



Association for Multinational
Radioactive Waste Solutions

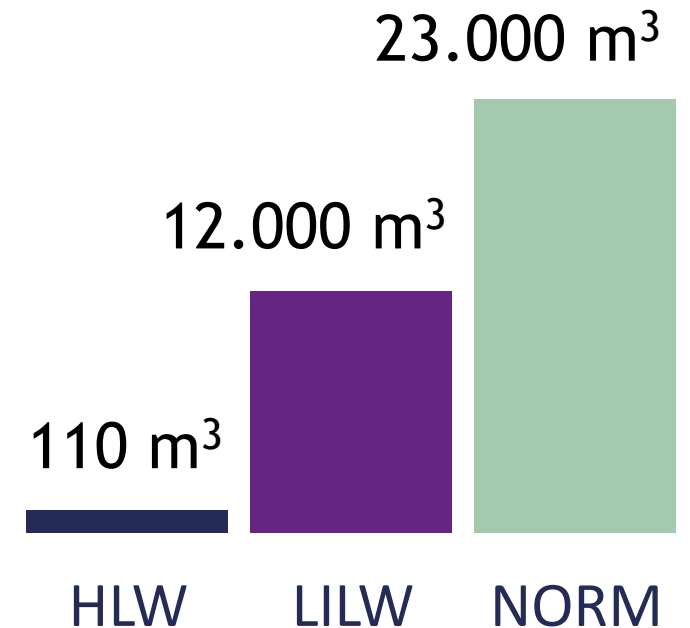
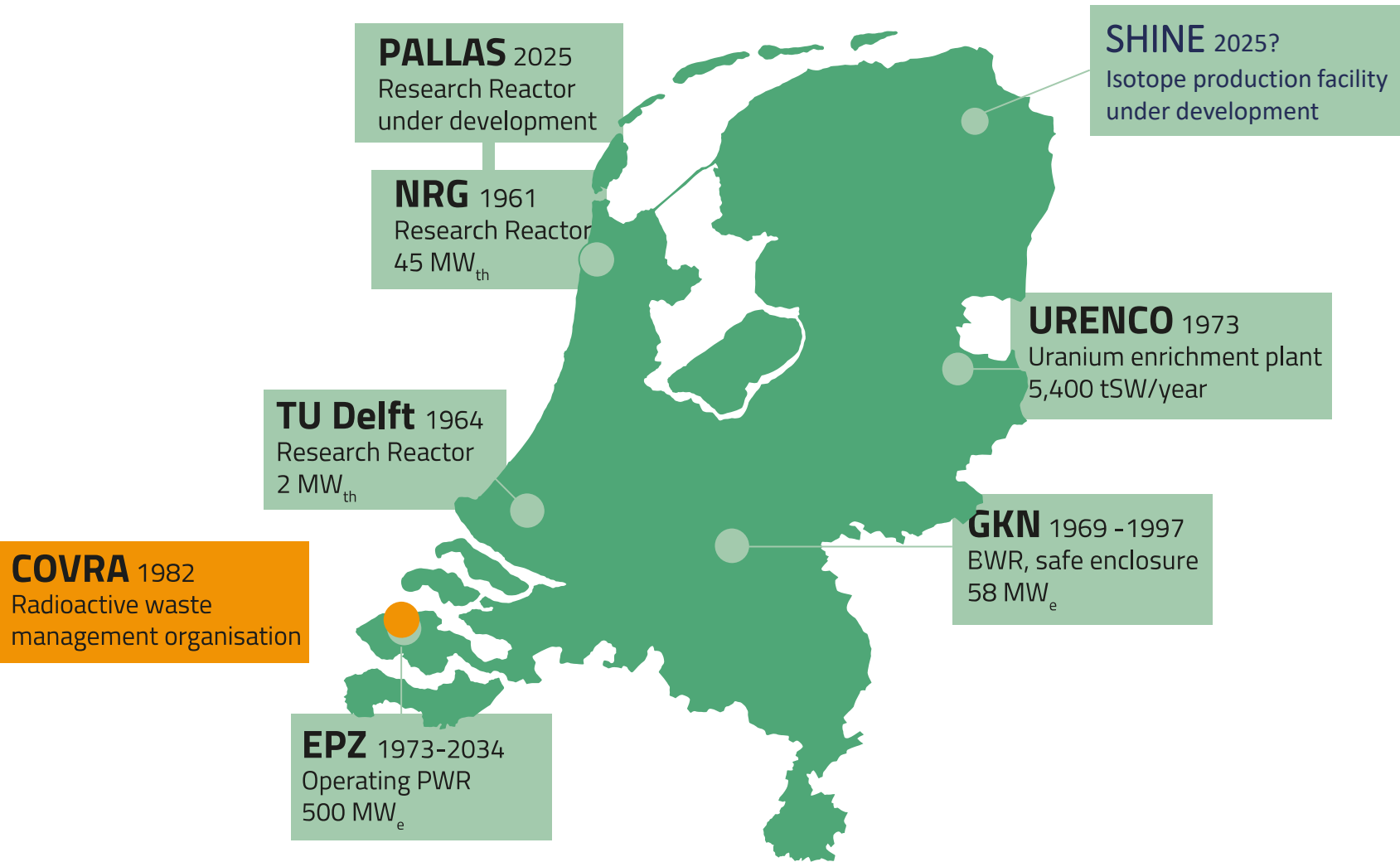
Multinational Radioactive Waste Solutions

Marja Vuorio

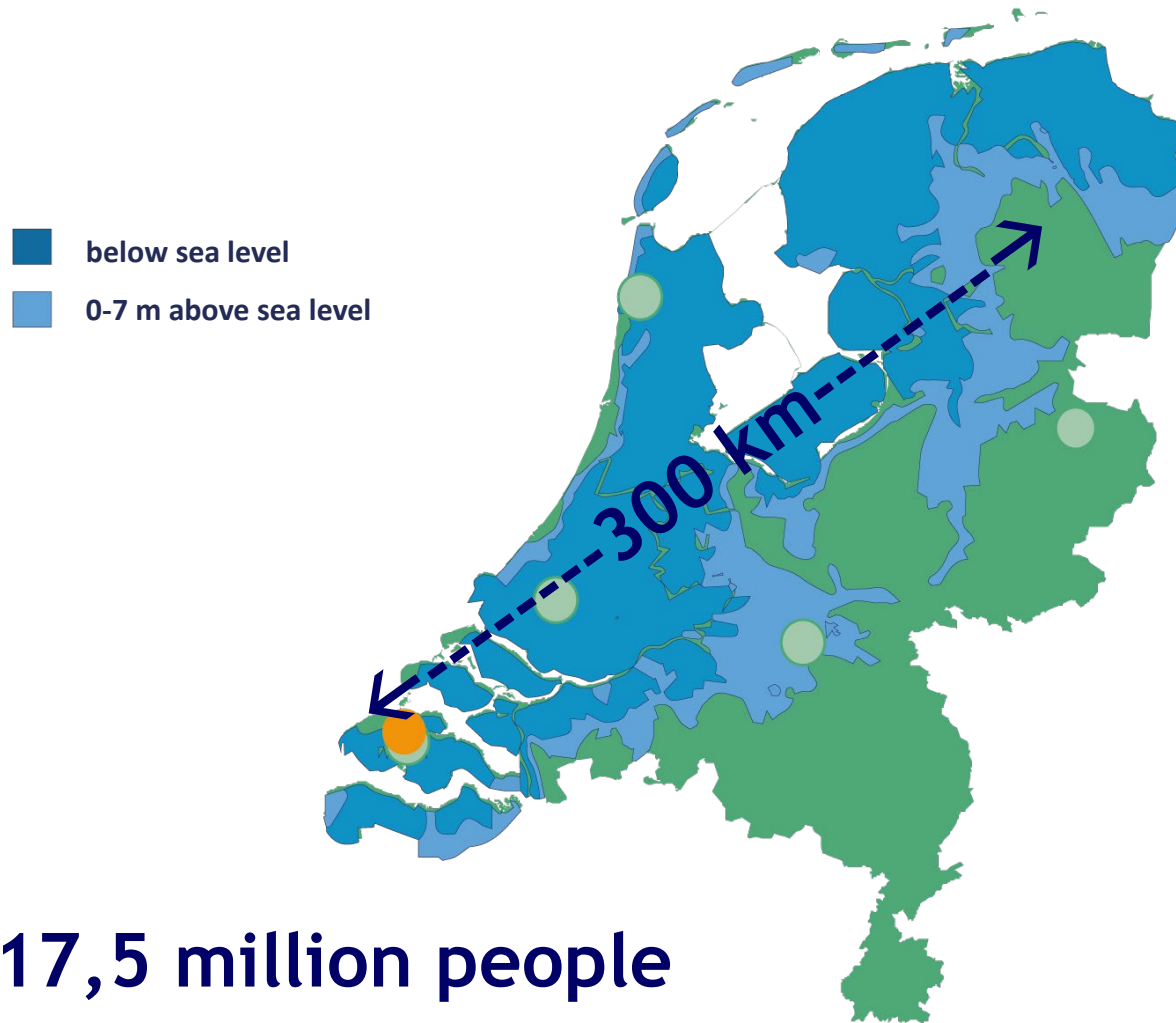
Content

- Waste management in the Netherlands
- Why shared solutions and dual track
- EC activities on multinational solutions
- ERDO's evolution to date
- Paths to a MNR
- Summary

RADIOACTIVE WASTE in the Netherlands



SOLUTIONS FOR THE NETHERLANDS



17,5 million people

- Small volume of waste
- High ground water table
- High population density
- Little space
- National policy:
 - Dual track: both national and shared disposal options are studied
 - Long-term storage
 - Possibilities to learn from the experiences acquired internationally
 - Time to flexible decisions

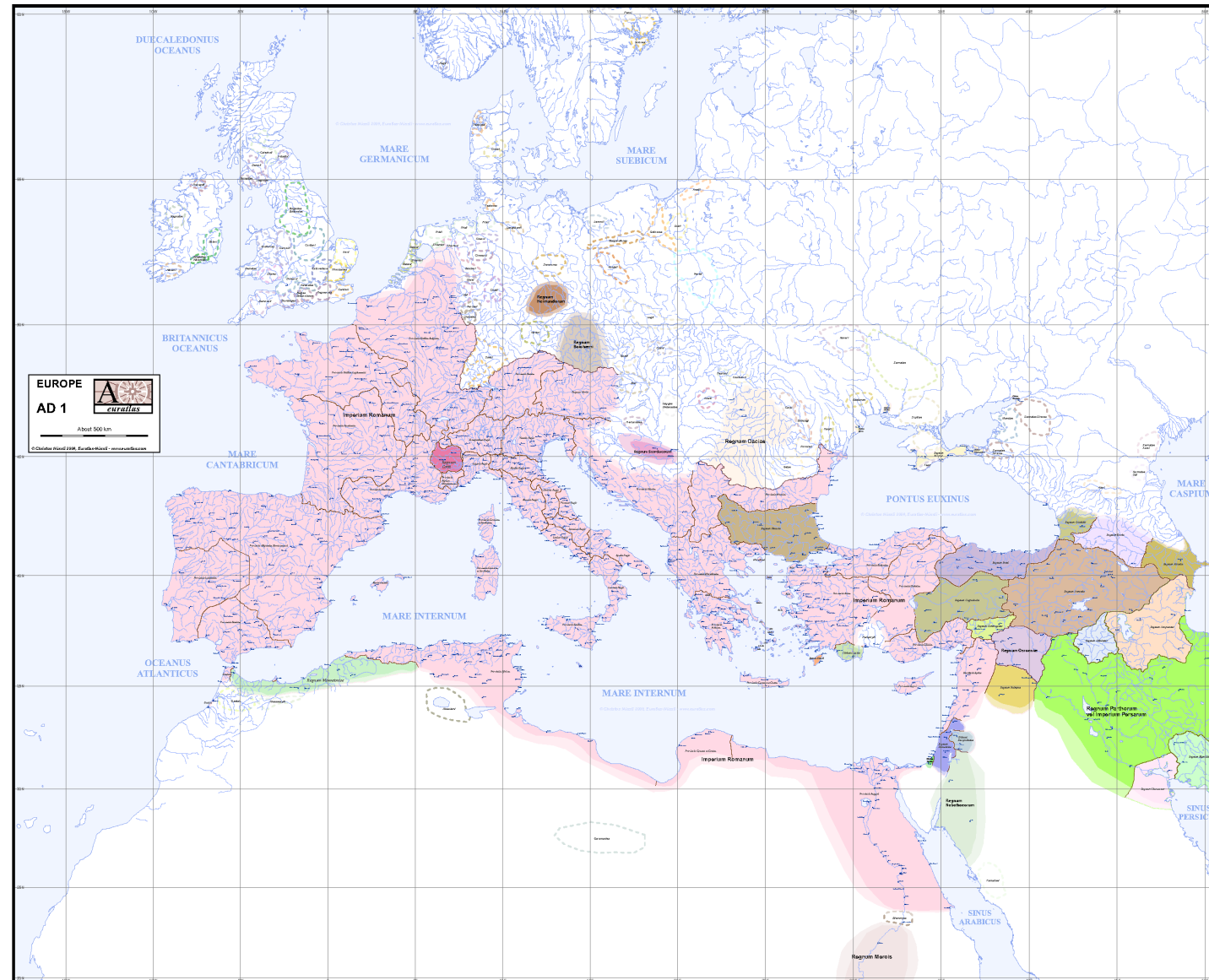
Shared solutions and Dual track

- In some European countries it is difficult or impossible to develop purely national solutions for the management of radioactive waste:
 - financial and technical resources,
 - research capacity,
 - suitable geological formations
- Others are interested in economic optimisation:
 - economies of scale
 - more productive uses for public funds
- Importance of national programme!



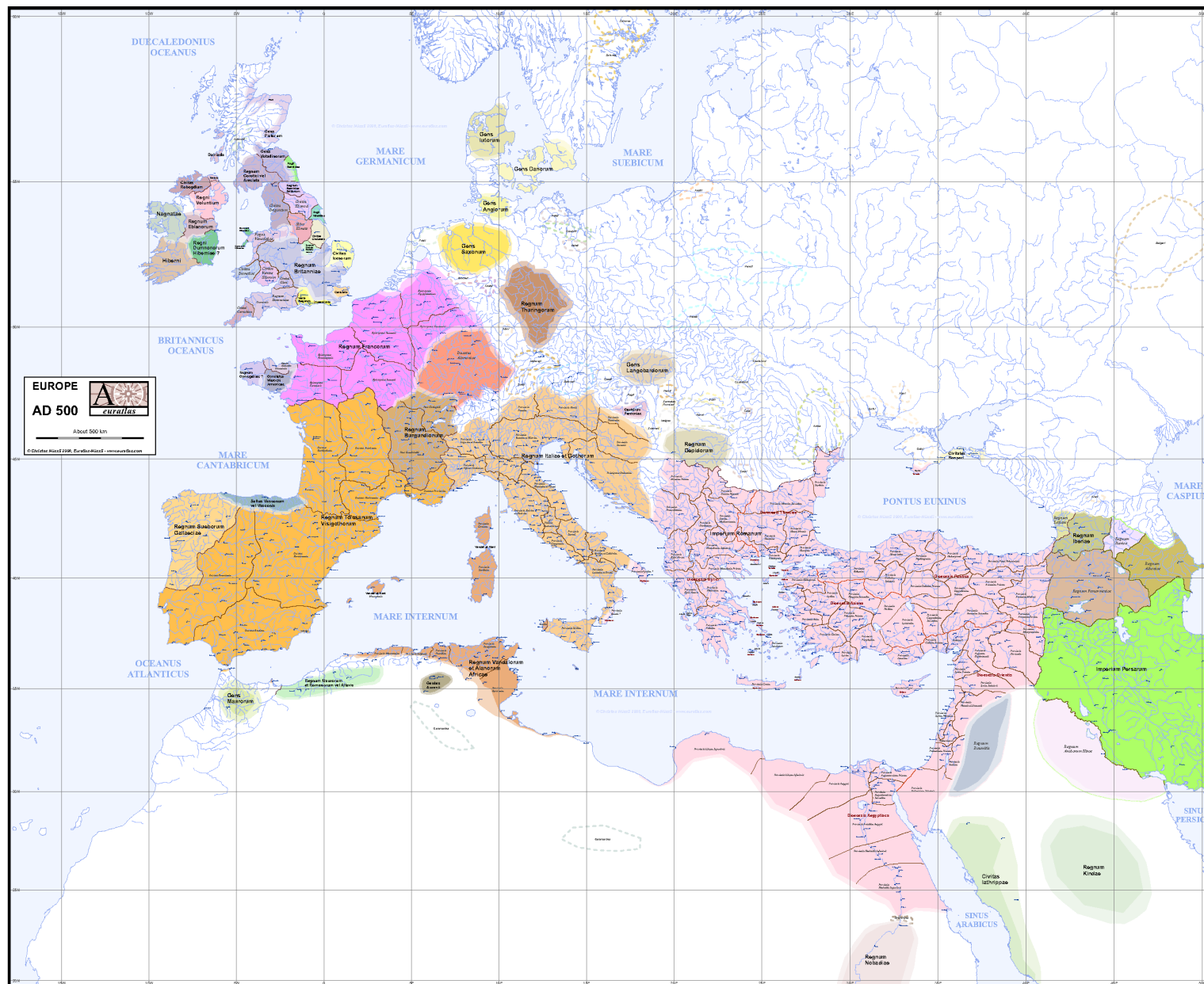
Think beyond national borders!

1 AD



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500 AD



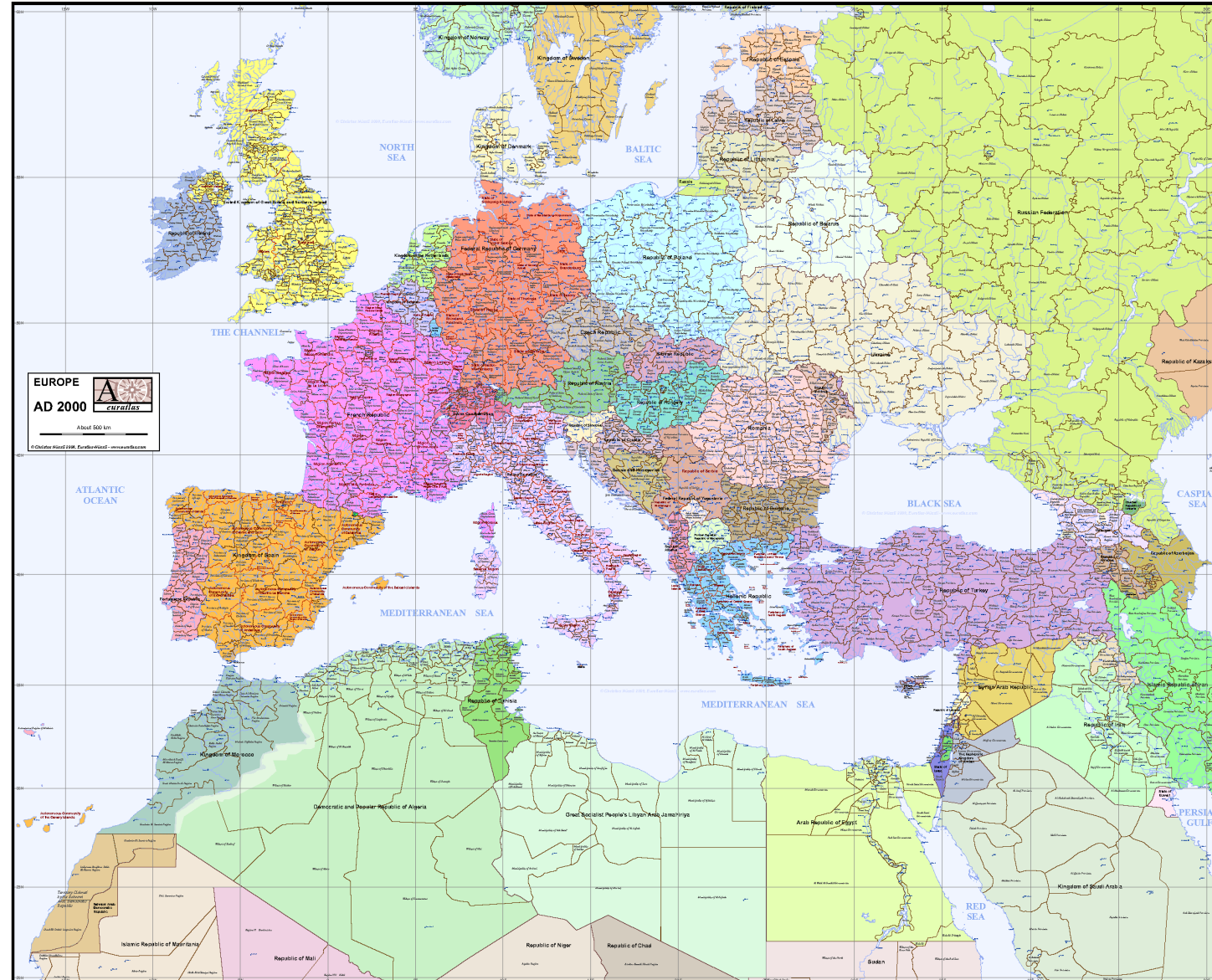
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ERDO

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Activities on Multinational Approaches European Commission (EC)

- Resolution 1157 (1998) calls on MS to *“study the technical, economic and political feasibility of the creation of international repositories..”*
- 2003-2009 support of SAPIERR Projects – 5 key reports
- Waste Directive 2011 – confirms feasibility of shared facilities *“if agreement has entered into force between the Member State concerned and another Member State or a third country to use a disposal facility in one of them”*.
- 2018 EURAD –Waste management routes in Europe from cradle to grave (ROUTES) Task 6 – Shared solutions in European countries
- 2021 HORIZON-EURATOM-2021-NRT-01-08; Towards a harmonised application of the international regulatory framework in waste management and decommissioning

ERDO Association evolution

feasibility

SAPIERR I

implementation
strategy

research



policy

SAPIERR II

ERDO

working group

mission evolved beyond the eventual goal of a shared MNR to include activities in the pre-disposal phase that could benefit from sharing knowledge, technologies or facilities

ERDO

formal association representing its members, launching joint projects, knowledge centre shared solutions, spokesman multinational solutions



implementation
repository

SAPIERR
Organizations from 14
countries

ERDO-WG
Representatives from 13 national
governments

ERDO Association
Currently 7 member countries and 9
members

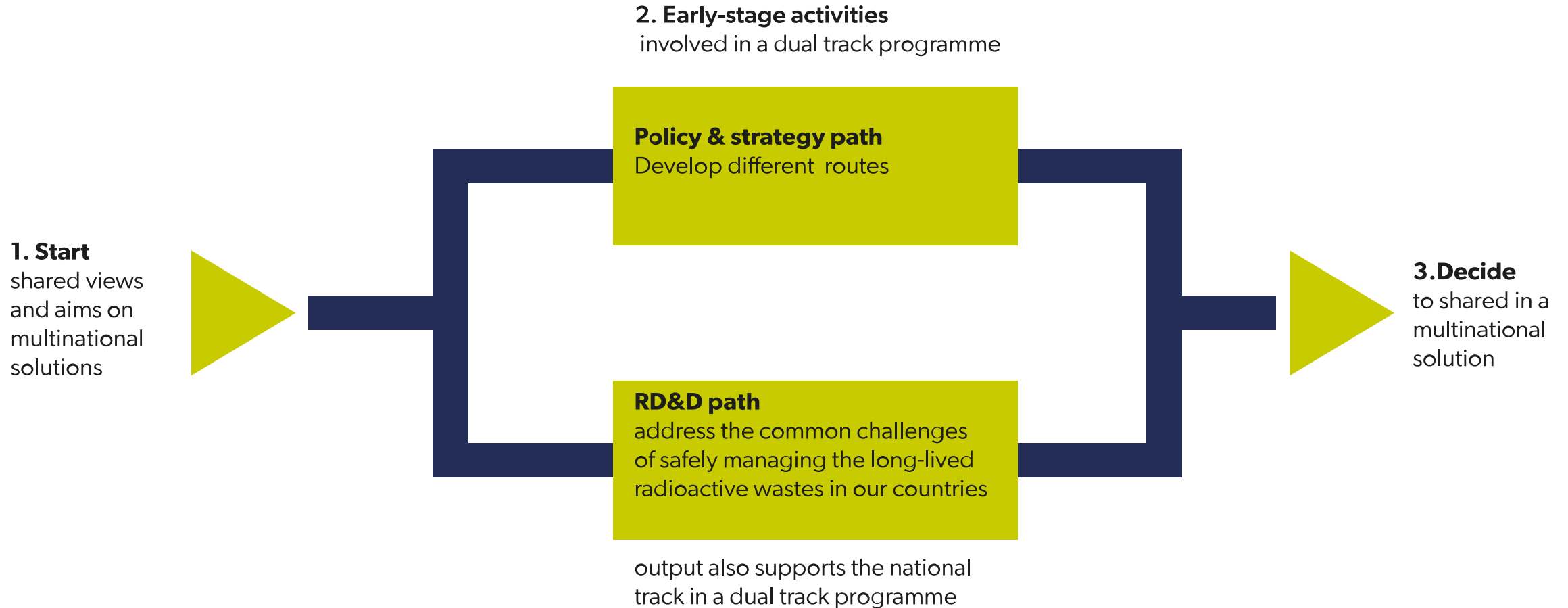


ERDO member countries have adopted different positions on how they will manage the dual track approach

- National programmes that do not currently exclude the option of hosting
- National programmes that are **undecided** as to whether they could be willing to host an MNR
- National programmes that are interested in being part of a shared MNR project but have already decided that they **do not want to be the host country**

...national policy can evolve and change from any of these starting positions

The ERDO approach: 2 paths to an MNR



The RD&D Pathway: solving common problems

Concept: there are similar issues facing smaller-inventory programmes where a common approach would improve efficiency and effectiveness as well as facilitating adoption of shared disposal solutions, e.g.:

- harmonised WAC for similar facilities
- harmonised approach to nature and level of waste characterisation
- generic, transferable disposal concepts that could be applied widely without need for adaptation (e.g. a design concept for deep borehole disposal)
- demonstrators of novel disposal concepts
- common conditioning and packaging technologies and standards

Output: common standardised packaging and characterisation would meet common disposability requirements for a shared MNR

ERDO's initial and current projects

- Legacy Waste Characterization Project (ERDO LWC Project) shared state-of-the-art knowledge on thorough characterization of legacy waste. Harmonization of characterisation methodologies will simplify future possible multinational cooperation in pre-disposal activities or for multinational repositories. The focus is on:
 - legacy waste streams in participating countries,
 - approaches for developing Very Low-Level Waste and Low-Level Waste Waste Acceptance Criteria across eighteen countries.
 - available chemical, physical, and radiological techniques which could be appropriate for the characterization of VLLW and LLW legacy waste.
- The deep borehole disposal (DBD) project assessed the strategic potential of DBD for several European countries. The project was based on development work done by NND for the Norway and extrapolated to the inventories of other ERDO member
 - Austria, Croatia, Denmark, The Netherlands, Norway, and Slovenia.
- The ERDO-USDOE joint study on the potential impacts of Small Modular Reactors (SMRs) on multinational cooperation at the back end of the fuel cycle.
 - Assessment how a shared or a commercial multinational repository project could be impacted in terms of concept/design, economics and scheduling.
 - Identify key international policy issues for the USA and ERDO countries, in a global scenario with widespread SMR deployment.



Technical Note
ERDO – LWC project
Final Report



Id. Doc. FSN FISS (01) 2022



Technical Note ERDO-
WG - LWC project –
Task1 Report on main
Legacy Waste streams
in the interested
countries

**Technical Note ERDO-WG
- LWC project – Task2
Minimum set of WACs for
nearsurface disposal of
VLLW-LLW**



Technical Note	ELABORATO DN SM 00120
	REVISIONE 00

Technical Note
ERDO-WG - LWC project – Task1 Rr
Legacy Waste streams in the interes
ELABORATO DN SM 00117

Boreholes as a
permanent solution for
national inventories of
radioactive waste

REVISIONE 01



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Abstract

This report considers whether borehole disposal might be suitable for inventories of radioactive waste from Austria, Croatia, Denmark, The Netherlands, Norway, and Slovenia. A concept is described briefly, with references to more comprehensive technical descriptions. The same is done for site-evaluation factors, regulatory framework, and cost estimates. Emphasis is placed on disposal of high-level radioactive waste in deep boreholes. Deep borehole disposal is feasible with existing technology and may be a suitable and cost-competitive alternative for the most radioactive waste types that Croatia, Denmark, The Netherlands, Norway, and Slovenia need to handle. If these countries were to construct a shared deep-borehole repository, costs could decrease by approximately one third compared to separate national

The Policy & Strategy Pathway

Actions

- Political engagement: national interests/drivers; moving towards intergovernmental agreement
- Public engagement: making the MNR concept commonplace

Evaluation and Documentation

- Liabilities and responsibilities of MNR participants
- Organisational structures and governance of a MWMO
- Financing a project
- Benefits and Risks
- Siting strategies

LOGIC of a dual track POLICY

- **CLEAR ADVANTAGES**

- Lower costs
- More choice of possible suitable locations
- Pooling technical capacity, personnel and facilities
- Diversification of disposal per waste type

- **DISADVANTAGES**

- Longer distances
- Deviating (national) legislation and definitions
- Different timetables and several locations from where the waste will be delivered



Summary

- Importance of national programme in Dual track approach
- ERDO has opted for small scale in-kind projects to collaborate with ERDO members and other organizations interested in the topics
- Collaboration with international organizations and large projects (EURAD, IAEA, NEA and US DOE) important to ERDO's work



ERDO Shared Programme

- Shared staff, teams, facilities, projects... reduces costs
- Membership of ERDO provides prospect of a shared solution
- NP and shared ERDO 'tracks' run together, nested within each other

National GD Programme

Acknowledgements

- ERDO members and associate members:
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Thank you !

- Any questions?
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erdo.org