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Reference N°	Creation Date	
SCK CEN/86265095	2024-09-18	
Alternative Reference N°	Revision	Version
N/A	1.0	1
ISC	Revision Status	
Public	Approved	

PREDIS Deliverable D2.8 Governance Implementation Plan - PREDIS recommendations for the EURAD-2 Joint Partnership.pdf

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Approval information for current revision*

Name	Outcome	Date
Christophe Bruggeman	Approved	2024-09-23

Change log*

Revision	Version	Status	Date	Description of change
1.0	1	Approved	2024-09-18	

**This automatically generated cover page shows references and document information as were available in the Alexandria document management system on 2024-09-23. Please refer to Alexandria for current and complete metadata, or to the document contents and/or author for additional information.*





PREDIS

Deliverable D2.8 Governance Implementation Plan: PREDIS recommendations for the EURAD-2 Joint Partnership

Version Date 12.4.2024 Final

Dissemination level: Public

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Project acronym PREDIS	Project title Predisposal management of radioactive waste	Grant agreement No. 945098
Deliverable No. D2.8	Deliverable title Governance Implementation Plan: PREDIS recommendations for the EURAD-2 Joint Partnership	
WP No 2	Date version 12.4.2024	Due date M46
Lead beneficiary VTT Technical Research Centre of Finland		
Main author Erika Holt, VTT	Reviewed by PREDIS Management Team	Accepted by Maria Oksa, VTT, Coordinator
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Abstract

This document provides the governance recommendations for a future joint programme or partnership within the Euratom programme 2024-2029. In a future partnership such as EURAD-2, it is anticipated that research and development as well as knowledge management on pre-disposal waste management topics (associated with the PREDIS project) will continue based on the PREDIS Strategic Research Agenda and EURAD Roadmap where pre-disposal issues are covered in Theme 2.

This deliverable specifically addresses the PREDIS expectations, based on the lessons learned obtained within the project, for the future partnership (EURAD-2) via four points to ensure a successful programme:

- a) flexibility mechanisms
- b) use of End User Group (EUG) and Stakeholder group
- c) strong guidance by the Chief Scientific Officer and External Advisory Board members, and
- d) the engagement with SNETP.

By taking these four points into the governance, the PREDIS project feels the future partnership can fulfil its Vision and make significant impacts to the European Member States with holistic safe and sustainable waste management practices.

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Notification

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Acknowledgement

This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 945098.

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Preface

This Deliverable report is associated with Work package 2 Strategic Implementation, Task 2.4 Governance. It has received review feedback in early 2024 from the PREDIS Management Team and was requested for externally reviewed by Piet Zuidema (Chief Scientific Officer of EURAD, independent consultant) and Rebecca ROBBINS (IAEA Waste Management Team Leader), as relevant knowledgeable stakeholders.

This report is complemented by the earlier Milestone #M13 “Draft governance implementation plan” (memo published 28.2.2023), also from Work package 2 Strategic Implementation, Task 2.4 Governance [1]. The earlier Milestone answered specific questions posed by the EURAD-2 Core Group - who was tasked by the EURAD Colleges with preparing the proposal for the Euratom call submitted in November 2023 – to different stakeholder groups including PREDIS. This current deliverable report elaborates the original Milestone memo, with revisions based on additional feedback received from the PREDIS partners, end users and wider stakeholder community over the past year. It re-incorporates many of the same topics that were already documented in the earlier Milestone M13, such as the SWOT analysis feedback from the mid-term review.

The background information about the existing PREDIS and EURAD¹ governing structures are provided in Appendix A, as a direct copy from the earlier Milestone M13, to provide further context to this Deliverable.

1 Introduction

This document provides the governance recommendations for a future joint programme or partnership on radioactive waste management within the Euratom Work Programme 2024-2029, based on the lessons learned obtained within the PREDIS project. In this future partnership (called EURAD-2), it is anticipated that research and development as well as knowledge management on pre-disposal waste management topics (currently associated with the PREDIS project) will continue based on the PREDIS Strategic Research Agenda [2] and the EURAD Roadmap² where pre-disposal issues are covered in Theme 2, thereby effectively merging the existing EURAD(-1) programme and PREDIS project.

This deliverable specifically addresses the PREDIS expectations for the future partnership (EURAD-2) via four points to ensure a successful programme: a) flexibility mechanisms; b) use of End User Group (EUG) and Stakeholder group; c) strong guidance by the Chief Scientific Officer and External Advisory Board members; and d) the engagement with SNETP³.

With the planned EURAD-2 scope including both pre-disposal and disposal issues, the PREDIS project recommends the Governance of the programme should encompass four points to ensure the successful future programme. These points are elaborated in Chapter 3, and include:

- a) allowing for flexible mechanisms in project scope and budget, to be able to allocate additional effort to adapt to new needs that may emerge or be generated during the programme;
- b) having two separate groups of, on the one hand, dedicated End Users (who will be directly using the results and guiding the programme) and, on the other hand, more general Stakeholders having a wider range of interests;
- c) ensuring strong advisory guidance and high quality of EURAD-2 outputs, with selection of high calibre candidates for the Chief Scientific Officer (CSOff) and the External Advisory Board (EAB) roles;
- d) having close engagement with SNETP, for helping implement all the above items from the (pre-disposal) view of waste owners/generators.

¹ EURAD European Joint Programme on Radioactive Waste Management, <https://www.ejp-eurad.eu/>

² EURAD Roadmap, <https://www.ejp-eurad.eu/roadmap>

³ Sustainable Nuclear Energy Technology Platform, <https://snetp.eu/>, including Nugenia Technical Area 5 on Waste Management and Decommissioning

By incorporating these four points into the EURAD-2 governance, the PREDIS project is confident the future partnership can fulfil its Vision⁴ and make significant impacts to the European Member States with holistic safe and sustainable waste management practices, further establishing the European Community as the reference worldwide leader in this field.

2 EURAD-2 Governance Structure

2.1 2023 European Commission Euratom Call

On 17th March 2023 the European Commission published the EURATOM Work Programme⁵ for years 2023 to 2025. In this Work Programme, the EC established a grant to beneficiaries for a co-funded European partnership on radioactive waste management (EURAD-2), with the intended duration 2024-2029. This partnership aims for the continuation and merge of the current ongoing EURAD programme and PREDIS project. Regarding pre-disposal topical interest, the Euratom call specifically noted the partnership should:

- *“reach out to the waste owners/generators/processors when relevant, in particular on topics related to predisposal activities; ...*
- *develop elements for a strategy for predisposal operations (including treatment solutions and interim storage) and the disposal of challenging radioactive waste streams.”*

The Euratom call also prescribed that the *“three colleges should continue to work together to pursue their shared interests while ensuring their independence”* and that the mandated actors include waste management organisations (WMOs), Technical Support Organizations (TSOs) and Research Entities (REs). A list of legal entities as beneficiaries nominated by Member States was prescribed as well. In the call it was specifically noted that regulators and waste generators were identified to be sought as EUG members, not defined within a specific college or representation in the governance of the programme.

2.2 EURAD-2 Proposal Scope

A Core Group representing the three mandated actor groups (WMOs represented by IGD-TP⁶; TSOs represented by SITEX network⁷; REs represented by EURADSCIENCE [3]) was formed to prepare the EURAD-2 proposal from September 2022 to November 2023. The Core Group was comprised of three of the six members having involvement in PREDIS. The final EURAD-2 proposal was reviewed and approved by the Colleges through a series of iterations, culminating in the proposal submission to the EC on 8th November 2023.

During the EURAD-2 proposal preparation phase, the Core Group actively asked feedback from the three Colleges as well as stakeholder groups such as SNETP, IAEA and NEA. Position Papers or responses were issued, that helped formulate the governance implementation plan and technical (work package) content described in the EURAD-2 proposal. One of these documents was the Milestone M13 (February 2023) as precursor to this Deliverable. Additionally, as SNETP is a key stakeholder group linked to the PREDIS project conception and implementation, their view as the waste owners and waste generators official representation, who often handle pre-disposal waste issues, was specifically scoped for. The SNETP Responses to EURAD-2 proposal preparation documents are given in Appendix B and included:

- a) SNETP Answer to EURAD-2 (upload to ProjectPlace 1 December 2022)
- b) SNETP Response to EURAD-2 Request for Feedback on Theme 1&2 Templates (upload to ProjectPlace 4 July 2023)
- c) SNETP Response to EURAD-2 Template 3 Submission (upload to ProjectPlace 9 November 2023)

⁴ EURAD Vision, <https://www.ejp-eurad.eu/eurad-vision> “A step change in European collaboration towards safe radioactive waste management (RWM), including disposal, through the development of a robust and sustained science, technology and knowledge management programme that supports timely implementation of RWM activities and serves to foster mutual understanding and trust between Joint Programme participants.”

⁵ Euratom Work Programme, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/euratom-research-and-training-programme_en

⁶ Implementing Geological Disposal of radioactive waste Technology Platform, <https://igdtp.eu/>

⁷ Sustainable network for Independent Technical Expertise on radioactive waste management, <https://www.sitex.network/>

The Core Group issued responses to the comments received from various Position Papers, and used the information received as a basis for revisions before the final proposal was submitted. Some of the feedback was not possible to accommodate, due to the prescriptive nature of the EC's call (for instance regarding the composition of Colleges). The final EURAD-2 proposal did clearly identify "*the engagement of waste generators will be done via the Sustainable Nuclear Energy Technology Platform (SNETP). For waste generators which are not a member of SNETP, they will have the option to be members of the end-users group organised by the Programme Management Office (PMO).*"

The EURAD-2 proposal, as agreed by the Colleges, identified two groups as separate End Users and Stakeholders, following the model that PREDIS had used:

- *End-users are defined to be waste owners, waste generators, waste management organisations and regulators, as those other than who are participating in work packages. They will be able to provide feedback to the programme via attendance to workshops and review of draft documents. They will have access to work package insights and will have some ability to guide the programme direction without any voting power or approval rights.*
- *Stakeholders will be a wider group of interested parties and users of the programme outcomes. They will be invited to public events to follow the progress of the programme and will be a main target audience for dissemination activities.*

Further details about the Core Group roles and their communication to the community can be found from the EURAD and PREDIS⁸ project web pages used for EURAD-2 information distribution. The final EURAD-2 proposal to the EC is a confidential document and thus the final details of the Governance structure are not repeated here. The work of the Core Group and the EURAD-2 preparation was done on a voluntary basis, with no financial contribution (and no costs allocated to PREDIS).

3 PREDIS's Recommendations for (EURAD-2) Future Governance

Based on the lessons learned within the PREDIS project, and in order to help shape the future EURAD-2 programme, the PREDIS project recommends the future programme's Governance should encompass four points to ensure its success, as described below. Incorporating these items will also help support the recommendations of the European Commission that the joint programming will fulfil the expectations of the end-users, integrate the predisposal research areas and thus ultimately help Member States in their timely implementation of RWM activities [4].

3.1 Flexibility Mechanism

The work scope of EURAD-2 should be ready to work in a highly flexible way for adaptation of work scope, budget (effort) and partners that allow for providing position papers on emerging topics and/or for focusing tasks on emerging needs. Such topics and needs are already emerging now and are anticipated to arise even more strongly during the 2024-2029 programme implementation phase. This anticipation is based on the continuously evolving European policy for clean energy and nuclear applications, which have direct impacts to holistic waste management challenges. Additionally, the rapid emergence of new nuclear technologies is impacting existing solutions and concepts for radioactive waste management including disposal. Apart from new future wastes, there is also the driver of heightened priorities for environmental stewardship and accelerating solutions to better handle legacy wastes, which include options for extracting further value from waste.

In addition to technology developments, new needs are also already identified for increased knowledge management actions, in particular capacity and capability building in nuclear newcomer countries and/or countries which seek to (drastically) expand their nuclear infrastructures. The combined efforts of decommissioning of closed nuclear installations, LTO (long-term operation) of existing Nuclear Power Plant, new build of Gen III EPRs (European Pressurized Reactors), as well as design and build of innovative concepts

⁸ See "Towards EURAD-2" listing of public communications and documents at <https://predis-h2020.eu/publications-and-reports/>

(Gen III and Gen IV Small Modular Reactors), within the European Community indeed poses unprecedented demands for a skilled technical-scientific workforce, which includes dealing with the fuel cycle back end and operational/decommissioning waste.

To introduce flexibility within the project framework, PREDIS strategically set aside resources, both in terms of budget and time, under the purview of the Coordinator. These resources could be reallocated to project partners or even external parties as needed. An example of this approach is evident in the production of Knowledge Management documents within the Domain Insights. Recommendations for such reallocations could be suggested by any partners, to their WP leader or the Coordinator, and were formulated by the Management Team (comprising Work Package leaders) and subject to approval by the General Assembly before any grant amendments.

In EURAD(-1), a similar flexibility mechanism was utilized during the Wave 1 and Wave 2 selection processes for Work Packages. Additionally, a portion of the Coordinator's budget was earmarked for yearly allocations based on requests from the Bureau or Colleges. Looking ahead, there's potential for an even more agile approach, with a larger budget reserve earmarked for flexible deployment in response to high-priority topics agreed upon by all three Colleges. The topical ideas can be proposed by individual persons or institutes, via their Colleges which are then discussed and prioritized. The proposed changes are always decided by voting of the General Assembly, based on recommendations of the Bureau. The exact details of the decision making is documented in the EURAD-2 proposal and the Bureau recommendations. This proactive stance for the flexibility mechanism not only showcases the EURAD-2 community's responsiveness to Member States' needs but also underscores its commitment to addressing challenges and fostering innovative solutions in collaboration with end users and stakeholders.

It is important to highlight that the effective operation of this flexibility mechanism necessitates regular assessment of R&D needs, given the lead time required for planning and execution, typically spanning 2-3 years.

3.2 Separate End User and Stakeholder groups

As demonstrated by the success of PREDIS, it is important to have a two-tiered system where the End Users have a higher influence and impact to steering the programme's scope, focus and direction compared to generic stakeholders. This has been adopted by the Core Group and the EURAD-2 proposal, as described in Chapter 2.2. This section sets out to provide further transparent background about how the End User Group (EUG) roles, benefits and establishment was done in PREDIS, so that it may help in the onset of the EURAD-2 programme. By taking into action this recommendation, it also supports the comments by the EURAD(-1) Chief Scientific Officer Piet Zuidema who expressed his opinion at the EURAD(-1) Annual Event 2023 on the importance and value of participatory reviews by the end users during the project so that they trigger improvements to the programme of work and to ensure that the right issues are addressed within the project in the right manner [5].

3.2.1 PREDIS Definition of EUG member

The PREDIS project defined End User Group (EUG) members as Parties that are directly responsible for advancing the implementation of the EU Member State's waste management directive, including waste management organizations and waste owners/generators. They are the companies or institutes directly implementing and using the solutions, to which the RD&D and KM programme funded by Euratom brings added value. In some cases the End User parties were also members of the consortium implementing the project, but in many cases they did not have sufficient time and resources, and thus wanted only to follow the project through their national research partners. It should also be noted that about a third of the PREDIS consortium partners were also End Users of the results, as they are also having facilities with pre-disposal issues, such as research reactors. PREDIS did not include regulators as part of the EUG membership due to the potential conflict of interest when both implementors and regulators are together discussing the challenges, approaches and solutions needed to be addressed by RD&D. The PREDIS management team would like this to be resolved in the future so that Regulators are engaged equally to the EUG as direct users of the results.

The method of soliciting the EUG membership was by open publicity, including a free response location on the web page. Potential EUG members needed to submit an application identifying which work packages (WP) were of interest to them, and appointing contact person(s) per WP. Their application had to be approved by the General Assembly by voting. They also needed to sign a commitment document that addressed respect of IPR, confidentiality and the public "open access" nature of the project outcomes. If the potential EUG

member was outside of Euratom Member States or their role as a waste owner or waste management organisation was uncertain, then the application was reviewed in detail by the Management Team and recommendations made prior to a final vote by the General Assembly.

By using this definition from PREDIS, it is clear that EUG members can differ based on the topic, goal and objectives of the Work Package considered. For example, when developing a new conditioning matrix for a difficult to handle waste stream, WMOs were considered explicitly as end users because they would be responsible for receiving the final conditioned waste form for acceptance in an eventual repository. On the other hand, in the same work package also waste owners were considered as end users, as it was the goal of the work package to provide tailored solutions that would accommodate these owners' need, meaning that these solutions should be practically applicable in the (industrial) environment in which these owners operated.

3.2.2 Observations on EUG achievements and functionality during PREDIS

The EUG had various means of positively contributing to the PREDIS project, including the gap analysis at the start of the project, identifying RD&D needs and priority waste streams and challenges to be tackled, contributing and prioritising topics for the strategic research agenda, providing continuous feedback, guiding and re-aligning (if necessary) work programme scope during project execution, sharing experiences during webinars and annual events with the larger community. The decision making of these recommendations from EUG members was still via the General Assembly, based on recommendations of the Management Team after receiving EUG feedbacks. There are also lessons learned from how the EUG functioned during PREDIS, many of which are described with the EUG achievements by Jacops *et al.* at an IAEA stakeholder conference [6]. Additional observations to highlight here, included:

- it was acknowledged from the start that many partners of PREDIS were qualified as EUG members (i.e. operate research reactors and do waste treatment/conditioning). Typically, these end users are also responsible for the operational/decommissioning waste programmes within their organisations and different from the ones performing the RD&D;
- the EUG membership did not grow much over the 4-year duration, but this can also be a good indicator that the interested parties who helped plan the project were on-board from the start (with over 20 members who were listed from the first General Assembly);
- The EUG covered the different geographical regions of Europe. As it was also open to End Users outside of Europe, the United States were also represented and contact was made in Asia and Australia but these members remained as Stakeholders;
- joining the EUG can be a hurdle for some companies due to the NDA/contract type document that requires a legal review;
- there may be a limitation to the number of EUG members as waste-owners/generators who want to participate in "public" terms of an EC project because of their own commercial interests;
- there was a very high level of interest for having a more passive role of just following the project for awareness, and thus some potential EUG members defaulted to the Stakeholder group instead. In some cases this was also because they needed many approval steps inside their organisations in order to disclose information or give personal expert opinions to the project.

PREDIS recognizes opportunities for improvement in its relationship with the EUG, for example it would have been beneficial to have a focused PREDIS EUG online meeting to ask their feedback more often during the EURAD-2 preparation phase, which could be carried to the Core Group. It is noted that the Core Group did ask SNETP feedback, but PREDIS did not use the EUG as much as could have been done for specific feedback besides the public webinars, focus funnel and communications of the Core Group.

There was also a high level of variability between how the partners of the consortium engaged with their own national (potential) EUG members. In some cases, the EUG members were providing financial contributions to the consortium partners directly via the co-financing mechanism adopted by PREDIS, while in other national cases there was very little interaction. It is recognised that variability will exist, but in the future more effort could be given to help partners engage with their national Member State representatives, waste owners and waste management organisations to ensure and maximise programme impact.

EUG members were often invited to share their needs and testimonials during annual workshops, webinars, and WP meetings, as well as requested to occasionally donate materials, data or test specimens or even facilities for demonstrations and trainings. Their feedback was analysed separately during events, to ensure we paid special attention to their views on benefits and ways of improvement. Towards the end of the project,

Value Assessments and Case Studies are being documented from the WPs as part of impact and dissemination of the final project outcomes.

3.2.3 Roles and Benefits with EUG members in the future

In the future, PREDIS encourages EUG membership to be composed of parties that are directly responsible for advancing the implementation of the Member State's waste management directive. The EUG members should therefore include those who are evaluating the compliance of solutions with national regulations (regulators), those who are the source of radioactive materials needing waste management activities up to disposal (including future fuel producers, reactor vendors, facility operators, legacy waste owners, etc) as well as those who are responsible for implementing final waste management solutions including disposal facility operators (waste management organisations, nuclear operators operating their own disposal facility). PREDIS sees that the EUG is critical to the success of the programme:

- End users should help in shaping and monitoring work packages, as these organisations will be the ones needing to implement the technical solutions to be developed. By the EUG involvement and active participation and solicitation, from the development stage of a work package, and all the way through the execution phase up to closure, it is ensured that the RD&D that is performed brings real added value.
- End users need to formulate their needs so RD&D activities can be prioritized and linked to these needs. This will ensure that the outcomes from the programme are tailored to provide optimised solutions ready for use.
- End users' perspectives and facilities should be used, being instrumental to ensure that solutions can be upscaled from the lab to the field while considering economic, technical and operational feasibility. End users help facilitate the Technology Readiness Level (TRL) increases through demonstrations and feedback to improve the technologies.
- End users must be empowered to bring inputs as the WPs progress, to re-route, re-focus, change priorities or even to stop R&D that has turned out to be irrelevant, not economically feasible or unfruitful.

PREDIS notes the incentive for the organisations outside the consortium to participate in the EUG should also be for their own added-value benefit. Many EUG member organisations have only their own national perspective or only a company focus in-view. By engaging with the wider (EURAD-2) community, the EUG members gain a broader international perspective of options, alternatives and best-practices, as well as the ability to consider shared solutions or infrastructures. They gain awareness of evolving methods, material and solutions, also gain early access to new technologies that are in the pipeline that may suit their needs. By engaging with the wider community, end users also get a perspective on the whole waste management chain, leading to a better understanding of needs and requirements throughout the whole process up until disposal. They also gain a better understanding between different actors and the variations across EU Member States. By this very same engagement of the EUG, the future EURAD-2 also gains wider international perspective, fosters cooperation and focuses R&D efforts to optimize the outcomes. All in all, the involvement of the EUG brings multidirectional benefits for the community and must be properly used.

EUG members should be integrated at the Work Package level for participating to discussions at meetings and workshops, but it is recommended that the coordination of their overall involvement should be done at the Programme level by the Coordinator, Programme Management Office or Bureau. Ideally, the EUG group involved in EURAD-2 work packages and/or the programme should be comprised of organisations who have scientific competences both at detailed as well as holistic views (otherwise stated as both specialists and generalists). Involvement of advanced programmes to the EUG is critical, to ensure the accurate topics are being addressed that provide added value throughout the whole waste management chain.

The EUG therefore should have a strong internal role, giving feedback on the applicability, integration and safety of the final outcomes from each work package, but also a strong external role demonstrating the relevance of the future EURAD-2 programme to the EU Member States. They should help formulate and revise the State of the Art and Strategic Research Agenda documents to be accurate and when possible, denote the importance or urgency of topical studies. In this regard, the flexibility of the mechanisms of the EURAD-2, similarly to the ones allowed for in PREDIS or EURAD(-1), covers again relevance in the sense that urgency of different topics may change along the duration of the programme.

3.3 Strong Advisory Guidance

To help ensure the high quality of the EURAD-2 partnership, it is important to have strong guidance from qualified persons in the roles of the Chief Scientific Officer (CSOff) and the External Advisory Board (EAB) as part of the oversight guidance. The roles of these two parties should be clearly differentiated, to focus on internal and external issues respectively. Both roles work closely with the Programme Management Office, the Bureau and the European Commission officer to see the success of the programme, focusing on the most important topics having high added value from the outputs, both technically and with respect to knowledge management. PREDIS expects that:

- The Chief Scientific Officer (CSOff) (or officers, if more than one person is selected) is focusing on internal scientific leadership and excellence of the programme's impacts, but it is also critical that the person(s)' competences are encompassing holistic waste management from plant operation through final disposal that supports sustainability practices. They should help integration of the different WPs for demonstrating transversal impacts of the programme including aspects of best practices and safety. They can help ensure the EUG inputs are integrated into the WPs.
- The External Advisory Board (EAB) is focusing on external perspectives being brought to the attention of the programme, but it is also critical that at least half of their members brings perspectives of pre-disposal challenges and also beyond the European Community landscape to help understand how the outcomes of the project can be applied outside the direct beneficiaries, and to gain advantage of different experiences and needs. We expect they are providing perspectives on good practices from outside the EC, linking the programme to national programmes beyond the EC and ensuring EURAD-2 programme is recognised as a referenced worldwide in safe and responsible waste management practices;
- Both roles require individuals who are familiar with a range of pre-disposal topics, and can demonstrate a comprehensive understanding of waste management beyond just disposal concerns. In this way the PREDIS perspective is integrated and the waste management practices are developed with a holistic end-point informed view, especially in the light of the new technological deployments resulting in different waste streams.
- The persons in these roles represent various backgrounds (for instance not both CSOff from the same background College or country) and possibly programmes in different status of development.
- The persons in the CSOff and the EAB must consider all sides of the programme, the scientific developments, the strategic needs and the knowledge management developments, to ensure an adequate knowledge transfer intra and extra community.

3.4 Engagement with SNETP

The Sustainable Nuclear Energy Technology Platform, recognised as a European Technology and Innovation Platform (ETIP) by the European Commission, incorporates different pillars, among which the Nuclear Generation II & III Alliance (NUGENIA), which covers 8 main technical areas, including Technical Area 5 on Waste Management and Decommissioning. SNETP was the platform used for development of the PREDIS proposal and seeking participation to the PREDIS EUG and stakeholder community. They were also requested for feedback during the EURAD-2 partnership preparation, as demonstrated in Appendix B with their supplied Position Papers.

PREDIS strongly recommends that SNETP continues to be utilized during EURAD-2 as a key avenue for feedback to the programme implementation. SNETP has means to help implement the above three action items described in Chapters 3.1 to 3.3, by:

- providing feedback on prioritisation of emerging needs from industry and Member States, as routes where additional tasks or effort should be put via the flexibility mechanism funding (both for technology and knowledge management issues)
- soliciting members to the End User and Stakeholder groups, as well as an avenue for dissemination of documents, events and outcomes of the EURAD-2 partnerships
- providing expert candidates that can serve in roles of the Chief Scientific Officer and/or the External Advisory Board members.

Recommendations of SNETP should be shared to the parties within the Colleges, such as Research Entities and/or Waste Management Organisations. These messages are carried to the EURAD-2 Bureau for consideration and eventual voting of approved adjustments to the work plan by the General Assembly.

4 Summary

The PREDIS project has been committed to an open and transparent dialogue with the European Commission, our partners, our End Users, and the EURAD(-1) programme for the develop of the EURAD-2 partnership proposal. We appreciate that the future EURAD-2 programme has been built on the best practices and lessons learned from both the PREDIS project and EURAD(-1) programme. PREDIS recommends ways to implement the future governance structure via the flexibility funding mechanism, engagement of various user groups and external advisors to strengthen the programme success in both technology and knowledge management issues. Our End User Group (EUG) community and that of the wider SNETP technical area on waste management look forward to helping implement the EURAD-2 goals of advancing Member State needs for holistic, efficient and safe radioactive waste management practices in the predisposal theme of the EURAD Roadmap Theme 2. We will strive for successful implementation of EURAD-2 together.

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APPENDIX A: Background of Existing Governance Structures

A.1 PREDIS Governance

The management of PREDIS is structured with a leading Coordinator and the Management Team, consisting of each Work package (WP) leader. All contributors to the project are partners to the Consortium and voting members in the General Assembly.

An End User Group (EUG) consists of waste owners, waste producers and waste management organisations who have direct impact from the innovative solutions and ability to implement the outcomes of the PREDIS project. As of August 2022, there are 25 members of the End User group from 15 countries. There are an additional 15 of 47 PREDIS partners who also qualify as End Users due to their ownership of facilities, such as research reactors, that also are responsible for managing their own waste. Key places for solicitation of EUG interests have been via the Sustainable Nuclear Energy Technology Platform (SNETP)⁹ Technical Area 5 on waste management and decommissioning. EUG members sign a confidentiality agreement and are invited to focused discussions specific to the direction of the project. In some cases, they are providing co-financing for the PREDIS project work done by partners. External EUG members have no voting rights in the project but are encouraged to give feedback to ensure high impacts from the project achievements.

And additional group of Stakeholders is also identified, which is comprised of other parties who have an interest to follow the project work, such as regulators, other research entities, national programme owners, service providers, civil society, and international organisations. PREDIS currently has 119 registered Stakeholders, with a total project reach of 109 institutes/countries (partners included), from 23 Member State Countries, and 6 additional countries outside the EC.

A graphical representation of the management structure of PREDIS is shown in Figure A.1. Further details of the PREDIS governance are noted on the project web page <https://predis-h2020.eu/> and within the Consortium Agreement and Grant Agreement.

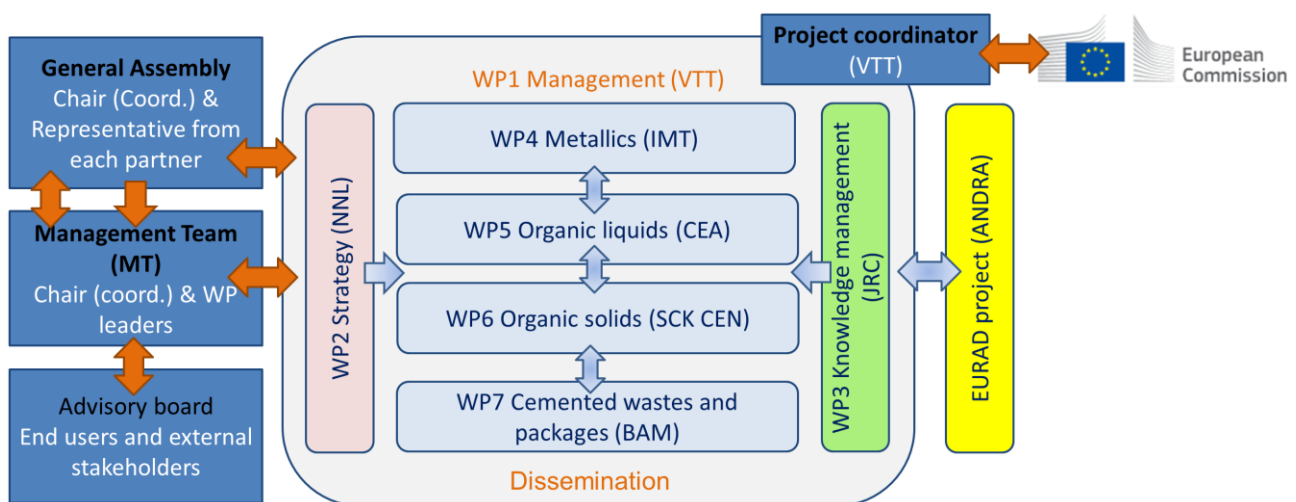


Figure A.1. Current PREDIS project Governance structure.

A.2 EURAD Governance

The management of EURAD, the European Joint Programme on Radioactive Waste Management (2019-2024) is structured with a leading Coordination supported by the Programme Management Office (PMO). Each Member State (through the Programme Owner) mandates a selected number of Beneficiaries that are uniquely classified as either a Waste Management Organisation (WMO), Technical Safety Organisation (TSO) or a Research Entity (RE). These mandated Beneficiaries are comprising the General Assembly and fall within the three respective Colleges of the same name (WMOs, TSOs, REs). Typically, there are then two to three representatives of each country's National Programme within the General Assembly. As of November 2022, the overall General Assembly has 51 voting members as mandated actors. All other contributors to the programme are Linked Third Parties (LTP) to these mandated Beneficiaries, and there are currently 62 LTPs,

⁹ <https://snetp.eu/>

with a total representation of 23 countries (20 EU Member States and 3 Associated countries). The LTPs should express their views on programme implementation issues via the Colleges and/or their associated Beneficiary.

The existing three EURAD Colleges are comprised of the following groups (as of November 2022):

- Waste Management Organisations (WMOs) represented by IGD-TP¹⁰ Executive Group, coordinated by Posiva (Finland),
- Technical Safety Organisations (TSOs) represented by SITEX.Network¹¹, coordinated by BelV (Belgium),
- Research Entities (REs) represented by EURADSCIENCE¹², coordinated by SCK CEN (Belgium).

Each EURAD College nominates three representatives to comprise the Bureau of the General Assembly, for efficient discussions and recommendations to both the General Assembly and PMO. The Bureau, via the Colleges, makes suggestions that impact the programme scope, such as contributing to feedback on the Roadmap, facilitating the revisions of the Strategic Research Agenda and proposing the future or additional work packages that were deployed as the second wave at the midpoint of the programme. The Bureau takes decisions jointly, thus it plays an important role in finding compromise between the different Colleges' positions. All EURAD programme decisions must be approved by the General Assembly.

The PMO together with the EC has also established an External Advisory Board (EAB) consisting of a few selected senior experts who fulfilled the defined Terms of Reference, whose role is to provide feedback on the programme and be ambassadors to share about EURAD. The persons on the EAB were nominated by the PMO and approved by the General Assembly.

EURAD End-users are parties who have expressed interest to follow the project, including implementing organisations, regulators, research entities, waste generators/owners, national programme owners and international organisations. As of February 2022, EURAD has 109 registered End-Users, from 64 organisations external to EURAD, representing 21 different countries. End-users have no financial ties or voting rights in the programme.

A graphical representation of the management structure of EURAD is shown in Figure A.2. Further details of the EURAD governance are noted on the programme web page <https://www.ejp-eurad.eu/> and within the Consortium Agreement and Grant Agreement.

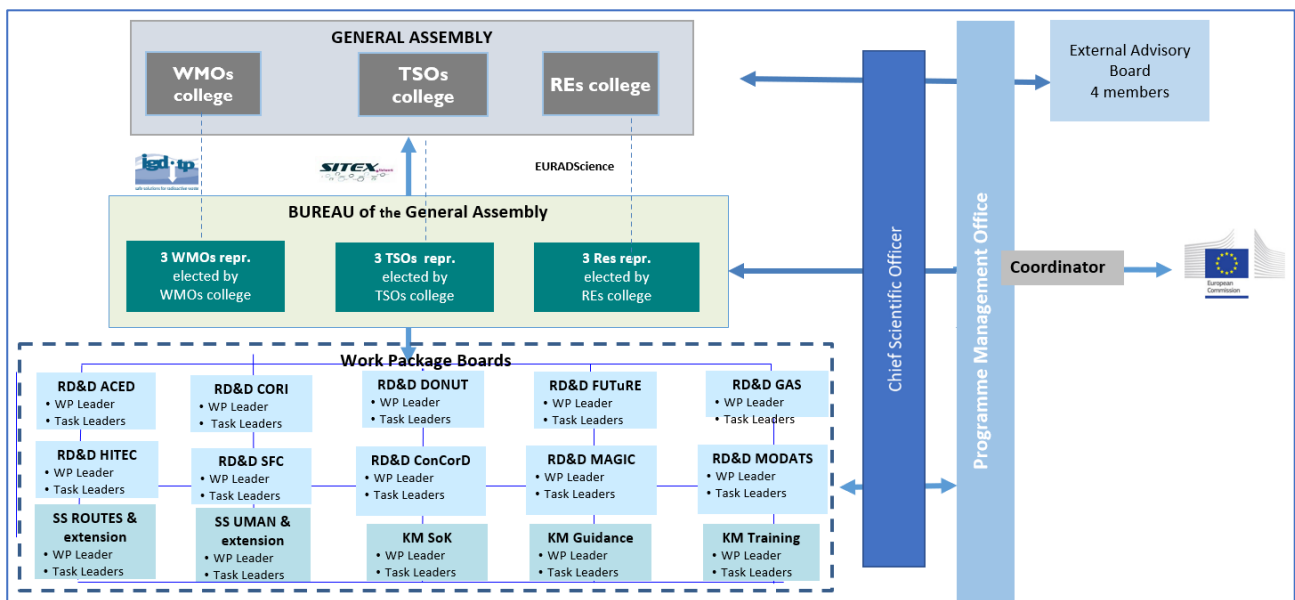


Figure A.2. Current EURAD programme Governance structure.


¹⁰ <https://igdtp.eu/>

¹¹ <https://www.sitex.network/>

¹² Bruggeman et al. 2020, "EURADSCIENCE, A Network of Research Organisations for Radioactive Waste Management Science Within Europe," Proceedings of EURADWASTE'19 Conference, pp. 338-343.

APPENDIX B: SNETP Position Papers to EURAD-2 Preparations

Position Paper "I", received December 2022 (*amended by removing email address*):



SNETP
Sustainable Nuclear Energy
Technology Platform

SNETP Secretariat Meeting
December 2022

SNETP Answer to EURAD 2

1. **How would you like the Core Group (during preparation) and PMO (during operation) to communicate with SNETP?**

The Core Group and PMO should communicate with SNETP through its representative appointed who are:

 - Ms Nadia CHERUBINI -SNETP/ESNII
 - Mr Anthony BANFORD-SNETP/NUGENIA
 - and the SNETP Secretariat represented by
 - Mr Luis Enrique HERRANZ
 - Ms Elisabeth GUILLAUT
 - Ms Stéphanie CORNET
 - Which role do you see for where to contribute within the feedback and decision making during both programme preparation, and during programme operation?

SNETP can contribute as a consultative body, provide an overview to programme preparation and during programme operation.
Common topics of interest can be identified and added to respective SRIAs. Previously, it was the way to collaborate with EURAD and PREDIS, in regards with the Technical Area 7 of NUGENIA.
Mutual promotion can also be discussed using communication tools such as SNETP webpage, Linked, newsletter...
3. **What type (size, composition, etc) of group representing waste generators might provide inputs during the programme operation?**

The group representing the waste generators may be composed by the Technical Area 7 Leader and its subtasks leaders who are:

 - Bruno Michel – TA7 leader
 - Dan Mathers
 - François Barré
 - David Hambley

And include also Anthony Banford, Nadia Cherubini and the 3 SNETP Secretariat members mentioned in question one.

So the group should count 9 members.
4. **Are the SNETP members aware of the potential need to provide co-financing to the partners for implementation of the programme work packages/tasks?**

Yes, SNETP members are aware of the potential need to provide co-financing. In SNETP every member decides on its own willingness and strategy to co-fund a project or not.



SNETP Secretariat Meeting

5. Please identify an appointed person(s) for the communication actions with the Core Group.

SNETP appoints:

- Mr Anthony Banford (representative of SNETP/NUGENIA) ,
- Mss Nadia Cherubini (representative of SNETP/ESNII)
- SNETP Secretariat

A fourth representative will be appointed in the coming weeks.

Position Paper "II", received July 2023:



SNETP Response to EURAD 2 Template2 (Themes 1&2)

Dear Louise and EURAD-2 Core Group

Thank you for sharing the EURAD Template 2 documents that outline potential work packages in themes 1 and 2 of the future EURAD 2 joint programme. These documents were helpful to the SNETP team, and we are grateful for the opportunity to review them.

We also note that work packages in other themes are probably relevant to many SNETP members and we would welcome the opportunity to consider these also (for example, spent fuel management, advanced technologies such as digital twins, optimisation etc).

We recognise the importance of the continuation of RD&D work on radioactive waste pre-disposal and disposal across Europe in the context of the following drivers

- the Europe wide drive to minimise radioactive waste through appropriate integrated waste management strategies,
- the UN Sustainable Development Goals (in particular SDG 12 -sustainable consumption and production),
- Critical Raw Materials strategy, resilience and the push to a circular economy,
- the drive to have HLW disposal facilities in place by 2050, and
- the overall sustainability of current and future nuclear energy systems.

Position

1. Having reviewed the EURAD template 2's for themes 1 and 2, we believe that all work packages should proceed to the next stage of definition. This ensures that appropriate emphasis is given to the holistic lifecycle management, and progress can be made collaboratively towards the sustainability goals.
2. The SNETP team would like to continue engaging as the work packages develop, and review the next iteration of more detailed scopes, for Themes 1 & 2. We would also like to engage on other areas such as Spent Fuel, Advanced Technologies (e.g., Digital , AI) where they form part of the programme.
3. Maintaining a balance between RD&D in Pre-disposal and Disposal activities (as per PREDIS and EURAD-1 balance of investment and effort) is appropriate to ensure, the implementation of the waste hierarchy and the drive towards circularity.
4. Given the level of interest in Europe (and worldwide) in nuclear new build, SMRs, advanced nuclear technologies and energy systems, as illustrated by the SMR Pre-partnership, it would seem right that EURAD 2 gives due attention to future radioactive waste challenges in addition to the current and legacy arisings.
5. As previously stated, we support a holistic and integrated approach to radioactive waste management and are particularly keen to see this demonstrated across the themes as well as within the individual work packages of EURAD. To this end the inclusion of lifecycle and sustainability analysis is welcomed and encouraged.

Requests

We kindly request that you advise on the timing of the EURAD 2 (i) key Work Package Selection decision points and (ii) when the next iteration of Work Package templates will be available for SNETP review. This will allow the scheduling of reviews by our team and enable a timely response at the next stage.

We also encourage utilisation of the SNETP innovation platform to socialise the proposals to interested parties.



We hope the following specifics will help the core group and the work package development teams.

ASTRA

- The proposal appears to have interested parties from many member states including those with small inventories, this is important.
- Deep Borehole Disposal may be of interest to some actors but not all. The WMO college may have a view on this.
- Most strategic studies are shorter in duration (50-60 months) and lower in budget (2M) than this proposal. Is the budget and duration correct?
- Perhaps there could be a greater emphasis on considering strategies to minimise waste for disposal (Waste Hierarchy).

SURE

- This proposal is very relevant as it strives to develop the concept of sustainability in the field of RWM, and to do this collaboratively (Task 3).
- The investigation of potentially recyclable materials (Task 4) using tools such as LCA would be very helpful to set sustainable RWM strategies.
- The pursuit of low CO₂ concrete (Task 5) is also of great importance to all.
- The work package should make reference to the Complementary Delegated Act, in its deliberations, specifically the reference to minimising waste and other factors/requirements in Europe (this increases the case for support of the proposal).
- The proposal is in line with all the drivers set out above – we strongly support.

FORSAFF

- Given the interest in SMRs in Europe and globally, it is timely to address this issue now.
- The 18-month timeframe is appropriate as this issue should be a priority and underpinning by a strategic study is helpful.
- Be mindful and aware of the ongoing Pre-partnership when developing this further.
- We strongly support this proposal and expect SNETP members to engage.

ICARUS

- Characterisation is important for effective waste management and application of the waste minimisation through the waste hierarchy.
- We support developments in this area but encourage engagement with utilities and operators to ensure
 - that the focus is on early characterisation to minimise waste from operations and to reduce waste ultimately destined for disposal
 - that the focus is on characterisation techniques that support waste management decisions.

STREAM

- This proposal supports the maturation of technologies for immobilisation of challenging wastes. We recognise the need and strongly support the proposal. We encourage technology demonstration within these collaborative RD&D frameworks.
- These challenges affect many member states and many operators.



- We recommend that there is a strong interaction with end users on this work package, which would deliver value to both Researchers and end users. Perhaps have a specific end user group, to ensure alignment on tasks 3 and 4.
- We support the inclusion of LCA/LCC to assess the relative sustainability and environmental questions and links to ongoing work in PREDIS.

L'OPERA

- This project proposal complements the STREAM proposal and we recognise the importance of demonstration of the long term performance of matrices alongside the technology demonstrations.
- End users need certainty before deployment and the demonstration of long-term performance is critical to the adoption of new waste matrices. We strongly support this proposal.
- Is this theme 2 or 3? It is relevant to both.

SHIRE

- The issue of management of irradiated graphite affects many countries and sites across, including RBMKs, UNGGs, Magnox, AGR, test reactors, others and is also of interest for some advanced reactors.
- There have been many disparate initiatives over the years and it is right to consolidate the knowledge base, then to map out the direction of travel and then to specify the gaps hence the required R&D.
- There is end user interest in this project and again we would encourage close engagement through an EUG, to help set the direction. We therefore support a strategic study in this area.
- We suggest a lifecycle assessment of credible options is included, perhaps utilising the approach developed in Carbowaste and high level LCA/LCC to evaluate options, strategically to help define any R&D needs.

SNETP EURAD-2 Team.

(Note from the Core Group after this position paper: Colleges decided to not pursue the Work Packages SURE and SHIRE, though these maybe considered again for EURAD-2 wave 2 in 2026. A summary Template #1 about EURAD-2 was posted to the SNETP innovation platform by the RE and TSO Colleges together (by SCK CEN and VTT, respectively) for open sharing about the proposal preparation phase).

Position Paper “III”, received November 2023:



SNETP Response to EURAD 2 Template 3 Submission

Dear Louise and EURAD-2 Core Group

Thank you for sharing the EURAD Template 3 documents that outline the proposed work packages in themes 1 and 2 of the future EURAD 2 joint programme. We recognise the great effort and intense schedule that the Core Group and participants have had to commit to in order to meet the submission date in November, and consequently that the Work Packages descriptions are now fixed ready for your proposal submission.

As stated in our previous response:

We recognise the importance of the continuation of RD&D work on radioactive waste pre-disposal and disposal across Europe in the context of the following drivers,

- The Euratom legislation and in particular the Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste
- the Europe wide drive to minimise radioactive waste through appropriate integrated waste management strategies,
- the UN Sustainable Development Goals (in particular responsible SDG 12 -sustainable consumption and production),
- the European Circular economy action plan,
- the drive to have HLW disposal facilities in place by 2050, and
- the overall sustainability of current and future nuclear energy systems.

In this respect we are pleased to see the following work packages move forward as phase/wave 1 projects.

- WP3 – ASTRA,
- WP4 – FORSAFF,
- WP5 – ICARUS,
- WP6 – STREAM, and
- WP7 – L'OPERA

However, we note that previously reviewed and supported projects SuRE and SHIRE have not progressed. We presume that these topics along with spent fuel issues will be considered as priorities for phase/wave 2 projects.

Position

1. The ultimate impact of the EURAD2 programme, will be dependent upon effective engagement with the end users, including utilities, nuclear facility operators, decommissioners and of course the WMOs.
2. Through SNETP members and our team we can provide an end user voice to represent those existing nuclear and legacy facility operators, but also that of those members engaged in advanced systems such as SMR, AMR and cogeneration.
3. The SNETP team expect to continue engaging with EURAD 2 as the phase/wave 1 work packages progress, and also to engage in the development of phase/wave 2 projects. As previously stated, we would also like to engage further on other areas such as Spent Fuel, Advanced Technologies (e.g., Digital, AI) where they form part of your programme.
4. We continue to call for the maintenance of a balance between RD&D in Pre-disposal and Disposal activities (as per PREDIS and EURAD-1 balance of investment and



- effort). This is appropriate to ensure, the implementation of the waste hierarchy and the drive towards circularity.
5. Given the level of interest in Europe (and worldwide) in nuclear new build, SMRs, advanced nuclear technologies and energy systems, as illustrated by the SMR Pre-partnership, it would seem right that EURAD 2 gives due attention to future radioactive waste challenges in addition to the current and legacy arisings. These actions should be engaged in full dialogue with the future works of the SMR Pre-Partnership (i.e. SMR Industrial Alliance).
 6. As previously stated, we support a holistic and integrated approach to radioactive waste management and are particularly keen to see this demonstrated across the themes as well as within the individual work packages of EURAD. To this end the inclusion of lifecycle and sustainability analysis is welcomed and we encourage further work in this area.

Requests

1. That SNETP are represented on the EURAD 2 External Advisory Board by one representative of Nugenia and one additional member representing the other SNETP pillars ESNII and NC2I.
2. SNETP are engaged in the implementation of the EURAD 2 programme, to encourage end user engagement directly into work packages in themes 1 and 2.
3. SNETP are engaged in the process of identifying and reviewing proposals for wave 2 work packages.
4. EURAD 2 continue to work with SNETP to disseminate the output of the programme to SNETP members.

From
SNETP EURAD Team.