

## EURAD-2 WP description Template #2

Please see Instructions for Work Package Preparation Team, public document for guidance (available on EURAD and PREDIS websites)

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<b>Short Acronym and full Title</b>	ASTRA - <b>A</b> lternative RWM <b>STR</b> ategies		
<b>Type of activity</b>	<input type="checkbox"/> R&D	<input checked="" type="checkbox"/> Strategic Study	Knowledge Management – covered by a separate committee and template
<b>Budget estimation (total budget in M€, i.e ~ 1.5 M€)</b>	2 M€	<b>Duration of the WP (in months)</b>	50-60 months, to be adjusted during the next iteration of the WP Template
<b>Links with EURAD SRA / Roadmap Themes</b>  (if multiple choices, indicate the primary link in bold – maximum 3)	<input checked="" type="checkbox"/> <b>Programme Management (Theme 1)</b> <input checked="" type="checkbox"/> Pre-disposal (Theme 2) <input type="checkbox"/> Engineered Barrier Systems (Theme 3) <input type="checkbox"/> Geoscience (Theme 4) <input checked="" type="checkbox"/> Disposal facility design and optimisation (Theme 5) <input type="checkbox"/> Siting and Licensing (Theme 6) <input type="checkbox"/> Safety Case (Theme 7)		
<b>Links with EURAD SRA topics</b>  (if multiple choices, indicate the primary link in bold – maximum 3)	<i>Please indicate the corresponding Domains (number) and Description of R&amp;D, StSt or KM needs (second column of SRA)</i> Example: <ul style="list-style-type: none"> <li>- <b>1.1.1: National RWM policy</b></li> <li>- 2.2.4: Storage</li> <li>- 5.1.1: Design Requirements</li> </ul>		
<b>SRA drivers (maximum 3)</b>	<input type="checkbox"/> Implementation Safety	<input checked="" type="checkbox"/> Tailored Solutions	<input type="checkbox"/> Scientific Insight
	<input checked="" type="checkbox"/> Innovation for Optimisation	<input checked="" type="checkbox"/> Societal Engagement	<input type="checkbox"/> Knowledge Management
<b>Objective (What) – 1 sentence</b>	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.		

<p>Justification: impact / innovation / added-value (Why) – bullet points or short paragraph (maximum quarter of a page)</p>	<p>Alternative RWM strategies need to be considered for waste types which do not currently have available WM routes or where WM routes could be optimised for challenging waste forms or where originally proposed/considered disposal solution in frame of national concept is updated. These include storage lifetime prolongation<sup>1</sup>, alternative WM solutions (including deep borehole disposal and internationally shared waste management solutions) and disposal of waste bearing naturally occurring long-lived radionuclides (Depleted Uranium-DU, U, Th, Ra). Alternative strategies can be considered by countries at different stages of programmes and with different volumes of waste. Such strategies were little addressed in EURAD1. Sources for ASTRA include:</p> <ul style="list-style-type: none"> <li>• Ideas from the EURAD1 WP ROUTES.</li> <li>• Issues identified in EC Waste Directive national reports.</li> <li>• Cross cutting topics such as the need for interactions with Civil Society and Knowledge Management.</li> </ul> <p>ASTRA will contribute to identification of R&amp;D needs and optimisation of national waste management programmes.</p>
<p>List of planned tasks / subtasks with % of effort per task (5% increments)  (Maximum 10 bullets)</p>	<ul style="list-style-type: none"> <li>• Task 1: <b>Management/coordination</b> of the WP, max 10%.</li> <li>• Task 2: <b>Knowledge Management</b>, app 15%.</li> <li>• Task 3: <b>RW long term storage</b> (situations in which waste is stored for periods that exceed the original design life of the containers and storage facilities, for example, owing to the disposal of the waste being delayed or postponed) for some specific inventories, app 15%: <ul style="list-style-type: none"> <li>• Technical and safety issues (aging of materials and safety barriers, maintenance, retrievability of waste packages, repackaging, needs for construction).</li> <li>• Financial issues (construction, operation, extension capacity, funding principle and availability).</li> </ul> </li> <li>• Task 4: <b>Deep borehole disposal (DBD) technological readiness level (TRL) and challenges</b>, app 15%: <ul style="list-style-type: none"> <li>• European wide inventory of knowledge and mapping of stakeholder concerns and needs around DBD (such as inventory, timing/optimisation issues where mined programme exists requirements (safety) and design basis / borehole geometries, siting, handling of uncertainties).</li> <li>• Knowledge sharing, confirmation of TRL and mapping of similarities and differences for boreholes/sealing technologies via cross-industries engagement (workshop).</li> </ul> </li> <li>• Task 5: <b>Alternative waste management solutions for SIMS</b>, app 15%: <ul style="list-style-type: none"> <li>• Analysis of management strategies for small amount of often diverse and challenging wastes, by supporting exchanges of</li> </ul> </li> </ul>

<sup>1</sup> IAEA Safety Guide - No. WS-G-6.1: LONG TERM STORAGE OF RADIOACTIVE WASTE 6.86. Long term storage of radioactive waste refers to situations in which waste is stored for periods that exceed the original design life of the containers and storage facilities, for example, owing to the disposal of the waste being delayed or postponed. Long term storage can also refer to situations in which the waste packages and storage facility are designed for relatively long periods of storage (e.g. 100 years).

	<p>experiences and best practice in forum for community of practice between LIMS and SIMS.</p> <ul style="list-style-type: none"> <li>• Shared solutions for different RW: sharing of predisposal &amp; disposal activities and facilities, strategic issues not addressed in previous projects,(e.g. maintenance of specialist competences and safety on a longer term basis).</li> <li>• Disposal strategies and waste management solutions for specific challenging wastes that do not meet existing WAC.</li> <li>• Task 6: Evaluation of <b>RWM strategies for the disposal of waste bearing naturally occurring long-lived radionuclides</b> (Depleted uranium, U, Th, Ra), app 15%: <ul style="list-style-type: none"> <li>• Evaluate and possibly define suitable indicators/yardsticks which can be used to effectively evaluate safety on very long time scales.</li> <li>• Evaluation of optimised disposal concepts.</li> <li>• Explore alternatives for the long-term management of DU, e.g. recycling, or reuse in disposal applications such as shielding, barrier material, criticality control and tunnel backfilling.</li> </ul> </li> <li>• Task 7 : <b>Interaction with Civil Society (ICS)</b>, app 15%: <ul style="list-style-type: none"> <li>• Development of scoping program for ICS (Year 1).</li> <li>• Each year (2-4) elaboration of report with particular topic addressing the task 3, 4, 5 and 6 with feedback to governance aspects of these socio technical challenges.</li> <li>• ICS dissemination activities with summary report in Year 5.</li> </ul> </li> </ul>
<p>List of expected outcomes linked to the identified SRA drivers</p> <p>(Maximum 6 bullets)</p>	<ul style="list-style-type: none"> <li>• <b>Innovation for Optimisation:</b> ensure Member States to advance in optimisation and implementations of their programmes, in particular for SIMS.</li> <li>• <b>Tailored solutions:</b> enable platform to share future disposal strategies and to discuss the associated difficulties, especially for SIMS, to support the cost effective RWM solutions. Consolidation of learning internationally on lifecycle management of wastes containing high concentrations of long-lived naturally occurring radionuclides (and in particular DU), leading to optimised reuse, packaging and disposal concepts relevant to countries having varying amounts of such wastes. Identification of the elements of a safety case methodology applicable to such wastes. Identification of DBD as option for specific waste groups.</li> <li>• <b>Social Engagement:</b> assure structured interactions between actors, including CS and help to foster mutual understanding and trust about how the RWM is selected and implemented.</li> </ul>
<p>Deliverables</p> <p>(Maximum 6 – including the prescribed deliverables)</p>	<ol style="list-style-type: none"> <li>1. <b>Green paper</b> - position paper on mutual understanding on alternative RWM strategies for tasks (in month 12 )</li> <li>2. <b>White paper</b> about further activities to be analysed in ASTRA (in month 18).</li> <li>3. <b>Alternative RWM challenges</b> – middle term report on the issues investigated in the WP (in month 36)</li> </ol>

	<p>4. <b>An outcome/impacts report</b> about alternative RWM strategies summarizing the work performed (Month 56- TBC in next iteration of the WP Template)</p>
<p>Critical input requirements &amp; identified risks</p>	<ul style="list-style-type: none"> <li>• To ensure productive interactions and meaningful discussions among participants.</li> <li>• To maintain a diverse representation from various participants and across different programs, such as SIMS and LIMS.</li> <li>• R&amp;D from participating countries into DBD, plus consideration of work in non-EU countries having undertaken significant work on concept development (e.g. work by SNL in the US / DBD field test). No significant risks identified to successful implementation of the task.</li> <li>• Extensive R&amp;D programme in the UK on optimised reuse, packaging and disposal concept options for DU. No significant risks identified to successful implementation of the task.</li> </ul>
<p>Major achievements expected by end of Year 2 (Go/No Assessment)<sup>2</sup> (Maximum 5 bullets)</p>	<ul style="list-style-type: none"> <li>• Green paper (position paper) from WP partners on alternative for RWM strategies (in month 12).</li> <li>• White paper (second wave description for year 3-5) regarding activities ASTRA (in month 18).</li> <li>• KM plan for ASTRA (in month 12).</li> <li>• Established forum for a community of practice between LIMS and SIMS.</li> </ul>
<p>(Optional - Explain what is out of the scope?)</p>	<p>All related activities in preparation in the framework of IAEA (e.g CRP on DBD), NEA (feasibility of shared solutions) and other projects on these topics (programmes still under preparation), DG-ENER feasibility study on shared disposal</p>
<p>List of preliminary interested organisations as partners in the WP contributing effort; % of effort (person months, by College)</p>	<p>% of effort is an estimate at this stage.</p> <p>REs (44%): IST-ID (Portugal), ENEA (Italy), INCT (Poland), DMT (Germany), CEPN (France), Egis (France), TNO (Netherlands), GTK (Finland), UJV (Czech), TU Sofia (Bulgaria), LEI (Lithuania), Energorisk (Ukraine), CTU (Czech R), SCK.CEN (Belgium), PolITO (Italy)</p> <p>TSOs (38%):SURO (Czech R), IRSN (France), NTW (France and international), EIMV (Slovenia), NCSR (Greece), NRG (Netherlands), GI-BAS (Bulgaria), NRG (Netherlands), IDOM (Spain), SSTC NRS (Ukraine), VTT (Finland), NTL-AUT (Greece), FTMC (Lithuania)</p> <p>WMOs (18%): NES (Austria), DEKOM (Denmark), COVRA (Netherlands), ARAO (Slovenia), IAE (Lithuania), NJF (Slovakia).</p>

<sup>2</sup> EC budget being only allocated for the first 2 years, each work package progress will be reviewed at the end of Year 2, to assess its continuation based on the total budget that EURAD-2 will be granted.

If applicable - links with previous projects / work packages	ROUTES, UMAN, ERDO, SITEX.Network, HARPERS, PREDIS WP7.
WP Preparation Team (1 member per College) contact (organisation + person, email)	RE: EGIS Group, Laure Prevot, Laure.PREVOT@egis-group.com TSO : EIMV, Matija Simon, Matija.simon@eimv.si WMO : COVRA, Marja Vuorio, marja.vuorio@covra.nl CG observer: NAGRA, Ingo Blechschmidt, ingo.blechschmidt@nagra.ch