responsible for communicating with other WPs stakeholders in EURAD and beyond. In order to fulfil these aims, the WP Board will have monthly meetings, which will be captured in minutes to be distributed to WP partners and the PMO representative.			
Subtask 1.2	**Dissemination / outreach / impact**			
	The WP Board will organise the WP Annual Meetings. In year 2 two online WP meeting are planned. One WP meeting is planned for month 17 (February 2026). The second WP meeting is planned for month 23 (August 2026). The WP Annual Meetings will be arranged with all partners to allow for information exchange, monitoring of work progress, dissemination of results, and interaction with End Users and other stakeholders. Dedicated technical meetings on the Task level will be organised as well. The WP Board will contribute to EURAD-2 newsletters and website by providing at least bi-annual news. A poster presentation during the IGD-TP exchange forum 2025 is planned for dissemination.			
Subtask 1.3	**Quality control**			
	The WP Board will be responsible for addressing quality control of the work package implementation, specifically for the review of milestones and deliverables, as well as assessing how the WP is achieving the KPI targets. Review teams for the White paper and WP reports will be organized. Disseminations will be reviewed by the WP Board team.			
Task 2	**Knowledge Management**	**TU Delft**	**1**	**24**
	The main goal of Task 2 is to capture knowledge relevant to this WP's SRA topic and contribute to knowledge transfer to the EURAD-2 community and beyond through the EURAD-2 KM programme.			
Subtask 2.1	**Knowledge capture**			
	By the end of year two (month 24) the deliverable “D13.5 Final Report WP13” will be provided. The final report is a synthesis of the work carried out in task 2, 3 and 4.			
Subtask 2.2	**Knowledge transfer**			

	In cooperation with KM WP two domain insight documents will be produced. Topic 5.1.1 is already defined. The second topic has to be defined together with the KM WP. The exchange with WP ANCHORS and WP DITUSC will be continued. WP ANCHORS will contribute to the case study 2 (closure systems) and help to identify key challenges in regard of optimization of bentonite materials. A workshop between OPTI task 4 and ANCHORS task 2.3 is planned to discuss the needs and requirements for the bentonite database. An exchange meeting between all members of OPTI and ANCHORS is planned, in combination with the ANCHORS WP meeting in 2026. Date and place are not yet defined. With WP DITUSC an exchange on the level of WP board is planned. Key challenges for optimization will be discussed. In month 20 the deliverable "D13.4 Outcome/impacts report to Member States and End Users" will be provided.			
Task 3	**Mutual Understanding**	**BEL V**	**3**	**12**
	Task 3 was closed by month 12. No further activities planned. The results will directly feed into task 4.			
Subtask 3.1	**Workshop to build mutual understanding**			
	Finished			
Subtask 3.2	**Case study**			
	Finished			
Task 4	**Identification of Key Challenges for Optimization**	**CTU**	**13**	**24**
	Task 4 will start with the beginning of year 2. Output of task 3 represents the starting point of task 4. This includes especially: • List of key topics to be addressed in task 4 (long-list) • Two case studies for more detailed investigation and discussion in task 4 The deliverable D13.2 (Final version on Mutual Understanding of actors views about optimization) will be published in month 14. This deliverable (green paper) is produced in task 3 but reviewed and finalized in task 4.			

	In task 4 the specific optimisation challenges will be investigated, and potential R&D needs associated with these challenges will be identified. Potential key topics regarding optimization of specific SSCs and procedures related to waste disposal facilities are design, safety, engineering, cost, environment or less technical/socio-technical aspects such as trust between the actors of a GDF programme. REs, WMOs, TSOs and CSOs will discuss key topics identified in task 3 (long-list) and agree on a limited number of them for further investigations. The short list of key topics will include the two case studies (Case study 1 – Liner optimization and case study 2 – Optimization of closure systems). The investigations will focus on strategies and methods about how to perform the optimization process considering the views of the different actors. The mutual understanding of optimisation and the case studies developed in task 3 will serve as a basis. Suitable tools for supporting the optimization process have to be identified, as well as optimisation options. The case study related to closurec will investigate the optimisation of closure systems in deep geological repositories (DGR). First, closure systems and their components for different DGRs as well as the closure strategies are described. This will include decision making strategies as well. Next, the optimisation carried out so far for the different closure components is reviewed. Finally, the optimisation needs of closure systems are discussed and different options, such as methods and models, for closure optimisation are proposed. The goal is the identification of common challenges and needs for closure optimisation concerning: Design aspects, Installation methods, Material considerations, Model development, Monitoring implementation as well as Regulatory and societal aspects. The case study related to the liner systems will be organized in a similar way. First existing concepts and the challenges related to the host rock interaction will be described. Next, the optimisation carried out so far for the different concepts are reviewed. Finally, the drivers for optimisation as well as the targets for optimization are discussed. Different options, such as strategies/methods/models will be proposed. The goal is the identification of common challenges and needs for liner optimisation. Task 4 will provide overviews of the identified optimisation topics and possible optimisation approaches, considering the views of the REs, WMOs, TSOs and CSOs. A long list of key topics is provided at the end of year 1/the end of task 3. The long list is a result of the discussions and provided information in task 3. Additionally, other WPs (e.g. ANCHORS) were asked for input. Task 4 will identify potential needs for further activities, discuss them more in detail and document them in a white paper (Milestone 4/D13.3 latest month 18).

Deliverables

- D13.2 Final: Mutual Understanding of actors views about optimization – Month 14
- D13.3 Technical Key challenges for Optimization of HLW GDFs – Month 18
- D13.4 Outcome/impacts report to Member States and End Users - WP13 – Month 20
- D13.5 Final Report WP13 – Month 24

4.3.14 WP14 – SUDOKU

Set of Activities Number	14	**Start Date**	October 2024
Set of Activities Title	Near-surface disposal optimisation based on knowledge and understanding (SUDOKU)		

Participant Number	**1**	**1.1**	**2**	**7**	**7.1**	**8**	**8.1**	**8.5**	**9.4**	**11.2**
Short name of participant	**Andra**	**BRGM**	**AGES**	**CEA**	**EDF**	**CIEMAT**	**UAM**	**CSIC**	**Upoitiers**	**CVUT**
Person-months per Participant:	0,72	3,84	0,32	3,36	0,16	4,64	0,88	3,36	0,48	0,88

Participant Number	**11.6**	**13**	**14.1**	**14.3**	**15**	**18**	**20**	**20.1**	**23.1**
Short name of participant	**UJV**	**EK**	**UNIPR**	**POLIMI**	**ENRESA**	**GI-BAS**	**IRSN**	**ENSMP**	**ZAG**
Person-months per participant:	2,8	2,08	1,12	1,52	0,4	1,44	3,28	1,44	1,28

Participant Number	**25.2**	**27**	**30**	**32**	**33**	**36**	**37**	**42**	**49**
Short name of participant	**Amphos21**	**LEI**	**ONDRAF**	**NRG**	**NTUA**	**RATEN**	**SCK CEN**	**SSTC NRS**	**Uhelsinki**
Person-months per Participant:	4,24	1,12	0,8	0,4	0,24	3,68	2,56	1,44	1,6

Start month	1	**End month**	60

Objectives

Understanding the behaviour and performances of covers and cementitious barriers of near-surface disposal facilities for short lived waste (ground level facilities) and ILW (shallow deep facilities) in view of these barriers optimization to ensure the long-term safety of disposal facilities.

Activity No	Activity Title	Lead participant	Start Month	End month
Task 1	**Management / Coordination of the WP**	**RATEN**	**1**	**60**
	The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results. The SUDOKU WP Board will facilitate the interaction between WP partners and also between SUDOKU WP and other EURAD-2 WPs with complementary activities.			
Subtask 1.1	**S/T coordination**			
	To ensure that the SUDOKU WP is progressing according to the agreed planning, S/T coordination started from Month 1 involving the WP Board. The main activities to be performed during second Annual Work Plan include: - organizing the four WP Board meetings (scheduled for months 15, 18, 21 and 24); In addition to these scheduled meetings, the WP board will meet ad-hoc to address decisions requiring their attention. - organizing annual WP meeting, planned to be organized face-to face in month 24 - organising Task progress meetings and workshops - communication with the SUDOKU partners, PMO and other EURAD-2 WPs (mainly with CLIMAT and HERMES).			
Subtask 1.2	**Dissemination / outreach / impact**			
	One WP workshop is proposed to be organized during second year for the dissemination of the on-going activities, results, and achievements among WP partners and to the RWM community, including SUDOKU End Users and stakeholders. For monitoring the work progress, three online Task meetings (one at the level of each technical tasks (T 3, T 4 and T 5) will be organized around M18 and three Task workshops around M 22. At least one article on the SUDOKU activities and results will be prepared and submitted for publication in an open access journal by the end of the second year. SUDOKU results will be disseminated at two or more international events: - An overview of the SUDOKU on-going activities, results and achievements will be presented at the 16th Biennial International Conference on Sustainable Development through Nuclear Research and Education to be organized in May 2026 in Pitesti, Romania. - One presentation at the 52 Meeting of the Nuclear Spanish Society (September 2026) will be given regarding the activities and results achieved under SUDOKU Task 4.			

	During second year, SUDOKU WP Board will contribute to one EURAD-2 newsletter and will provide one news to be posted on EURAD-2 website.			
Subtask 1.3	**Quality control**			
	The quality control of the work package implementation will be addressed by the WP Board to ensure the conformity to the Grant Agreement and high-quality outcomes that meet the objectives of the WP and overall programme. Three Milestones are planned for M24 (MS96, MS97 and MS98) and the WP board will review and validate these milestones. Also the WP board will monitor how the WP is achieving the KPI targets. This task also covers implementing data management and open access requirements and addresses risk management of the WP, for task actions, budget, schedule and outcomes.			
Task 2	**Knowledge Management**	**SCKCEN**	**1**	**60**
	The KM activities in Y2 will be focused mainly on knowledge transfer exploring possibilities for common training organized with other WPs.			
Subtask 2.1	**Knowledge capture**			
	No specific actions are foreseen in Y2. Interaction with WP2 will continue. Any action defined within WP2 regarding knowledge capture will be implemented. Initiatives will be taken regarding data management plan etc. following guidelines given by WP2.			
Subtask 2.2	**Knowledge transfer**			
	Continuously follow up of activities for knowledge transfer. Exploring possibilities for training organised on WP level.			
Task 3	**Performance of multilayer covers**	**AMPHOS 21 / ONDRAF NIRAS**	**1**	**60**
	The objective of Task 3 is to improve the current knowledge of processes that control infiltration in multilayer covers for surface disposal facilities and to evaluate cover effectiveness and its long-term performance. This will be achieved by performing in-situ monitoring/experiments on under construction and existing multilayer cover mock-ups, complemented by laboratory scale experiments to study separately and under controlled conditions (to simulate diverse weather conditions) the behaviour of different barriers or combinations of layers that form the cover.			

	The studies performed in this task will provide a better understanding of the behaviour and evolution of different multilayer cover concepts and make it possible to make recommendations regarding design optimisation, construction, and monitoring.			
Subtask 3.1	**Lab scale experiments to study the factors that govern cover effectiveness and their evolution in time under controlled conditions.**			
	The main activities performed during Year 2 include: - Testing of laboratory setups, initiation of laboratory experiments and data collection (ENRESA, CIEMAT, Amphos21) - Experiments simulating extreme rainfall events and investigation of erosional patterns and resulting sediment flux output (Mine ParisTech, ANDRA) - Continuation of a column experiment and characterisation of the materials after thermal cycling and saturation/desaturation (UJV, CTU) - Installation of a lab scale mock-up of a simplified multilayer cover (made only of natural materials), determination of monitoring parameters, arrangement of the measurement plan and initiation of the experiment (GI-BAS) At least 5 different laboratory scale experiments are planned to be started during Year 2.			
Subtask 3.2	**On-site experiments on multilayer cover mock-ups (including instrumentation systems)**			
	The main activities performed during Year 2 are focused on analysis the data collected from the Spanish cover mock-up and on validation new monitoring devices. These activities include: - Data collection and verification of their reliability, analysis of the data collected during the first months from the ENRESA cover mock-up - Further testing and validation of the in-situ permeability measurement device for low-permeable materials and feasibility study of using the Ground Penetrating Radar technique for in situ measurements of the water content (SCK•CEN, ONDRAF) - Drafting the milestone MS96 (delivery date M24) reporting the first outcomes of the analysis of the monitoring data from the existing cover mock-up (ENRESA, Amphos21)			
Task 4	**Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides**	**ANDRA / CIEMAT**	**1**	**60**
	The objective of Task 4 is to improve the knowledge on the chemo-mechanical degradation of cement engineered barrier systems and to evaluate its consequences on radionuclide migration in the conditions of shallow and surface disposal facilities. This will be achieved by investigating the coupling of mechanical constraints and chemical alterations on (i) unreinforced cement-based materials (mortars and concretes) for characterizing the behaviour of the cementitious matrix including aggregates (Subtask 4.1), and (ii) similar systems with steel reinforcement for characterizing the effect of corrosion in terms of cracking and diffusion of corrosion products (Subtask 4.2). The migration of mobile radionuclides will be studied in degraded samples from the subtasks 4.1 and 4.2 (Subtask 4.3). Four consortia are performing complementary studies in Task 4: Consortium C-1 composed by CIEMAT, CSIC and			

	UAM, Consortium C-2 composed by BRGM, UPoitiers and UHelsinki, Consortium C-3 composed by IRSN, CEA and Mines Paris, and Consortium C-4 composed by SCK CEN and ONDRAF.
Subtask 4.1	**Cementitious materials ageing and degradation – CMH evolution**
	According to the agreed degraded protocols described in Milestone MS 14, the Task 4 partners continue during Year 2 the degradation tests started in Year 1. At least 8 different laboratory scale experiment are planned to be started during Year 2. The degraded materials from both laboratory scale degradation tests and from degradation at real disposal sites will be analysed to evaluate the main impact in physicochemical and mechanical properties. A range of analytical, spectroscopic, and microscopic techniques will be employed to characterize the chemical and mechanical evolution of materials properties as well as the extent of degradation progresses. The experimental results obtained by the different teams regarding the chemo-mechanical evolution of the cement-based materials for several formulations will be synthesized and the Milestone MS 97 (delivery date M24) will be drafted.
Subtask 4.2	**Corrosion of steel reinforced materials**
	Different types of combined degradation processes were planned to produce accelerated corrosion of steel-reinforced materials. At least 5 different laboratory scale experiments are planned for Year 2. First data on cracking initiation and propagation will be obtained and used for the development/improvement of chemo-mechanical modelling. Microscopic techniques will be used to analyse cracking patterns and provide deeper insights into the damage mechanisms, which can be used in the interpretation of radionuclide transport experiments. The experimental results obtained by the different teams regarding the steel corrosion products and cracking initiation and propagation will be synthesized and the Milestone MS 97 (delivery date M24) will be drafted.
Subtask 4.3	**Effect of CMH evolution of cementitious materials and steel corrosion products on the migration of mobile radionuclides**
	After the analysis and characterization of damaged materials produced in Task 4.1 and Task 4.2, diffusion/transport tests and supporting sorption tests will start. As the degradation of powdered materials used for sorption experiments is faster than that of consolidated ones, it is expected that diffusion tests on degraded mortar/concrete samples will start later. Diffusion tests on non-degraded mortar/concrete samples, initiated in the first year to be used as reference for assessing the effect of degradation processes on diffusion, will be continued.

Task 5	**Modelling of the evolution of the EBS and its effect on radionuclide migration on the basis of the experimental results obtained in Tasks 3 and 4**	**PSI / SSTC NRS**	**1**	**60**
	Relevant scenarios for gas and liquid transport of long-lived mobile radionuclides through the EBS of near surface disposal facilities will be discussed during the task meeting planned for the end of year 1. The scenarios to be modelled will be developed and defined considering the outcomes of this meeting. Based on these scenarios the partners in task 5 will set up during the year 2 their conceptual models and the numerical codes and will run first test cases. These scenarios will be documented in the Milestone MS 98 (delivery date M24). A coordination event is planned between Task 5 members and WP16 HERMES to find synergies in development and application of HPC methods for the chosen test cases. Interactions with CLIMAT and DITUSC WPs will be better defined based on the outputs of the modelling workshop hosted by PSI (during 25-26 September 2025), to which representatives of CLIMAT and DITUSC are invited.			

Deliverables

None for Year 2

4.3.15 WP15 – DITOCO2030

Set of Activities Number	15		**Start Date**			October 2024		
Set of Activities Title	Next generation Digital Twins to support Optimisation, Construction and Operation of surface and subsurface radioactive waste management facilities (DITOCO2030)							
Participant Number	**1**	**1.1**	**6**	**8.2**	**10.1**	**11.4**	**14.4**	**15.5**	**16**
Short name of participant	**Andra**	**BRGM**	**BGE**	**UCLM**	**EGIS**	**TUL**	**UNIPI**	**IIDP**	**FTMC**
Person-months per Participant:	0,5	1	0,5	0,5	0,375	0,5	0,75	2,375	0,5
Participant Number	**17.1**	**17.3**	**20**	**23.2**	**25.2**	**25.5**	**37**	**37.1**	**40**
Short name of participant	**HZDR**	**UFZ**	**IRSN**	**EIMV**	**AMPHOS21**	**GRS**	**SCK CEN**	**TRACTEBEL**	**SOGIN**
Person-months per Participant:	0,75	1,25	0,25	0,5	2	0,75	2	0,5	0,375
Participant Number	**44**	**47**	**47.1**	**48**	**49.3**	**50**	**51**		
Short name of participant	**SURAO**	**TS ENERCON**	**GOLDER ASSOCIATES**	**TUS**	**MITTA**	**UTARTU**	**VTT**		
Person-months per Participant:	1	1,5	1	0,5	0,5	0,4	2		
Start month	1				**End month**	24			

Objectives

Lay-out the path on how to close the R&D gap between the currently fragmented digital twins (DT) of individual disciplines, common data environments and decision-making platforms to better understand the opportunities and limitations of DT in their deployment in whole life cycle of waste management.

Activity No	Activity Title	Lead participant	Start Month	End month
Task 1	**Management / Coordination of the WP**	**IFE / TS ENERCON**	**1**	**24**
	Management and coordination will be conducted in accordance with the Grant Agreement (GA). Efforts will focus on ensuring that all activities adhere to the established timeline and objectives. Regular updates will be shared to keep all Partners informed and aligned.			
Subtask 1.1	**S/T coordination**			
	The WP Board will continue to ensure that the WP is progressing according to the agreed planning, milestones and deliverables. The WP leader will continue to report on work progress, the WP deliverable status and any modifications of the WP work plan to the PMO. The WP board will continue with the monthly, 1-hour long meetings and sharing the Meeting Minutes with WP partners and the PMO representative.			
Subtask 1.2	**Dissemination /outreach / impact**			
	Participation in the 1st Annual Event of EURAD-2 is scheduled, where progress will be presented. A followed-up DITOCO technical meeting with all Partners is also planned after the EURAD-2 Annual Event. An in-person meeting is planned in Year 2, and will be hosted by a Work Package (WP) Partner capable of offering a technical tour of an existing repository. The WP board will continue contributing to EURAD-2 newsletters, website by providing at least bi-annual news. The WP will disseminate its results through multiple channels. These include the preparation of a synthesis document, the submission of abstracts and conference papers, and the use of dissemination platforms recommended by the Project, such as DigiDECOM NuclearNEXT 2025, WM Symposia, and relevant scientific journals. The expected dissemination outcomes are as follows: Open access publications: 1 to 2 Scientific conference presentations: 2 to 3 Annual events with regulator participation: 1 News or publications shared with regulatory forums (e.g., WENRA, SITEX, ETSON): 1 Interactions between WPs (e.g., sample sharing, joint webinars): 2 to 3 Training sessions delivered: 1 session, with expected participation of 40+ attendees Events open to non-EURAD-2 students: 1 to 2 (including a training session and the Stakeholder Engagement event). These events will be promoted on the EURAD-2 website and through a targeted email campaign in due time. Cross-disciplinary networking events: 1 to 2 events are planned, with participation numbers aligning with the above activities.			

Subtask 1.3	**Quality control**			
	The WP Board will continue reviewing the Milestones and Deliverables and will quality control all necessary documents in year 2.			
Task 2	**Knowledge Management**	**IRSN**	**1**	**22**
	The main goals of Task 2 are to capture knowledge relevant for the SRA topic of this WP and to contribute to knowledge transfer to the EURAD-2 community and beyond through the EURAD-2 KM programme, establish cooperation with other tasks within the WP and develop a network for collaboration with other WPs as well as disseminate in WP information on KM activities, updates, and collaboration opportunities, including participation in training sessions, dissemination events, the mobility program, and the mentoring initiatives.			
Subtask 2.1	**Knowledge capture**			
	The efforts will be focused on capturing knowledge relevant to the WP and preparation of the WP White paper based on outcomes of Tasks 3, 4, 5 and 6 of the WP, knowledge consolidated or generated through know-how sharing and discussions of common challenging issues.			
Subtask 2.2	**Knowledge transfer /Training material**			
	Identification and further implementation of specific knowledge transferring activities will continue in Year 2. In cooperation with the KM WP, WP experts will participate in specific activities aimed at transferring knowledge to interested parties (e.g. Domain Insight documents production, creating material for training, e-learning, workshops, videos, social media posts and guidance).			
Task 3	**Current practices of digital twins**	**VTT / SURAO**	**1**	**20**
	Although the concept of DT has recently gained significant attraction in both industry and academia, there is no systematic understanding of DT from its different concepts to their applications in disparate disciplines. Initially, T3 and T4 were planned to produce two separate green papers: one on current practices of digital twins (T3) and one on gap analysis (T4). During the work within Y1 it was found more feasible to merge these two separate green papers to one single green paper containing both the current practices of digital twins with the gap analysis. The amendment for merging the green papers in T3 and T4 is in the process. Most of the information collection and preliminary preparatory work is done during Y1, but the finalisation of the merged green paper will be done during the beginning period of Y2 (M13).			

	If relevant data related to Tasks 3 and 4 are identified in the White Paper, the Green Paper will be updated accordingly during Year 2.			
Subtask 3.1	**Identification of nuclear sector drivers for DTs**			
	This subtask interacts with potential end-users of digital twins on their high priority needs with respect to decision making supported by DTs. Additionally, it gathers ranking of the needs to steer the focus of the Gap analysis in Task 4. Main effort are done during Y1, but during Y2 the findings within T3 and T4 will be communicated to the stakeholders and will support production of the T5 white paper. If relevant data related to Tasks 3 and 4 are identified in the White Paper, the Green Paper will be updated accordingly during Year 2.			
Subtask 3.2	**Compilation of current DT use cases within nuclear sector and other industries**			
	The main effort will take place in Year 1, but any new use cases that emerge afterward will still be considered.			
Subtask 3.3	**Identification and comparison of international standards**			
	No activity is planned, as the identification and comparison of international standards take place between Month 2 and Month 12.			
Subtask 3.4	**Compilation and review of regulatory requirements**			
	This task will be actively carried out during the second year of the project, focusing on building upon the foundations established in the first year and incorporating insights, data, and outcomes from earlier tasks and related work packages into the White Paper produced in T5.			
Task 4	**Gap analyses**	**SCK CEN / PSI**	**1**	**12**
	During the work within Y1 it was found more feasible to merge two separate green papers into one single green paper containing both the current practices of digital twins with the gap analysis. The amendment for merging the green papers in T3 and T4 is in the approval process.			
Subtask 4.1	**Identification of gaps that need to be addressed to meet the high priority needs and drivers by the end-users (cross- industrial view)**			
	Most of the information collection and preliminary preparatory work is performed during Y1, but the finalisation of the merged Green paper will be done during the beginning of Y2.			

	If relevant data related to Tasks 3 and 4 are identified in the White Paper, the Green Paper will be updated accordingly during Year 2			
Subtask 4.2	**Compilation of technical solutions, methodologies and collaboration aids needed to address the gaps identified**			
	By M12, for each of the identified gaps, potential routes will be described on how these can be closed in the second half of the project, finalization of the merged Green paper (T3/T4) will be done in M13.			
Subtask 4.3	**Qualitative and quantitative performance indicators, human and technical competences**			
	The main work will be carried out in Year 1, indicators to measure the closing of identified gaps will be defined. However, the finalization of the Green Paper will extend into Year 2 (Finalization of merged green paper (T3/T4) in M13).			
Task 5	**Strategic recommendation of the common approaches and standards in the design of digital twins**	**IIDP / NAGRA**	**6**	**22**
	Although the primary contribution of task five was initially scheduled to be completed in year 2, significant progress has been made during year 1, including: • Development of the overarching strategy for the definition of standardized Digital Twins in to be used in DGRs. • Presentation of uses cases and functionalities potentially relevant to WMO organizations. During year 2 Task 5 will be committed to reviewing the results obtained by Task 3 and Task 4, merging and aligning the results obtained in the respective tasks with the use cases gathered from WMO organizations. Taking into account inputs from Task 3 and Task 4, the internal discussions held within Task 5 and following the first steps of the proposed strategy, the objectives for year two are: • Common agreement on the use cases of interest by WMOs for their applicability to different stages of DGRs lifecycle. • Prioritize use cases that should be implemented in Digital Twins for DGRs. • Graphic definition and comparison of current software ecosystems used as the technological basis for DTs, referring main decision factors applicable to the definition of such ecosystem. • Propose a preliminary common software ecosystem and data architecture to support the standardization of Digital Twins and the prioritized use cases outlined above. This work will ultimately contribute to the standardization of digital twin applications within the sector, including the creation of classification systems and data mapping frameworks. These aspects will be incorporated into the White Paper. The White paper will be issued by Month 18, but the WP aims a matured version1 to be issued by Month 15.			

Task 6	**Stakeholder engagement and dissemination**	**Amphos 21**	**1**	**24**
	Two partners are involved in Task 6: Amphos 21 and EIMV. The main objective of this task is to organize Stakeholder Engagement Workshops to facilitate the exchange of information, track project progress, disseminate findings, and promote engagement with End Users and other stakeholders across various industries. To support these activities, a **Stakeholder Engagement Plan** was developed and delivered in December 2024. This document provides a comprehensive overview of the scheduled activities over the project's two-year duration and is available at https://service.projectplace.com/#/project/187129521/document/370779721. The Stakeholder Engagement Plan ensures alignment with project goals and expectations, outlining strategies to effectively involve key stakeholders throughout the project, ensuring their input and participation at critical stages. To tailor engagement efforts, Task 6 partners prepared and distributed a survey to Task Leaders, aiming to identify the specific needs of each subtask regarding stakeholder involvement. Once the responses are collected and analysed (activity until in progress), Task 6 partners will reach out to relevant stakeholders to confirm their availability for participation in upcoming activities. Additionally, internal discussions are underway regarding the possible inclusion of members from the Civil Society group, now part of the PMO activities. Although these members are not part of the EUG, they may still be considered stakeholders and could participate in open events under DITOCO2030. This proposal is currently under evaluation and will be discussed with the Project Coordinator, pending agreement from the Work Package Coordinator. Originally, two stakeholder/end-user workshops were planned for Months 6 and 12, focusing on the Green Paper and the White Paper. However, the scheduling of these events is being adjusted to align with the delivery timelines of the documents. The first Stakeholder Engagement took place in June 2025 (Month 9) as part of the EURATOM HARPERS training program, with 81 online attendees. Following an introduction to the Work Package, targeted questions relevant to the EURAD-2 DITOCO Work Package were posed through participant polling. The feedback received will help inform and support the activities of Tasks 3 to 5. The next Stakeholder Engagement activity is scheduled for December 2025 (Month 15). Stakeholders will be informed in advance through a targeted email campaign and promotional outreach on LinkedIn. These workshops are directly linked to the delivery of the Green Paper (Month 13) and the White Paper (Month 18). Non-EURAD students may also participate in the Stakeholder Engagement Workshops, fostering intergenerational knowledge sharing.			

Deliverables

- D15.2 Next Generation Digital Twins: A State-of-the-art Review and Gap Analysis for optimizing the Surface and Subsurface Radioactive Waste Management Facilities. - Month 13
- D15.3 White paper: Position paper (Task5) – Month 18
- D15.4 Outcome/impacts report to Member States and End Users - WP15 – Month 22

4.3.16 WP16 – HERMES

Set of Activities Number	16	**Start Date**	October 2024
Set of Activities Title	High fidElity numeRical siMulations of strongly coupled processes for rEpository syStems and design optimisation with physical models and machine learning (HERMES)		

Participant Number	**1**	**2**	**7**	**7.1**	**8.2**	**9**	**9.2**	**9.6**	**10.1**	**11.3**
Short name of participant	**Andra**	**AGES**	**CEA**	**EDF**	**UCLM**	**CNRS**	**Uni Lille**	**ULorraine**	**TUDELFT**	**IGN**
Person-months per Participant:	0,12	0,43	3,5	1,37	0,92	2,5	1	0,75	3,22	4,14
Participant Number	**11.4**	**14.1**	**15**	**15.3**	**17**	**17.2**	**17.3**	**20**	**25**	**25.1**
Short name of participant	**TUL**	**UNIPR**	**ENRESA**	**UDC**	**FZJ**	**GFZ**	**UFZ**	**IRSN**	**KIT**	**BGR**
Person-months per Participant:	5,87	1	0,79	7,25	1,5	1,25	4,19	2,62	2	1,87

Participant Number	**25.2**	**25.5**	**25.6**	**32**	**37**	**44**	**47**	**47.1**	**48**	**49.3**	
Short name of participant	**AMPHOS21**	**GRS**	**TUBAF**	**NRG**	**SCKCEN**	**SURAO**	**TS ENERCON**	**GOLDER ASSOCIATES**	**TUS**	**MITTA**	
Person-months per Participant:	2	0,5	0,97	0,62	2,32	0,27	1,33	1,97	0,37	1,66	

Start month	1	**End month**	48

Objectives

This WP aims at the development of high-fidelity numerical models for simulations of strongly coupled THMC processes in repository nearfield, repository design optimisation and interpretation of mock up experiments using a combination of physics based models and accelerated computing assisted with machine learning and artificial intelligence.

Activity No	Activity Title	Lead participant	Start Month	End month
Task 1	**Management / Coordination of the WP**	**PSI/UFZ**	**1**	**48**
	The main goals of Task 1 are the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination / outreach of the results. In this respect there are significant interactions with all other tasks of the WP and other WPs. The S/T coordination will be performed by the WP Leader [PSI] with support of the Task Leaders [UFZ], [TU Delft], [Inria], [SCK CEN], [TS Enercon], [Enresa], [UDC] all together composing the WP Board. Deputy WP leader [UFZ] is assigned to maximise the management efficiency.			
Subtask 1.1	**S/T coordination**			
	Management board conduct regular meeting to monitor the WP progress.			
Subtask 1.2	**Dissemination / outreach / impact**			
	The major results and the achievement of the project will be communicated at scientific conferences and national workshops. In line with the KPI's, the following outcomes are planned for Y2: - Interaction with other WPs such as DITOCO2030, ANCHORS, DITUSC and RAMPEC; - 5 open access publications; - 15 presentation at scientific conferences; - Annual WP HERMES meeting, where regulators will be invited; - 1 mobility action			
Subtask 1.3	**Quality control**			
	Project progress evaluation by the external scientific board will be important milestone for successful project evaluation. On of the most important guiding documents are the initial SoTA report and the periodic project progress reports.			
Task 2	**Knowledge Management**	**SCK CEN**	**1**	**48**
	SCK CEN, UFZ/TUBAF and PSI collect state of the art contributions to the initial state of the art report and its update.			

Subtask 2.1	**Knowledge capture**			
	New developments are periodically summarised and made documented for the project reporting.			
Subtask 2.2	**Knowledge transfer**			
	Data and models are disseminated with in the WP and between WPs.			
Subtask 2.3	**Collaborative platform for code development and data management**			
	After setting up the technical infrastructure for a web platform in the first project year, the THMC benchmark collection will be systematically extended in the next project year, especially with regard to the new aspects of interoperability and automation. Existing benchmarks will be selected and prepared for collaboration between the HERMES partners (model and code comparisons). A joint benchmarking hackathon is also planned to demonstrate and finalize a selected benchmark.			
Task 3	**Process couplings and computational performance**	**UFZ / TU Delft**	**1**	**48**
	Process-based numerical simulations are the basis for in-depth system understanding, analysis of experimental observations and their upscaling to natural systems. Despite the continuous growth of computational resources, the realism of the models used in the simulation of repository systems remains still limited in terms of dimensions, spatiotemporal resolution and process couplings. Task 3 is subdivided into three sub-tasks in order to adequately organise the overall task objectives. Subtask 3.1 deals with the benchmarking of coupled processes and computational performance and in particular provides examples for the HERMES model hub (Task 2.3). Interpretation of experimental data, safety and cost driven design optimisation, model uncertainty analysis belong to the class of inverse problems addressed in Subtask 3.2 together with sensitivity analysis and upscaling methods. To speed up numerical simulations a strong collaboration is established with Task 4 exploring the machine learning methods. Subtask 3.3 will establish a strong link to model applications of mock-up experiments and repository modelling (Task 5), as data and model integration will be realised and later integrated into the model hub. We expect multiple contributions to the HERMES Model Hub from all tasks.			
Subtask 3.1	**Benchmarking coupled processes and computational performance**			
	UDC will continue the work on code implementation for moving boundaries for the canister corrosion considering the passivation layer of corrosion products. The code will be improved to consider a more realistic glass dissolution (GRAAL model). In addition, we will make code implementations available for the model-hub. PSI contribution focus on deploying a surrogate model enhanced reactive transport lattice Boltzmann solver at distributed memory multi GPU HPC architecture and the assessment of the efficiency gains in realistic simulation setups will be benchmarked. The system of interest is related to the microstructural changes of clay in contact with cement due to mineral precipitation.			

	Fast computations will allow to perform a sensitivity analysis to identify the major influencing parameters. UCLM will setup reference cases simulation setup from the perspective of the XMm coupled model. The selected cases will be modelled, focusing on couplings of processes, and on the computational performance using numerical strategies that apply symbolic algebra. EDF will evaluate the performance of dedicated preconditioners for hydro-mechanical (HM) problems using data from the Mont Terri experiment. This model, shared with the BRG (see Task 5), will serve as a benchmark for assessing different simulation tools. By leveraging massively parallel solution algorithms, a comprehensive mesh convergence analysis will be conducted.
Subtask 3.2	**Inverse modelling, sensitivity analysis and upscaling**
	SCK CEN continues the ROM development in MATLAB with a live link to COMSOL to be used for the inverse analysis of in-situ heating test to identify THM material parameter values based on a coupled 3D THM FOM and its surrogate ROM. A global search method (genetic algorithm), known for its effectiveness in solving more complex optimization problems, will be employed to carry out the identification procedure. CEA will validate non-reactive simulations using tracer data from WP-RAMPEC. Then, the simulations will be performed on other elements (PW chemistry) with multi-compound / multi-species approach. Three main objectives are listed: i) the modelling of EDTA perturbation (coupling of chemistry & transport) ii) the modelling of multi-compound diffusion from a saline plume, using previous data, iii) the quantification of possible retro-actions between chemical perturbations and diffusive transport.
Subtask 3.3	**Data and model integration**
	IRSN+CNRS/ULorraine/GeoRessources work on development of an extended SPH solution to involve consideration of temperature dependency and gradual improvement of code performance. Application to pore structures based on already existing image data will be performed with SPH (HM, THM applications) and LBM (electrokinetic transport) and numerical upscaling towards effective properties will be performed. Based on the knowledge gathered in year 1 and on a more classical optimisation, the capacities of our models will be extended to allow good quality data generation for benchmarking and training data for predictive and surrogate models. UFZ/TUBAF/MUL focus on the further development of coupled process models simulations of TH2M processes in clay rock. Firstly, typical scenarios for the emplacement of both low- and intermediate-level radioactive waste as well as high-level radioactive waste will be modelled (i.e. gas and heat production rates). Secondly, the material models for clay rocks are extended. Among other things, the results of EURAD GAS experiments will be incorporated. Simplified test examples are then derived from the use cases and made available for the benchmark collection and the HERMES model hub. Further development of coupled process models for THM processes in crystalline rock will be continued. Both the phase field and low dimensional interface (LIE) methods form the basis for modelling fracture processes. The existing HM and TM models will be extended to a standardised THM model in order to be able to model typical scenarios of higher emplacement temperatures and increased fluid pressures. The aim is to improve models in order to better characterise the integrity of the geological barrier in crystalline host rocks.

	Among other things, the results of DECOVALEX SAFENET experiments will be incorporated (link to Subtask 5.2). Simplified test examples will then be derived from the use cases and made available for the benchmark collection and the HERMES model hub. KIT-IMB/MPA will focus on finalizing meso-scale chemo-mechanical model for internal expansive reactions in concrete. To this send in first year the lattice mechanical models were implemented and tested in year 1. In year 2 coupling with Lattice Boltzmann reactive transport solver will be started and benchmarked against literature data.			
Task 4	**Surrogate modes (of individual and coupled phenomena)**	**PSI/TUL**	**1**	**48**
	The aim of this task is to create surrogate models of individual processes and, where appropriate, of several coupled processes. Surrogate models or proxy models provide a significant acceleration to the simulation codes. The topics which will be addressed are relevant to Chemistry, Gas-Mass-Heat transport and Mechanics (THMC). In the core of this task is the application and implementation of machine learning methods and codes which go beyond the state of the art. Benchmarking of surrogate models against physical models and experimental data will provide a measure of the obtained efficiency in terms of accuracy and computational cost.			
Subtask 4.1	**Acceleration of computations for individual processes and phenomena**			
	Taking advantage of joint PhD position, the UFZ/TUBAF team and GFZ will participate in the ML-Reactive Transport benchmarking initiative. The aim of the PhD project is to combine machine learning methods with particle methods in order to capture reactive transport processes on larger scales (far-field). The developed benchmarks will also be integrated into the HERMES model hub, so that classical numerical methods can be compared directly with those of machine learning for test examples. PSI will continue the improvement of the pore-scale algorithms for accelerated simulations based on variable time stepping and surrogate models. At the same time the work will focus on improving the accuracy of the surrogate models for the chemistry (for several systems of interest) as well as in the efficient coupling of the surrogate models with macroscopic and pore-level simulators. In the second year, GFZ will focus on extending its DecTree surrogate approach to tackle the geochemistry of uranium diffusion and sorption depicted in the benchmark problems defined in year 1, and to integrate it into its own coupled simulator POET, especially adding incremental training capability. Besides such technical developments, GFZ will assess different strategies to evaluate the accuracy of surrogate predictions at runtime during RTM simulations: mass and charge balances, simplified mass action laws, or explicit error models (i.e., error variance if available from the surrogate). This is required to reject predictions from surrogates and run numerical solver for geochemistry instead. FZ-Jülich will further develop a surrogate model using a physics-based machine learning method to map pore-network images to effective diffusivity under partially saturated conditions. This work builds upon our achievement in the Year 1, where a surrogate model to map 3-D pore-network images to their corresponding partially saturated states was constructed. In the			

	current phase, the non-intrusive reduced-basis (NI-RB) method and the Convolutional Autoencoder are combined to construct the surrogate model. The training samples are generated through Lattice-Boltzmann simulations, which are used to estimate effective diffusivity under partially saturated conditions. TUL and IGN will continue the development of the SurrDAMH library with a focus on neural network surrogates tailored for Bayesian inversion in hydromechanical and transport problems. The aim is to design neural networks that adapt to growing datasets by dynamically expanding their architecture during sampling, avoiding full retraining. Special attention will be given to techniques for efficient integration of new data and maintaining surrogate quality throughout the process. The approach will be tested on benchmark scenarios, including heterogeneous material behavior with high-dimensional parameter spaces.			
Subtask 4.2	**Surrogate models for coupled processes and multiphysics**			
	PSI will lead the activities of the reactive transport benchmark which involves several participants across the HERMES project. Amphos 21 will work on training neural networks on the chemical systems defined with the help of PSI and SCK-CEN while continuing the development of a robust machine learning-transport framework for testing neural network in reactive transport setup. UniParma will study the effects of cracks on diffusivity and transport properties through laboratory experiments and simulations, with results integrated into the surrogate model to enhance predictive performance. Secondary processes such as pressurized moisture transport will be explored using advection equations under varying pressure gradients. Additionally, gas generation, accumulation, and migration will be simulated by incorporating models that account for chemical reactions and microbial activity. UDC will continue with ML benchmark of cement and uranium systems. UDC will produce simulations for the ML benchmark case of canister/bentonite interactions. CNRS-LaMcube will continue the development of ANN-based models to identify the mechanical parameters at microscopic scale of clay matrix from conventional macroscopic tests. At the same time, we will progress on the construction and validation of the physics-informed neutral networks (PINN) models to solve coupled thermo-hydromechanical process. Some typical examples will be solved. TUBAF/UFZ team will develop and test machine learning methods for modelling constitutive material behaviour in inelastic deformations. Further physically inspired neural networks (PINNs) for the accelerated solution of non-linear partial differential equations will be applied. The benchmarks developed for the method testing will also be integrated into the HERMES model hub, so that classical numerical methods can be compared directly with those of machine learning for test examples.			
Task 5	**Tailored models for SA/PA and field scale mock-ups**	**TS Enercon / UDC**	**1**	**48**
	This task aims at modelling the repository scale systems and simulations of field scale experiments. It uses the approaches and results of the development carried out in other Tasks			

	of HERMES to create modelling tools that are capable of used in safety case, in design and optimization of radioactive waste disposal systems.
Subtask 5.1	**Real time simulation of field scale experiments (link to DECOVALEX)**
	As part of various collaborations, the BGR is working on the validation and further development of numerical methods. In the context of a cooperation with EDF, the focus is on validating a numerical 3D model for investigating HM-coupled processes in claystone. The comparison of model calculations from different teams using different codes (OGS6, Lagamine) as well as measurement data is to be further advanced in the second year. In a collaboration with IGN, the BGR uses a monitoring dataset from Mont Terri to investigate possibilities for combining physical models with data models. For the second year, initial evaluations and the further development of possible methods are planned. MITTA is modelling the data from FISST test conducted at ONKALO underground facility with recently improved CODE_BRIGHT allowing for consideration of heterogeneity in clay barriers and rock. The heterogeneity from the information considering the production of blocks and the tunnel geometry before the installation of the filling components will be considered in the 3D model. CNRS LaMcube will realize a series of numerical simulations in relation with the DECOVALEX project including near-field scale excavation experiments, heating and gas injection tests. In particular, we will perform all the steps involved in the task BASSIS (bentonite and sand in sealing systems) in close collaboration with ANDRA, in particular the in-situ experiment NSC.
Subtask 5.2	**High fidelity models for repository near-field simulations and assessment of waste package integrity**
	UFZ/TUBAF will continue to work on improving the computational performance of the OpenGeoSys code and make the code improvements available as open source solutions. This includes, on the one hand, accelerations for the classical numerical methods, e.g. through optimised parallelisation, accelerations for non-linear solution methods and, on the other hand, parallelisation methods for machine learning methods or hybrid methods in the future. In addition to the classic benchmarks for verifying the results for coupled process models, benchmarks for computational performance will also be systematically developed in future and made available via the model hub. (see also Subtask 3.1) UDC will continue with the 2D simulations of the long-term geochemical evolution of a spent fuel repository in granite including glass, canister, bentonite and granite. TS Enercon will continue simulations of the temperature distribution in the near-field. Additionally, efforts will focus on the development of a model for waste package degradation. WSP will continues the work which as it began in the first year. Bentonite alteration and ion-exclusion models will be developed as separate small models, once again to demonstrate how these processes may be properly implemented within the GoldSim environment. In collaboration with BGR, TUL / IGN /SURAO will investigate approaches to parameter fitting and prediction using monitoring data and numerical models from the Mont Terri experiment. In

	cooperation with TUL, IGN will work on Bayesian inversion of rock material parameters based on measurements from the Bukov underground laboratory. PSI will continue the work on surrogate models for the individual waste package evolution and sensitivity analysis. At the same time the digital twin of the Mont Terri experiment developed during EURAD-1 MODATS project will be substantially updated to include a hydrological model and the first considerations for including mechanics (e.g. stresses due to bentonite swelling) along with the thermal and hydrological fields will be done.
Subtask 5.3	**Dedicated models for optimization and repository design and integration of the models into DT concepts to be formalized in WP17**
	Working closely together with TS Enercon and WSP, AGES will develop a biosphere model to be linked to the Total System Performance Assessment (TSPA). In this way the output from the TSPA model can be converted to quantities like dose and effect on non-human biota relevant in a safety assessment. Emphasis will be laid on elaborating the interfaces between the different compartments of the model to track the handling of parameters and on defining scenarios and boundary conditions. Selected methods of uncertainty and sensitivity analyses will be also implemented in small (non-TSPA specific) models to investigate their efficiency in GoldSim environment. By the end of Year 2, WSP plans to have an (almost) complete stack of features which could be then implemented in a TSPA model in the latter two years.

Deliverables

None for Year 2

4.3.17 WP17 - CSFD

Set of Activities Number	17		**Start Date**			October 2024		
Set of Activities Title	Criticality Safety for Final Disposal (CSFD)							
Participant Number	**1**	**6**	**8**	**11.2**	**15**	**23**	**23.2**	**25.5**
Short name of participant	**Andra**	**BGE**	**CIEMAT**	**CVUT**	**ENRESA**	**JSI**	**EIMV**	**GRS**
Person-months per Participant:	0,86	0,72	2,64	2,16	0,32	2,04	1,28	1,52
Participant Number	**27**	**34**	**35**	**37.1**	**39**	**42**	**44**	**51**
Short name of participant	**LEI**	**POSIVA**	**PURAM**	**TRACTEBEL**	**SKB**	**SSTC NRS**	**SURAO**	**VTT**
Person-months per Participant:	1,92	0,64	0,64	0,18	1,24	2,4	0,24	1,6
Start month	1			**End month**	60			

Objectives

Explore the optimisation potential of the technical and administrative measures available for ensuring criticality safety in final disposal, attain an improved understanding of their methodological validation and experimental verification, and further consolidate the technical basis of the criticality safety argumentation for final disposal of fissile wastes.

EURATOM Call objective	**SRA Drivers**	**KPI at the WP level**	CSFD
Help build or maintain public confidence and awareness in radioactive waste management;	Societal Engagement	Number of news / Post / Blog per year	**1** Contribution to the EURAD-2 Newsletter on behalf of WP-17.
Contribute to addressing scientific/technical challenges;	Scientific Insight	Number of State-of-the-Arts published	**1**: The first SoTA on criticality safety in the repository post-closure phase.
		Number of open access publications accepted	**1:** One technical publication to be submitted to an open access publication.
		Number of presentation at scientific conferences done	**2**: Two presentations (this includes poster contributions) at scientific conferences such as EURADWASTE, NENE 2025, etc.

Encourage the efficient use of R&D resources at EU level;		Number of interactions between WPs (sharing of samples, ..)	**1:** A kick-off meeting to explore synergies and potential collaboration mechanisms between WP-8 (SAREC) and WP-17.
Encourage a better transfer of knowledge across generations of experts and between experts from different fields of expertise.	Knowledge Management	Number of networking events allowing cross-disciplinary sharing + number of participants	**1:** One "Lunch & Learn" session with a view to presenting the SoTA-1 report.

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**Nagra**	**1**	**60**
	The WP management and coordination is performed by the WP Lead, Nagra, in collaboration with the WP Co-Lead, GRS, the Task Leads (EIMV, Andra, VTT, PSI, SKB and NWS) and Task Co-Leads (SSTC NRS, Galson Sciences Ltd, PURAM, JSI). The objectives of Task 1 comprise the overall management of the WP including scientific-technical coordination, monitoring and reviewing the WP progress and outputs against the work plan and dissemination/outreach of the results.			
Subtask 1.1	**S/T coordination**			
	In year 2, the WP Lead in collaboration with the WP Board will organise a set of dedicated meetings to ensure common understanding between all WP participants in view of the WP goals and the time plan, and to discuss and review WP deliverables and milestones. Two general WP meetings are envisioned in the second year: one to take place in person, the other to be organised online. In addition, regular Task-level meetings will be organised online to discuss the technical work undertaken by each Task, the progress made, and to facilitate the communication and interplay between the different WP Tasks.			
Subtask 1.2	**Dissemination / outreach / impact**			
	Analogously to Year 1, in Year 2, the key topics and conclusions reached in WP and relevant Task meetings will be captured in minutes that will be made available to all WP participants. Furthermore, an outreach strategy will also be developed with a view to engage the WP stakeholders and end-users. The strategy will also comprise the production of training and/or lecture materials.			
Subtask 1.3	**Quality control**			

	In Year 1, the WP Board will have defined a dedicated quality control strategy, including a list of reviewers, to implement the quality check defined for the WP tasks. In Year 2, the focus lies on engaging the confirmed reviewers and setting up a collaborative mechanism to ensure effective communication and feedback between the WP and the reviewers, concerning their quality control work.			
Task 2	**Knowledge Management**	**EIMV**	**1**	**60**
	The main goal of Task 2 is to capture knowledge relevant for the SRA topic of this WP and to contribute to knowledge transfer to the EURAD-2 community and beyond through the EURAD-2 KM programme. Task 2 Leader will continue to organise cooperation between the WP and WP KM (including Knowledge capture and Knowledge transfer). In addition 2 other subtasks will be addressed in the Task 2: Fissile waste package records for PCCS assessments and PCCS communication methods.			
Subtask 2.1	**Knowledge capture**			
	The objective of this subtask is to capture knowledge relevant to the WP, gained prior to EURAD-2 and extended during this WP´s progress. In the year 2, the focus will be on identifying potentially relevant EURAD-2 documents, such as contributing to a DI related to Criticality Safety for Final Disposal, and their development. Any other knowledge transfer as agreed by WP and KM will be implemented.			
Subtask 2.2	**Knowledge transfer**			
	The goal is to deliver, in cooperation with KM WP/(s), specific activities to transfer knowledge to interested parties. Interested parties and activities will depend on the WP topic and objectives. Some examples of knowledge transfer activities: organising training & preparing training materials, providing lectures to “Lunch and Learn” sessions, providing content in guidance documentation & workshops, contributing to Domain Insights and SoK production. In year 2, the focus will be on preparing training material for online training covering WP topics. In addition, the organisation of a “Lunch & Learn” session by the end of Year 2 is envisioned with a view to presenting the first WP-17 SoTA report.			
Subtask 2.3	**Fissile waste package records for PCCS assessments**			
	The objective is to identify, specify, and ensure the availability of fissile material records—such as spent fuel irradiation histories and ILW fissile inventories—required to support robust PCCS (post-closure criticality safety) assessments and to demonstrate compliance with relevant repository waste acceptance criteria. In year 2, the focus will be on identifying and categorising the fissile waste and container data required for PCCS assessments and WAC compliance demonstrations, including establishing			

	appropriate metadata and specifying the information needed for each type of fissile waste package, such as various reactor fuels and fissile ILW.			
Subtask 2.4	**PCCS communication methods**			
	The objective of the subtask is to initiate the development of a stakeholder-oriented PCCS communication strategy that supports transparent and accessible dialogue on criticality safety across diverse stakeholder groups and to begin the development of a common PCCS terminology and explore preliminary visual and narrative tools to support the clear communication of complex safety case arguments over long timescales. In Year 2, the work will focus on identifying key stakeholder groups, understanding their perspectives through initial consultations, and developing a draft communication strategy tailored to their needs and national contexts. In parallel, a draft glossary of PCCS-related terms will be initiated and prototypes of communication tools—such as diagrams and storyboards—will be developed, exploring the use of analogues and administrative controls to support clearer, more accessible criticality safety communication.			
Task 3	**Validation of long-term evolution scenarios for PCCS assessments**	**ANDRA**	**1**	**60**
	The goal of Task 3 is to identify, among the phenomena that could occur during the post-closure period, the ones that can have an influence on criticality safety. This identification will be the basis to develop a methodology for post-closure criticality scenario validation.			
Subtask 3.1	**FEP identification for PCCS assessments**			
	Features, events and processes is a tool to help defining relevant scenarios for safety assessments studies. However, it is not limited to criticality purposes and some parts might not be developed enough for criticality. The objective is to develop a “FEP-like” base dedicated specifically to criticality safety. In year 2, a first complete draft of this base is expected.			
Subtask 3.2	**Evaluation of FEPs identified for PCCS assessments**			
	After the identification of the phenomena (ST 3.1), the goal of ST 3.2 is to gather the currently known approaches to building PCCS assessments for each phenomenon. The work will start at the end of year 2.			
Subtask 3.3	**Methodology for post-closure criticality scenario validation**			

	Goal of ST 3.3 is to synthetise the work of ST 3.1 and 3.2 into a deliverable (technical note). It is not expected to start during year 2.			
Task 4	**Verification of model implementation for PCCS assessments**	**VTT**	**13**	**60**
	The key objectives of Task 4 are: (*i*) to gain understanding of post-closure criticality scenario modelling approaches; (*ii*) to develop a methodology for modelling post-closure criticality scenarios; and (*iii*) to verify whether the computational models developed appropriately represent the scenarios (i.e. the underpinning conceptual models) and include a suitable treatment of uncertainty and appropriate model simplifications. Participation to relevant meetings of WP17 will be a continuous part of the task throughout the CSFD project.			
Subtask 4.1	**Review of post-closure criticality scenario modelling approaches**			
	As the first step, to be started before the end of Year 1, a survey is going to be performed among the WP17 participants to compile the existing approaches to PCCS modelling. The survey should include analysed scenarios, applied simplifications, known uncertainties and other known gaps. During Year 2, the review will be continued and complemented with reflection to any potential new findings of Task 3 concerning relevant FEPs. In case of delays in Task 3 work, this part will be scheduled accordingly.			
Subtask 4.2	**Methodology and models for evaluating post-closure criticality scenarios**			
	The existing methods of the participants to evaluate the applicability of the computational models should be covered by the survey of T4.1. Further evaluation will be performed within the subtask 4.2. The work is intended to start before the end of Year 2. A more detailed approach will be drafted along with the analysis of T4.1 survey answers.			
Subtask 4.3	**Sensitivity analysis of scenario uncertainties and model simplifications**			
	The intended sensitivity analysis of scenario uncertainties, model simplifications, etc. is planned to be performed based on the findings to be obtained in subtasks 4.1 and 4.2, in addition to any relevant input from other tasks of the WP. This subtask will be mostly idle over the Year 2, but the previously performed or on-going sensitivity analyses may be part of the survey of T4.1.			
Task 5	**Development of post-closure criticality scenario assessment methodology for the derivation of spent fuel loading curves and ILW package fissile mass limits**	**PSI**	**1**	**60**

	The main objectives of Task 5 are: (*i*) to improve understanding of modelling approaches and technical details underpinning the derivation of spent fuel loading curves and ILW fissile mass limits; and (*ii*) to explore the optimisation potential with respect to waste package and engineered barrier designs by improving understanding of the key factors that influence the calculation of fissile material limits and identifying opportunities for managing those factors.			
Subtask 5.1	**Spent fuel loading curve derivation**			
	Based on a survey realised in Year 1, a set of models for a generic canister will be made available, representing a geometry of spent fuel assemblies with nuclide contents, inserted into the canister. Such assemblies will be representative of 17x17 PWR assemblies, chosen for illustration purposes, with UO2 enrichments from 2.5 to 5%. Such models will be used by participants to perform sensitivity studies. The definition and assignment of sensitivities will be discussed at the end of Year 1 or early Year 2. The next step will be to perform such sensitivity studies, eventually leading to the geometrical definition of the canister, assemblies, and their positions, in order to calculate the loading curves.			
Subtask 5.2	**ILW package fissile mass limit derivation**			
	Based on the same survey as for subtask 5.1, realised in Year 1, a discussion was initiated on the definition of the approach and technical steps for the study of fissile mass limits. Participants decided to perform this subtask in parallel to subtask 5.1. During Year 2, the definition of fissile mass limits and their application will be explored, with a number of examples.			
Subtask 5.3	**Optimisation potential for fissile waste package and engineered barrier design**			
	During Year 2, this subtask will be partly addressed in parallel to subtask 5.1. The sensitivity study of 5.1 will help to select or exclude a number of possibilities for the canister design and direct us toward an optimised geometry and material design. The outcome will be a set of insights regarding dimensions, geometry and materials, based on the outcome of the subtask 5.1 and optimisation of the quantities of interest.			
Task 6	**Experimental basis for validation of depletion and criticality codes for PCCS**	**SKB**	**1**	**60**
	The objective of the task is to identify the experimental data required for PCCS assessment needs and define the types of experimental programme that could be done to address any significant gaps and uncertainties. Work in the second year will focus on two items: - preparing a proposal for funding of most prioritised experiments in second wave; - completing a thorough gap analysis for all identified needs to support validation of depletion and criticality codes for PCCS.			

Subtask 6.1	**Gap analysis**			
	Information collection about the current status has been performed during the first year. In the second year, the other parts of a gap analysis will be done: formulate the goal (what do we lack in order for better validations for PCCS) and identify gaps compared to the current status and draft activities that can be undertaken to meet the gaps. In the first year, the most urgent needs will have been identified and a research proposal drafted that addresses these needs. During the second year a more comprehensive gap analysis will be produced that can be an inspiration for future projects. This larger gap analysis will be produced from information collected during the first year and through deeper discussions on noted needs. Another source of information will be progress in other tasks in the work package. One or two meetings will be dedicated to these discussions and in addition to that a report will be produced. Due in month 27 is a deliverable on "Experimental data needs to support post-closure criticality safety assessments".			
Subtask 6.2	**Survey of experimental methods**			
	To address experimental needs with actual experiments and investigations it is valuable to understand the methods used in the experiments and their possibilities and limitations. Work in this subtask will mainly be done during the second year. Activities within the subtask: - In order to understand the experimental challenges and state-of-the-art, identify: previous experimental projects in the area (with focus on PCCS-relevant experiments), techniques for experiments, possible operating agents. - Produce and carry out a survey on experience in obtaining experimental data, including lessons learned, communication with various stakeholders, boundary conditions, etc - Engagement with experimentalists involved in such work will form part of this subtask. The work in this subtask will result in knowledge valuable for entering into an experimental programme. The work will be documented either in the planned deliverable or as a separate technical paper.			
Task 7	**Methodology for consequence assessment in the post-closure phase**	**NWS**	**1**	**60**
	The overall aim of Task 7 is to review the way consequence assessments are performed, including the key areas of focus, and then develop a methodology that can be used as a guide for assessing the impact of hypothetical criticality events on repository performance. This will be achieved through reviewing previous work and consolidating the information in a deliverable.			
Subtask 7.1	**Types of criticality events**			

	Research the mechanisms and prerequisites for different types of postulated criticality events to occur in a repository. In year 2 this will focus on understanding how hypothetical critical configurations (identified in year 1) could evolve and how changes in conditions such as temperature increases affect the system.
Subtask 7.2	**Impacts of criticality**
	Research approaches to assessing the impacts of a postulated criticality event on engineered and natural barriers. In year 2 this will focus on understanding how mechanical and thermal energy released from different types of criticality events could affect the properties of barrier materials.
Subtask 7.3	**Modelling the consequences of criticality**
	This sub-task is to develop and apply models based on common principles/methodology to carry out post-closure criticality consequences assessments. This task is reliant on outputs from subtasks 7.1 and 7.2 and so will not be started in year 2.

Deliverables

There are no WP17 deliverables to be delivered by the end of Year 2.

Planned milestones: Completion of first draft summarising the findings of Subtasks 3.1 and 3.2 on post-closure criticality FEP and scenario identification.

Planned reports: A first complete draft of a report on Subtask 3.1: FEP identification for PCCS assessments.

Key performance indicators: The following KPI were defined to be realised within WP-17 by the end of Year 2 (see table below).

4.3.18 WP18 – DITUSC

Set of Activities Number	18		**Start Date**			October 2024	
Set of Activities Title	Development and Improvement of Quality Assured Thermodynamic Understanding for use in Nuclear Waste Disposal Safety Case (DITUSC)						
Participant Number	**1.1**	**6**	**7**	**8**	**9.1**	**17**	**17.1**
Short name of participant	**BRGM**	**BGE**	**CEA**	**CIEMAT**	**IMT ATLANTIQUE**	**FZJ**	**HZDR**
Person-months per Participant:	2,15	2	1,2	2,25	1,25	1	2
Participant Number	**25**	**25.2**	**25.5**	**30**	**37**		
Short name of participant	**KIT**	**AMPHOS21**	**GRS**	**ONDRAF**	**SCK CEN**		
Person-months per Participant:	2	2,9	1	2	1,5		
Start month	1			**End month**	24		

Objectives

Assessment of the current thermodynamic understanding in support of the Safety Case for radioactive waste disposal, with particular emphasis on a transversal understanding to allow identification of possible future improvements in knowledge and use.

Activity No	**Activity Title**	**Lead participant**	**Start Month**	**End month**
Task 1	**Management / Coordination of the WP**	**ONDRAF/NIRAS**	**1**	**24**
	The overall management of the WP includes scientific and technical coordination, monitoring and review of the WP's progress and results against the work plan, and monitoring the dissemination/outreach of the scientific results obtained. In this respect, important interactions with all other tasks of the WP and other WPs are identified.			

Sub-task 1.1	**S/T coordination**			
	The activities to be carried out include: - Overall coordination of the DITUSC activities through monthly WP Board meetings to ensure work package progress according to plan and coordination of reporting, deliverables and milestones, - Coordination of the organization of the biannual meetings and coupled workshops, - Coordination of the organization of technical meetings at Sub-Task level (Sub-Tasks 3.1 to 3.5) to coordinate all technical activities, - Interactions with the Project Management Office (PMO) representative to ensure good communication and best practices as defined by the PMO, - Preparation of relevant input to EURAD-2 secretariat specific requests and attendance to annual EURAD-2 events and General Assemblies.			
Sub-task 1.2	**Dissemination / outreach / impact**			
	The activities to be carried out include: - Advertisement of the workshop, ensuring they are timely organized and programmed scopes are tailored to serve the work package objectives efficiently, - Coordination of the efforts related to dissemination of the scientific results and promote open exchange at scientific conferences and workshops. Publication of a scientific paper on solid-phase transformation is planned for year two, - Preparation of deliverable D.18.4 entitled Outcome/impacts report to MS&EU and due by Month 20, - Preparation of relevant input to the EURAD-2 Newsletter on a regular basis, Whenever relevant, advertise DITUSC-related events and major deliverables through the relevant communication channels (more than 50% of the targeted communications relating to KPIs have already been completed).			
Sub-task 1.3	**Quality control**			
	The activities to be carried out include: - Quality control of the work package implementation, review of milestones and deliverables according to EURAD-2 standards, - Monitoring of the progress and fulfilment of all KPI targets (see updated KPI table).			
Task 2	**Knowledge Management**	**FZJ**	**1**	**24**
	The main goal of Task 2 is to capture knowledge relevant for the SRA topic within DITUSC and to contribute to knowledge transfer to the EURAD-2 community and beyond through the EURAD-2 KM programme.			
Sub-task 2.1	**Knowledge capture**			

	Writing of the White Paper draft on the basis of the outcomes of the scientific activities and revision based on external peer reviews			
Sub-task 2.2	**Knowledge transfer**			
	The activities to be carried out include: - Further Interactions with other WPs as identified in year 1: WP6 (STREAM), WP8 (SAREC),WP9 (INCOMAND), WP12 (RAMPEC), WP13 (OPTI), WP14 (SUDOKU) and WP 16 (HERMES). Six documented interactions have already been emplaced and one will be organized in the scope of the EURAD-2 annual event to be held in September 2025 (RAMPEC-DITUSC joint technical session). Further interactions with relevant other work packages will be promoted if judged relevant (e.g., participation in Workshop 2), - Interactions with WP 2 KM and provide feedback whenever needed, - Supportive work for the organization and advertisement of the two remaining open workshops (19-20 November 2025 and Spring 2026), - Preparation of the documentation of the training course by Month 13 (MS58), - Preparation of deliverable D18.2 documenting the exchange with other work packages and with key actors and target experts from past projects by Month 14, Possible preparation of technical communications to relevant scientific events.			
Task 3	**Thermodynamics: data gaps, interlink with kinetics, and Safety Case**	**Amphos 21**	**1**	**20**
	The output of each subtask will include an analysis of gaps, priorities and proposals to improve the thermodynamic database content in the context of the safety case. A summary report of the technical activities carried out in Task 3 in support of the preparation of the White Paper will be prepared by month 20 (MS80).			
Sub-task 3.1	**Thermodynamic data gaps for RN and organics [Amphos 21, BGE, CEA, CIEMAT, GRS, HZDR, SCK CEN, Uni Szeged]**		**1**	**20**
	The activities to be carried out include but are not limited to: - Continuation of the data gaps identification for the identified systems, - Evaluation of estimation methods (such as LFERs) for filling some reported data gaps, - Evaluation of data gap needs as proposed by the end-users, - Consolidation of the resulting scientific basic for further insert in the White Paper by Month 16, Participation to the open workshops and contribute to the data gaps prioritization for the Safety Case.			

Sub-task 3.2	**Perturbed systems [Amphos 21, BGE, BRGM, CEA, CIEMAT, Empa, GRS, HZDR, KIT, PSI]**	**1**	**20**
	The activities to be carried out include but are not limited to: - Finalization of the data gaps identification for the identified systems (radionuclides, cement systems), - Finalization of the evaluation of different approaches for the estimation of missing ion interaction coefficients (saline perturbations) and enthalpy / entropy data (temperature perturbation), - Implementation of comparison exercises involving experimental data with the objective of evaluating the performance of various databases for the calculation of perturbed systems, - Consolidation of the resulting scientific basis for further insert in the white Paper by Month 16, Participation to the open workshops and contribute to the data gaps prioritization for the Safety Case.		
Sub-task 3.3	**Thermodynamics of solid-solutions [PSI, Empa, BRGM, USZ, FZJ]**	**1**	**20**
	The activities to be carried out include but are not limited to: - Overview of experiment designs and models status for C-S-H uptake of cations and anions (including effect of pH, elemental competition for system evolution and radionuclides uptake), - Overview of experiment designs and models status for LDH (mainly hydrotalcite) phases stability and uptake of anions, - Data gaps analysis for cation/anion exchange/retention in zeolites, - Preparation of a review paper on the use of solid solutions in sulphate- and carbonate-based systems, - Participation to the open workshops, section on solid-solutions, Consolidation of the resulting scientific basis for further insert in the White Paper by Month 16.		
Sub-task 3.4	**Interplay of thermodynamics and kinetics [Amphos 21, KIT, IMT Atlantique]**	**1**	**20**
	The activities to be carried out include but are not limited to: - Documentation of the current state of knowledge on solid phase transformation in a thermodynamic framework for a limited set of radionuclides, - Preparation of a manuscript on M(II), M(III) and M(IV) oxides and hydrous oxides solubilities, documenting the experimental and related estimation methods, and application to spent fuel dissolution in reducing environments and implications for the Safety Case, - Organization of Workshop to be held in Month 14 (MS57) on 19-20 November 2025, Consolidation of the resulting scientific basis for further insert in the white Paper by the Month 16.		
Sub-task 3.5	**Thermodynamics and Safety Case [BGE, ONDRAF/NIRAS, PSI]**	**1**	**20**
	The activities to be carried out include but are not limited to:		

	- Further interactions with end-users and stakeholders to ensure good liaison and integration of the input into the White Paper (e.g., email exchanges, face-to-face and/or virtual meetings), - Preparation of relevant input from relevant waste disposal national programs (Switzerland, Germany) for the writing of the White Paper, - Coordination of the White Paper with the DITUSC Board, - Organization of workshop in Month 20 (MS75) in Spring 2026, - Preparation of the documentation of the exchange with the end-users by Month 14 (MS59), Communication on the White Paper at a relevant scientific conference (to be determined).

Deliverables

- D18.2 Documentation of exchange with Eurad Community – Month 14
- D18.3 White Paper – Month 16
- D18.4 Outcome/impacts report to MS&EU – Month 20
-

4.4 List of AWP2 deliverables

WP n°	D n°	Title	Short description	Lead participant	Type	Dissemination level	Delivery date (in months)
WP01 - PMO	1.7	Annual Work Programme Y3	Description of activities for Year 3 per WP	1.ANDRA	R	SEN	21
WP02 - KM	2.1	Report on the KM platform specifications	Based on feedback from EURAD (-1), new specifications for KM platform development have to be written in order to implement the base tool for managing knowledge	20.IRSN	R	PU	18
	2.2	Report on the implementation of innovative and alternative methods	Assessment of the innovative methods and description of those that will be implemented in the second wave.	20.IRSN	R	PU	18
	2.3	Report on recommendations for the long-term maintenance of critical infrastructure for RWM at the European level	Describe the main outcomes with respect to critical infrastructures.	12.DEKOM	R	PU	24
WP03 – ASTRA	3.2	State-of-the-art assessment of TRLs and R&D requirements for deep borehole disposal of radioactive wastes	DBD of radioactive wastes	10.2 EGIS	R	PU	15
	3.3	White Paper WP3	About further activities to be analysed in ASTRA potential continuation	45 SURO	R	PU	18
	3.4	Outcome/impacts report to Member States and End Users WP3	About alternative RWM strategies summarizing the work performed	10 COVRA	R	PU	20
WP04 - FORSAFF	4.3	White Paper WP4	Identification of knowledge gaps for future RD activities	7. CEA	R	PU	18

	4.4	Outcome/impacts report to Member States and End Users WP4	Summarizes the work of Tasks 3, 4, 5 and 6.	51. VTT	R	PU	22
WP05 - ICARUS	5.2	New NDT Prototypes	Report on the advances of new Prototype devices for Non-Destructive characterization of waste - Task 3	32. NRG	R	PU	24
WP11 - CLIMATE	11.1	White Paper WP11	White Paper about climate change impacts on nuclear waste management facilities and sites across climate zones in Europe during the construction, operation, and post-closure phases. It includes a set of recommendations and proposals for actions to address the identified gaps in data management, protocols, methodologies, and practices for a robust climate risk assessment.	6. BGE	R	PU	18
	11.2	Synthesis report WP11	Construction, operational and post-closure phase climate scenarios, RWM facility information, RW disposal site information, hazard and risk screening methodologies, climate modelling and risk assessment methodologies, and natural analogues. The report contains background information for the white paper (D1).	25.2. Amphos 21	R	PU	18
WP13 – OPTI	13.2	Final: Mutual Understanding of actors views about optimization	Based on milestone 2, finalise deliverable 1 by documenting the mutual understanding/consensus view about the goals, strategies, and key challenges within optimization.	5. BEL V	R	PU	14
	13.3	Technical Key challenges for Optimization of HLW GDFs	Documents potential for further actions for specific key optimisation challenges, based on milestone 2 and 3	44. SURAO	R	PU	18

	13.4	Outcome/impacts report to Member States and End Users	Summarize the papers and the work in task 3 and 4, including case study as test field, conclude what new position was formulated	6. BGE	R	PU	20
	13.5	Final Report WP13	Summarize the papers and the work in task 3 and 4, including case study as test field, conclude what new position was formulated, Summarize End user Feedback	6. BGE	R	PU	24
WP15 - DITOCO2030	15.3	White paper: Position paper (Task5)	will include case studies and examples of DT applications, will report on the practical benefits and potential of DT in real-world scenarios.	44. SURAO	R	PU	18
	15.4	Outcome/impacts report to Member States and End Users - WP15	Short summary of green/white paper	56. IFE	R	PU	22
WP18 - DITUSC	18.2	Documentation of exchange with Eurad Community	Documentation of exchange with other WPs and with key actors and target experts from on-going / previous projects	17. FZJ	R	PU	14
	18.3	White Paper	First full draft base on final workshop outcomes	30. NIRAS	R	PU	18
	18.4	Outcome/impacts report to MS&EU	Report presenting the key achievements of DITUSC WP	25. KIT	R	PU	20
	18.5	Updated white paper	Final version	30. NIRAS	R	PU	24

5. Ressources to be committed

5.1 Summary of staff effort

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
Andra	10,3	0,00	0,88	2,50	0,00	0,00	0,67	0,00	1,36	0,56	1,88	1,08	0,75	0,72	0,50	0,13	0,86	0,00	22,16
BRGM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,06	2,13	1,40	0,00	3,84	1,00	0,00	0,00	2,15	11,58
EMSE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,80
GALTENCO	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,88	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,88
AGES	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,32	0,00	0,44	0,00	0,00	0,76
ARAO	0,00	0,00	1,50	0,00	0,48	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,98
BASE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
BEL V	0,6	0,00	0,00	0,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,75	0,00	0,00	0,00	0,00	0,00	4.35

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
BGE	0,75	2,62	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,28	3,13	0,00	4,25	0,00	0,50	0,00	0,72	2,00	15,25
GNS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,40	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,40
CEA	0,75	0,00	0,00	3,00	0,00	6,96	0,94	7,6	0,00	0,00	0,00	2,88	0,00	3,36	0,00	3,50	0,00	1,20	30,19
EDF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,40	0,00	0,16	0,00	1,38	0,00	0,00	1,94
ORANO	0,00	0,00	0,00	0,00	0,80	0,00	0,16	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,96
CIEMAT	0,00	2,10	0,00	2,00	2,56	7,00	2,51	2,52	3,92	2,77	0,00	3,96	0,00	4,64	0,00	0,00	2,64	2,25	37,00
UAM	0,00	0,00	0,00	0,00	0,00	6,00	1,88	0,00	0,00	0,00	0,00	0,00	0,00	0,88	0,00	0,00	0,00	0,00	8,76
UCLM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,43	0,00	0,00	0,00	0,00	0,50	0,93	0,00	0,00	3,86
UGR	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,60

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
UPM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,84	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,84
CSIC	0,00	0,00	0,00	0,00	3,14	8,70	2,19	0,00	0,00	0,00	0,00	0,00	0,00	3,36	0,00	0,00	0,00	0,00	17,39
MERIENCE	0,00	0,00	0,00	0,75	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,75
CNRS	0,00	0,00	0,00	0,00	0,56	4,44	5,62	2,6	6,72	1,44	0,00	3,16	1,25	0,00	0,00	2,50	0,00	0,00	28,29
IMT ATLANTIQUE	0,00	0,00	0,00	0,00	0,76	0,00	0,00	0,00	0,52	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,25	2,53
UNI LILLE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	1,00
UORLEANS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,54	0,00	0,00	0,00	0,00	0,00	0,00	0,54
UPOITIERS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,42	0,00	0,48	0,00	0,00	0,00	0,00	0,90

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
ENPC	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,90	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,90
ULORRAINE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,60	0,00	0,00	0,00	0,00	0,00	0,75	0,00	0,00	2,35
ENSAM	0,00	0,00	0,00	0,00	0,00	0,00	0,51	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,51
UMONTPELLIER	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,40	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,40
COVRA	0,00	0,00	1,62	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,28	1,00	0,00	0,00	0,00	0,00	0,00	1,90
TUDELFT	0,00	0,46	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,54	0,00	0,00	4,00	0,00	0,00	3,23	0,00	0,00	8,23
CVR	0,00	0,00	0,00	2,50	0,00	0,00	1,72	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,22
VSCHT	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,96	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,96

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
CVUT	0,00	0,00	0,00	0,00	1,60	0,00	1,41	0,00	0,00	3,58	0,00	1,00	5,25	0,88	0,00	0,00	2,16	0,00	15,87
IGN	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,71	0,00	0,00	0,00	0,00	0,00	4,14	0,00	0,00	5,85
TUL	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,92	0,00	1,50	1,24	0,00	0,00	0,50	5,88	0,00	0,00	11,04
CUNI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,75	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,75
UJV	0,00	0,00	0,00	2,25	0,00	0,00	2,12	0,00	0,96	0,88	0,00	2,52	2,75	2,80	0,00	0,00	0,00	0,00	14,28
DEKOM	0,00	1,27	1,28	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,55
DTU	0,00	0,00	0,00	0,00	2,24	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,24
EK	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,27	0,00	2,32	0,00	2,08	0,00	0,00	0,00	0,00	5,67
SORC	0,00	0,00	0,00	0,00	0,64	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,64

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
ENEA	0,00	0,00	0,00	0,00	1,84	0,00	0,61	0,00	0,00	0,00	1,88	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,32
UNIPR	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,12	0,00	1,00	0,00	0,00	2,12
CAEN	0,00	0,00	0,00	0,00	4,16	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,16
POLIMI	0,38	0,00	0,00	3,50	2,88	4,32	1,60	0,00	0,00	0,00	0,00	0,00	0,00	1,52	0,00	0,00	0,00	0,00	14,2
UNIPI	0,00	0,00	0,00	0,00	1,20	0,00	0,86	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,75	0,00	0,00	0,00	2,81
UNIROMA	0,00	0,00	0,00	0,00	0,00	0,00	0,79	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,79
ENRESA	0,00	0,00	0,00	0,00	0,80	0,32	0,00	0,00	0,00	0,14	0,00	0,00	0,00	0,40	0,00	0,79	0,32	0,00	2,77
CIMNE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,18	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,18
EURECAT	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,44	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,44

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
UDC	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	7,25	0,00	0,00	7,25
UPC	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,72	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,72
IIDP	0,00	0,00	0,00	0,00	0,52	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,38	0,00	0,00	0,00	2,90
US	0,00	0,00	1,50	1,50	2,56	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,56
FTMC	0,00	0,00	0,00	0,00	0,96	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,50	0,00	0,00	0,00	2,46
FZJ	0,70	0,24	0,00	0,00	0,00	0,00	0,00	2,40	0,00	0,00	0,00	1,16	0,00	0,00	0,00	1,50	0,00	1,00	7,00
HZDR	0,00	1,16	0,00	0,00	0,00	0,00	0,00	2,08	2,83	0,00	0,00	2,16	0,00	0,00	0,75	0,00	0,00	2,00	10,98
GFZ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,25	0,00	0,00	1,25
UFZ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,90	0,00	0,00	0,00	0,00	1,25	4,19	0,00	0,00	6,34

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
GI-BAS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,96	5,88	0,00	0,00	1,44	0,00	0,00	0,00	0,00	10,28
INCT	0,00	0,00	2,00	3,00	0,00	5,69	1,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	12,49
UW	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,48	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,48
IRSN	4,56	1,51	1,00	1,25	0,00	0,00	1,66	0,16	0,00	2,94	2,63	1,84	1,50	3,28	0,25	2,63	0,00	0,00	25,21
ENSMP	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,04	0,00	0,00	2,38	0,00	0,00	1,44	0,00	0,00	0,00	0,00	4,86
CEPN	0,00	0,00	0,00	0,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,50
NTW	1,46	0,00	2,25	1,50	0,00	0,00	0,00	0,00	0,00	0,00	3,88	0,00	3,00	0,00	0,00	0,00	0,00	0,00	12,09
IST-ID	0,00	0,00	0,73	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,73
JSI	0,00	0,00	0,00	0,00	2,08	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,04	0,00	4,12

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
ZAG	0,00	0,00	0,00	0,00	0,00	5,01	0,00	0,00	5,06	0,00	0,00	0,00	0,00	1,28	0,00	0,00	0,00	0,00	11,35
EIMV	0,00	0,60	3,63	2,75	0,00	0,40	0,00	0,00	0,00	0,00	2,13	0,00	1,25	0,00	0,50	0,00	1,28	0,00	12,53
KIPT	0,00	0,00	0,00	0,00	0,00	6,00	0,00	0,00	7,20	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13,20
ENERGORISK	0,00	0,00	1,50	0,00	2,08	0,00	0,00	2,16	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,74
KIT	0,75	0,00	0,00	0,00	0,00	0,00	0,00	3,80	1,28	0,00	0,00	3,08	1,25	0,00	0,00	2,00	0,00	2,00	13,71
BGR	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,16	0,00	0,00	0,00	0,00	0,00	1,88	0,00	0,00	3,04
AMPHOS21	5,85	2,14	0,00	3,50	0,00	0,00	0,00	2,12	0,00	0,75	5,63	3,04	0,00	4,24	2,00	2,00	0,00	2,90	34.17
BAM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,32	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,32
LUH	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,60

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
GRS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,64	1,30	1,25	1,32	0,00	0,00	0,75	0,50	1,52	1,00	8,28
TUBAF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,41	0,00	0,00	0,00	0,00	0,00	0,97	0,00	0,00	2,38
KTH	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,52	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,52
LEI	0,00	0,00	0,00	1,50	0,00	0,00	0,00	0,00	0,00	0,82	0,00	0,96	0,00	1,12	0,00	0,00	1,92	0,00	6,32
NCSRD	0,00	0,00	0,75	0,00	2,08	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,83
ONDRAF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,44	0,16	0,00	0,00	0,00	1,25	0,80	0,00	0,00	0,00	2,00	4,65
DMT	0,00	0,00	3,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,00
NES	0,55	0,00	0,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,05
ULIEGE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,94	0,00	0,00	1,25	0,00	0,00	0,00	0,00	0,00	3,19

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
EURIDICE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,25	0,00	0,00	0,00	0,00	0,00	1,25
NRG	0,00	0,00	1,75	1,25	1,44	0,00	0,00	0,00	0,00	0,00	0,00	1,48	0,00	0,40	0,00	0,62	0,00	0,00	6,94
NTUA	0,00	0,00	0,00	0,00	0,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,24	0,00	0,00	0,00	0,00	1,04
POSIVA	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,32	0,35	0,00	0,00	0,50	0,00	0,00	0,00	0.64	0,00	1,81
TVO	0,95	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,95
PURAM	6,75	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,50	0,00	0,00	0,00	0,64	0,00	7,89
RATEN	0,75	0,00	0,00	2,50	1,60	4,80	1,90	2,08	0,00	0,00	0,00	0,00	0,00	3,68	0,00	0,00	0,00	0,00	17,31
SCK CEN	1,30	6,22	0,00	1,50	2,08	5,88	1,34	5,00	0,00	0,00	3,13	1,64	1,50	2,56	2,00	2,32	0,00	1,50	37,97
TRACTEBEL	0,00	0,00	0,00	0,00	0,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,50	0,00	0,18	0,00	1,28

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
SIIEG NASU	0,00	0,00	0,00	2,00	0,00	5,60	5,24	0,00	8,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,84
SKB	0,75	1,16	0,00	0,00	0,64	0,00	0,00	0,76	0,00	0,60	0,00	0,00	1,00	0,00	0,00	0,00	1,24	0,00	6,15
CLAYTECH	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,81	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,81
SOGIN	0,00	0,94	0,00	0,00	0,00	1,60	0,16	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,38	0,00	0,00	0,00	3,08
SSTC NRS	2,25	1,48	3,88	3,50	1,20	0,00	0,00	0,00	0,00	0,00	3,88	0,76	2,25	1,44	0,00	0,00	2,40	0,00	23,03
SURAO	0,00	0,00	0,00	0,00	0,00	0,00	0,24	0,00	0,16	0,00	2,34	0,24	0,50	0,00	1,00	0,28	0,24	0,00	5,00
SURO	0,00	0,00	1,75	2,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,25	0,00	0,00	0,00	0,00	0,00	5,5
TNO	0,00	0,00	0,70	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,70
TS ENERCON	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,50	1,33	0,00	0,00	2,83

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
GOLDER ASSOCIATES	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	1,97	0,00	0,00	2,97
TUS	0,00	0,00	1,50	1,50	0,00	0,00	0,00	0,00	0,00	0,00	2,13	0,00	0,00	0,00	0,50	0,38	0,00	0,00	6,00
UHELSINKI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,28	0,00	0,00	0,00	2,24	0,00	1,60	0,00	0,00	0,00	0,00	5,12
JYU	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,42	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,42
GTK	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,25	1,20	0,00	0,00	0,00	0,00	0,00	0,00	2,45
MITTA	0,70	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,65	0,75	0,00	0,00	0,00	0,50	1,67	0,00	0,00	5,26
UT	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00
CTH	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,80	0,00	0,00	0,00	0,00	0,00	0,00	0,80

Organisation	WP1 - PMO	WP2 - KM	WP3 - ASTRA	WP4- FORSAFF	WP5 - ICARUS	WP6 - STREAM	WP7 - L'OPERA	WP8 - SAREC	WP9 - InCoManD	WP10 - ANCHORS	WP11 - CLIMATE	WP12 - RAMPEC	WP13 - OPTI	WP14 - SUDOKU	WP 15- DITOCO2030	WP16 - HERMES	WP17 - CSFD	WP18 - DITUSC	Total PM
UTARTU	**0,00**	**0,00**	**0,88**	**2,75**	**0,00**	**0,64**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**1,50**	**0,00**	**0,40**	**0,00**	**0,00**	**0,00**	**6,17**
VTT	**3,20**	**0,00**	**1,70**	**5,40**	**0,72**	**2,64**	**0,64**	**2,40**	**2,00**	**1,04**	**3,88**	**0,00**	**2,00**	**0,00**	**2,00**	**0,00**	**1,60**	**0,00**	**29,22**

5.2 Purchase costs items

The tables below are calculated with a prorata temporis based on the ones provided in Part B of the proposal (for travel and subsistence and other goods and services).

1.3/GALTENCO		
	Cost (€)	**Justification**
Travel and subsistence	480 €	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)	2,800	
Total	3,280	

2/AGES		
	Cost (€)	**Justification**
Travel and subsistence	980	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	331.65	Costs for other goods, works and services are planned under the following WPs: HERMES: open access publications
Remaining purchase costs (<15% of pers. Costs)		

Total	1,311.65

3/ARAO		
	Cost (€)	**Justification**
Travel and subsistence	942	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	128	Costs for other goods, works and services are planned under the following WPs: - ICARUS: Costs for organising meetings (meeting room, printing materials, coffee breaks, …), translation of materials and other services
Remaining purchase costs (<15% of pers. Costs)		
Total	1,070	

8.1/UAM		
	Cost (€)	**Justification**
Travel and subsistence	1,792	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	4,040	Costs for other goods, works and services are planned under the following WPs: - STREAM: Laboratory supplies, research services costs (use of characterization techniques services),

		consumables. - L'OPERA: Laboratory supplies, research services ((use of characterization techniques services), consumables - SUDOKU: Laboratory supplies, research services ((use of characterization techniques services), consumables
Remaining purchase costs (<15% of pers. Costs)		
Total	5,832	

8.3/UGR		
	Cost (€)	**Justification**
Travel and subsistence	480	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	1,600	Costs for other goods, works and services are planned under the following WPs: - InCoManD: Consumables for laboratory work (DNA extraction kits, enzymes, etc.). Microbial diversity analysis of the studied samples. Sample preparation and analysis for microscopic and spectroscopic technique characterization. Open access publications costs. Transport of samples to partner laboratory for analysis
Remaining purchase costs (<15% of pers. Costs)		
Total	2,080	

8.4/UPM		
	Cost (€)	**Justification**
Travel and subsistence	480	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes

Equipment		
Other goods, works and services	2,400	Costs for other goods, works and services are planned under the following WPs: - InCoManD: Machining of samples and laboratory supplies for stress corrosion tests, metallography and fractography and residual stress measurements. Repair of experimental equipment used for testing and accreditation costs of residual stress measurement laboratory.
Remaining purchase costs (<15% of pers. Costs)		
Total	2,880	

8.6/MERIENCE		
	Cost (€)	**Justification**
Travel and subsistence	480	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)		
Total	480	

9/CNRS		
	Cost (€)	**Justification**
Travel and subsistence	9,048	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes

Equipment	2,987.04	Costs for equipment are planned under the following WPs: - L'OPERA ○ 3 ventilated ovens - ANCHORS Swelling pressure and infiltration tests will be carried out re-adapting existing constant volume cells and infiltration columns. To do this, we will need 10 total pressure sensors, machining to install the pressure sensors on the cells/columns, a PC for data acquisition, a multimeter.

Other goods, works and services	18,875.3	Costs for other goods, works and services are planned under the following WPs:
		- PMO: CFS costs
		- ICARUS:
		  ○ chemicals for radioactive measurements, radioactive standard sources, analytical standards, resins, analytical chemical measurements, gases.
		- STREAM:
		  ○ Chemicals, electrochemistry cells and crucibles, metals for electrodes, gases, small laboratory devices, open access,
		  ○ chemical reagents for syntheses, analytical chemical measurements and gases for leaching experiments.
		- L'OPERA:
		  ○ Consumables and supplies: solvents, chemicals, pump repair kits, irradiation, DVS supplies, DSC supplies, GPC tests
		- SAREC:
		  ○ Supplies (chemicals, analytical standards, vials, crucibles, ...) to prepare, sinter and characterize the model materials and to perform the leaching tests, gamma irradiation source, transport of samples, irradiation cells supplies.
		- InCoManD:
		  ○ irradiation reactors supplies, use of gamma irradiation source, chemicals, analytical chemical measurements,
		  ○ purchase of raw powders and solvents/additives for the preparation of the sealing materials, the grinding media and bawls for the adaptation of the powder granulometry by e.g. high energy attrition milling, the gas and crucibles/supports for the sintering experiments.
		- RAMPEC:
		  ○ consumables for diffusion cells; chemical reagents for diffusion experiments and preparation of clay porous media; analytical chemical measurements, open access publication fees
		- HERMES:
		  ○ Publication open source
		- SUDOKU:
		Costs are needed for at least three lines : (1) contribution for buying a B20 Ne+CO_2 gas bottle which is needed for the functioning of the

		Beaquant, fees for recycling at ANDRA the nuclear wastes produced by the use of Posinam laboratory (14C-PMMA impregnations), and (3) The IC2MP internal invoice related to the use of the X-Ray computed tomograph and to the SEM. Additional reasons also are planned, such as buying the IA extension of an imaging software called Aphelion.
Remaining purchase costs (<15% of pers. Costs)		
Total	30,910.34	

11/CV REZ		
	Cost (€)	**Justification**
Travel and subsistence	1,248	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	160	Costs for equipment are planned under the following WPs: - L'OPERA: Chemicals, container for real-scale matrix stabilization, kaolin mixtures and stabilizing elements sources of ionizing radiation
Other goods, works and services	400	Costs for other goods, works and services are planned under the following WPs: - L'OPERA: Sources of ionizing radiation, structural material analysis
Remaining purchase costs (<15% of pers. Costs)		
Total	1,808	

11.1/VSCHT		
	Cost (€)	**Justification**
Travel and subsistence	480	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific

		conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	400	Costs for other goods, works and services are planned under the following WPs: - InCoManD: Laboratory supplies, consumables and devices, raw metallic materials, samples shipment
Remaining purchase costs (<15% of pers. Costs)		
Total	880	

11.2/CTU		
	Cost (€)	**Justification**
Travel and subsistence	4,744	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	160	Costs for equipment are planned under the following WPs: - ICARUS: Vacuum equipment for extraction chromatography
Other goods, works and services	6,445	Costs for other goods, works and services are planned under the following WPs: - ICARUS: Laboratory supplies such as extraction chromatography materials, reference materials for AMS, AMS cathodes and pressing materials) + Service costs for AMS measurement - L'OPERA: Laboratory supplies, cost of irradiation, radionuclides (including payments for disposal of generated waste), maintenance of utilized devices, publications - OPTI: Cost associated with workshop. Rentals, catering and other services. - RAMPEC: Laboratory supplies, radionuclides (including payments for disposal of generated waste), maintenance of utilized devices, publications - SUDOKU: Laboratory supplies mainly for the analyses of leachates and maintenance of utilized devices - ANCHORS: Laboratory supplies, equipment adjustment, tools, maintenance of utilized devices, externally supplied analyses, publications

Remaining purchase costs (<15% of pers. Costs)		
Total	11,349	

11.4/TUL		
	Cost (€)	**Justification**
Travel and subsistence	3,620	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	2,571.6	Costs for other goods, works and services are planned under the following WPs: - InCoManD: Laboratory supplies for microbiologic analyses, such as extraction kits, SYBR Green fluorescent dye for quantitative PCR, chemistry for sequencing, service for small laboratory equipment, publications, etc. - RAMPEC: Various online services vastly improving performance in software development, science writing, and research: ChatGPT, Zotero, Overleaf. Publication proofing and other language services. - HERMES: open access publications
Remaining purchase costs (<15% of pers. Costs)		
Total	6,191.6	

11.6/UJV		
	Cost (€)	**Justification**
Travel and subsistence	4,480	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		

Other goods, works and services	3,956	Costs for other goods, works and services are planned under the following WPs: - ANCHORS: chemicals, laboratory supplies and consumables, external analyses and services (correction/translation) - L'OPERA: chemicals, laboratory supplies and consumables, external analyses and services (correction/translation) - InCoManD: chemicals, laboratory supplies and consumables, sensors, external analyses and services (correction/translation) - RAMPEC: chemicals, laboratory supplies and consumables, radioactive tracers, external analyses and services (correction/translation) - SUDOKU: chemicals, laboratory supplies and consumables, radioactive tracers, external analyses and services (correction/translation)
Remaining purchase costs (<15% of pers. Costs)		
Total	8,436	

12.1/ DTU		
	Cost (€)	**Justification**
Travel and subsistence	768	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	640	Costs for equipment are planned under the following WPs: - ICARUS: purchase 3 small devices for the decomposition of samples and separation of radionuclides in the proposed experiment.
Other goods, works and services	1,200	Costs for other goods, works and services are planned under the following WPs: - ICARUS: is used to purchase the chemicals for the experiment in the method development of the analytical methods for determination of radionuclides, and the service of the measurement instruments used for this project.
Remaining purchase costs (<15% of pers. Costs)		

Total	2,608

13/EK		
	Cost (€)	**Justification**
Travel and subsistence	1,440	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	564	Costs for equipment are planned under the following WPs: - ANCHORS: Diffusion cells, peristaltic and vacuum pumps, laboratory hydraulic press, extension of analytical equipment, gas-pycnometer
Other goods, works and services	2,320	Costs for other goods, works and services are planned under the following WPs: - RAMPEC: Radiotracers, laboratory material for experimental work, chemicals and gases, standards, open access publication fees, conference registration fees - SUDOKU: Radiotracers, laboratory material for experimental work, chemicals and gases, standards, software licence, open access publication fees, conference registration fees
Remaining purchase costs (<15% of pers. Costs)		
Total	4,324	

13.1/SORC		
	Cost (€)	**Justification**
Travel and subsistence	512	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		

Other goods, works and services	96	Costs for other goods, works and services are planned under the following WPs: - ICARUS: Laboratory supplies such as resin columns, separation kits, sample holders.
Remaining purchase costs (<15% of pers. Costs)		
Total	608	

14/ENEA		
	Cost (€)	**Justification**
Travel and subsistence	2,280	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	2,400	Costs for other goods, works and services are planned under the following WPs: - ICARUS: Supply of mechanical and electrical components for nuclear instrumentation, chemical reagents, consumables, standard associated to ICP-MS, alpha spectrometry and liquid scintillation counting. - L'OPERA: Supply of chemical reagents, standard, consumables associated to measurement and tests of samples.
Remaining purchase costs (<15% of pers. Costs)		
Total	4,680	

14.3/POLIMI		
	Cost (€)	**Justification**
Travel and subsistence	3,584	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific

		conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	7,520	Costs for other goods, works and services are planned under the following WPs: - PMO: costs for CFS - FORSAFF: open access publication fees and conference participation fees. - ICARUS: reagents (ICP-MS certified reference materials and supply gases, radionuclide certified solutions, extraction chromatography resins) + consumables (glassware and columns) + open access publication fee, conference participation fee + organization of annual meetings. - STREAM: reagents (raw materials precursors and reagents for geopolymer preparation, ICP-MS standards and supply gases), lab consumables (lab glassware, centrifuge tubes, pipette tips, curing moulds), open access publication fee, conference participation fee. - L'OPERA: reagents (raw materials precursors and reagents for geopolymer preparation, surrogate wastes, ICP-MS standards and supply gases), lab consumables (lab glassware, centrifuge tubes, pipette tips, curing moulds, leaching containers), open access publication fee, conference participation fee. - SUDOKU: reagents (raw materials precursors and reagents for concrete preparation, ICP-MS standards and supply gases, radionuclide certified solutions), lab consumables (centrifuge tubes, pipette tips, curing moulds, leaching containers, apparatus for through diffusion), open access publication fee, conference participation fee.
Remaining purchase costs (<15% of pers. Costs)		
Total	11,104	

14.4/UniPi		
	Cost (€)	**Justification**
Travel and subsistence	1,644	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	960	Costs for equipment are planned under the following WPs: - L'OPERA: calibration of thermocouples type K

Other goods, works and services	960	Costs for other goods, works and services are planned under the following WPs: - L'OPERA: 1) International conference fees; 2) CISUP Interdepartmental Laboratory of UniPi services for material analysis
Remaining purchase costs (<15% of pers. Costs)		
Total	3,564	

14.5/UniRoma		
	Cost (€)	**Justification**
Travel and subsistence	576	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	800	Costs for equipment are planned under the following WPs: - L'OPERA: a new laboratory climatic chamber needed for the planned test
Other goods, works and services	2,400	Costs for other goods, works and services are planned under the following WPs: - L'OPERA: o Laboratory consumables (reagents, gases, sieves, glass, sands, geopol. etc.) o Cost for waste disposal o Publications o Services for research
Remaining purchase costs (<15% of pers. Costs)		
Total	3,776	

15/ENRESA		
Enresa	**Cost (€)**	**Justification**
Travel and subsistence	3,944	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2

		General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	1,131.6	Costs for other goods, works and services are planned under the following WPs: - STREAM: materials/means/consumables for real waste in new matrices, packages/samples manufacturing plus tests in El Cabril Laboratory (drilling to core extraction for mechanical and leaching tests) - HERMES: open access publications
Remaining purchase costs (<15% of pers. Costs)		
Total	5,075.6	

16/FTMC		
	Cost (€)	**Justification**
Travel and subsistence	1,540	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	960	Costs for other goods, works and services are planned under the following WPs: - ICARUS: Laboratory supplies and goods: o for Task 3 NDT design for industrial implementation Subtask 3.2: for the electronics modules for gamma spectrometer systems for development of cheaper and more robust plastic scintillators o for Task 4 Design of Destructive Techniques for DTM radionuclides Subtask 4.2:: QC laser for isotopic carbon analysis, electronic parts for development of express analysis method for the massic activity of ^{14}C determination in challenging waste samples. o laboratory consumables, cost for "open access" publications.
Remaining purchase costs (<15% of pers. Costs)		

Total	2,500

18/Gi-Bas		
	Cost (€)	**Justification**
Travel and subsistence	1,760	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	540	Costs for equipment are planned under the following WPs: - ANCHORS: High pressure swelling cell.
Other goods, works and services	2,720	Costs for other goods, works and services are planned under the following WPs: - SUDOKU: Laboratory supplies for lab scale mock-up of multilayer cover, internal business trips for selection and obtaining of appropriate natural materials for multilayer cover, software codes, publications
Remaining purchase costs (<15% of pers. Costs)		
Total	5,020	

19/INCT		
	Cost (€)	**Justification**
Travel and subsistence	2,354	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	1,200	Costs for equipment are planned under the following WPs: - L'OPERA: (laboratory equipment: thermostatic bath, peristaltic pumps., stirrers - will be used in long-term durability and leachability studies of zeolites/geopolymers proposed in the project.
Other goods, works and services	4,400	Costs for other goods, works and services are planned under the following WPs: - STREAM: chemicals included radionuclides, laboratory supplies, small laboratory equipment, costs of the publications, participation in seminars and conferences

		(including international ones). - L'OPERA: chemicals included radionuclides, laboratory supplies, small laboratory items, costs of the publications, participation in seminars and conferences (including international ones), costs for syntheses and analyses which cannot be carried out at the institute, irradiation of materials in a nuclear reactor, in electron accelerators and in a cobalt bomb.
Remaining purchase costs (<15% of pers. Costs)		
Total	7,954	

19.1/UniWarsaw		
	Cost (€)	**Justification**
Travel and subsistence	480	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events ; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	160	Costs for equipment are planned under the following WPs: - InCoManD: 2,000 €. Laboratory supplies (e.g. power source or temperature control units)
Other goods, works and services	640	Costs for other goods, works and services are planned under the following WPs: - InCoManD: Laboratory supplies (e.g chemicals, electrodes, electrochemical cells) and services (e.g. instrumental analysis of the samples)
Remaining purchase costs (<15% of pers. Costs)		
Total	1,280	

20/IRSN		
	Cost (€)	**Justification**
Travel and subsistence	9,050	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in

		scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	2,419	Costs for equipment are planned under the following WPs: - L'OPERA: purchase of 3 kg of C3S to make cement paste + laboratory materials - ANCHORS: purchase of sensors, testing cells, laboratory equipment like oedometers frame
Other goods, works and services	8,536	Costs for other goods, works and services are planned under the following WPs: - PMO: costs for CFS - FORSAFF: (costs associated with the organisation of workshops) - L'OPERA: (HIGH SCORE software licence purchase) - ANCHORS: (costs associated to the organisation of workshops and annual meetings (two are planned per year), open-source publications - RAMPEC: purchase of laboratory materials). - SUDOKU: (purchase of fiber optics, climate chamber for carbonation) - HERMES: open access publications
Remaining purchase costs (<15% of pers. Costs)		
Total	20,005	

20.2/CEPN		
	Cost (€)	**Justification**
Travel and subsistence	480	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		

Remaining purchase costs (<15% of pers. Costs)	
Total	480

20.3/NTW		
	Cost (€)	**Justification**
Travel and subsistence	10,410	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	1,800	Costs for other goods, works and services are planned under the following WPs: - PMO: costs for CFS - CLIMATE: organization of the pluralistic workshops
Remaining purchase costs (<15% of pers. Costs)		
Total	12,210	

21/IST ID		
	Cost (€)	**Justification**
Travel and subsistence	430	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)		

Total	430

23.2/EIMV		
	Cost (€)	**Justification**
Travel and subsistence	3,958	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	2,400	Costs for other goods, works and services are planned under the following WPs: - FORSAFF: organisation of meetings with support material (ex: laboratory supplies, publications…) - CSFD: organisation of meetings with support material (ex: laboratory supplies, publications…)
Remaining purchase costs (<15% of pers. Costs)		
Total	6,358	

24/KIPT		
	Cost (€)	**Justification**
Travel and subsistence	1,024	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		

Remaining purchase costs (<15% of pers. Costs)	2,064	
Total	3,088	

24.1/ENERGORISK		
	Cost (€)	**Justification**
Travel and subsistence	1,454	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	560	ICARUS: Costs for MicroShield software license
Remaining purchase costs (<15% of pers. Costs)		
Total	2,014	

25.2/Amphos 21		
	Cost (€)	**Justification**
Travel and subsistence	16,760	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		-
Other goods, works and services	17,950.05	Costs for other goods, works and services are planned under the following WPs: - PMO: CFS costs - KM: organisation of events, workshops – to be redistributed among other organisations participating to KM WP - FORSAFF: organisation of events, workshops, Task meetings – eventually, to be redistributed among other

		organisations as needed. - CLIMATE: organisation of events, workshops, task meetings and cost of external experts' participation in those events. - RAMPEC: experimental data acquisition, including use of lab consumables, purchase of necessary reagents & lab material. - HERMES: open access publications
Remaining purchase costs (<15% of pers. Costs)		
Total	34,710.05	

28/NCSRD		
	Cost (€)	**Justification**
Travel and subsistence	942	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	2,320	Costs for other goods, works and services are planned under the following WPs: - ICARUS: for materials including detector shielding and collimators as well as construction of the prototypes and development of the two software
Remaining purchase costs (<15% of pers. Costs)		
Total	3,262	

29 /NES		
	Cost (€)	**Justification**
Travel and subsistence	1,030	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes

Equipment		
Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)		
Total	1,030	

30.1/ULIEGE		
	Cost (€)	**Justification**
Travel and subsistence	2,640	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)		
Total	2,640	

34/POSIVA		
	Cost (€)	**Justification**
Travel and subsistence	2,032	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		

Remaining purchase costs (<15% of pers. Costs)	
Total	2,032

34.1/TVO		
	Cost (€)	**Justification**
Travel and subsistence	1,080	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)		
Total	1,080	

35/PURAM		
	Cost (€)	**Justification**
Travel and subsistence	2,512	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	1,400	Costs for other goods, works and services are planned under the following WPs: - CSFD: (Organisation of annual meetings/workshops, as Task Co-Lead of Task 5)
Remaining purchase costs (<15% of pers. Costs)		

Total	3,912

36/RATEN		
	Cost (€)	**Justification**
Travel and subsistence	3,552	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment	1,872	Costs for equipment are planned under the following WPs: - STREAM - L'OPERA
Other goods, works and services	5,136	Costs for other goods, works and services are planned under the following WPs: - ICARUS - STREAM - L'OPERA - SAREC - SUDOKU
Remaining purchase costs (<15% of pers. Costs)		
Total	10,560	

38/SIEEG NASU		
	Cost (€)	**Justification**
Travel and subsistence	2,432	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences/workshops to present EURAD-2 results and outcomes. 5 x large meeting of the whole consortium (kick-off, annual 3x, final), which is 3…4 days. There are typically 3 people per 3WP from the institute (1600€x3x5=24,000€) An additional 1-2 other WP-specific meetings will be held within the 5 years (1500€x3WPx 2=9000€) Total=33000€

		Unfortunately, for business trips from Ukraine, we cannot apply the recommended calculation of travel costs of roughly 700–1200 € / per person / per travel (covering hotel, airfare/transport, and daily allowance) since planes in Ukraine do not fly due to military operations. We need to travel by two trains (Kiev-Chelm-Warsaw) to Poland, spend the night in a hotel there and then fly to the meeting place, and also back. All this increases the cost of a business trip to 1500-1600 euros.
Equipment	1,440	Costs for equipment are planned under the following WPs: - STREAM: Equipment for durability tests freezer up to -36°C and the project requires a glove box for long-term experiments - L'OPERA: Infrared spectrometer FT-IR WQF-530 - InCoManD: Mixer for preparing cement mortar and glove box for long-term experiments
Other goods, works and services	880	Costs for other goods, works and services are planned under the following WPs: - STREAM: 5,000 € = laboratory supplies -300€, parts for repairs= 200€ chemicals-600€, consumables-600€, delivery of waste samples -300€, translations, and publications -3000€. - L'OPERA: 3,000 € = laboratory supplies -200€, chemicals-500€, consumables-800€, translations, and publications -1500€. - InCoManD: 3,000 € = laboratory supplies -500€, chemicals-500€, consumables-500€, translations, and publications -1500€.
Remaining purchase costs (<15% of pers. Costs)		
Total	4,752	

39/SKB		
	Cost (€)	**Justification**
Travel and subsistence	4,248	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	7,820	Costs for other goods, works and services are planned under the following WPs: - PMO: CFS costs.

		- SAREC: Open Access Costs to be distributed among the WP participants. For now secured under the WP Leader's budget. - CSFD: Organisation of annual meetings, knowledge management workshop
Remaining purchase costs (<15% of pers. Costs)		
Total	12,068	

44/SURAO		
	Cost (€)	**Justification**
Travel and subsistence	4,144	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	411,6	Costs for other goods, works and services are planned under the following WPs: - RAMPEC: rock sampling - HERMES: open access publications
Remaining purchase costs (<15% of pers. Costs)		
Total	4,555.6	

45/SURO		
	Cost (€)	**Justification**
Travel and subsistence	2,290	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	1,000	Costs for other goods, works and services are planned under the following WPs:

		- FORSAFF: Organisation of task events.
Remaining purchase costs (<15% of pers. Costs)		
Total	3,290	

47/TS ENERCON		
	Cost (€)	**Justification**
Travel and subsistence	1,900	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	331.6	Costs for other goods, works and services are planned under the following WPs: - HERMES: open access publications
Remaining purchase costs (<15% of pers. Costs)		
Total	2,231.6	

48/TUS		
	Cost (€)	**Justification**
Travel and subsistence	2,710	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	331.6	Costs for other goods, works and services are planned under the following WPs: HERMES: open access publications

Remaining purchase costs (<15% of pers. Costs)		
Total	3,041.6	

49/UHelsinki		
	Cost (€)	**Justification**
Travel and subsistence	1,600	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services	2,960	Costs for other goods, works and services are planned under the following WPs: - SAREC: Sample preparation equipment, international sample transport costs (ex: laboratory supplies, publications…) - RAMPEC: Radioactive tracers, C-14 labelled PMMA, equipment for diffusion studies, international sample transport costs (ex: laboratory supplies, publications…) - SUDOKU: Radioactive tracers, C-14 labelled PMMA, equipment for diffusion studies, international sample transport costs (ex: laboratory supplies, publications…)
Remaining purchase costs (<15% of pers. Costs)		
Total	4,560	

50/UT		
	Cost (€)	**Justification**
Travel and subsistence	600	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		

Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)		
Total	600	

74/IAE		
	Cost (€)	**Justification**
Travel and subsistence	384	Travels costs are needed to properly implement the actions that are planned in each relevant WP (WP annual meetings, tasks meetings, workshops, seminars); to participate in EURAD-2 General Assemblies and annual events; to participate in scientific conferences / workshops to present EURAD-2 results and outcomes
Equipment		
Other goods, works and services		
Remaining purchase costs (<15% of pers. Costs)		
Total	384	

6. Participation in AWP activities

ANDRA

Andra, The French National Agency for Radioactive Waste Management, is a public industrial and commercial organization created by the Act of 30 December 1991 (Nuclear Act related to Nuclear Waste Management). It comes under the supervision of the French Ministries for Energy, Research and the Environment, and is responsible for the long-term management of radioactive waste produced in France. It is in charge of the research program (concept design and long-term evolution) on a deep geological repository for high and intermediate level long lived radioactive wastes. It has also an industrial responsibility of operating the disposal facilities for short lived, low and intermediate level radioactive waste. For that purpose, Andra engaged its research process as of early 1994 and is currently operating an underground research laboratory in argillaceous rock, located in the Meuse/Haute-Marne region, in the vicinity of Bure. At the same time, Andra is further developing the technical concept of a repository.www.andra.fr

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	Y
PMO: support from a Chief Scientific Officer and an External Advisory Board. KM: external experts to contribute to the writing / reviewing of Domain Insights, State of Knowledge and Guidance documents. InCoManD: preliminary study on highly dense alumina coatings deposited by D-Gun	
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
BRGM In WP10 ANCHORS, Task 3 Laboratory testing In WP11 CLIMATE, Tasks 3 Construction and operational phases climate impacts and 4 Post closure phase climate impacts In WP12 RAMPEC, Task 3 Experimental programme In WP14 SUDOKU, Task 4 Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides In WP15 DITOCO203, Task 3 Current practices of digital twins In WP18 DITUSC, Task 3 Thermodynamics: data gaps, interlink with kinetics, and Safety Case **EMSE** In WP9 InCoManD, Task 3: Innovative HLW container materials and Task 4: Evaluation of materials durability **GALTENCO** In WP9 InCoManD, Task 3: Innovative HLW container materials and Task 4: Evaluation of materials durability	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N

Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

AGES

The Austrian Agency for Health and Food Safety (AGES) is a government owned agency attached to the Federal Ministry of Social Affairs, Health, Care and Consumer Protection and to the Federal Ministry of Agriculture, Forestry, Regions, and Water Management. The business of AGES is to promote a holistic approach to food security, food safety, animal health, public health, and radiation protection issues in Austria by integrating different disciplines along the human food chain in order to achieve synergy effects and to concentrate all relevant capacities.

Within AGES, the Division of Radiation Protection supports the Austrian authority as Technical Support Organization performing environmental monitoring, providing technical expertise on decommissioning of sites and clearance of radioactive material, and realizing radiation protection and remediation measures. As TSO the Division of Radiation Protection assesses applications for nuclear facilities, such as waste treatment compounds, and reports to the authority. Since the establishment of the Austrian Board for Radioactive Waste Management (Österreichischer Entsorgungsbeirat) by the Austrian government the Division of Radiation Protection has been supporting this Board organizationally and scientifically and is increasingly performing research, simulations, and assessments in the field of final disposal of radioactive waste. https://www.ages.at/en/ages/departments/radiation-protection

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

ARAO

The ARAO is a public service agency that concludes contracts in connection with its activities with the line ministry competent for the Energy Directorate. The ARAO is the mandatory service of general economic interest provider of management of radioactive waste generated in the territory of Slovenia. Its task is to takeover, transport, and carry out pre-treatment, treatment, conditioning, and storage of radioactive waste generated in industry, research and medicine. The ARAO is authorised to manage and carry out long-term monitoring and maintenance of disposal sites of hydrometallurgical tailings and mine waste tailings and repositories for radioactive waste and spent fuel after their closure. By planning

and providing long-term, safe and cost-effective solutions for radioactive waste and spent fuel management, including the construction of the LILW repository, it provides infrastructural and professional support to the use of nuclear and radiation technologies in Slovenia. The radioactive waste management as a mandatory service of general economic interest will, when the infrastructure conditions are met, also provide for the final disposal of the radioactive waste and spent fuel generated during the operation and decommissioning of the nuclear power plant and for the disposal of radioactive waste from all other industrial activities.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

BASE

The Federal Office for the Safety of Nuclear Waste Management (BASE) performs regulatory, licensing and supervisory tasks for the German government in relation to the disposal, storage, handling and transport of high-level radioactive waste. BASE supports and advises the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection on issues related to nuclear disposal and nuclear safety. It also conducts and coordinates research in its subject fields.

base.bund.de

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

BEL V

Bel V is a technical subsidiary of the Federal Agency for Nuclear Control (Belgian Safety Authority). By virtue of its activities and its relations to the FANC, Bel V is the Belgian Technical Safety Organisation. The FANC relies on the technical expertise of Bel V for carrying out inspections in nuclear installations in Belgium. Bel V acts as well as expert for the safety assessments of nuclear projects and participates actively in working groups that are organized in the framework of international organizations. Its financial resources are allocated in part to research and development activities.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

BGE

BGE is the federal company for radioactive waste disposal, implementer and German waste management organization. The BGE is entrusted with the task of implementing site selection procedures for a final repository, particularly for heat-generating radioactive waste. Additionally, the BGE is operator of the Asse II shaft mine, the Konrad final repository and the Morsleben final repository.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
GNS In WP9 InCoMand, Task 4: Evaluation of materials durability and Task 5: Experimental and modelling assessment of degradation mechanisms	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

CEA

The French Alternative Energies and Atomic Energy Commission (CEA) is a key player in research, development and innovation in four main areas: defence and security, low carbon energies (nuclear and renewable energies), technological research for industry, fundamental research in the physical sciences and life sciences. CEA represents 16,000 permanent staff, spread among 9 research centers in France.

Drawing on its widely acknowledged expertise, the CEA actively participates in collaborative projects with a large number of academic and industrial partners. Amongst its missions, CEA (Nuclear Energy Division) is working on the optimization of the current nuclear industry. In this framework, CEA is carrying out research for the management of radioactive wastes and spent fuel.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y

EDF In WP12 RAMPEC Task 5: Upscaling of data and models – benchmarking In WP14 SUDOKU Task 5: Modelling of the evolution of the EBS and its effect on radionuclide migration on the basis of the experimental results obtained in Tasks 3 and 4 In WP16 HERMES Task 3: Process couplings and computational performance **ORANO** In WP5 ICARUS Task 3: NDT design for industrial implementation In WP6 STREAM Task 4: Scaling-up of treatment and conditioning processes In WP7 L'OPERA, Task 3: Boundary conditions, Task 5: Wasteforms durability and stability testing –Task and 6: Implementation	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

CIEMAT

The CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas) is a public research body assigned to the Ministry of Science, Innovation and Universities, focusing on energy and the environment as well as in many vanguard technologies and in various areas of fundamental research.

The mission of the CIEMAT is to contribute to the sustainable development of the country and the quality of life of its citizens, through the generation and application of scientific and technological knowledge.

During the last decade, CIEMAT develop a strategy into the institutional project Physico-Chemistry of Actinides and Radioactive waste Management, participating in many projects related to the research on radioactive waste repositories, radionuclide transport processes, spent fuel and have been involved in National R&D Programs financed by ENRESA (the Spanish National Agency for Radioactive Waste Management) and the Nuclear Safety Council, as well as in European Union Programs in both R&D and the EURATOM Treaty. Besides CIEMAT has a wide experience in E&T in Nuclear Technology and Radiation Protection such as preparation and development on an annual basis of the Education and Training Program related to nuclear technology, radiation protection and in all the rest of R & D areas.

Within the European and international networks dealing with these topics the following projects, among others, in which CIEMAT participated, can be highlighted: CEBAMA, nTOF-ND-ADS, MUSE, PDS-XADS, Red- Impact, SARNET, PHEBEN2, ARTIST, CABRI, ACSEPT, HotLab, SFS, NF-PRO, MIKADO, ACACIAS, EUROPART, ADOPT, ACTAF, FEBEX I, PEBS, CEBAMA, BEACON FEBEX II,

NF-PRO, FUNMIG, CROCK, BELBAR, RESEAL II, FORGE, 1st Nuclides, REDUPP, MATISSE, TIARA, ECVET, ENETRAP, DEVCO, ACTINET Thematic Network.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
UAM In WP6 STREAM Task 3: Study of treatment and conditioning methods, Task 4: Scaling-up of treatment and conditioning processes In WP7 L'OPERA, Task 4: Inventory of the conditioned materials and complete characterisation and Task 5: Wasteforms durability and stability testing In WP 14 SUDOKU Task 4: Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides **UCLM** In WP10 ANCHORS Task 1: Management / Coordination of the WP, Task 2: Knowledge Management, Task 3: Laboratory testing, Task 4: Bentonite Barrier modelling and Performance assessment **UGR** In WP9 InCoMand, Task 4: Evaluation of materials durability **UPM** In WP9 InCoMand, Task 5: Experimental and modelling assessment of degradation mechanisms **CSIC** In WP5 ICARUS, Task 3: NDT design for industrial implementation In WP6 STREAM, Task 3: Study of treatment and conditioning methods, Task 4: Scaling-up of treatment and conditioning processes In WP7 L'OPERA, Task 4: Inventory of the conditioned materials and complete characterisation, Task 5: Wasteforms durability and stability testing, Task 6: Implementation In WP 14 SUDOKU, Task 4: Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides **MERIENCE** In WP4 FORSAFF, Task 6: Stakeholder Engagement	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N

Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

CNRS

The CNRS (National Centre for Scientific Research) is a government-funded research organization under the administrative authority of French Ministry in charge of research. As the largest fundamental research organization in Europe, CNRS is involved in all fields of knowledge. Interdisciplinary programs and actions offer a gateway into new domains of scientific investigation and enable CNRS to address the needs of society and industry. CNRS is organized in 1053 research units spread throughout France. These units are either intramural or in partnership with universities, other research organizations, or industry. CNRS is involved in research on nuclear waste mainly through four of its ten institutes (IN2P3, INC, INSMI, INSU). Additionally, CNRS has an academic research network SCINEE (Nuclear Science for energy and environment) including French universities and leads a national program on nuclear energy NEEDS (Nuclear Energy Environment Waste Society) with national R&D partners (ANDRA, EDF, ORANO, FRAMATOME, IRSN, BRGM, CEA) including material for nuclear waste and nuclear waste geological disposal.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
IMT ATLANTIQUE In WP5 ICARUS, Task 4: Design of Destructive Techniques for DTM radionuclides In WP6 STREAM, Task 4: Scaling-up of treatment and conditioning processes In WP8 SAREC, Task 5: Studies on Model Materials In WP9 InCoMand, Task 3: Innovative HLW container materials, Task 4: Evaluation of materials durability In WP18 DITUSC, Task 3: Thermodynamics: data gaps, interlink with kinetics, and Safety Case **UNI LILLE** In WP7 L'OPERA, Task 5: Wasteforms durability and stability testing In WP16 HERMES, Task 4 Surrogate modes (of individual and coupled phenomena) and Task 5 Tailored models for SA/PA and field scale mock-ups **UORLEANS**	

In WP12 RAMPEC, Task 3: experimental program, Task 4: Development of macroscopic/mechanistic models, Task 5: Upscaling of data and models – benchmarking **UPOITIERS** In WP12 RAMPEC, Task 3: experimental program, Task 4: Development of macroscopic/mechanistic models In WP14 SUDOKU, Task 4: Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides **ENPC** In WP10 ANCHORS Task 3: Laboratory testing **ULORRAINE** In WP10 ANCHORS, Task 3: Laboratory testing In WP16 HERMES, Task 3: Process couplings and computational performance **ENSAM** WP7 L'OPERA, Task 4 Inventory of the conditioned materials and complete characterisation and Task 5 Wasteforms durability and stability testing **Centrale Lille Institut (LamCube)** In WP7 L'OPERA, Task 5 Wasteforms durability and stability testing and Task 6 Implementation **UMONTPELLIER** In WP8 SAREC, Task 4 Role of Grain Boundaries in Spent Fuel Corrosion

Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

COVRA

COVRA is a national radioactive waste management organisation of the Netherlands. COVRA is a state-owned enterprise of which the stocks are held by the Ministry of Finance. It is the only company in the

Netherlands that is qualified to collect, treat and store radioactive waste and prepare and implement the final disposal. Its legal form is a 'Naamloze Vennootschap' (public limited company).

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
TUDELFT In WP10 ANCHORS, Task 4: Bentonite Barrier modelling and Performance assessment – In WP16 HERMES, Task 3: Process couplings and computational performance	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

CVREZ

The research organisation Centrum vyzkumu Rez (CV REZ) was founded on 9th October 2002 as 100% subsidiary company of UJV Rez, a.s. (NRI – ***N**uclear **R**esearch **I**nstitute*). The main aim of the research organisation is research, development and innovations in the field of power generation (especially nuclear). CV REZ owns unique research infrastructure such as experimental research reactors LVR-15 and LR-0 and technological experimental circuits. Significant modernization of the infrastructure is being realized within years 2012-2017 due to realization of the SUSEN project (realized in the framework of the Operational Programme Research and Development for Innovations of the European Regional Development Fund). As of January 1st, 2016 the company CV REZ had a total of 330 employees. The core activities of CV REZ involve fundamental and applied research on experimental research reactors LVR-15 and LR-0. Another activities are arising from the participation of CV REZ in the international Jules Horowitz Reactor project. No less important are national and international projects (especially H2020 projects). CV REZ is a member of the European Energy Research Alliance (EERA) and since 2010 represents the Czech Republic in the EERA managing body – Executive Committee, thereby participating in the realization of the Strategic Energy Technology Plan (SET-Plan). CV REZ is also a member (and co-founder) of the Technology Platform 'Sustainable Energy CR'.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N

Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y

VSCHT

In WP9 InCoMand, Task 4: Evaluation of materials durability

CVUT

In WP5 ICARUS, Task 4: Design of Destructive Techniques for DTM radionuclides

In WP7 L'OPERA, Task 4: Inventory of the conditioned materials and complete characterisation and Task 5: Wasteforms durability and stability testing

In WP10 ANCHORS, Task 4: Bentonite Barrier modelling and Performance assessment

In WP12 RAMPEC, Task 3: RAMPEC experimental program

In WP13 OPTI, Task 1: Management / Coordination of the WP, Task 3: Mutual Understanding, Task 4: Identification of Key Challenges for Optimization

In WP 14 SUDOKU, Task 3: Performance of multilayer covers, Task 4: Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides

In WP17 CSFD, Task 2: Knowledge Management, Task 3: Validation of long-term evolution scenarios for PCCS assessments, Task 4: Verification of model implementation for PCCS assessments, Task 5: Development of post-closure criticality scenario assessment methodology for the derivation of spent fuel loading curves and ILW package fissile mass limits, Task 6: Experimental basis for validation of depletion and criticality codes for PCCS

IGN

In WP10 ANCHORS, Task 4: Bentonite Barrier modelling and Performance assessment –

In WP16 HERMES, Task 4: Surrogate modes (of individual and coupled phenomena), Task 5: Tailored models for SA/PA and field scale mock-ups

TUL

In WP9 InCoMand, Task 4: Evaluation of materials durability, Task 5: Experimental and modelling assessment of degradation mechanisms

In WP11 CLIMATE, Task 3: Construction and operational phases climate impacts, Task 4: Post-closure phase climate impacts

In WP12 RAMPEC, Task 4: Development of macroscopic/mechanistic models

In WP16 HERMES, Task 1: Management / Coordination of the WP, Task 3: Process couplings and computational performance, Task 4: Surrogate modes (of individual and coupled phenomena), Task 5: Tailored models for SA/PA and field scale mock-ups

CUNI

In WP10 ANCHORS Task 3: Laboratory testing, Task 4: Bentonite Barrier modelling and Performance assessment **UJV** In WP4 FORSAFF, Task 5: Policy and Regulatory Framework, Task 6: Stakeholder Engagement In WP7 L'OPERA, Task 2: Knowledge Management, Task 3: Boundary conditions, Task 4: Inventory of the conditioned materials and complete characterisation, Task 5: Wasteforms durability and stability testing In WP9 InCoMand, Task 4: Evaluation of materials durability In WP10 ANCHORS Task 3: Laboratory testing In WP12 RAMPEC, Task 3: RAMPEC experimental program, Task 4: Development of macroscopic/mechanistic models In WP13 OPTI Task 3: Mutual Understanding, Task 4: Identification of Key Challenges for Optimization In WP14 SUDOKU, Task 3: Performance of multilayer covers, Task 4: Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

DEKOM

Danish Decommissioning (DD) is a state-owned company under the Ministry of Higher Education and Science. DD was established in 2003 and has the responsibility of decommissioning the Danish nuclear research facilities, managing waste from other Danish users of radioactive materials, and participating in the process leading to a longterm solution for the Danish RW. DD has the responsibility for safe handling and storage of all Danish RW, except from NORM.

Since 2003 it has been part of the official Danish policy to investigate the possibility to find an international solution for 233 kg of spent research fuel; this has been mentioned again in a recent Parliamentary resolution on long term waste management (B 90, May 2018.) B 90 also stresses the importance of DD participating in international research and development projects on RW management (storage and repository).

DD has for several years been a member of the ERDO-WG, focusing on both shared predisposal and disposal solutions.

See more information on www.dekom.dk

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

EK

Hungarian Academy of Sciences Centre for Energy Research was established in 2012 by a merger of two Institutes: KFKI Atomic Energy Research Institute and MTA Isotope Institute.

MTA EK is mainly active in the field of basic and applied research related to nuclear energy. The activities of the Centre started in the 1950's. The main research areas of MTA EK are reactor physics, thermal hydraulics, fuel behaviour studies, and material sciences, health physics, environmental physics, nuclear electronics and chemistry. MTA EK is the chief technical consultant of NPP Paks and key player in the power-upgrade, safety, life extension and maintenance activity of the utility. At the same time MTA EK also serves as a technical support organisation (TSO) to the nuclear safety authority in Hungary.

The Centre operates the 10 MW Budapest Research Reactor, providing the scientific community of Europe (see Budapest Neutron Centre for details) with research possibility for neutron physics and applications. The Centre has acquired important experience with VVER-type reactors, both in experimental and in analytical fields.

MTA EK has been contributing to many EURATOM research programs and member of several expert associations. The Centre is the co-founder of V4G4 Centre for Excellence which organizes the research for the next generation gas cooled fast reactor. MTA EK is the coordinator of the National Nuclear Research Program focusing on radiation ageing of reactor structural materials, spent fuels and radioactive waste management and advanced modelling and simulation of nuclear reactor physics.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
SORC In WP5 ICARUS, Task 4: Design of Destructive Techniques for DTM radionuclides, Task 5: Scaling factor optimisation	

Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners[2] (Article 9.1 of the MGA)?	N

ENEA

ENEA is the National Agency for New Technologies, Energy and Sustainable Economic Development, a public body aimed at research, technological innovation and the provision of advanced services to enterprises, public administration and citizens in the sectors of energy, the environment and sustainable economic development (article 4, Law no. 22 of 28 December 2015). The Agency depends on the Ministry of the Environment and Energy Security.

In the nuclear activities context, ENEA focus sectors are nuclear fusion and nuclear safety (the Agency is the reference national research coordinator). In particular, ENEA is active in research program about nuclear technologies, nuclear safety and radioactive waste management, also supporting the nuclear Italian operators and the national regulator authority (ISIN).

The specific provisions of the Ministerial Committee for Economic Programming (CIPE) of 1985 and 1986 entrusted the ENEA with the responsibility, the coordination and the supervision in the sector of low and medium activity waste produced at national level from non-electronuclear sector, in order to guarantee the collection, safekeeping and management of this kind of waste (Integrated Service). Integrated Service is a technical and operational tool able to take charge of all the phases of the management of this radioactive waste and of radioactive sources no longer used. Due to the lack of a national repository, for about 30 years the aforementioned Service has been the only entity, present in Italy, that is able to carry out the management of this type of non-electronuclear radioactive waste in an integrated manner, from collection to storage.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
UNIPR In WP14 SUDOKU, Task 5: Modelling of the evolution of the EBS and its effect on radionuclide migration on the basis of the experimental results obtained in Tasks 3 and 4 In WP16 HERMES, Task 4: Surrogate modes (of individual and coupled phenomena) **CAEN**	

In WP5 ICARUS, Task 2: Knowledge Management, Task 3: NDT design for industrial implementation **POLIMI** In WP1 Programme Management Office, Task 8: Management of the RD&D WPs In WP4 FORSAFF, Task 2: Knowledge Management, Task 3: Waste generation, Task 4: Waste Management In WP5 ICARUS, Task 1: Management / Coordination of the WP, Task 2: Knowledge Management, Task 4: Design of Destructive Techniques for DTM radionuclides In WP6 STREAM, Task 3: Study of treatment and conditioning methods, Task 4: Scaling-up of treatment and conditioning processes In WP7 L'OPERA, Task 2: Knowledge Management, Task 4: Inventory of the conditioned materials and complete characterisation, Task 5: Wasteforms durability and stability testing In WP14 SUDOKU, Task 4: Chemo-mechanical evolution of reinforced and unreinforced cementitious barriers and the effect on the migration of mobile radionuclides In WP15 DITOCO2030, Task 2: Knowledge Management **UNIPI** In WP5 ICARUS, Task 1: Management / Coordination of the WP, Task 2: Knowledge Management, Task 3: NDT design for industrial implementation In WP6 STREAM, Task 4: Scaling-up of treatment and conditioning processes In WP7 L'OPERA, Task 1: Management / Coordination of the WP, Task 3: Boundary conditions, Task 5: Wasteforms durability and stability testing, Task 6: Implementation In WP15 DITOCO2030, Task 3: Current practices of digital twins (DT) **UNIROMA** In WP7 L'OPERA, Task 3: Boundary conditions, Task 4: Inventory of the conditioned materials and complete characterisation, Task 5: Wasteforms durability and stability testing

Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

ENRESA

ENRESA is the Spanish radioactive waste management agency, with considerable experience in research and technological activities related to radioactive waste disposal and management of large industrial facilities and research programmes.

ENRESA is a public company founded in 1985 by the Spanish Government for the management of radioactive wastes, including:

- Design, construction and operation of facilities for the disposal of low-level waste (LLW), interim storage and final disposal of spent fuel, vitrified high-level waste and intermediate-level waste (SF/HLW/ILW).
- Decommissioning of nuclear facilities, including nuclear power plants (NPP).
- Drafting the R&D plans to cover the needs of the concepts and technical solutions for managing the radioactive wastes and SF in Spain.
- Managing the Fund to cover the previous activities.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y

CIMNE

In WP10 ANCHORS, Task 4: Bentonite Barrier modelling and Performance assessment

EURECAT

WP8 SAREC Task 3 IRF/FGR Performance of Spent Nuclear Fuel

UDC

In WP7 L'OPERA, Task 6: Implementation –

In WP16 HERMES, Task 1: Management / Coordination of the WP, Task 2: Knowledge Management, Task 3: Process couplings and computational performance, Task 4: Surrogate modes (of individual and coupled phenomena), Task 5: Tailored models for SA/PA and field scale mock-ups

UPC

In WP8 Release of safety relevant radionuclides from spent nuclear fuel under deep disposal conditions (SAREC), Task 6: Mechanistic modelling

In WP10 Hydraulic mechanical chemical evolution of bentonite for barriers optimisation (ANCHORS), Task 1: Management / Coordination of the WP, Task 4: Bentonite Barrier modelling and Performance assessment

IIDP

In WP5 Innovative characterisation techniques for large volumes (ICARUS), Task 5: Scaling factor optimisation

In WP15 Next generation Digital Twins to support Optimisation, Construction and Operation of surface and subsurface radioactive waste management facilities (DITOCO2030), Task 1: Management / Coordination of the WP, Task 5: Strategic recommendation of the common approaches and standards in the design of digital twins **US** In WP5 Innovative characterisation techniques for large volumes (ICARUS), Task 4: Design of Destructive Techniques for DTM radionuclides – In WP18 Development and Improvement of Quality Assured Thermodynamic Understanding for use in Nuclear Waste Disposal Safety Case (DITUSC), Task 3: Thermodynamics: data gaps, interlink with kinetics, and Safety Case

Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

FTMC

Valstybinis moksliniu tyrimu institutas Fizinių ir technologijos mokslų centras (FTMC) is the scientific research institution carrying out a unique fundamental research and technological development works in scientific fields of laser technologies, optoelectronics, nuclear physics, organic chemistry, bio and nanotechnologies, electrochemical material science, functional materials, electronics in Lithuania. The main activity of FTMC is to carry out fundamental and applied research as well as experimental investigations in the fields of physics, chemistry and technologies, which are of utmost importance to the state, society and business. The main activities in the nuclear energy field are development of theoretical and experimental methods devoted for safe operation of nuclear facilities, radiation safety and optimization of radioactive waste management, research on interaction of radioactive waste with different barriers and shielding materials, degradation of engineering barriers in waste repositories, assessment of radionuclide accumulation and migration in the environment. FTMC is the technical support organization of the State Nuclear Power Safety Inspectorate (VATESI) helping in preparing normative requirements for the analysis of transitional and emergency processes during decommissioning of the Ignalina NPP and radioactive waste disposal. FTMC has partnership agreements and works in close cooperation with main waste producer and management organization in Lithuania - Ignalina NPP. The research work is carried out to order of business entities, the methodological, methodical and other assistance is rendered, a versatile expertise is provided as well as scientific consultations are given. FTMC disseminates the scientific knowledge to the public and contributes to the development of innovation-based economy and the knowledge society education. As FTMC unites the best Lithuanian researchers and it is equipped with the modern laboratory facilities, thus most of the performed scientific investigations are unique not only in Lithuania, but also all over the world, and the developed technologies and the achieved scientific results are known at the international level. www.ftmc.lt

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

FZJ

Forschungszentrum Jülich (JUELICH) makes a vital contribution to solving major challenges facing society in the fields of information, energy, and bioeconomy. It focuses on the future of information technologies and information processing, complex processes in the human brain, the transformation of the energy system, and a sustainable bioeconomy. Forschungszentrum Jülich develops simulation and data sciences as a key research method and makes use of large, often unique, scientific infrastructures. Its work spans a range of topics and disciplines and it exploits synergies between the research areas. With some 5,600 employees, Jülich – a member of the Helmholtz Association – is one of Europe's large research centres. The work program within EURAD will be performed in the Institute for Energy and Climate Research – Nuclear Waste Management and Reactor Safety (IEK-6), making use of the knowledge acquired during the last 50 years on safety issues regarding nuclear waste management and reactor safety.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y

HZDR: In WP2-KM, in task 6 In WP8-SAREC, in task 4 In WP9-InCoManD, in tasks 1, 2 and 4 In WP12-RAMPEC, in tasks 3 and 4 In WP15-DITOCO2030, in task 4 In WP18-DITUSC, in sub-tasks 3.1 and 3.2 GFZ: In WP16-HERMES 4 UFZ: In WP10-ANCHORS, in tasks 2 and 4 In WP15-DITOCO2030, in tasks 3, 4 and 5 In WP16-HERMES, in tasks 1, 2, 3 and 5	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

GI-BAS

GI-BAS, Geological Institute at the Bulgarian Academy of Sciences, is a public research institution founded in 1947, having a legal entity status from 01 June 1994. It comes under the supervision of the Headquarter of the Bulgarian Academy of Sciences and the Bulgarian Ministry of Education and Science. GI-BAS is recognized as the largest national research and scientific organization in geology. Since 1990's it become a leading research and development organization focused on the geological aspects of RAW disposal in Bulgaria. GI-BAS analysed the territory of Bulgaria and identified potential host rocks for development of a mined geological HLW/SF repository. It conducted site selection and detail site characterization to confirm the selected site and to provide respective data for the design, safety assessment and environmental impact assessment of the national LILW disposal facility which is under construction. Currently the GI-BAS experts are involved in various multidisciplinary RAW disposal R&D projects.

www.geology.bas.bg

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N

Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third	N
parties (articles 6.2 D.1 and 9.4 of MGA)?	
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

INCT

The Institute of Nuclear Chemistry and Technology is the most recognised institution in Poland in the fields of nuclear chemistry, radiochemistry, radiation chemistry, nuclear chemical engineering and technology. The other fields of the INCT's expertise include application of nuclear methods in material engineering and process engineering, radioanalytical techniques, design and production of measurement instruments based on nuclear techniques, environmental research, radiobiology and radioprotection. The results of research performed at the INCT have already been implemented in various branches of the national economy, particularly in industry, medicine, environmental protection and agriculture. With nine electron accelerators in operation and with a staff experienced in the field of electron beam application, the INCT is one of the most advanced centres of science and technology in this domain. The Institute has four pilot plants equipped with six electron accelerators: for radiation sterilization of medical devices and tissue grafts; for radiation modification of polymers; for removal of SO2 and NOx from flue gases and for food hygienisation. The

Institute trains international atomic energy agency's fellows and plays a leading role in agency regional

projects. Because of its achievements, the INCT has been nominated "the IAEA's collaborating centre in radiation technology and industrial dosimetry". Its expertise and infrastructure was the basis for participation in several EURATOM, FP7 and Horizon2020 grants. The organization is preparing to play a role of TSO in the Polish nuclear energy programme.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
UWarsaw: - In WP-InCoManD, in tasks 3 and 4	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N

Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

IRSN

The IRSN is a French public establishment of an industrial and commercial nature placed under the joint authority of the Ministries of the Environment, Health, Industry, Research and Defence. The IRSN's field of expertise covers all of the risks related to ionising rays used within industry or medicine, or even natural radiation rays. More precisely, the IRSN carries out missions relating to analysis and research in the following fields: the safety of nuclear installations, including those relating to defence; the safety of the transport of radioactive and fissile materials; the protection of man and the environment against ionising rays; the protection and control of nuclear materials and products likely to be used in the manufacture of weapons and the protection of installations and transport against acts of malevolence (theft or misappropriation of nuclear materials, or even sabotage). The research activities, most often carried out within the framework of international programmes, allows IRSN to maintain and develop its expertise. IRSN was involved in or coordinated several EC FP projects on waste safety (EVEREST, SPA, NFPRO, BENIPA, PAMINA, MICADO, FORGE, SITEX, JOPRAD).

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
Mines Paris: In WP8-SAREC, in task 6 In WP14 SUDOKU, in task 3 and sub-task4.2 **CEPN:** In WP4-FORSAFF, in task6 **NTW**: In WP1-PMO, in task 7 - In WP3-ASTRA, in tasks 1 and 2, and in sub-task 6.1 - In WP4-FORSAFF, in task 6 - In WP11-CLIMATE, in tasks 1 and 5 - In WP12-RAMPEC, in task 2 - In WP13-OPTI, in sub-task 3.1 and task 4	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N

Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

IST-ID

IST-ID, the Association of Instituto Superior Técnico for R&D (http://www.ist-id.pt) is a private not-for-profit institution for which Instituto Superior Técnico (IST) is one of the founding associates. IST is part of the Universidade de Lisboa, and it is the largest and most reputed school of engineering, Science and Technology (S&T) in Portugal. Its mission is to provide top quality higher education in the areas of Engineering, S&T and Architecture, as well as developing RD&I activities that meet the highest international standards.

IST-ID is the host institution of Centro de Ciências e Tecnologias Nucleares (C^2TN) where the proposed R&D activity will be carried out. Under agreements between IST and IST-ID, IST makes available the majority of facilities, infrastructures and services, where IST-ID R&D activities are carried out. Researchers from the Radiological Protection and Safety Group (GPSR) of C^2TN, mainly, will be involved in the project but collaborations with other C^2TN research groups are envisaged. They are members of the EU Research Platforms MELODI, EURADOS, Alliance, NERIS, IGD-TP and EURAMET and are involved in IAEA and NEA within radioactive waste management activities.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

JRC

The Directorate General-Joint Research Centre is the European Commission's science and knowledge service. Its mission is to support EU policies with independent evidence throughout the whole policy cycle. Its work has a direct impact on the lives of citizens by contributing with its research outcomes to a healthy and safe environment, secure energy supplies, sustainable mobility and consumer health and safety. The JRC hosts specialist laboratories and unique research facilities and is home to thousands of scientists working to support EU policy. The JRC has ten Directorates and is located across five EU Member States (Belgium, Germany, Italy, the Netherlands and Spain).

The Directorate involved in this project is Directorate G – Nuclear Safety and Security within which the JRC's nuclear work programme, funded by the EURATOM Research and Training Programme, is carried out. It contributes to the scientific foundation for the protection of the European citizen against risks associated with the handling and storage of highly radioactive material, and scientific and technical support for the conception, development, implementation and monitoring of community policies related

to nuclear energy. Research and policy support activities of Directorate G contribute towards achieving effective safety and safeguards systems for the nuclear fuel cycle, to enhance nuclear security then contributing to achieving the goal of low carbon energy production.

The research programmes are carried out at the JRC sites in Germany (Karlsruhe), Belgium (Geel), The Netherlands (Petten) and Italy (Ispra) and consist of research, knowledge management and training activities on nuclear safety and security. They are performed in collaboration and/or in support to the EU Member States and relevant international organizations. Today the Directorate G is one of the leading nuclear research establishments for nuclear science and technology and a unique provider of nuclear data measurements. Typical research and policy support activities are experimental and modelling studies covering nuclear reactor and fuel cycle safety, including current and innovative nuclear energy systems.

Fundamental properties, irradiation effects and behaviour under normal and accident conditions of nuclear fuels and structural materials are studied. The activities cover also studies of structural integrity and functioning of nuclear components, emergency preparedness and radioactivity environmental monitoring, nuclear waste management and decommissioning, as well as the study of non-energy technological and medical applications of radionuclides. A dedicated functional entity is devoted to the management and dissemination of knowledge and to facilitate open access to JRC nuclear facilities including training and education.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

JSI

Jožef Stefan Institute (www.ijs.si) is the leading Slovenian scientific research institute, covering a broad spectrum of basic and applied research. The staff of more than 900 specializes in natural sciences, life sciences, and engineering. The main areas include production and control technologies, information, communication and knowledge technologies, biotechnologies, new materials, environmental technologies, nanotechnologies, and nuclear engineering. JSI accumulates and disseminates knowledge through the pursuit of research, development, and education at the highest international level of excellence. This project will be supported by the Reactor Engineering Division (http://r4.ijs.si), Reactor Physics Division (http://f8.ijs.si) and Departrment of environmental sciences (www.environment.si).

JSI also acts as a Technical and scientific support organization (TSO) to the Slovenian nuclear regulatory authority.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
ZAG: In WP6-STREAM, in task 3 In WP9-InCoManD, in task 1, 4 and 5, and in sub-task 2.3 In WP14 SOUDOKU, in sub-task 4.2 **EIMV:** In WP2-KM, in task 6 In WP3 ASTRA, in tasks 1, 2, 4 and 6, and in sub-task 5.1 In WP4 FORSAFF, in tasks 1, 5 and 6 In WP6-STREAM, in task 5 In WP11-CLIMATE, in task 3 In WP13-OPTI, in tasks 3 and 4 In WP15-DITOCO2030, in task 6 In WP17-CSFD, in tasks 1 and 2	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

KIPT

National Science Center Kharkov Institute of Physics and Technology (KIPT) is a state owned and non-profit research & technology organization (RTO). KIPT is a part of the Department of Nuclear Physics and Power Engineering of the National Academy of Sciences of Ukraine (NASU). It is one of the oldest and the largest centers of physical sciences in Ukraine, was established in 1928 for research in the fields of nuclear physics and solid-state physics.

As a scientific Center, KIPT consists of 5 research institutes and 5 scientific and technology complexes:

- Institute of Solid-state Physics, Materials Science and Technologies,
- Institute of Plasma Physics,

- Institute of Plasma Electronics and New Methods of Acceleration,
- Institute of Theoretical Physics,
- Institute of High-energy Physics and Nuclear Physics,

Also there were created R&D Complex "Accelerator", the Technological Complex "Nuclear Fuel Cycle", Research-and-production Complex of Renewing Sources of Energy, R&D Complex “Applied plasma chemistry” and R&T complex “Accelerated nuclear systems”.

KIPT provides scientific and technological solutions for safety and long-term operation of the Ukrainian NPPs and accompanies the fuel diversification program in Ukraine for VVER reactors. It is engaged in the national and international research programs for nuclear sector in the areas of radiation materials science, fuel cycle, radioactive waste management, construction fission and fusion materials, advanced nuclear reactors and other.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
Energorisk: - In WP3-ASTRA, in tasks 3 and 5 - In WP5-ICARUS, in sub-task 3.2 and in task 5 - In WP8-SAREC, in tasks 2 and 6	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

KIT

Karlsruhe Institute of Technology (KIT) is one of the biggest science and engineering research institutions in Europe and funded jointly by the Federal Republic of Germany and the State of Baden-Wuerttemberg. Its research and development program is embedded in the superordinate program structure of the Helmholtz Association of National Research Centers. KIT was established by the merger of the Forschungszentrum Karlsruhe GmbH and the Universität Karlsruhe (TH) on October 01, 2009. KIT combines the tasks of a university of the state of Baden-Württemberg with those of a research center of the Helmholtz Association in the areas of research, teaching, and innovation. In research and education, KIT assumes responsibility for contributing to the sustainable solution of the grand challenges that face the society, industry, and the environment.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y

BGR:

In WP10-ANCHORS, in tasks 3 and 4

In WP16-HERMES, in task 5 Amphos21:

In WP2-KM, in task 1

In WP4-FORSAFF, in tasks 1, 3, 4 and 6

WP8-SAREC, in tasks 1, 2 and 6

In WP10-ANCHORS, in task 4

In WP11-CLIMATE, in tasks 1, 3, 4 and 5

In WP12-RAMPEC, in tasks 1, 2, 3, 4 and 5

In WP14-SUDOKU, in sub-tasks 3.1 and 3.2 and in tasks 1 and 5

In WP15-DITOCO2030, in tasks 1, 3, 4 and 6

In WP16-HERMES, in task 4

In WP18-DITUSC, in tasks 1 and 3

BAM:

In WP9-InCoManD, in tasks 1 and 2 LUH:

In WP9-InCoManD, in task 3

In WP12-RAMPEC, in tasks 1, 2, 3 and 4

In WP15-DITOCO2030, in task 4

In WP18-DITUSC, in sub-tasks 3.1 and 3.2

GRS:

In WP9-InCoManD, in task 4

In WP10-ANCHORS, in task 3

In WP11-CLIMATE, in tasks 3 and 4

In WP12-RAMPEC, in tasks 1, 2, 3 and 4

In WP15-DITOCO2030, in task 4

In WP16-HERMES, in task 2

In WP17-CSFD, in tasks 1, 3, 4, 5 and 6

In WP18-DITUSC, in sub-tasks 3.1 and 3.2 **TUBAF:** In WP10-ANCHORS, in tasks 3 and 4 In WP16-HERMES, in task 4	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

KTH

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

LEI

Lithuanian Energy Institute (LEI) is a state scientific research organization with about 250 employees. LEI carries out fundamental and applied research in various fields related to radioactive waste and spent nuclear fuel (SNF) management, heat transfer, hydro and gas dynamics, alternative energy sources, materials science. LEI laboratories are participating in broad of international projects (COST, EUREKA, FP5, FP6, FP7, H2020, IAEA, Phare, etc.).

Since 1994 the LEI Nuclear Engineering Laboratory (NEL) has been actively involved in the analysis of the radioactive waste management problems at Ignalina NPP covering planning and decommissioning of nuclear power plant, designing storage, treatment and disposal facilities, evaluating environmental

impact of nuclear facilities and post closure safety of repositories. Implementing the research on SNF and long-lived intermediate level waste disposal in Lithuania, the researchers of LEI NEL with the assistance of experts from Sweden and other countries proposed the concept of deep geological repository in crystalline and clay rocks in Lithuania, and generic repository safety assessment was initiated. The concept on disposal and the safety assessment are constantly being updated taking into account international experience and thermal, groundwater flow, mechanical and chemical properties of a possible repository site.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

NC SRD

The National Centre for Scientific Research “Demokritos” (NCSRD) was founded in July 1961 as a Research Centre for Nuclear Research, Demokritos. Today it is the largest multidisciplinary Research Centre of Greece with approximately 180 Researchers in tenured and tenure-track positions and over 500 Research Personnel working in projects funded mainly by grants from State Funds, the European Union and Private Industries. It is governed by the Board of Directors and is supervised by the General Secretariat of Research and Technology, which is in the Ministry of Education, Research and Religious Affairs of Greece. The Centre consists of five independent Institutes focusing on different scientific fields: 1) Institute of Nuclear & Radiological Sciences and Technology, Energy & Safety (INRASTES); 2) Institute of Nuclear and Particle Physics (INPP); 3) Institute of Nanoscience and Nanotechnology (INN); 4) Institute of Biosciences & Applications (IBA); 5) Institute of Informatics & Telecommunications (IIT). The NCSRD is a mandated RE in EURAD-RWMD.

The INRASTES operates: 1) the Greek research reactor (GRR-1) by the Research Reactor Laboratory; 2) the centralized facility in Greece for interim storage of radioactive waste and sources by the Radioactive Waste & Material Laboratory (RWML). Furthermore, INRASTES possesses Laboratories who performing research and technological development in 1) sorption, multiphase flow, heat & mass transfer in porous materials; 2) reliability and safety of complex technological systems; 3) radioecology and radiation protection; 4) materials characterization by X-ray scattering, X-ray fluorescence spectroscopy, Positron Annihilation Lifetime Spectroscopy, Scanning and Transmission Electron microscopy in collaboration with the INN, mechanical testing, optical and thermal properties measurement in collaboration with the INN; 5) nuclear and radiation techniques (prompt gamma neutron activation analysis, gamma spectrometry, RBS, NRA, NAA in collaboration with the TANDEM accelerator laboratory/ INPP).

The RWML research and development activities are related to radioactive waste and materials management as well as to the decommissioning of nuclear facilities. The main activity is the

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
DMT: - In WP3-ASTRA, in tasks 1, 3 and 4 and in sub-tasks 5.1 and 5.2	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

development of techniques as well as the elaboration and performance of studies for radiological characterization of waste (including historical waste) and facilities by destructive and non-destructive techniques. Furthermore, RWML elaborates studies for the safe storage of radioactive waste at the NCSRD and provides services to the laboratories of the Centre as well as to hospitals, the industry, companies and individuals.

NES

Nuclear Engineering Seibersdorf GmbH (NES) is Austria's only radioactive waste management organization, established in 2003. The main tasks, which are carried out on behalf of the Republic of Austria, include the collection, processing, conditioning and storage of radioactive waste and the

decontamination and decommissioning (dismantling) of nuclear facilities, especially from 45 years of research and development in Seibersdorf. Pursuant to a contractual agreement between the Republic of Austria, the municipality of Seibersdorf and Nuclear Engineering Seibersdorf GmbH, NES undertakes to collect, condition and store all radioactive waste generated in Austria until it is sent to a final disposal site, which is yet to be determined. This contract also specifies that NES is responsible for the preparatory work related to final disposal (including transport to the yet-to-be-determined disposal site).

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

ONDRAF/NIRAS

ONDRAF/NIRAS, the Belgian Agency for radioactive waste and enriched fissile materials, is a public agency established by law (08.08.80, modified by law of 11.01.91; royal decree of 30.03.81, modified by royal decree of 16.10.91 and 04.04.2003). In the meantime, several laws and royal decrees were voted for specific tasks of the agency.

The mission of ONDRAF/NIRAS is to protect man and the environment, for the present and the future, against the potential hazards arising from radioactive waste, without thereby imposing any excessive obligations on future generations. Its competences cover transport, processing, conditioning, interim storage and final disposal of radioactive waste and spent fuel, as well as the decommissioning of nuclear facilities.

The agency is also competent for technical research and RD&D in the field of radwaste management, especially with regard to disposal and the optimisation of current practices. Since 1997, the agency is also entrusted by law with the inventory of all nuclear liabilities on the Belgian territory.

The policy pursued so far is to have its industrial tasks performed by subcontractors as far as transportation is concerned and by Belgoprocess, a 100 % subsidiary of ONDRAF/NIRAS, for the activities with regards to the treatment, conditioning and storage of waste awaiting disposal. Concerning the long-term management of radioactive waste, ONDRAF/NIRAS has the monopoly in Belgium. In this respect, it defines the RD&D needs, steers the RD&D projects and integrates the RD&D results. For the R&D in the field of final disposal of waste the Belgian research centre on nuclear energy SCK•CEN is one of its major contractors. The Belgian Underground Research Laboratory HADES is operated by EURIDICE, a joint Economic Interest Grouping (EIG) of ONDRAF/NIRAS and SCK•CEN.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA)?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
ULiège: In WP10-ANCHORS, in task 4 In WP13-OPTI, in task 4 **Euridice:** In WP13-OPTI, in task 4	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

NJF

National nuclear fund (NJF) was established in 2006 as a state fund for accumulation and management of resources for back end of nuclear facilities life cycle (which replaced the State Fund for the Decommissioning of Nuclear Energy Facilities and the Treatment of Spent Nuclear Fuel and Radioactive Waste existing from 1995). Its role is to ensure sufficient acquisition sources for decommissioning of nuclear installations and for construction of deep geological repository in Slovak Republic and supervise accounting of decommissioning and waste management projects and their consistence with National Policy and Program.Board of supervisors of the Nuclear Fund except of account control insure the evaluation, updating and continuous performance of tasks resulting from the National Policy and Program for the Management of Spent Nuclear Fuel and Radioactive Waste in cooperation with other central state administration bodies, license holders and other stakeholders.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N

Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

NRG

NRG has been the lead organisation for research in nuclear technology and in geological disposal in the Netherlands for over 30 years. NRG operates the HFR research reactor, a Hot Cell Laboratory, a Waste Storage Facilty and various other nuclear facilities. NRG has almost 500, employees, more than about 100 employees work The Research, Consultancy and Services departments of NRG

NRG has been studying disposal options since the 1970's. NRG had a key role in the recently completed research program into disposal in Boom clay in The Netherlands, (*https://covra.nl/en/downloads/opera-info*) and provides the Dutch authorities with advice on various topics concerning radioactive waste disposal and radiation protection in general.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

NTUA

“The National Technical University of Athens (NTUA) operates as a State University with nine Schools. NTUA provides five-year studies, which, after the the acquisition of 300 credit units lead to a Diploma of Master’s level in Engineering. The primary institutional component of the NTUA’s mission, effected through the integrated complex of studies and research, is to provide advanced higher education of outstanding quality in science and technology. The NTUA Statute is stipulated in the Ministerial Decision 1098/B/05.09.2000. In EURAD-2, the section of Nuclear Engineering (NES) of the School of Mechanical Engineering of NTUA is involved. Education and research activities of NES include areas related with nuclear technology applications, nuclear engineering and environmental radioactivity. NES has a long-standing expertise in radioactivity measurements, radiation transport simulations, thermal-hydraulics and multiphase flows modelling and simulation and environmental radiological impact assessment. NTUA cooperates with the Greek regulator (EEAE) including in relation to nuclear safety, emergency preparedness and response, radioactive waste management and for educational purposes. NTUA

carried out the first, preliminary safety assessment for the near surface disposal of the radioactive waste in the country, in accordance with the National Program (MD-35225/2023, 2638/B/21.04.2023)."

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

POSIVA

Posiva Oy from Finland is a nuclear waste management company whose main task is the disposal of the spent fuel of its owners' NPPs. It is jointly owned by Teollisuuden Voima Oy (TVO 60%) and Fortum Power and Heat Ltd (FPH 40%). POSIVA have been carried out a research, development and technical design programme for disposal in ONKALO Underground Rock Characterisation Facility (URCF). Posiva will be in charge of the disposal facility in Olkiluoto, Finland, which construction have been initiated. Posiva's ONKALO offers a unique site for practical learning experiences related to repository characterization and construction of underground facilities. Posiva is currently testing in ONKALO the EBS component emplacement and the early evolution of disposal system in full scale.

POSIVA started operations in 1996 and has over 50 specialists engaged in research, development and technical design for an environmentally acceptable disposal solution. POSIVA's programme brings together the resources of Finnish research institutes, universities and consulting and contracting companies. POSIVA has unique specialization in Europe related to site characterization and underground site specific activities. POSIVA received the Decision in Principle for the site of the geological disposal facility in 2000 and 2002 and a construction license for a geological disposal facility and encapsulation plant in 2015 as the first in the world. As a part of the preparations for the start of the construction and operations, POSIVA has carried out and continues the planning a series of various full-scale tests and demonstrations on encapsulation and disposal technologies. These will be carried out partly in the ONKALO, the Olkiluoto underground rock characterization facility, partly in suitable surface facilities. POSIVA has participated in many EURATOM projects related to geological disposal since 4th framework program. POSIVA's most recent EURATOM projects include ReCoSy, FORGE, MODERN, SecIGD, SecIGD2, REDUPP, LUCOEX, BELBaR, Petrus II, Petrus III, DOPAS (in FP7) and in H2020 MIND and MODERN 2020. In addition, POSIVA is an end user in several other European R&D projects.

POSIVA has gained years of experience in working with and applying R&D results into its underground repository development work. POSIVA has acted as the coordinator of SecIGD and DOPAS projects. In addition, POSIVA has led several work packages in the EURATOM projects with success.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
TVO: - in WP4 FORSAFF in Task 3: Waste Generation and Task 4: Waste Management	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

PURAM

PURAM is the national radioactive waste management organization in Hungary, a 100% state-owned enterprise that was established by the Government in 1998. PURAM's responsibility is to prepare proposal for the national radioactive waste and spent fuel management policy and national programme as well as for their revision, take care of the final disposal of radioactive waste, interim storage of spent fuel and decommissioning of nuclear facilities.

PURAM operates the Interim Spent Fuel Storage Facility (Paks), National Radioactive Waste Repository (Bátaapáti) and the Radioactive Waste Treatment and Disposal Facility (Püspökszilágy).

The financial source of PURAM's activities is the Central Nuclear Financial Fund, a segregated state fund within the national budget, which is exclusively earmarked for radioactive waste and spent fuel management purposes that are defined in law.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N

Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

RATEN

The Technologies for Nuclear Energy State Owned Company (RATEN) is a strategic Romanian legal entity coordinating the R&D activity in the nuclear energy field, which maintains and develop the scientific and technologic support for the National Nuclear Energy Program. RATEN manages two subsidiaries: Institute for Nuclear Research Pitesti (RATEN ICN) and Center of Technology and Engineering for Nuclear Projects (RATEN CITON). The activities proposed by RATEN under this proposal will be carried out in the Institute for Nuclear Research Pitesti.

The Institute for Nuclear Research Pitesti (RATEN ICN) is a complex R&D centre created in 1971 to provide the scientific and technical support to the national nuclear energy program. Its activity covers a wide range of nuclear fields such as nuclear safety, radioactive waste, radioprotection, nuclear fuel and materials, reactor physics. Under the Radioactive Waste Management R&D program, RATEN ICN specialists developed treatment and conditioning technologies for LLW/ILW, established and applied new methodologies for radioactive waste characterization, in parallel with performance and safety assessments mainly for the future LLW/ILW repository designed mainly to dispose of the radioactive waste generated by Cernavoda NPP but also for geological repository for CANDU spent fuel and long-lived waste. The research activity is founded on a modern and complex infrastructure consisting of TRIGA reactor, Hot Cells Facility, Radioactive Waste Treatment Department, radiochemical laboratories operating modern investigation techniques, and sustained by specialists with large experience in the nuclear field.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SCK CEN

SCK CEN (www.sckcen.be) is a foundation of public utility and is one of the largest research institutions in Belgium, with activities dedicated to the development of peaceful applications of radioactivity. Our developments have already resulted in a long list of innovative and forward-looking applications for the medical world, industry and the energy sector. In the course of our work, there are three main research topics:

- The safety of nuclear installations

- The well-considered management of radioactive waste
- Human and environmental protection against ionising radiation

We offer various services and operate BR2, a Material Test Reactor (MTR) with a very high neutron flux, BR1, a graphite-gas research reactor, GUINEVERE a zero-power-critical-facility, several gamma irradiation facilities, a laboratory for High and Medium Activity and Nuclear analysis, as well as different chemical laboratories.

Through the EIG EURIDICE, an economic interest grouping between SCK•CEN and ONDRAF/NIRAS, we run our Underground Research Laboratory HADES. Also noteworthy are our European demonstration programs for PWR dismantling and MYRRHA (Multi-purpose hYbrid Research Reactor for High-tech Applications), an Accelerator Driven System (ADS) under development in Mol.

SCK•CEN began R&D on geological disposal in clay in 1974 and since then has been an active participant in all EC FP's and the R&D programs of ONDRAF-NIRAS, performing R&D on many aspects of near-field and far- field processes including laboratory experiments in its hot and cold dedicated facilities, state-of-the-art multi- scale and coupled modelling, in-situ tests in the HADES URL and performance and safety assessment for both surface and geological disposal concepts. SCK•CEN actively contributes to the Belgian programme for radioactive waste disposal as a main contractor for the Belgian waste management organisation, ONDRAF- NIRAS, in two projects: 1) the surface disposal facility for short-lived low and intermediate level waste in Dessel, and 2) research on a potential geological disposal facility in poorly indurated clay formations.

SCK•CEN received the mandate as research entity (RE)-type programme manager by our programme owner.

Also noteworthy is the SCK•CEN Academy for Nuclear Science and Technology (academy.sckcen.be), which has a specific task to foster the transfer of nuclear knowledge, skills and attitudes towards students and professionals who are active in the nuclear field. Following topics are part of the SCK•CEN Academy's mission: 1) guidance for young researchers; 2) organisation of academic courses and customised training for professionals; 3) policy support regarding education and training in nuclear domains; 4) caring for critical- intellectual capacities.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
Tractebel in : - ICARUS (WP5) – Task 3: NDT design for industrial implementation (subtasks: Raw waste management innovations with data management for comprehensive decommissioning characterization and Exploring the Options into Non-Destructive Technology (NDT) Prototype Implementations for Comprehensive Decommissioning) and Task 5: Scaling Factor optimization (subtasks: Theoretical analysis of waste streams and identification of conducive parameters and Sampling design for accuracy improvement: trueness/precision) - DITOCO2030 (WP15) – Task 4: Gap analyses and Task 5: Strategic recommendation of the common approaches and standards in the design of digital twins	

Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SIIEG NASU

State Institution "Institute of Environmental Geochemistry of the National Academy of Sciences of Ukraine" is a state nonprofit scientific institution with the rights of a legal entity. Institute is a leading scientific institution dealing with the problems of radioactive waste management, radiation and ecological safety. The Institute is subordinated to the National Academy of Sciences of Ukraine as a part of the Nuclear Physics and Energy Department and is in charge of the research program for the management of radioactive waste produced in Ukraine. The Institute staff carries out fundamental and applied research in the scientific support of nuclear fuel cycle; geochemistry and radiogeochemistry; problems of decontamination; instrument-making in the sphere of nuclear and radiation safety. The Institute supported the scientific program of the European Commission project "European Technology Platform - Implementation of the Geological Waste Disposal" and became its member [http://www.igdtp.eu].
The Institute experts closely worked in EuropeAid projects and contributed a number of collaborative EURATOM Projects: CAST, EURAD-WP HITEC, PREDIS and IAEA research contracts.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SKB

Svensk Kärnbränslehantering AB (Swedish Nuclear Fuel and Waste Management Company), SKB, is responsible for safe management of all nuclear waste arising in Sweden. Over the past few decades SKB has built and operated an underground final repository (SFR) for final repository for short-lived radioactive waste generated by nuclear power plants, hospitals etc., a central interim storage facility for spent fuel (CLAB) and a specially- built vessel for transportation of the wastes and the spent fuel. SKB has also planned, constructed and is operating an underground research facility – the Äspö Hard Rock

Laboratory, a chemical laboratory, a bentonite laboratory and an canister laboratory. These facilities are used to execute essential research, development and demonstration before construction of the spent fuel repository and the encapsulation plant.

A license application for the final repository for spent nuclear fuel was submitted in 2011 and an application to extend the SFR facility was submitted in 2014 . Reviewing is ongoing. The plan is to start construction of the SF repository around 2022 and the extension of SFR some years later.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	Y
Subcontracting is planned under the following WPs: - SAREC: 140,000 € Laboratory service by Studsvik Nuclear AB to perform autoclave experiment where fragments of Spent Nuclear Fuel (SNF) are leached in aqueous solution under reducing conditions in order to measure the release of dissolved and gaseous fission products during the leaching. Key requirements for the experiment: o Representative fuel. The SNF chosen for the study should be a of fuel type used in European reactors, produced by a standard (non-experimental) method, having experienced “normal” reactor operation resulting in average fission gas release during operation, average linear heat generation rate, and average burn-up. Using representative fuel is key for the implementation of the results in safety analysis of future deep geological disposal facilities. o Conducted without the limitations imposed by Hot Cell. Autoclave experiments using SNF has historically proven to be challenging. Experiments where the autoclave is not placed in a Hot Cell allows for more immediate control and handling of the autoclave thus maximizing the chances of a successful experiment. o 100 % H2 overpressure. To ensure fully reducing conditions, 100% H2 overpressure is necessary.	
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
CTAB: - in WP ANCHORS (WP10): Task 3 Laboratory testing and Task 4: Bentonite Barrier modelling and Performance assessment	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provisions of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SOGIN

Sogin is the Italian State-owned company responsible for the decommissioning of Italian nuclear plants and for the management of radioactive waste, including those produced by industrial, research and nuclear medicine activities. It is also responsible for locating, designing, building, and operating the National Repository, a surface infrastructure for disposal of VLLW/LLW and long-term storage of ILW/HLW. Together with the National Repository, a Technology Park will be built, which will be a research center open to international collaborations where activities in the field of energy, waste management and sustainable development will be carried out, in agreement with the area concerned. Entirely owned by the Italian Ministry of Economy and Finance, Sogin operates according to the strategic guidelines of the Italian Government. Sogin has been operating since 2001. It became a Group in 2004 through the acquisition of the majority stake (60%) of Nucleco SpA, the national operator responsible for collecting, treating, conditioning and temporary store radioactive wastes and sources that derive from nuclear medicine and scientific and technological research.

The over 1,000 employees of the Sogin Group include nuclear, civil, mechanical, chemical, and environmental engineers, physicists, geologists, biologists and radiation protection and material science experts. They constitute the most highly skilled team of professional experts in the management of radioactive wastes and the decommissioning of nuclear plants in Italy.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SSM

SSM, the Swedish Radiation Safety Authority, is the government agency/authority responsible for radiation protection, nuclear safety and nuclear non-proliferation in Sweden. SSM work on behalf of the Swedish Ministry for Climate and Enterprise, with its main mission to, based on prevention and enforcement, protect humans and the environment from harmful effects on radiation, now and in the future. SSM was created in 2008 based on a merger between the previously existing Swedish Radiation Protection Authority and the Swedish Nuclear Power Inspectorate. The authority has an annual budget of 600 million Swedish Crowns and about 300 employees mostly covering required competence areas in natural sciences, technology, behavioural science, law and finance. A majority of employees work with nuclear power and other nuclear installations, but the workforce is also covering all other aspects of radiation risks including non-ionising radiation. The authority operate mainly based on the framework of the Swedish Act of Nuclear Activities and Radiation Protection Act, but also based on other Swedish laws. In the area of waste management SSM is responsible for regulatory oversight of all Swedish existing or planned facilities dealing with nuclear and other radioactive wastes. This for instance includes the operating CLAB facility for intermediate central storage of spent nuclear fuel, and the SFR facility for final disposal of low and intermediate level short lived radioactive wastes at the Forsmark site. SSM is

also responsible for regulatory review and the step wise authorisation according to the Act of Nuclear Activities of the planned final repository for spent nuclear at the Forsmark site licensed by the Swedish government in 2022, and the corresponded procedure for the extension of the existing SFR facility in order to accommodate decommissioning waste, which was licensed by the Swedish government in 2021.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SSTC NRS

The State Scientific and Technical Center for Nuclear and Radiation Safety (SSTC NRS) is a Technical Safety Organization (TSO) to the national nuclear regulatory authority of Ukraine since 1992.

The SSTC NRS mission is to provide scientific, engineering and expert support to the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) in all areas of its activity to ensure nuclear and radiation safety, protection of public health and safety, and protection of the environment. About 140 researchers and experts in safety- related areas are presently involved in the SSTC NRS scientific and technical activities.

SSTC NRS has above 20-year experience in the field of management of radioactive waste (RW) and spent nuclear fuel (SNF). It employs highly qualified experts, possesses advanced methodological, analytical and technical infrastructure and developed capabilities for review of safety-related documentation and development of regulatory documents related to RW and SNF management.

In addition, the SSTC NRS staff has solid background and practical experience gained during their previous assignments at Ukrainian RW management enterprises, Ukrainian NPPs (including Chornobyl NPP), in research and design institutes, as well as in technical support organizations in the nuclear industry.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N

Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

STUBA

Slovak University of Technology in Bratislava (hereinafter referred to as "STUBA") is an educational and scientific institution. At present, it consists of seven faculties. All the faculties provide a study in accredited study programmes within the complex system of a bachelor, master and PhD. study. Faculties realise credit system compatible with the European credit transfer system enabling mutual mobility of students within European Union member countries and a larger European space. In the area of scientific and research activities the STU successfully joints European Union programmes. STU is a public university and offers education mainly in technical, technological, technical-economical, technical-information and technicalartistic fields of study. International cooperation is a significant area based on interactive contact with educational as well as scientific-research institutions of the countries all over the world. First of all, it is focused on solution of the joint projects within the EU framework and other international programmes, mobility of students, ect.

Institute of Nuclear and Physical Engineering (STUBA-INPE) at Faculty of Electrical Engineering and Information Technology of Slovak University of technology is focusing on research of operation and decommissioning of NPPs, material science, nuclear fuel cycle and decommissioning of NPPs and radiation protection.STUBA-INPE staff is based on 10 professors in physics, nuclear power engineering and material science. There are actually 50 employers (scientific or research workers) and about 20 PhD students.

This institute is also a base for activity of Slovak Nuclear Society (SNUS) and the Slovak Centre for operation and Decommissioning of Nuclear Facilities. STUBA-INPE has a long tradition in the NDS investigation of RPV materials by use of Positron Annihilation Spectroscopy and Mossbauer spectroscopy. The partner role to the project: research organisation.

The partner contribution to the project: performance of R&D work mainly in field of development of proper methodology for mapping of radioactive material behaviour during its decommissioning, transport and long term storage. Knowledge management in dismantling, decommissioning and geological disposal characterisation is one of the main task in education and research at the University level.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N

Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SURAO

The Radioactive Waste Repository Authority (SURAO) is a Czech state organisation and its activities and management are regulated by Article 113 of Act 263/2016 (the Atomic Act). SURAO's mission is to ensure the safe disposal of existing and future radioactive waste in compliance with the requirements of nuclear safety and human and environmental protection. SURAO's most important responsibilities include the operation of 3 low- and intermediate-level radioactive waste repositories.

SURAO also coordinates the considerable work necessary regarding the development and construction of

a deep geological repository for high-level radioactive waste and spent nuclear fuel, the commencement of operation of which is planned in 2065 according to the Policy of Radioactive Waste Management as approved by the Government of the Czech Republic and for which a Strategic Environmental Assessment (SEA) was granted last year as part of the Nuclear Action Plan covering the next few decades.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

SURO

SURO is a non-profit research institution and mandated TSO in radiation protection and nuclear safety. SURO was founded by State Office for Nuclear Safety (SUJB) in 1995. The mission of SURO is focused on research in the field of radiation protection, emergency preparedness and nuclear safety, including radioactive waste management, providing SUJB with research, expertise, methodologies, supervision, legislative support and consultation activities. SURO operates the main part of Czech National Radiation Monitoring Network including independent monitoring of nuclear power plants and radioactive waste disposal sites. SURO is an accredited laboratory in radioactivity measurements.

SURO is engaged in training and tutoring in the field of nuclear safety and radiation protection, hosting IAEA trainees (based on signed Memorandum between IAEA and SURO) and cooperating with ENSTTI.

With respect to the statutory request (new Atomic law, 263/2016), the Research Centre Rez (CV REZ) has agreed with SUJB on building of an independent technical and expert support in the area of nuclear safety, including RWM, inside the SURO. Due to this decision, human and material resources of CV REZ TSO group have gradually started to be transferred from CV REZ into SURO to ensure a high level of competent and independent expertise in all basic areas related to the evaluation of nuclear safety. This process has started in January 2017 based on signed Agreement between CV REZ and SURO.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

TNO

The Netherlands organisation for applied scientific research TNO (**TNO**) is an internationally oriented knowledge organisation for private industry, government and governmental organisations. It is active in technical, earth, environmental, life, societal and behavioural sciences and has a staff of c. 3,500. The unit **Geological Survey of the Netherlands TNO** is nationally responsible for all geoscientific data and groundwater monitoring information. As such TNO-GSN is the national information provider on subsurface data, including the 3D groundwater information products REGIS, GeoTop and webservices such as Groundwater Tools. It has built up leading experience in the development of environmental databases. TNO has several laboratories among which a geochemical laboratory, that is shared with Utrecht University and knowledge organisation Deltares. The laboratory comprises analytical and experimental facilities for environmental geochemical and also sedimentological, stratigraphical, paleontological, and petrological applications. In addition, the laboratories comprise electron microscopic and advanced mass spectrometric facilties. TNO has extensive expertise in environmental geochemical characterisation of the subsurface both within the framework of its responsibility as geological survey and for individual purposes. TNO has over 30 years of experience in supporting industries and authorities in groundwater and subsurface management

where environmental issues aimed at a sustainable use and environmentally responsible management of groundwater and other subsurface resources become addressed. All kinds of risk assessment studies of anthropogenic, subsurface activities have been performed by TNO: Carbon Capture and Storage, oil and gas production, geothermal energy production, high temperature - aquifer thermal energy storage, storage in salt caverns, etc. It has also been strongly involved in the Dutch, national research programs on disposal of radioactive waste among which the last OPERA program.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

TS ENERCON

TS Enercon Ltd. is a Budapest-based engineering and consulting organization specializing in radioactive waste and spent fuel management issues, safety and reliability of fuel cycle facilities, design of fuel storage methodologies both for nuclear power plants and research reactors, radioactive waste management, storage and disposal technologies. TS Enercon carries out safety assessments, safety cases, and feasibility studies for both nuclear and radioactive waste management installations.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y
GOLDER WSP in - WP15 DITOCO2030: Task 4: Gap analyses - WP16 HERMES: Task 2 Knowledge Management and Task 5 Tailored models for SA/PA and field scale mock-ups	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

TUS

Technical University of Sofia (TUS) in Bulgaria is the biggest higher technical educational and research complex in the fields of thermal-, nuclear- and electrical power engineering, computer science and technologies, communications, etc. with close contacts and cooperation with governmental energy institutions and nuclear regulatory body. TUS has national role for the distribution of safety engineering knowledge and analysis, and for development of the Energy and Nuclear Energy Research Area in Bulgaria. The Research and Development Sector (R&DS) of TUS organizes, administrates and services of the research activities of TUS.

The Safety and Environmental Engineering Laboratory (SE&EL) by the Electrical Power Department at TUS, has significant experience regarding VVER safety analysis and studies, Environmental Impact Assessment of NPPs with caution to the radwaste management, ASTEC benchmark calculations, post-test analysis, etc. In these activities the team of SE&EL often works together with involved experts from Kozloduy NPP plc, Bulgarian Academy of Science and other institutes and companies. TUS, in particular SE&EL has an experience in the nuclear and severe accident research in the frame of 5FP Projects - PHEBEN2 and RMPS; 6FP Projects - SARNET, COVERS and NEPTUNO; 7FP Projects SARNET2, NEWLANCER, ASAMPSA-E and

ARCADIA. Since 2002 TUS was participant in the PHEBUS FP Programme. TUS, in particular SE&EL was initiator for preparation and implementation joint with CEA and KIT (then FZK)' teams different experiments (2003-2006) for VVER conditions in experimental program PLINIUS - COLIMA tests, and in LACOMERA platform – COMET-1 (MCCI), DISCO-L2 (DCH) and LIVE-L1 tests, etc.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

UHELSINKI

The University of Helsinki, established in 1640, is the most versatile research university in Finland. It includes eleven faculties. The University has ca. 31 000 students and 7 800 employees. (https://www.helsinki.fi/en/university/the-university-of-helsinki-in-brief).

High-level research is carried out at the departments of the faculties and departmentally affiliated research stations, as well as at independent research institutes. In 2017, the University of Helsinki placed 56th in the Shanghai Ranking, 90th in the Times Higher Education World University Ranking and 102th in the QS World University Ranking and 81th in the Taiwan (NTU) ranking.

The University lays special emphasis on the quality of education and research. The University monitors the research quality by organising research assessment exercises using international peer review process approximately every six years. The University of Helsinki is a member of the League of the European Research Universities (LERU).

The Research Funding Services of the University of Helsinki was established in 1994 with an aim to provide centralised research administration and management services for the researchers of the University. The unit is part of the Research Services, which is one of the six sectors of the University Services. In the previous EU's Framework Programmes the unit has gained valuable experience from providing support services to over 800 projects, out of which to 240 FP7 and currently over 140 Horizon 2020 funded projects.

The Department of Chemistry is the leading hub of chemistry teaching and research in Finland. The research carried out at the department is highly valued internationally, and it is divided into three research programmes: Materials Chemistry, Molecular Science, and Synthesis and Analysis. The molecular research unit of the Department of Chemistry combines many complementary molecular and methodological approaches, both experimental and theoretical. The main directions of experimental studies are exhaled human air monitoring, photochemistry, low-temperature chemistry, fundamental reaction studies, gas kinetics, solid phase and surface reactions, and combustion chemistry. We actively develop infrared optical frequency combs, precision laser spectroscopy and mass spectrometric techniques, to name a few. In parallel to experimental techniques, we develop and employ a multitude of theoretical and computational methods.

The radiochemistry research is a part of molecular science research programme. The radiochemistry research is focused on four areas, the largest one of them being study on behaviour of radionuclides in the geosphere in reference to final disposal of spent nuclear fuel. Another are related to nuclear waste is the development of inorganic ion exchangers for the selective removal of radionuclides from nuclear waste effluents. Third area is radiopharmaceutical chemistry and fourth environmental radioactivity. The Disposal of nuclear waste team is based at the Department of Chemistry on the Kumpula Science campus. The research is focused on providing realistic parameters for safety analysis of the final disposal of nuclear waste and improving the understanding of chemical and physical processes of elements in geomaterials. The team provides a wide range of services from structure characterization to transport modelling

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	Y

JYU in WP10 ANCHORS: Task 1 Management and coordination of the WP, Task 2 Knowledge Management and Task 3 Laboratory testing

GTK in:

- WP11 CLIMATE in Task 4 Post-closure phase climate impacts
- WP12 RAMPEC: Task 3 Experimental program, Task 4 Development of macroscopic and mechanistic models and Task 5 Upscaling of data and models - benchmarking

MITTA in:

- WP10 ANCHORS: Task 1 Management and coordination of the WP, Task 2 Knowledge Management, Task 3 Laboratory testing and Task 4: Bentonite Barrier modelling and Performance assessment
- WP11 CLIMATE: Task 3 Construction and operational phases climate impacts and Task 4 Post- closure phase climate impacts
- WP16 HERMES: Task 3 Process couplings and computational performance and 5 Tailored models for SA/PA and field scale mock-ups

UT in WP11 CLIMATE: Task 4 Post-closure phase climate impacts **CTH** in WP12 RAMPEC: Task 3 Experimental program and Task 4 Development of macroscopic and mechanistic models	
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

UTARTU

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N

VTT

VTT Group is the largest public applied research activity in Northern Europe with a staff of 2600 and turnover of M€ 279. VTT has 75 years of experience in addressing the needs of industry and the knowledge-based society. Over the years, VTT has participated in more than 1000 European R&D Framework Programme projects, within various thematic programmes. VTT is currently involved in over 10 H2020 Euratom projects and is an active member of IGD-TP. VTT has partnership agreements and works in close cooperation with both the waste management producers and repository operators (Fortum, TVO, Fennovoima, Posiva) and the Finnish Nuclear Regulatory Authority (STUK). VTT is a multi-technological research organisation providing high-end technology solutions and innovation services.

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be sub-contracted) (article 6.2 B and 9.3 of Model Grant Agreement (MGA))?	N
Does the participant envisage that part of its work is performed by affiliated entities (article 8 of MGA)?	N
Does the participant envisage the use of in-kind contribution provided by third parties (articles 6.1 and 9.2 of MGA)?	N
Does the participant envisage the provision of financial support to third parties (articles 6.2 D.1 and 9.4 of MGA)?	N
Does the participant envisage that part of the work is performed by associated partners (Article 9.1 of the MGA)?	N