

## WP 3 ASTRA

### ALTERNATIVE WASTE MANAGEMENT STRATEGIES

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# TASK 1: MANAGEMENT AND COORDINATION

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# ASTRA INTRODUCTION

**2** years

**700.000** EUR budget

- **Strategic study** based on **ROUTES** suggestions
- Analysis of readiness, feasibility and challenges of alternative RWM solutions needed by many countries, in particular Small Inventory Member States (SIMS) to safely manage and dispose of their waste.

**21** partners

**4** associate partners

## **01** Management coordination

*Lead Marja Vuorio, COVRA, WMO, Netherlands*

## **02** Knowledge management

*Lead Wilfried Pfingsten, PSI, RE, Switzerland  
Co-lead Laure Prévot, EGIS, RE, France*

## **03** RW long term storage

*Lead Kateryna Fuzik, SSTC NRS, TSO, Ukraine  
Co-lead Wilfried Pfingsten, PSI, RE, Switzerland*

## **04** Deep borehole disposal (DBD)

*Lead Laure Prévot, EGIS, RE, France  
Co-lead Elizabeth Harvey, Galson Sciences, RE, United Kingdom*

## **05** Alternative for SIMS

*Lead Barbara Horvat, EIMV, TSO, Slovenia  
Co-lead Marie Charlotte Bornhöft, DMT, RE, Germany*

## **06** Interaction with civil society

*Lead Gabriele Mraz, NTW, TSO, France  
Co-lead Alexis Geisler-Roblin, NTW, TSO, France*

# PARTICIPATING COUNTRIES AND ORGANIZATIONS

Country	Task 1 Management coordination	Task 2 Knowledge management	Task 3 RW long term storage	Task 4 Deep Borehole Disposal	Task 5 Alternatives for SIMS	Task 6 Interaction with civil society
<b>Austria</b>			NES		NES	
<b>Bulgaria</b>			TUS		TUS	
<b>Czech republic</b>			SURO	SURO	SURO	
<b>Denmark</b>			DEKOM	DEKOM	DEKOM	
<b>Estonia</b>			UTARTU	UTARTU	UTARTU	
<b>Finland</b>			VTT	VTT	VTT	
<b>France</b>	EGIS,NTW	EGIS,NTW	IRSN; NTW	<b>EGIS</b> , ANDRA, NTW	EGIS, ANDRA, NTW	<b>NTW</b> and all partners
<b>Germany</b>	DMT	DMT	DMT	DMT	DMT	
<b>Greece</b>			NCSR		NCSR	
<b>Netherlands</b>	<b>COVRA</b> , NRG	COVRA, NRG	NRG	TNO, COVRA	NRG	
<b>Poland</b>			INCT	INCT	INCT	
<b>Portugal</b>			IST-ID		IST-ID	
<b>Slovenia</b>	EIMV	EIMV	EIMV	ARAO, EIMV	<b>EIMV</b> , ARAO	EIMV
<b>Ukraine</b>	SSTC NRS	SSTC NRS	<b>SSTC NRS</b> , Energorisk	SSTC NRS	Energorisk, SSTC NRS	
<b>Switzerland</b>	PSI	<b>PSI</b>	PSI	PSI	PSI	
<b>UK</b>	GSL	GSL	NWS	GSL, NWS	GSL	
<b>US</b>			SNL	SNL	SNL	

# DELIVERABLES AND MILESTONES

Number	Deliverable name	Short description	Lead participant	Delivery date (in months)
1	Green paper	Position paper on mutual understanding on alternative RWM strategies for tasks	COVRA	M12
2	State-of-the-art assessment of TRLs and R&D requirements for deep borehole disposal of radioactive wastes	DBD of radioactive wastes	Egis/GSL	M15
3	White paper	About further activities to be analysed in ASTRA potential continuation	PSI	M18
4	Outcome/impacts report to Member States and End Users	About alternative RWM strategies summarizing the work performed	COVRA	M20

Number	Milestone name	Lead participant	Delivery date (in months)
1	Workshop on TRLs for DBD	Egis/GSL	M6
2	Workshop on building mutual understanding about RWM strategies for long-term storage exceeding the design lifetime	SSTC NRS	M9
3	Workshop on alternative RWM strategies for long-term storage exceeding the design lifetime	SSTC NRS	M15
4	Workshop for RWM strategies for the disposal of waste bearing naturally occurring long-lived radionuclides	NRG	M15
5	Management strategies for small amounts of waste in SIMS	EIMV	M18
6	Report from pluralistic workshop, and central aspects from civil society vision.	NTW and EIMV	M21

# TASK 2: KNOWLEDGE MANAGEMENT

Wilfried Pfingsten, Laure Prévot



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## TASK 2: KNOWLEDGE MANAGEMENT - DESCRIPTION

- Partners: PSI, COVRA, EIMV, EGIS, SSTC NRS, NTW
- The main goal is
  - .... to capture knowledge relevant for the ASTRA WP prior and during this WPs progress
  - ... contribute to knowledge transfer to the EURAD-2 community and outside in accordance with the EURAD-2 KM Deliver, in cooperation with KM WP/(s), specific activities to transfer knowledge to interested parties.
- Task 2
  - .... organise cooperation on KM within ASTRA WP, between ASTRA WP and all relevant parties involved in KM activities in EURAD-2.
  - .... promote, when applicable, individual students participation to relevant dissemination events (conferences, workshop, webinar and meetings),
  - .... support internal, cross-WP and external mobility actions, networking activities, and encourage mentoring

## TASK 2: KNOWLEDGE MANAGEMENT – CONTINUOUS ACTIVITIES & DELIVERABLE

- Monthly editorial meeting with Task 1,3,4,5,6 leaders
  - subtasks status exchange, identification of news relevant to ASTRA, EURAD2, students, end users, ...
  - identification of new knowledge, gaps, announcements, possible activities, contacts, exchange, ...
  - exchange about partners installations, equipment, possibilities, ...
  - communication of questionnaire, WS results, others
  - protocols of editorial meetings
  - decide on communication within and out of ASTRA / input to green/white paper

exchange via projectplace (internal), LinkedIn, WhatsApp (groups), ... ?  
Exchange with KM WP (tbd)



# TASK 3: RW LONG TERM STORAGE

Kateryna Fuzik, Wilfried Pfingsten



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## SUBTASK 3.1 DATA COLLECTING AND BUILDING MUTUAL UNDERSTANDING OF RWM STRATEGIES FOR LONG-TERM STORAGE EXCEEDING THE DESIGN LIFETIME

- **16 partners:** SSTC NRS, PSI, TUS, Energorisk, INCT, IRSN, SURO, EIMV, IST ID, DMT, NRG, NES, UTARTU, VTT, DEKOM, NWS
- **Collect and analyse data** from subtask partners on situations and possible ways of management of RW packages and storage facilities for which the design lifetime has been exceeded (distribution of questionnaire - **December 2024**)
- Contribute and participate in **workshop** focused on the building of mutual understanding about the views of all actors (WMO, RE, TSO, CSO) about RWM strategies for long-term storage exceeding the design lifetime (**June 2025**)

## SUBTASK 3.2 ALTERNATIVE RWM STRATEGIES FOR LONG-TERM STORAGE EXCEEDING THE DESIGN LIFETIME

- **11 partners:** SSTC NRS, PSI, EIMV, INCT, IRSN, Energorisk, NRG, NES, SURO, TUS, NCSR
- **Study of alternative RWM strategies** for situations in which the design lifetime of long-term storage is exceeded, considering safety, technical, and financial factors
- Contribute and participate in **workshop** focused on the discussion with different categories of actors (WMO, RE, TSO, CSO) on alternative RWM strategies for long-term storage exceeding the design lifetime, and sharing and obtaining feedback for refining study results (**December 2025**)

# TASK 4: DEEP BOREHOLE DISPOSAL

Laure Prévot, Liz Harvey



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# TASK 4: DEEP BOREHOLE DISPOSAL

## 2 interlinked objectives

- **State-of-the-art** report on Technology Readiness Levels for DBD
- Identification of **stakeholder concerns and R&D needed** to build confidence in the implementation of DBD

## 17 organizations

Czech republic



Denmark



Estonia



Finland



France



Germany



Netherlands



Poland



Slovenia



Ukraine EURAD2 Kic



Switzerland



United Kingdom



United States



eurad2

→ Interfaces will be managed with parallel 4-year IAEA Common research project on Deep Borehole Disposal to identify synergies and avoid redundancy of assessment.

## TASK 4: DEEP BOREHOLE DISPOSAL



### SUBTASK 4.1 TRLs for DBD

**Questionnaire** to End Users

Notes to examine **transferability of technologies** from other applications

*For instance:*

- seal systems for mined repositories,
- drilling/sealing large diameter boreholes
- Oil/ Gas industry

**Workshop** to identify areas of agreement and uncertainties and discuss the mapping of TRLs



### SUBTASK 4.2 Stakeholder needs and R&D requirements for DBD

**Questionnaire** to End Users, in light of associated TRLs where applicable

*For instance:*

- suitable inventories for DBD,
- timing and optimization if mined programmes needed,
- safety requirements for DBD,
- design basis for borehole geometries,
- siting issues,
- management of uncertainties.

**Workshop** with perspectives of different stakeholders, R&D work in progress, proposed R&D and uncertainties



### Final report

The R&D requirements could form the basis for a further WP in EURAD Wave 2.

# TASK 5: ALTERNATIVE WASTE MANAGEMENT SOLUTIONS FOR SIMS

Barbara Horvat, Marie Charlotte Bornhöft, Kelvin  
Browning



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## TASK 5: ALTERNATIVE WASTE MANAGEMENT SOLUTIONS FOR SIMS

- **Subtask 5.1: Analysis of management strategies for small amounts of waste**

- Partners: EIMV, DMT, IST-ID, NES, ARAO, NRG, PSI, UTARTU, TUS, INCT, VTT, SURO, ENERGORISK, EGIS, GSL, DEKOM, SSTC NRS, SNL, NCSR.D.
- Analyse management strategies for small amounts of often diverse and challenging wastes, by supporting exchanges of experiences and best practices in the forum for community of practice between LIMS and SIMS;

- **Subtask 5.2: Investigation of shared solutions for different RW**

- Partners: EIMV, IST-ID, DMT, NES, ARAO, NRG, PSI, UTARTU, TUS, INCT, VTT, SURO, ENERGORISK, EGIS, GSL, DEKOM, SSTC NRS, SNL, NCSR.D.
- Investigate shared solutions for different RW: sharing of predisposal & disposal activities and facilities, strategic issues not addressed in previous projects (maintenance of specialist competencies and safety on a longer-term basis);



## TASK 5: ALTERNATIVE WASTE MANAGEMENT SOLUTIONS FOR SIMS

- **Subtask 5.3: Evaluation of RWM strategies for the disposal of waste bearing naturally occurring long-lived radionuclides**
  - Partners: IST-ID, DMT, ANDRA, UTARTU, NRG, PSI, INCT, SURO, ENERGORISK, GSL, SSTC-NRS, NCSR, NWS.
  - Assess the Current Waste Inventory.
  - Lifecycle management:
    - Understand optimisation and reuse,
    - Understand the current disposal programs for managing such wastes in member states.
  - Understand how Long-Term Safety is Demonstrated:
    - Understand how member states demonstrate long-term safety for waste disposal over extended timeframes, addressing issues such as long half-lives and radionuclide ingrowth. Identify the types of performance assessments used to ensure safety throughout the disposal lifetime.
  - Develop Future Work Directions:
    - Use the insights gained to guide the development of future initiatives and projects related to waste management.

# TASK 6: INTERACTION WITH CIVIL SOCIETY

Gabriele Mraz, Alexis Geisler-Roblin



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## TASK 6: INTERACTION WITH CIVIL SOCIETY (ICS)

- **Objective: Enabling interaction between technical partners and civil society partners**
- **Subtasks**
  - Task 6.1:
    - Identifying and elaborating topics of interest for ICS
    - Direct collaboration of CS with technical partners in the tasks 3, 4 and 5 (= taking part in meetings, giving input and discussing)
    - Reporting of our input to the ASTRA “green paper” and “white paper”
  - Task 6.2:
    - Organisation of a pluralistic workshop (=3+1 workshop = 3 technical colleges plus civil society experts)

## BASICS OF ICS WORK IN ASTRA

- **Identifying and elaborating topics of interest for ICS mainly based on outcomes of the ROUTES strategic study from EURAD-1, but also from UMAN and collaboration with EURAD technical WPs**
- **Using methods that have been developed in EURAD:**
  - Giving input and discussing with technical partners in the other tasks
  - Developing together methods for these meetings (f.e. using scenarios and discussing along them)
  - Using the PEP serious game
  - Giving feedback on inputs of the technical colleges
  - Contributing to reports
  - Organisation of a pluralistic workshop
  - Exchanging with larger civil society group in ICS meetings

# INTERFACES WITH ONGOING WPS AND PROJECTS

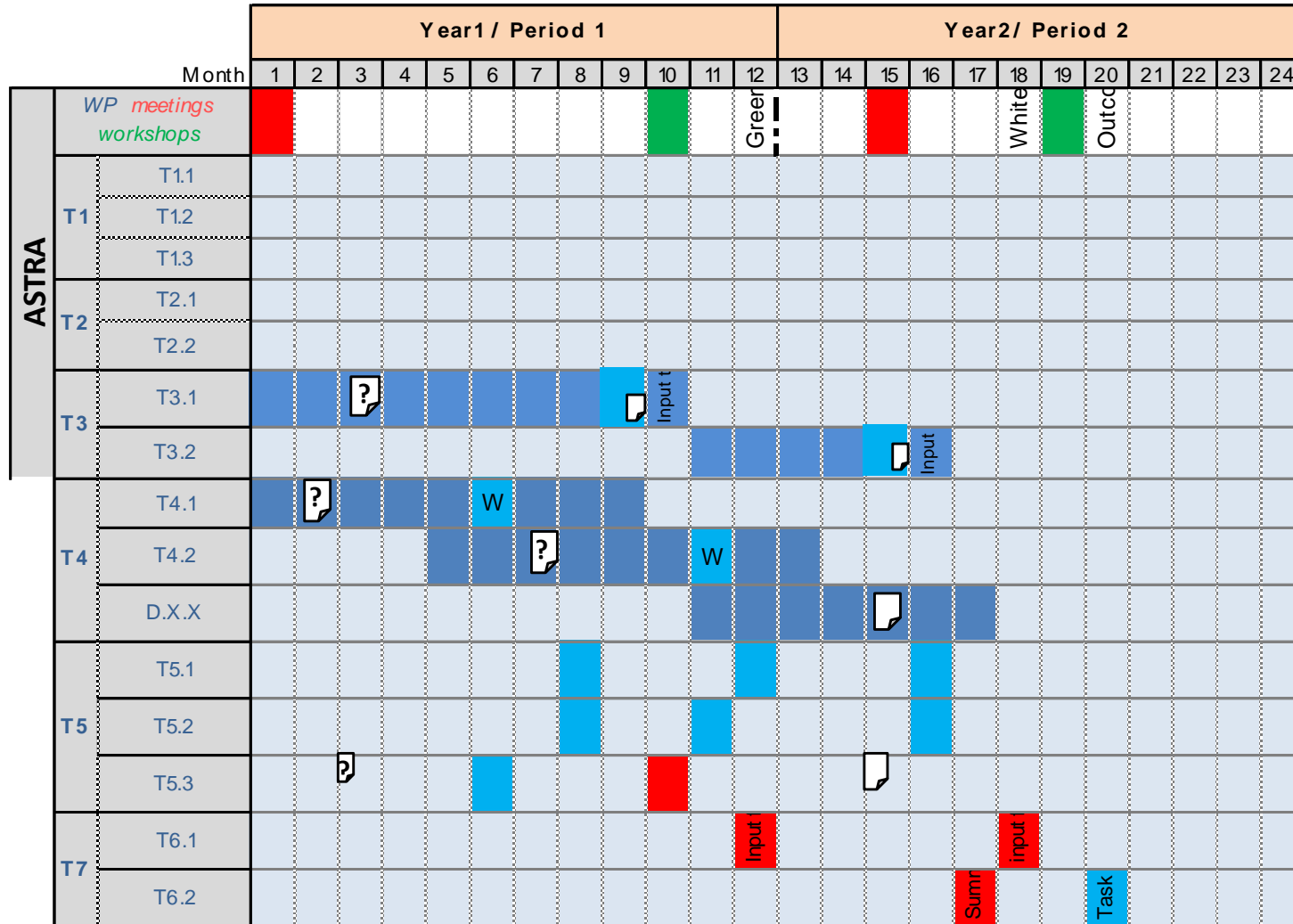
- **EURAD-2**

- FORSAFF
  - Effect of SMRs on DBD and SIMS
- STREAM
  - Is DBD considered within the deep disposal options?
- CLIMATE
  - Impacts on RW long term storage and deep boreholes disposal

- **OTHER projects**

- IAEA CRP on DBD
- DG ENER funded pilot project on shared solutions
- NEA MIRA on feasibility of multinational solutions
- IAEA update on MNR tecdoc?

# TIMELINE



- Training
- Meeting
- WP workshop
- Task workshop
- Task deliverable/milestone
- Task questionnaire
- Kick-off online
- Annual meetings with task meetings/Ws

## THANK YOU - ANY QUESTIONS?

If your organization is not a WP partner, but would still like to participate in the surveys or webinars we invite you to contact WP leader

[marja.vuorio@covra.nl](mailto:marja.vuorio@covra.nl)



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