

PRESENTATION OF ROUTES

October 22nd 2020 • SHARE Workshop • Elisa Leoni (IRSN) and
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ROUTES KEY FIGURES

2019  2024

35 Organisations

21 Countries

Total budget: 1.7 M€
EC contribution: 1.2 M€





ROUTES GENERAL OBJECTIVES

- **ROUTES OBJECTIVES**

- Provide an opportunity to share experience and knowledge on waste management routes between interested organisations (from different countries, with programmes at different stages of development, with different amounts and types of radioactive waste to manage).
- **Identify safety-relevant issues and their R&D needs** associated with the **waste management** routes (cradle to grave), including the management routes of legacy and historical waste, considering **interdependencies** between the routes.
- Describe and compare the different approaches to characterisation, treatment and conditioning and to long-term waste management routes, and **identify opportunities for collaboration between MS (member states)**.

ROUTES - TASKS BREAKDOWN

T2 Challenging Waste to be collaboratively tackled within EURAD

- 2.1 Identify **challenging wastes** and map existing WM Routes (if any)
- 2.2 Compare knowledge and **strategies for their management**

T3 Description and comparison of RW characterisation approaches

- 3.1 Radio-analytical characterisation of RW and waste with **complex/toxic properties**
- 3.2 Characterisation approaches of **historical and legacy waste**

T4 Identification of WAC used in MS for different disposal alternatives

- 4.1 Current use of WAC
- 4.2 Sharing experience on **WM with/or without WAC**
- 4.3 R&D needs and opportunities of collaboration

T6 Shared solutions in European countries

- 6.1 State of the art on shared developments/technologies/facilities
- 6.2 Case studies
- 6.3 Assess feasibility of developing shared solutions

T5 RWM solutions for small amounts of waste

- 5.1 Knowledge about disposal options for SIMS
- 5.2 Define predisposal routes for disposal

T7 Interaction with Civil Society

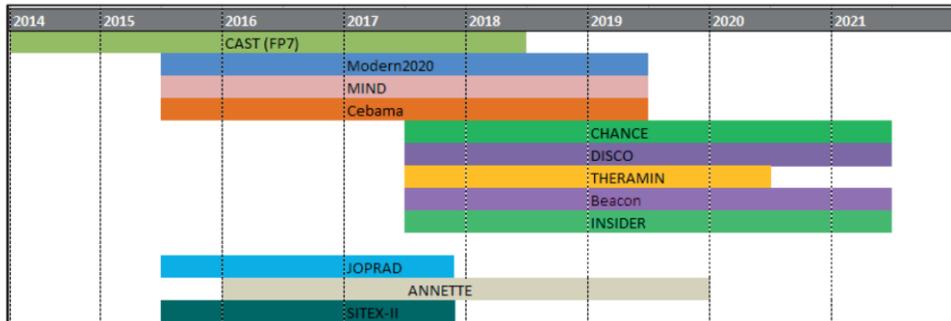
- 7.1 Scoping of Routes and action plan
- 7.2 Implementation of the action plan

ROUTES – METHODOLOGY

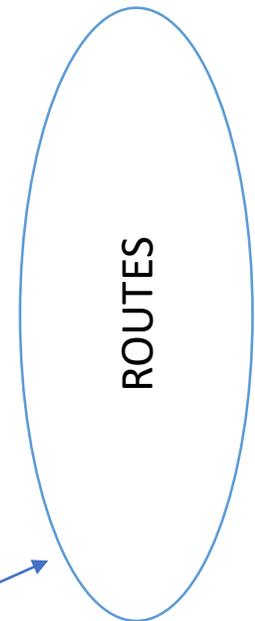
Participans Inputs

Questionnaire
 Experience
 Case studies
 Lessons Learnt
 « What is working and what is not... »
 CS vision

Past and on-going EC Funded Projects in RWM



EC, IAEA and NEA Reports and Activities



Common R&D Programmes

Lay the framework for the development of Shared Facilities

Strategical assistance to less advanced MS

Enhance CS involvement

ROUTES SURVEY

- **Methodology**

- ROUTES Questionnaire objective
 - 25 questions with the aim to gather relevant and up-to-date information needed for ROUTES
 - Questionnaire is organized in six topics covering the activities addressed in the different tasks:
 - General information
 - Waste acceptance criteria
 - Inventory of challenging waste and management routes
 - Characterization
 - Management strategy and R&D programmes
 - Shared solutions for waste management
- ROUTES Workshop in Athens (Greece) March 2020
 - Preliminary analysis of available responses
 - Cross-check of received responses March/August
- Publicly available information (from EU, IAEA, NEA)
 - National Reports & Programmes (EU, IAEA), National Summaries (NEA), reports on THERAMIN and CHANCE, IAEA TECDOCs

ROUTES SURVEY - INVENTORY OF CHALLENGING WASTE

- It was asked to participants to provide information about the challenging waste in their countries
 - A brief description of the origin
 - Properties (Volume, activity...)
 - Details about the reasons why there are considered as challenging
- Based on a **first list** that partners could implement and possible **reasons** why there are considered as challenging
- The main objective was to feed other tasks :
 - TASK 3 about Characterisation
 - TASK 4 about WAC
 - TASK 6 about Shared Solutions
 - TASK 5 SIMS
 - TASK 7 CS interaction
 - Ensure Knowledge transfer (KM WP)

ROUTES SURVEY - INVENTORY OF CHALLENGING WASTE

- **Based on a first list** that partners could implement
 - Sludge
 - Organic waste
 - IERs
 - Bituminized waste
 - Graphite
 - Particular spent fuel (metallic U or Al cladding)
 - Disused sealed sources (category 1 to 5)
 - Waste containing reactive metals (Al, Mg, Zr, Na)
 - Waste containing chemitoxic material (Be, Hg, asbestos, Pb)
 -
- **Some suggestions were given about possible reasons**
 - No available or reliable inventory
 - Unknown or uncertain Characterisation (radiological, physical, chemical)
 - No pre-disposal technologies available (sorting, retrieval, transport, conditioning, storage)
 - No disposal facilities
 - Technologies available in other MS but not accessible
 - Too small volumes to develop a dedicated facility/technology
 - Lack of or poor knowledge in waste management
 - No or poor public acceptance of the foreseen solution

ROUTES SURVEY - INVENTORY OF CHALLENGING WASTE

- Example of Ion Exchange Resins

spent ion exchange resins	Characterization issues (radiological, physical, chemical), inventory	re-conditioned to conform our interim storage WAC (and state-of-the-art waste management techniques)	Wait and see strategy because disposal facility is not available	WAC do not exist	The resins are considered not suitable for long term storage. Potential processes to condition the radionuclides in the resins	are plasma technologies available in other MS but not accessible	Conditioning/treatment	disposal	Lack of human and financial resources in waste management	Sampling techniques are under development	Too small volumes to develop a dedicated facility/technology	Treatment (incinerator) is uncertain due to incompatibility with available	treatment/conditioning methods do not lead to a waste form that is compatible with surface or geological disposal	No or poor public acceptance of the foreseen solution	Lack of, or poor knowledge in waste management
1															
2	x											x			
3	x							x							
4															
5	x							x							
6	x								x						
7															
8	*			*				-	*						
9							x								
10															
11															
12															
13															
14	x							x				x			
15	x							x							
16															
17															
18									x						
19															
20									x						
21								x			x				

→ Example of waste stream that is considered as challenging in a Country while a solution for its management has already be found in some others



ROUTE SURVEY – INVENTORY OF CHALLENGING WASTE

Some notable observations:

- The proposed tentative list of challenging waste was quite exhaustive
- Similar inventories of challenging waste and technical issues related to their management (including SIMS),
- But different boundaries conditions (amount, available facilities...)
- In some cases solutions are available in other MS
- Sometimes challenging waste are considered as challenging because no WAC exist

These preliminary results reinforce the idea that solutions can be found jointly

Steps forward :

- exchange on specific waste streams will be initiated taking into account both predisposal and disposal issues
 - To identify possible R&D new activities
 - To establish technical basis for Knowledge and technology transfer

ROUTES SURVEY - WASTE ACCEPTANCE CRITERIA

- The section of the Questionnaire related to Waste Acceptance criteria addresses the following topics:
 - Status and nature of WAC in different countries (linked to national waste management activities)
 - Approaches to develop and update WAC and WAC-related responsibilities of different parties
 - Use of generic WAC
 - Detailed requirements set out in WAC
 - Approaches to determine compliance with WAC
 - Approaches to respond when a non-compliance with one or more WAC is detected

ROUTES SURVEY - WASTE ACCEPTANCE CRITERIA

- **Some notable observations:**

- Different interpretations of the term 'WAC' in different countries
- Application of WAC (and analogous requirements / procedures / policies / decrees / criteria / regulations / specifications) during different lifecycle stages varies considerably
 - Such requirements are extensive when all lifecycle stages are considered, particularly for countries with long-established civil nuclear industry
 - 'WAC' typically used in relation to storage and disposal facilities, but often have a bearing on upstream activities (treatment, conditioning, packaging) as well
- Limited use of generic WAC
 - Variable interpretation of what 'generic WAC' constitute

Steps forward :

- Gap analysis will compare situations in which final WAC for disposal are available with cases of experience with conditioning or management of waste without WAC, facilities or technical solutions
 - i.e. How the development of generic WAC can help in defining a management route for challenging waste?

ROUTES SURVEY – SHARED SOLUTIONS

- The section of the Questionnaire related to Waste Acceptance criteria addresses the following topics:
 - General information about sharing policies
 - Past shared experiences;
 - competences,
 - methods,
 - technologies and/or facilities of radioactive waste treatment, storage or disposal (or something else related to radioactive waste management) shared in the past with other states

ROUTES - SHARED SOLUTIONS

- **Some notable observations:**

- No example of **real** shared facility
- In the first set of responses to the Questionnaire most of the examples given were about past and on-going EC Projects and participation in IAEA and NEA initiatives (cooperation/sharing of information etc.)
- This came also from the difficulties in defining a shared solution
 - Given for free (i.e. support to less advanced MS)
 - Shared/Exchanged
 - Commercial

ROUTES SURVEY - SHARED SOLUTIONS

- **Some notable observations:**

- At the end commercial solutions were included since they can be useful for further steps of the Project when possible management routes for challenging waste will be identified, especially for countries with medium, small sized inventory which can not afford the development of a specific facility
- Now we have a quite extensive list of commercial available solutions for the management of waste including :
 - Facilities treating or having treated foreign waste
 - Example of mobile systems (which can represent a valuable alternative to develop a shared solution particularly for small inventory MS)

- **Steps forward :**

- Case study work has been initiated on examples already identified in order to establish mechanisms for the implementation of shared solutions from a technical point of view and in terms of acceptance issues

CONCLUSIONS

- **The work done within ROUTES can provide :**
 - Up-to date information about the Inventory of challenging waste in participating MS
 - A first survey on case studies and lessons learnt about the management of challenging waste
 - Next steps : work on specific waste streams will be initiated in order to identify R&D work to be tackled jointly
 - Up-to date information on WAC in MS
 - Covering both pre-disposal and disposal steps
 - Step forward : Gap analysis to compare situations in which final WAC are available with cases of experience with conditioning or management of waste without WAC, facilities or technical solutions
 - A first review of experiences of sharable facilities particularly on facilities treating or having treated foreign waste and lessons learnt from past experiences
 - Steps forward : work on a selection of case studies in order to establish mechanisms for the implementation of shared solutions from a technical point of view and in terms of acceptance issues

Thank You for your attention!