EU-PREDIS PROJECT OVERVIEW

Project Plan, as submitted to Euratom NFRP-10, September 2019

Prepared by: Coordinator, VTT Technical Research Centre of Finland

Presented at SYP2019, 31.10.2019, Helsinki

Erika Holt, Customer Account Leader, Principal Scientist, Project Manager

SHORT OVERVIEW

- Title: “PREDIS: Pre-disposal Management of Radioactive Waste”
- Participants: Consortium of 48 partners from 17 countries
- Duration: 4 years, planned June 2020 through May 2024. Proposal was submitted 25.9.2019. Evaluation expected February 2020.
- Budget: 23.7 M€ total, of which EC contribution of 14 M€
- Reply to: Euratom call NFRP-10, Research and Innovation Action (RI)
- Support/endorsement from Nugenia, IGD-TP, IAEA, NEA, EURAD project – all are listed for cooperation during the project duration

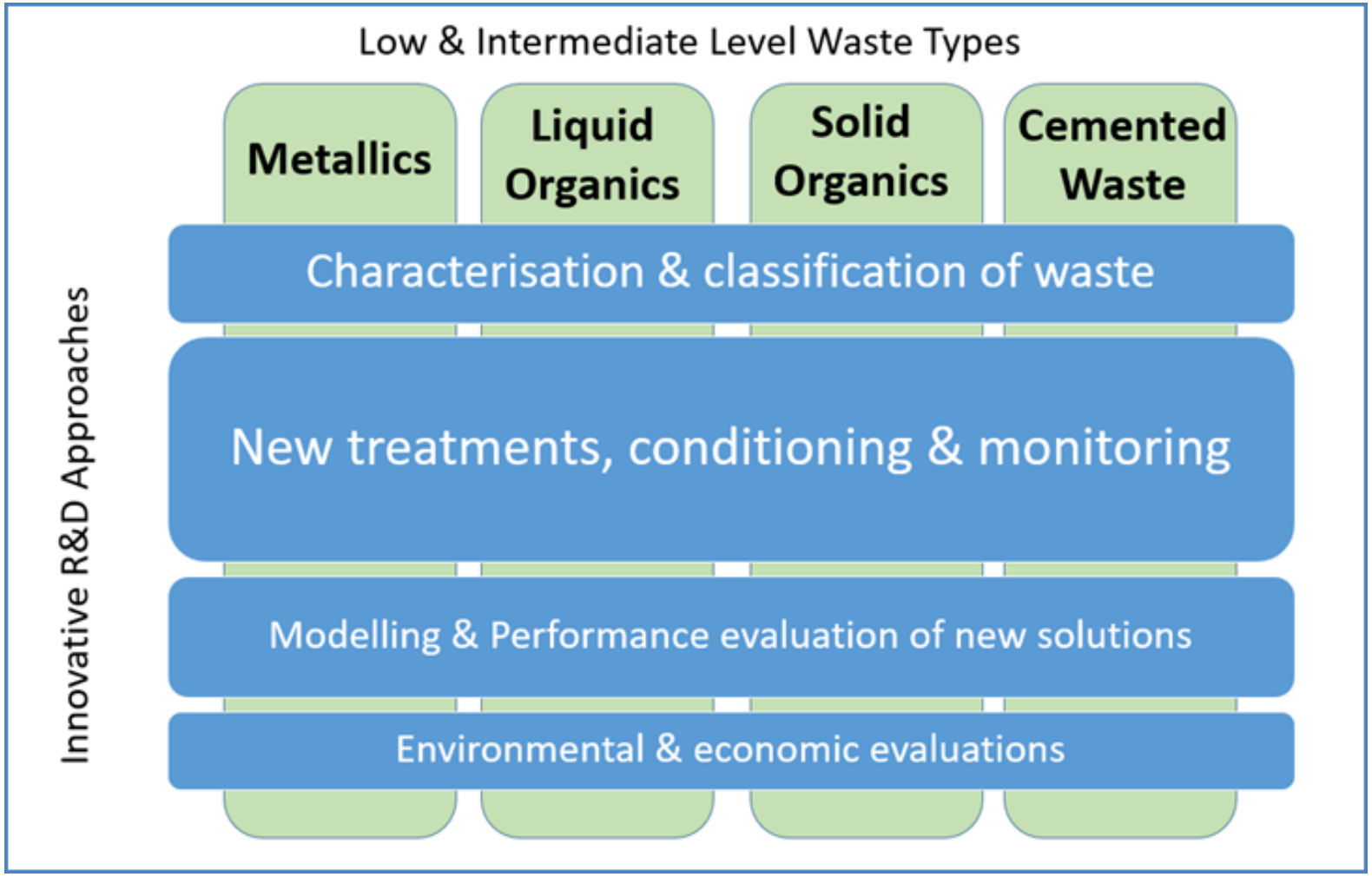
PROJECT OVERALL (High level) OBJECTIVES

- Develop solutions (*methods, processes, technologies and demonstrators*) for future treatment and conditioning of waste across a number of MSs for which no industrially mature or inadequate solutions are currently available, improving safety during next waste management steps;
- or improve existing solutions with safer, cheaper or more effective alternative processes where they bring measurable benefits to several MSs (Member States).
- Analyse criteria, parameters and specifications for materials and packages with associated Waste Acceptance Criteria (WAC) for pre-disposal and disposal activities, supporting homogenisation of waste management processes across Europe.

PROJECT SPECIFIC OBJECTIVES

1) Applying multi-disciplinary and multi-scale scientific approaches to demonstrate technical, economic and environmental feasibility of the new solutions;
2) Addressing project drivers from the end users' points-of-view;
3) Fostering deeper cooperation between experts from many EU Member-states and across generations;
4) Training new experts in the field of pre-disposal waste management technologies;
5) Updating and revising pre-disposal guiding documents (vision, SRA, roadmap, governance and deployment mechanisms), together with the EURAD EJP executive bodies.

PROJECT TECHNICAL SCOPE

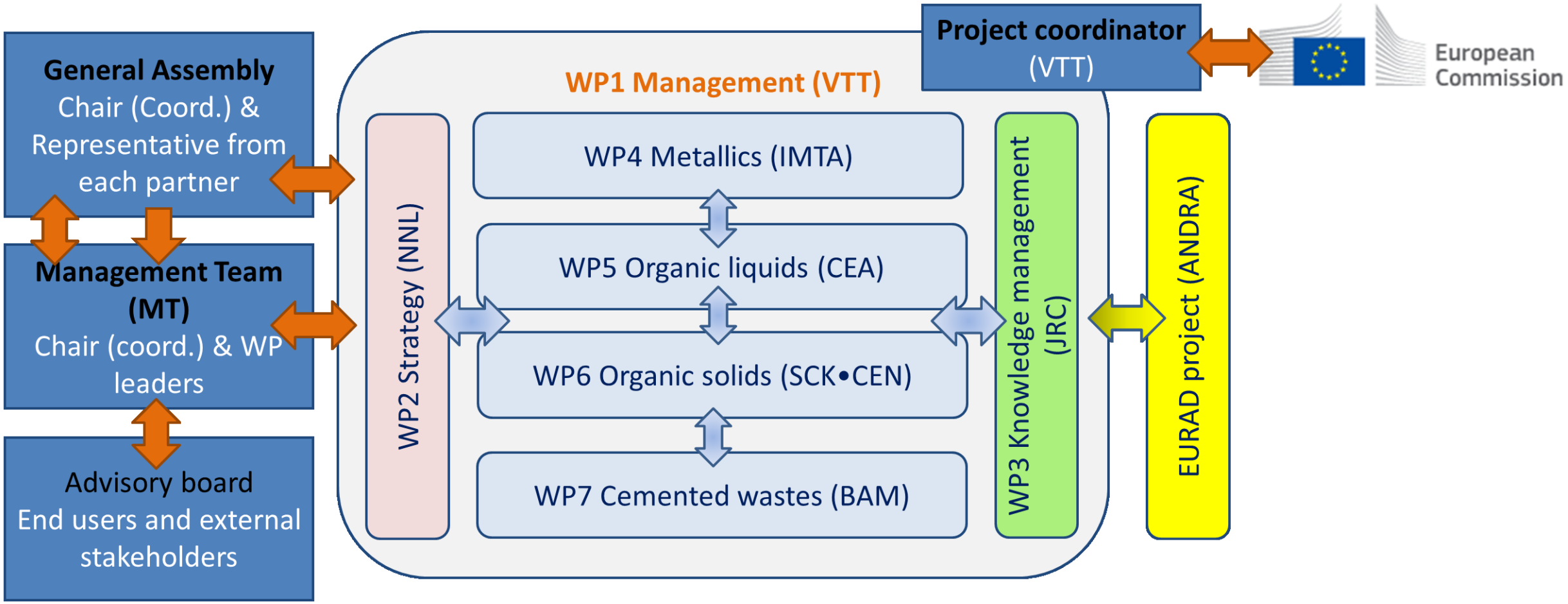


Scope was developed based on iterative feedback from end user community, regarding priorities on R&D topics.

Selection of topics and tasks based on areas having highest potential for technical and innovation impact.

Proposal lists exact techniques and their current, project and future technology readiness level (TRL) targets

PROJECT STRUCTURE



WP1 Tasks - Project Management and Dissemination

Each task identifies Task leader organization in parenthesis

- Task 1.1 Communication actions (VTT)
  - Includes with partners, EC, EURAD, End Users, Stakeholders
- Task 1.2 Project administration (VTT)
- Task 1.3 Quality assurance and risk management (VTT)
  - Includes data and quality management, ethics, risk and security management
- Task 1.4 Dissemination (VTT)

Total effort = 99 Person-Months (PM), among 7 partners as WP leaders

WP1 leaders: VTT (erika.holt@vtt.fi & maria.oksa@vtt.fi)

WP2 TASKS - Strategic Implementation

- Task 2.1 Establish a pre-disposal stakeholder community (SCK•CEN)
- T2.2 Development of a pre-disposal strategic research agenda (NNL)
- Task 2.3 Waste acceptance systems (CVRez)
  - Including assessments from WP4-7 cases
  - Close interaction with EURAD (WP9 Routes)
- Task 2.4 Governance (VTT)
- Task 2.5 Cross work package strategic assessment (CEA)
  - Including Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) from WP4-7 case studies

Total effort = 226 PM, among 18 partners

WP2 leader: NNL (anthony.w.banford@uknnl.com).

WP3 TASKS - Knowledge Management

- Task 3.1 Development of Knowledge Management Programme (Amphos 21)
- Task 3.2 State of Knowledge (SoK) (UJV)
- Task 3.3 Developing and Implementing Training Programme (Amphos21)
- Task 3.4 Implementing Mobility Programme (UJV)

Total effort = 77 PM, among 8 partners

WP3 leader: JRC (Paul.CARBOL@ec.europa.eu)

WP4 TASKS - Innovations in metallic treatment and conditioning

- T4.1 WP management (IMTA)
- T4.2 Defining Europe-wide Needs and Opportunities for Management of Metallic Waste Streams (GSL)
- T4.3 Development and optimisation of decontamination processes (IMTA)
- T4.4 Optimisation of metallic waste characterisation and procedures for waste minimisation and recycling (NCSRD)
- T4.5 Encapsulation of reactive metals in magnesium phosphate cement-based matrices (CNRS)
- T4.6 Dissemination (IMTA)

Total effort = 534 PM, among 23 partners

- WP4 leader: IMT-Atlantique Bernd GRAMBOW - grambow@subatech.in2p3.fr

WP5 TASKS - Innovations in liquid organic waste treatment and conditioning

- Task 5.1 WP5 Management (CEA)
- Task 5.2 Collection & review of waste, regulatory, scientific & technical data (GSL)
- Task 5.3 Study of direct conditioning process (RATEN & SOGIN)
- Task 5.4 Study of conditioning matrix performances (ECL & USFD)
- Task 5.5 Preliminary technical, economic and environmental analysis (GSL)
- Task 5.6 Implementation & dissemination (UNIPI)

Total effort = 618 PM, among 21 partners

WP5 leader: CEA (frederic.charton@cea.fr)

WP6 TASKS - Innovations in solid organic waste treatment and conditioning

- Task 6.1 Work package management (SCK•CEN)
- Task 6.2 Database on solid organic waste forms and their final state and value assessment analysis (GSL)
- Task 6.3 Thermal treatment of the radioactive waste forms and characterisation of the treated / reconditioned wastes (CEA)
- Task 6.4 Immobilisation of the treat wastes by geopolymer or cement-based materials encapsulation or by molten glass coating (CVRez)
- Task 6.5 Densification (USFD)
- Task 6.6 Physico-chemical characterisation of reconditioned waste form and stability testing (VTT)
- Task 6.7 Economic and Environment impact - Implementation (GSL)
- Task 6.8 Dissemination and Reporting (SCK•CEN)

Total effort = 509 PM, among 14 partners

WP6 leader: SCK•CEN (thierry.mennecart@sckcen.be)

WP7 TASKS - Innovations in cemented waste handling and pre-disposal storage

- Task 7.1 WP management (BAM)
- Task 7.2 State of the art in packaging, storage, and monitoring of cemented wastes (GSL)
- Task 7.3 Innovative integrity testing and monitoring techniques (BAM)
- Task 7.4 Digital Twin (PSI)
- Task 7.5 Data handling, processing and fusion (VTT)
- Task 7.6 Demonstration and implementation of monitoring, maintenance, and automation/digitalisation techniques (Orano)
- Task 7.7 Dissemination and Reporting (GSL)

Total effort = 408 PM, among 17 partners

WP7 leader: BAM (ernst.niederleithinger@bam.de)

CONSORTIUM MEMBERS

Bold indicated WP leaders, = Project Management team

30 of 48 partners are also participating in EURAD

- **VTT Technical Research Centre of Finland, Finland**
- **National Nuclear Laboratory (NNL), UK**
- **Joint Research Centre (JRC), Belgium**
- **Institut Mines Télécom Nantes Atlantique (IMTA), France**
- **Commissariat à l'énergie atomique et aux énergies alternatives (CEA), France**
- **Studiecentrum voor Kernenergie / Centre d'Etude de l'Energie Nucléaire (SCK•CEN), Belgium**
- **Bundesanstalt Fuer Materialforschung und Pruefung (BAM) Germany**
- Magics Instruments, Belgium
- Technical University Sofia, Bulgaria
- Ceske Vysoke Uceni Technicke V Praze (CTU), Czech Republic
- Centrum Vizkumu Rez (CVRez), Czech Republic
- Statni Ustav Radiacni Ochrany (SÚRO), Czech Republic
- ÚJV Rez, Czech Republic
- University of Helsinki, Finland
- Centre National de la Recherche Scientifique, France
- Ecole Centrale de Lille, France
- Institut de radioprotection et de Sûreté Nucléaire (IRSN), France
- ORANO CYCLE, France
- DMT GmbH & Co., Germany
- Forshungszentrum Julich GMBH, Germany
- Karlsruher Institut Fuer Technologie (KIT) Germany
- National Center for Scientific Research "Demokritos" (NCSRD), Greece
- Isotoptech Nuklearis Technoloiai Esszolgaltato Reszvenytarsasag, Hungary
- Radiookologiai Tisztasagert Tarsadalmi Szervezet (SORC), Hungary
- TS Enercon Mernokiroda KFT, Hungary
- Ansaldo Nucleare SPA, Italy
- Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA), Italy
- Istituto Nazionale di Fisica Nucleare (INFN), Italy
- Nucleco Societa Per L'Ecoingegneria, Italy
- Politecnico di Milano, Italy
- Società Gestione Impianti Nucleari (SOGIN), Italy
- University of Pisa, Italy
- Valstybinis Mokslinių Tyrimu Institutas (FTMC), Lithuania
- Nuclear Research and Consultancy Group, Netherlands
- Institutt for Energiteknikk (IFE), Norway
- Regiei Autonome Tehnologii pentru Energia Nucleara - Institutul de Cercetari Nucleare Pitesti (RATEN), Romania
- Amphos 21 Consulting SL, Spain
- Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas (CIEMAT), Spain
- Agencia Estatal Consejo Superior Deinvestigaciones Cientificas (CSIC), Spain
- Empresa Nacional de Residuos Radioactivos SA (ENRESA), Spain
- Universidad Autónoma de Madrid, Spain
- Paul Scherrer Institut, Switzerland
- Galson Sciences Limited, United Kingdom
- MCM Environmental Services Ltd, United Kingdom
- University of Manchester, United Kingdom
- University of Sheffield, United Kingdom
- National Science Centre Kharkov Institute of Physics and Technology (KIPT), Ukraine
- Institute of Environmental Geochemistry, National Academy of Science, Ukraine

PROJECT KEY PERFORMANCE INDICATORS

Project's specific objective	KPI as measure of success	Targets, by project end
Applying multi-disciplinary and multi-scale scientific approaches to demonstrate the new solutions	Increase of TRL and innovations (see Table 1.5, Section 1.4.2 examples), WP4-7	At least +1 TRL level increase for 10 or more innovative solutions
	Technical/scientific journal publications (open access)	At least 25 submitted
	Generate invention notifications (pre-patent)	At least 4 submitted
Addressing project drivers from the end users' point of view	Participation of industry to EUG	At least 20 at start, 30 by project end
	Demonstration or trial deployment of new technologies (WP4-7)	At least 3 by EUG members, in different Member states
	Adoption or refining of national WAC based on project guidelines (WP2)	At least 8 EUG members implement
Fostering deeper cooperation between experts from many EU Member-states	Engagement of other countries, beyond PREDIS membership	Participants from at least 5 other countries to workshops
	Individual subscribers to project newsletter (WP1)	At least 200, from over 25 countries
Training new experts in the field of pre-disposal waste management technologies	Number of PhD and Postdoc students (see Table 3.4c)	At least 15
	Number of mobility between partners (WP3)	At least 20
	Number of training modules produced (WP3), in cooperation with EURAD	At least 6
Updating and revising pre-disposal guiding documents	Producing cooperative deliverables with EURAD	At least 5
	Completed feedback from EUG for SRA (WP2)	At least20
	Project feedback from EUG members at annual workshops	Average score 7 out of 10 (survey questions)

KPIs to be assessed by Management team at annual reviews and for EC periodic reporting

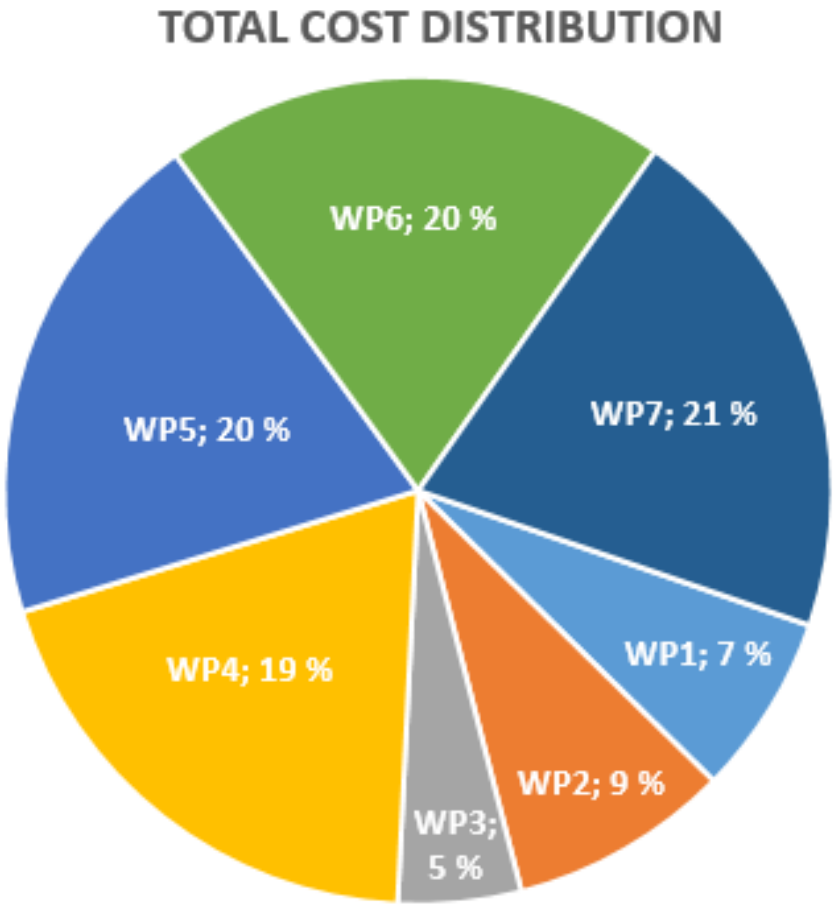
Objectives (left column) are same as specific objectives of project (slide #3)

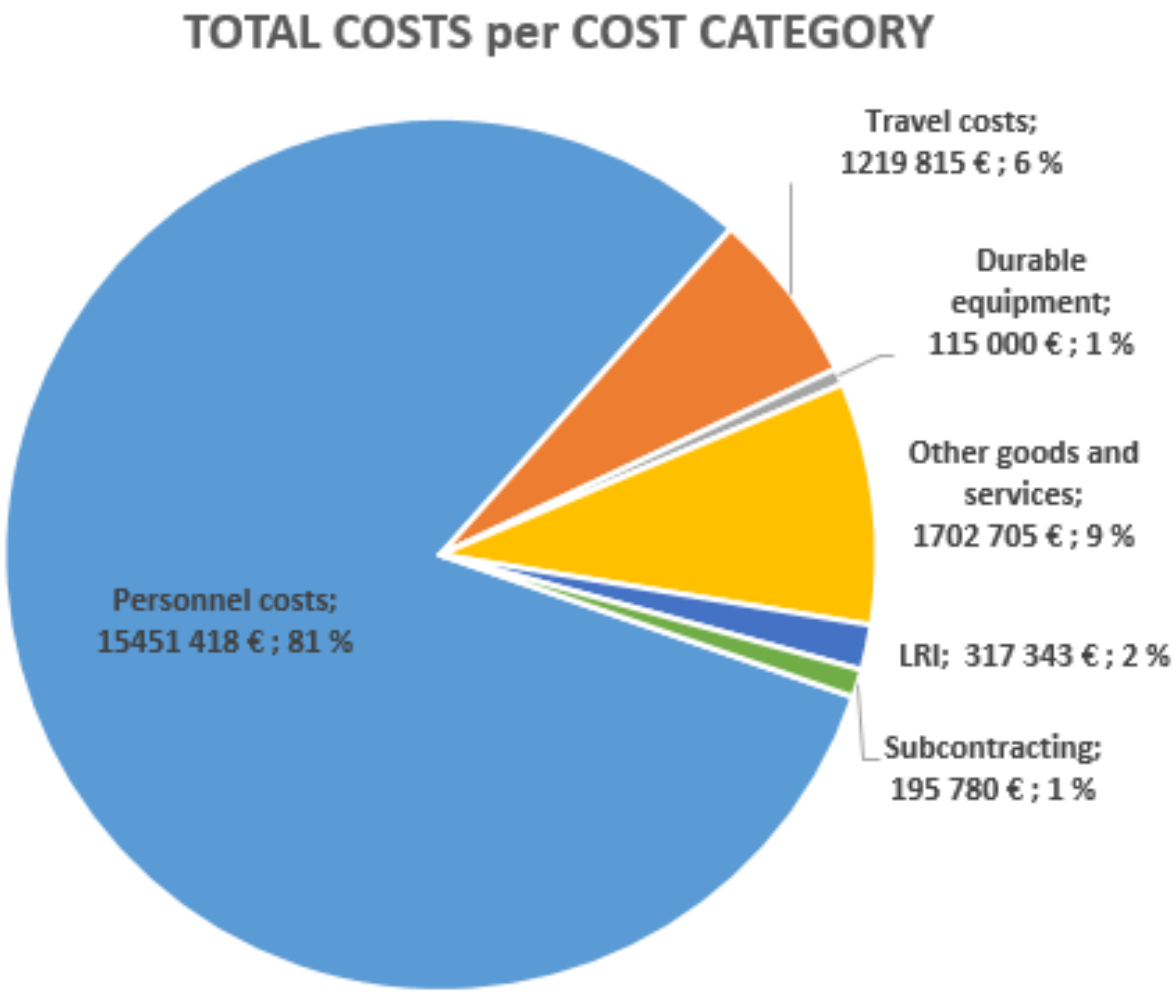
47.5 k€ is reserved (yet unallocated, in WP1) for stakeholder engagement grants, to participate to events

350 k€ is reserved (yet unallocated, inWP3) for training and mobility grants of partners, by application

BUDGET OVERVIEWS (1 of 2)

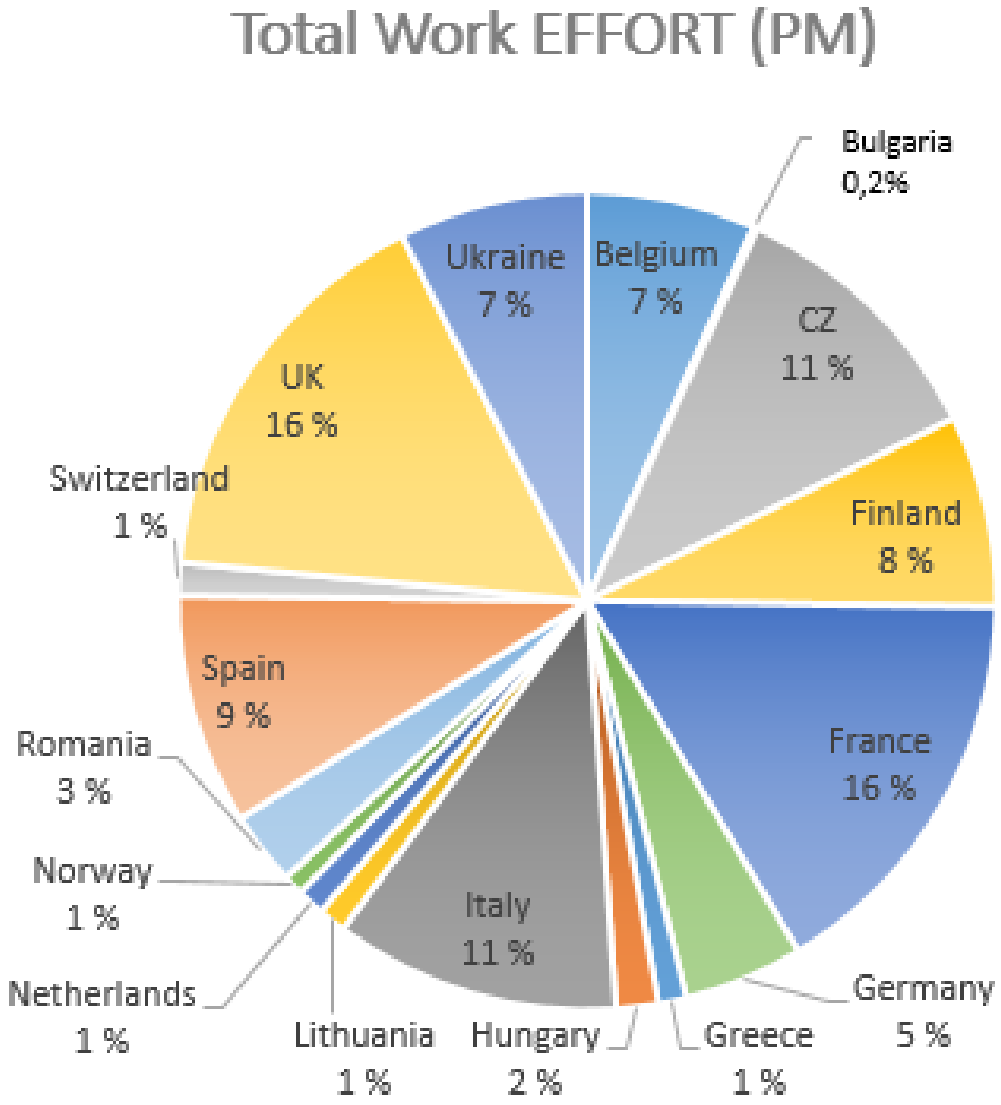
FUNDING NOTE:
*Technical WPs4-7 are co-funded at **50% total cost** at national (partner) level, 50% by EC.*
*WP1-3 are funded at **100% direct cost** by EC.*

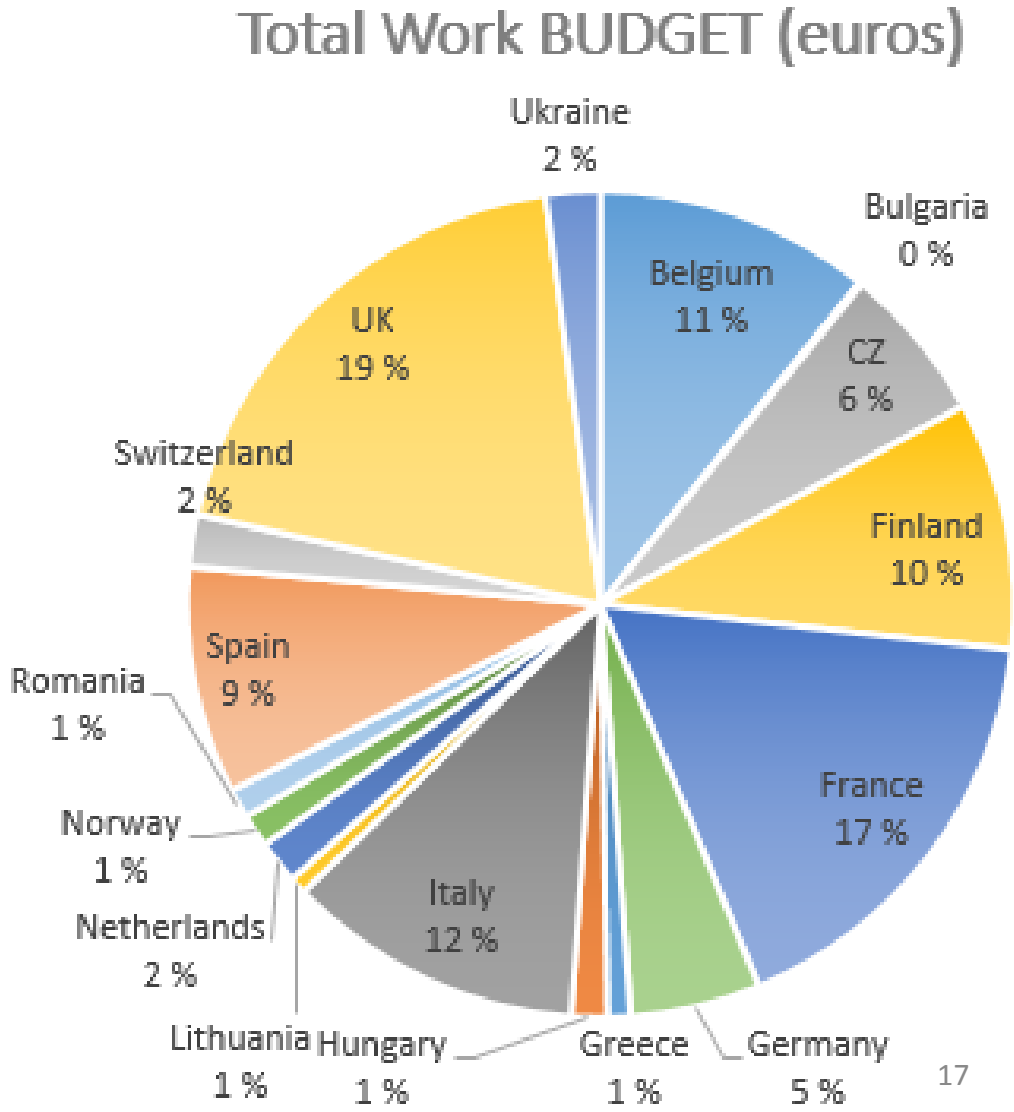




Note that an addition 8.6% of the budget within WP4-7 is dedicated to activities of students (PhD, postdoctoral and interns)

BUDGET OVERVIEWS (2 of 2)





END USERS AND STAKEHOLDERS GROUPS

End User Group (EUG)

- Focused group, consisting of radioactive waste producers (RWP), waste owners (WO), waste management organizations (WMOs).
- Institutes may be providing co-funding to partners.
- Listed in proposal (confirmed parties who expressed interest). More can be added.
- Will be required to sign NDA (part of Consortium Agreement) in spring 2020
- Role to provide feedback during project (attending workskhops, reviewing some draft documents, contribute to SRA, etc.)
- No voting power or approval rights.
- Benefit to them: access to project insights, ability to guide project direction, access to field demonstrations, focused applied R&D based on their co-funding (in cases where applicable) which is close to application

Stakeholders Group

- Wider group of interested parties. Consisting of other research entities, technical support organizations, regulators, government officials, policy makers, civil society, educators, non-EU parties.
- Institutes not directly named in proposal.
- Will be invited to public events to “follow” project.
- Will be invited to contribute to SRA development.
- Target audience for dissemination activities.

END USERS GROUP

Table as in Project Plan, Sept 2019.
More EUG members are welcome.

Organisation	Country	Description / Relevance to the project
ANDRA	France	WMO: interest in WP3, WP4, WP5, WP6 and WP7 EURAD Coordinator: liaison in WP2 and WP3
Belgoprocess	Belgium	WMO: Interest in WP7. Offers in-kind contribution to Task 4.3.
CEZ, a.s.	Czech Republic	WO/RWP: waste management (processing): interest WP4, WP5, WP7
Chernobyl NPP	Ukraine	WO/RWP, Interest in all WPs.
Dounreay	UK	WO: Interested in all.
EDF	France	WO/RWP: Interest in all.
ENGIE	France	WO/RWP: interest in WP6 and WP7
ENRESA	Spain	WMO and partner: interest in WP5, WP6 (Task 3, 6, 7) and WP7
Fennovoima	Finland	WO/ RWP: interest in WP6
INPP	Lithuania	WO/RWP, WMO: interest in WP6 (Task 3), WP7
Nagra	Switzerland	WMO: interest in WP
NIRAS/ ONDRAF	Belgium	WMO: interest to WP6 (Tasks 3, 6)
ORANO	France	WMO: Participation in WP7 as leader for Task 6, contributor for Tasks 1, 2, 4 and 7
PURAM	Hungary	WMO: interest in WP5 and WP6 (Tasks 3-7)
RWM	UK	WMO: interest in WP5
Sellafield Ltd	UK	WO/RWP, WMO: Interest in WP6 (Tasks 2, 7) and WP7
SKB	Sweden	WMO: interest in WP5.
SOGIN	Italy	WO/RWP, WMO: interest in all WPs. Participation in WP2, WP5 and WP7
SURAO	Czech Republic	WMO
TVO	Finland	WO/RWP, WMO: interest in WP6 (Tasks 1, 4, 5) and WP7.
Vattenfall	Sweden	RWP
Nugenia Association	worldwide	Association of WO/RWP. Technical Area 5B. Interest in all. Close liaison in WP2. In future merged with SNE-TP.
IGD-TP Association	worldwide	R&D focused Technology platform of WMOs and supporting organizations. Interest in all. Close liaison in WP2.

EURAD PROJECT INTERACTIONS

- High level of cooperation expected, especially on topics of:
  - Strategic Research Agendas & future governance accounting for needs of waste producers and waste owners (PREDIS WP2 Task 2.2 and 2.4, EURAD PMO & WP1)
  - Waste acceptance criteria (PREDIS WP2 Task 2.3, EURAD-ROUTES as WP9)
  - Knowledge management (PREDIS WP3 Task 3.1, EURAD WP11)
  - Training and mobility (PREDIS WP3 Task 3.3 and Task 3.4, EURAD WP13)
- PREDIS project proposal must stand “on its own”, for evaluation purposes. PREDIS must make own deliverables and have own milestones! BUT it is intended that some of these can be joint (or merged) with EURAD. This can only be agreed with EC during Grant Negotiation, and could not be explicitly promised in the project proposal phase.
- It is recommended that PREDIS+EURAD establish a “memorandum of understanding” for cooperation. Action to be taken during spring 2020.

SCHEDULE GOING FORWARD

- Management team open to share with stakeholders about project
- Comments to Project (e.g. interest in End User Group membership) should be addressed to VTT
- EC evaluation / decision expected February 2020
- Consortium Agreement to be circulated March-May 2020
- Project Kick-off meeting planned for June 15-17 2020, in Helsinki
- Annual project workshops (i.e. #2 in May 2021, France) with stakeholder sessions
- **WELCOME TO FOLLOW THE PROJECT or GET INVOLVED!**

Thanks!
Questions?

We are looking forward to this innovation-driven project and cooperating with many interested parties over the next 5 years

EXTRA SLIDES

Further details on WP contents:

- Innovation
- Task lists
- Expected outcomes
- Planned deliverables

Expected Impacts:
WP2 – Strategic Implementation

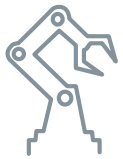
- Providing practical guidance on waste form qualification processes and on formulating generic waste acceptance criteria applicable for storage and disposal.
- Utilising LCA and LCC evaluation as a criteria in strategic decision making, which can underpin the basis to inform the research agendas
- Developing of new LCA and LCC models, for evaluating of existing and future pre-disposal methods
- Generating insights for both process development and overarching decision-making.
- Identifying of future innovation needs based on end user challenges and opportunities, this will focus research and innovation actions

Expected Impacts:
WP3 – Knowledge Management

- Integration of the Knowledge Management Programme of PREDIS activities with those of Radioactive Waste disposal as per the close link between this project with EURAD WPs 11 and 13. This will facilitate coherence and transferability along the complete process of the radioactive waste management.
- Multidisciplinary approach: integration of radioactive waste producers, waste managers, training organisations, research institutions and experts in knowledge management from countries in very different state of technological development.
- Alignment of the training programme with the needs of the pre-disposal industry and activities
- Intimate collaboration with the scientific-technical WPs in implementing the mobility measures

WP4 – Innovations in metallic material treatment and conditioning

- Develop innovative conditioning matrices for reactive metallic wastes.
- Develop innovative and optimised characterisation techniques for metallic wastes.
- Demonstrate innovative techniques to decontaminate metallic wastes to quantify the efficiency of decontamination processes and allow more effective application of the waste hierarchy.
- Develop treatment techniques for secondary waste streams after decontamination.



Expected Impacts:
WP4 –Metallic material treatment and conditioning

- Making problematic metallic waste management routes (from storage to disposal) safer and more economically efficient.
- Promoting the harmonisation of European regulation including WACs.
- Contributing to repository use optimisation, by allowing a more efficient use of the available disposal volumes.
- Reduction of waste management and disposal cost by valorisation of part of the waste stream through recycling, and minimisation of volumes and increased waste incorporation rates.

WP5 – Innovations in liquid organic waste treatment and conditioning

- Study of innovative materials (geopolymers) and their interactions with ROLW
- Development of direct conditioning solutions for RLOW based on geopolymer from TRL3 to TRL6 including validation tests with real waste and feasibility scale-up tests.
- Optimisation of geopolymers options and formulations to optimise ROLW encapsulation, especially incorporation rates and matrix performance.
- Process robustness regarding waste, raw materials and process variability including study definition and execution of non-standard tests to verify the stability and durability of the final waste form.
- Disposability assessment from the study of matrix performances and long-term behavior including “technical standard tests” related to WAC when available and scientific approaches for deeper physico-chemical understanding including the development of methodologies to evaluate parameters important for disposability assessment.

Expected Impacts: WP5 – Liquid organic waste treatment and conditioning

- Availability of a treatment and conditioning process for RLOW (problematic waste common to MSs) developed up to TRL 6.
- Availability of a set of experimental and technical data demonstrating the performances of the final waste materials in long-term storage and disposal conditions allowing to assess disposability.
- A shared view of pre-disposal solutions for RLOW translated into management strategies applied at national or European scales.
- A fully cooperative working program, targeting a common goal (development of direct conditioning route for RLOW as a common pre-disposal solution), with strong partners interactions where each partner generates a part of the required information and data to be merged together.

WP6 – Innovations in solid organic waste treatment and conditioning

- Closing the cycle for treatment of RSOW by proposing, developing, testing and verifying suitable matrices for conditioning of residues and secondary wastes stemming from (thermal) treatment options (like those investigated within THERAMIN).
- Development of geopolymers as alternative binder material to ordinary cement-based systems for conditioning of residues and secondary wastes.
- Demonstrate robustness of full treatment cycle for selected RSOW waste streams.
- Assessment of full treatment cycle in terms of technology and economical assessment, achieved volume reduction factor, final conditioned matrix performance and related WAC for different primary waste stream physico-chemical characteristics.

Expected Impacts: WP6 – Solid organic waste treatment and conditioning

- Increase the confidence about the long-term stability of the reconditioned wastes exposed to the ultimate repository environment, and hence the confidence in the thermal treatment + subsequent solidification / immobilisation as a very powerful and versatile technology for the stabilisation of problematic RSOW.
- Increase of the disposability, in some cases coupled with a decrease of the volume (e.g. volume reduction factor can reach 200 in case of incineration / gasification technique) and the cost for the interim storage and final disposal, of the RSOW that can be treated by thermal techniques.
- Be in agreement with the national and / or European legislation about the management of ROSW (including the 'historic' wastes) after their reconditioning thanks to thermal treatment technologies.
- Applicable to other problematic waste streams like highly reactive metals, cement-based waste susceptible to ASR, sulphate attack and other deterioration.
- Increase the confidence of all stakeholders that the nuclear industry has at its disposition mature technologies for the treatment and solidification / stabilisation of problematic wastes.

WP7 – Innovations in cemented waste handling and pre-disposal storage

- Innovative NDE tools for evaluation of package integrity, including, but not limited to visual methods, muon tomography and ultrasonic techniques
- Innovative sensor technologies for instrumented packages, including, but not limited to fiber optical techniques and methods for wireless power supply and data transmission
- An approach for developing and maintaining digital twins of packages, including a package evolution model based on inventory data, chemical and mineralogical characterisation data, data from chemical modelling, and monitoring data
- Application of machine-learning algorithms, trained on digital datasets, to produce a fast and accurate description of the geochemical evolution and the geo- and thermo-mechanical integrity of radioactive waste packages during pre-disposal
- A digital twin of a radioactive waste package based on machine-learning algorithms that can offer advanced information for waste package inspection protocols and, thus, contribute to safety of storage facilities
- Large digital database to train the machine-learning algorithms
- A decision framework model that is based on existing knowledge, data from measurements and predictions from digital twins
- Advancement of the overall TRL for data handling, processing and fusion in the context of intermediate radioactive waste storage from 4 to 6
- Reports on treatment options for existing packages, potential improvements in package design and recommendations for store automation concepts.

Expected Impacts: WP7 – Cemented waste handling and pre-disposal storage

- More versatile and reliable condition monitoring technologies, which have been demonstrated on operating radioactive facilities and made available to end users
- Improved accuracy in predicting the behaviour of waste/packages in stores through the integration of models with store and package monitoring information obtained using digital and machine learning technologies to enhance sampling, monitoring strategies and multi-method data fusion
- Increased safety: reduction of exposure time to personnel connected to remediation activities, reduction of risk of RN dispersion (locally or to the environment), gaining local stakeholder trust
- Reduced cost (20% or greater reduction in costs related to late-stage detection of damage or deterioration within waste packages)
- Minimised environmental footprint resulting from optimised treatment, packaging and store operations.

D#	Deliverable name	WP#	Lead	Type	DIS.	Month	D#	Deliverable name	WP#	Lead	Type	DIS.	M
D1.1	Project web site	WP1 (T1.1)	VTT	DEC	PU	M2	D3.5	Implementing specialised training actions	WP3 (T3.3)	A21	R	PU	M24, 48
D1.2	Communication & Dissemination report	WP1 (T1.4)	VTT	R	CO	M3+18, 36, 48	D3.6	Priority list and mobility formats	WP3 (T3.4)	UJV	R	PU	M9, 24
D1.3	Contingency plan	WP1 (T1.3)	VTT	R	CO	M3	D3.7	Summary report on activities of training and mobility grants	WP3 (T3.4)	UJV	R	PU	M48
D1.4	Project Data Management Plan	WP1 (T1.3)	VTT	R	CO	M6, 18, 48	D4.1	Database providing European metallic waste inventory info and WAC	WP4 (T4.2)	GSL	R	CO	M18
D1.5	Technical proceedings of Annual workshops	WP1 (T1.4)	VTT	R	PU	M13,25, 37, 48	D4.2	Synthesis report on management of metallic waste streams	WP4 (T 4.2)	GSL	R	PU	M45
D2.1	Final pre-disposal SRA report	WP2 (T2.2)	MCM	R	PU	M44	D4.3	Development of vacuumable gel decontamination process	WP4 (T 4.3)	CEA	R	PU	M42
D2.2	International approaches to establishing a waste acceptance system	WP2 (T2.3)	CVRez	OTHER	PU	M12	D4.4	Report on innovative decontamination process	WP4 (T 4.3)	IMTA	R	PU	M44
D2.3	Assessment of feasibility of waste form characterisation	WP2 (T2.3)	ISOT	OTHER	CO	M36	D4.5	Report on secondary waste management	WP4 (T 4.3)	CTU	R	PU	M44
D2.4	Guidance on waste form qualification	WP2 (T2.3)	SURO	R	PU	M42	D4.6	Report on insitu γ-spectrometry and sampling procedure	WP4 (T 4.4)	FTMC	R	CO	M46
D2.5	Guidance on establishing generic WAC	WP2 (T2.3)	TSE	R	PU	M44	D4.7	Report on radiochemical procedures for DTM nuclides	WP4 (T 4.4)	IMT	R	CO	M46
D2.6	Governance implementation plan	WP2 (T2.4)	VTT	R	CO	M46	D4.8	Characterization of MPC and LC-MPC	WP4 (T 4.5)	UAM	R	PU	M46
D2.7	Synthesis report on Pre-disposal LCA Studies	WP2 (T2.5)	UoM	R	PU	M47	D4.9	Effect of leaching on the chemical durability of magnesium phosphate cement	WP4 (T 4.5)	CEA	R	PU	M46
D3.1	Report on adaptation of KMP to pre-disposal activities	WP3 (T3.1)	A21	R	PU	M48	D4.10	Effect of irradiation on the durability of magnesium phosphate cement	WP4 (T 4.5)	IMTA	R	PU	M46
D3.2	Definition of demonstration case for S-of-Knowledge processes	WP3 (T3.2)	UJV	R	PU	M24	D4.11	Aluminum and steel reactivity in magnesium phosphate cement	WP4 (T 4.5)	RATEN	R	PU	M46
D3.3	Outcome of pilot case and input to final report on KMP activities	WP3 (T3.2)	UJV	R	PU	M46	D4.12	Beryllium reactivity in magnesium phosphate cement	WP4 (T 4.5)	SCK•CEN	R	PU	M46
D3.4	Design and Definition of training programme	WP3 (T3.3)	A21	R	PU	M15, 36	D4.13	Final report on dissemination in metallics	WP4 (T 4.6)	IMTA	R	PU	M47

D#	Deliverable name	WP#	Lead	Type	DIS.	Month	D#	Deliverable name	WP#	Lead	Type	DIS.	M
D5.1	Input data synthesis report	WP5 (T5.2)	GSL	R	CO	M6	D6.7	Modelling tool to predict behavior of reconditioned wastes	WP6 (6.7)	SCK•CEN	OTHER	PU	M48
D5.2	Report on Synthesis of formulation & process studies results	WP5 (T5.3)	RATEN	R	PU	M38	D6.8	Submission in scientific journals of at least 5 papers about the RSOW	WP6 (6.8)	ALL	R	PU	M48
D5.3	Report on Synthesis of conditioning matrix performances studies	WP5 (T5.4)	ECL	R	PU	M41	D7.1	SOTA report about pre-disposal activities for cemented waste	WP7 (T7.2)	SOGIN	R	PU	M6
D5.4	Report on Disposability assessment report for direct conditioning	WP5 (T5.4)	GSL	R	PU	M44	D7.2	2 open-access articles on integrity testing & monitoring techniques	WP7 (T7.3)	BAM	R	PU	M36
D5.5	Report on Direct conditioning of liquid organic waste route	WP5 (T5.5)	GSL	OTHER	PU	M46	D7.3	Report on innovative integrity testing and monitoring techniques	WP7 (T7.3)	BAM	R	PU	M42
D5.6	Report on Use of geopolymer matrices for the immobilisation	WP5 (T5.6)	CEA	R	PU	M47	D7.4	2 open-access articles on digital twin and modelling technologies	WP7 (T7.4)	PSI	R	PU	M36
D5.7	Report on interactions with stakeholders/end-users	WP5 (T5.6)	CEA	R	PU	M47	D7.5	Report on digital twin and modelling technologies	WP7 (T7.4)	PSI	R	PU	M42
D6.1	Summary report: Thermal processes for the thermal treatment of the RSOW	WP6 (T6.3)	CEA	R	PU	M36	D7.6	2 open-access articles on data processing and decision framework	WP7 (T7.5)	VTT	R	PU	M36
D6.2	Conditioning of ashes of RSOW by geopolymer or cement based encapsulation	WP6 (T6.4)	CVRez	R	PU	M36	D7.7	Report on innovative data handling & decision framework technologies	WP7 (T7.5)	VTT	R	PU	M42
D6.3	Economic, environmental & disposability impacts of novel treatments	WP6 (T6.7)	GSL	R	PU	M42	D7.8	Report on demonstration and implementation	WP7 (T7.6)	Orano	R	PU	M48
D6.4	Implemented database: Matching the chemical composition of the reconditioned wastes	WP6 (T6.2)	GSL	R	CO	M47	D7.9	Economic, environmental, and safety impact	WP7 (T7.7)	GSL	R	PU	M45
D6.5	Densification techniques test report	WP6 (6.5)	USFD	R	PU	M47	D7.10	Final report on innovations in waste handling and storage	WP7 (T7.7)	GSL	R	PU	M48
D6.6	Final report on Physico – chemical characterisation	WP6 (6.6)	VTT	R	PU	M47							