



Strategic Study WP Waste management routes in Europe from cradle to grave (ROUTES)

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Content of presentation

1. WP Main Objectives
2. WP Expected impacts
3. WP Participants
4. WP – Task Breakdown and WP Board
5. WP – Planned resources
6. WP – Tasks' descriptions
7. Key challenges and objectives in the first year – to communicate near-term focus

ROUTES - Main 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 - Expected impacts

- ▶ Regarding RWM implementation needs
 - a gap analysis is conducted with respect to RD&D activities and strategic needs required for implementation of the different spent fuel and radioactive waste management and disposal routes in Europe
- ▶ Regarding safety
 - Safety-relevant issues and R&D needs associated with the waste management routes (cradle to grave) will be identified
- ▶ Regarding increasing scientific and technical Knowledge (beyond the state-of-the-art) in the field of RWM
 - consolidation and integration of existing knowledge to identify good practices and challenges, in order to provide guidance for research activities in the second wave of activities or in subsequent EURAD implementation phases
- ▶ Regarding radioactive waste management routes
 - providing an overview of good practices for different steps in radioactive waste management and guidance for research activities
 - opportunity to consider sharing of technology and facilities
 - support countries with early-stage programme / small inventory programmes (SIMS small inventory member state) in the development of their national RWM programmes, for compliance with the Council Directive 2011/71 EURATOM

ROUTES Participants

Organisations

- ✓ **Andra**, France (WMO)
- ✓ **ARAO**, Slovenia (WMO)
- ✓ **BEL V**, Belgium (WMO)
- ✓ **CEA**, France (RE)
 - Orano, France
- ✓ **CIEMAT**, Spain (TSO)
- ✓ **COVRA**, Netherlands (WMO)
- ✓ **DEKOM**, Denmark (WMO)
- ✓ **EEAE**, Greece (WMO)
- ✓ **CPST**, Lithuania (TSO)
- ✓ **FZJ**, Germany (RE)
- ✓ **GRS**, Germany (TSO)
- ✓ **IAE**, Lithuania (WMO)
- ✓ **INCT**, Poland (TSO)
- ✓ **IRSN**, France (TSO)
 - NTV, France
- ✓ **IST-ID**, Portugal (RE)

Organisations

- ✓ **IST-LPSR**, Portugal (WMO)
- ✓ **JSI**, Slovenia (TSO)
 - EIMV, Slovenia
- ✓ **LEI**, Lithuania (RE)
- ✓ **NCSR D**, Greece (RE)
 - DMT, Germany
- ✓ **NES**, Austria (WMO)
- ✓ **NRG**, Netherlands (TSO)
- ✓ **NJF**, Slovakia (WMO)
- ✓ **ONDRAF/NIRAS**, Belgium (WMO)
- ✓ **RATEN**, Romania (RE)
- ✓ **SCK-CEN**, Belgium (RE)
- ✓ **SKB**, Sweden (WMO)
- ✓ **SSE Ecocentre**, Ukraine (RE)
- ✓ **SSTC NRS**, Ukraine (TSO)
- ✓ **STUBA**, Slovakia (RE)

Organisations

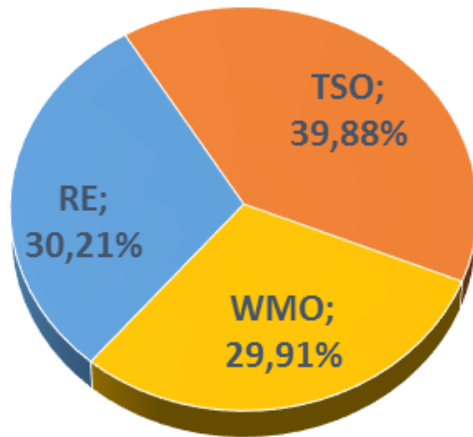
- ✓ **SURAO**, Czech Republic (WMO)
- ✓ **SURO**, Czech Republic (TSO)
- ✓ **TS Enercon**, Hungary (TSO)
- ✓ **TUS**, Bulgaria (RE)
- ✓ **UCY**, Cyprus (RE)
- ✓ **VTT**, Finland (TSO)
 - Galson Sciences, United Kingdom
- ✓ **VUJE**, Slovakia (TSO)

ROUTES - Task Breakdown and WP Board

- ▶ WP leader : virginie.wasselin-trupin@irsn.fr
- ▶ **Task 1 – S/T coordination, State-of-the-art and training material**
 - ▶ IRSN
- ▶ **Task 2 - Identify challenging wastes to be collaboratively tackled within EURAD - Mapping and shared understanding at EU level of practical issues on waste management routes**
 - ▶ ANDRA and SSTC
- ▶ **Task 3 - Description and comparison of radwaste characterisation approaches**
 - ▶ FZJ and CIEMAT
- ▶ **Task 4 – Identification of WAC used in EU Member States for different disposal alternatives in order to inform development of WAC in countries without WAC/facilities**
 - ▶ ONDRAF/NIRAS and VTT (GSL)
- ▶ **Task 5 - RWM solutions for small amounts of wastes**
 - ▶ NCRSD (DMT) and SURO
- ▶ **Task 6 – Shared solutions in European countries**
 - ▶ COVRA and CEA (ORANO)
- ▶ **Task 7 – Interactions with Civil society**
 - ▶ IRSN (NTW) and JSI (EIMV)

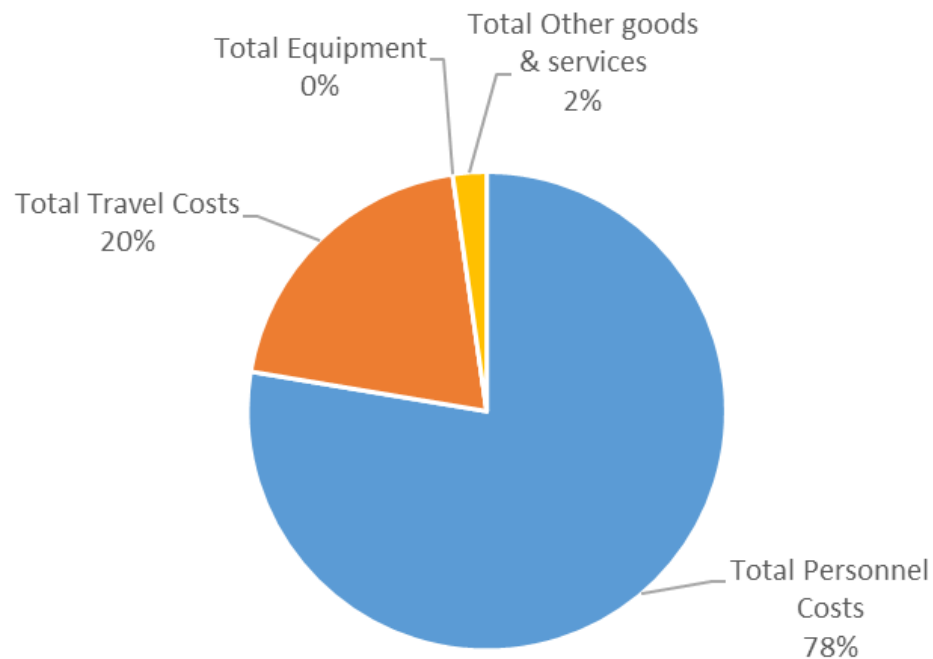
ROUTES - Planned resources

ROUTES WP:
Distribution of EC Contribution
between categories of Actors

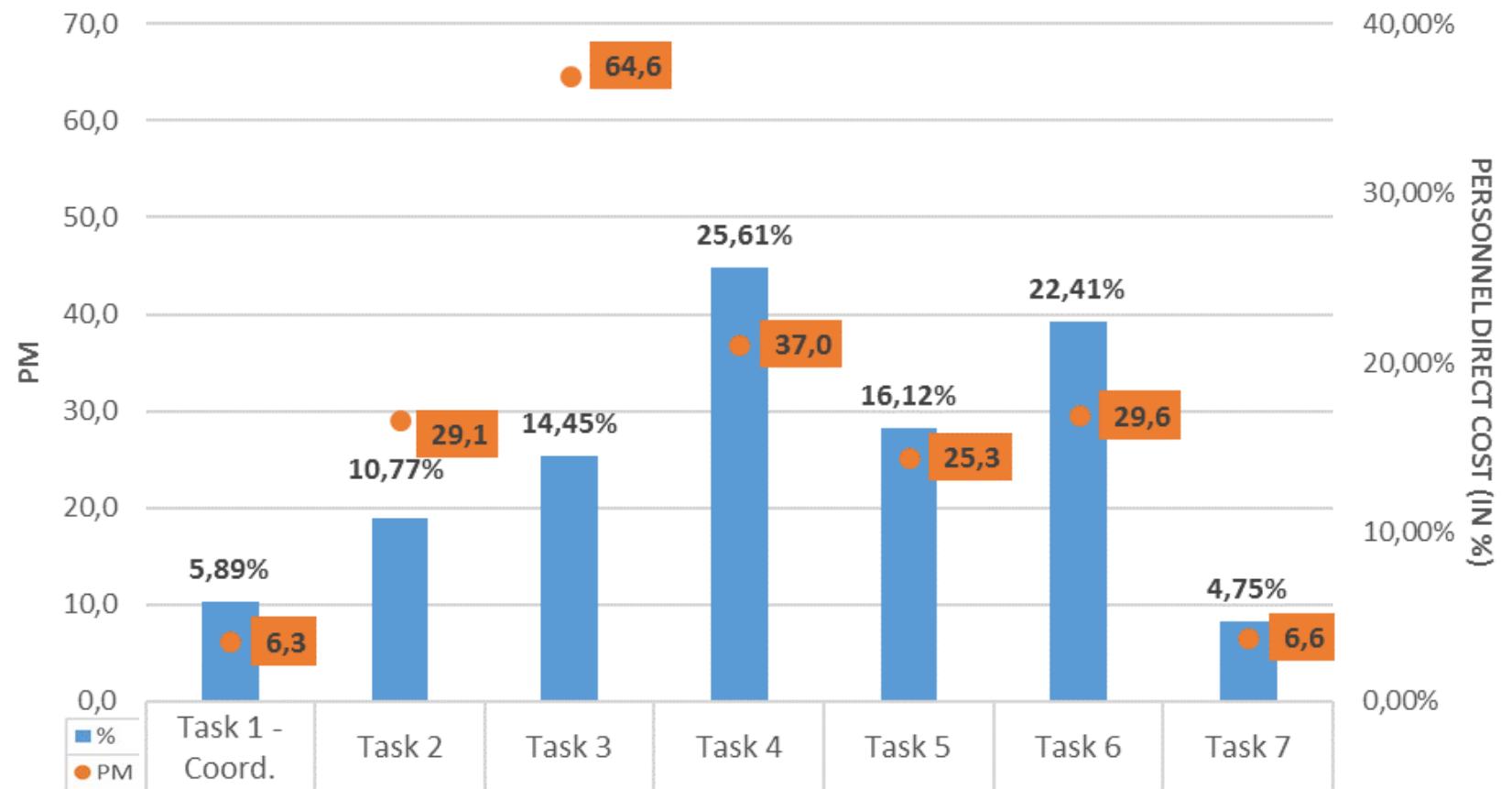


TOTAL BUDGET	1,7M€
EC requested contribution	1,2M€

ROUTES WP - Budget distribution between categories of direct costs



ROUTES WP:
Personnel costs breakdown per task
(in % and in PM) - Total PM: 198,4



ROUTES - Task 1

- ▶ **S/T coordination, State-of-the-art and training material**
 - ▶ S/T coordination
 - ▶ coordination also of the exchanges with NEA and IAEA and with relevant projects such as CHANCE, THERAMIN
 - ▶ meeting points with the SHARE CSA on decommissioning in order to exchange on needs/solutions and build a common Roadmap in the field of management of waste coming from decommissioning
 - ▶ Interactions with KM WP
 - ▶ Integration

- ▶ **1st year :**
 - ▶ develop a collective questionnaire for collecting information from the organisations involved in this WP on member states practices in waste management as an input the task 2, 3, 4 and 6

ROUTES - Task 2

▶ Identify challenging wastes to be collaboratively tackled within EURAD

→ *Mapping and shared understanding at EU level of practical issues on waste management route*

- ▶ Collection and analysis of existing work on categorisation and classification of radioactive waste with regard to disposal options,
- ▶ Identification of waste for which there is not yet a complete management plan in each Member State,
- ▶ Identification of waste management routes for pre-disposal steps
- ▶ Understanding at EU level of the practical issues on RWM routes for challenging waste
 - ▶ e.g. : Sludge; Organic waste; Ion exchange resin; Bituminized waste; Graphite waste; Uranium/radium/thorium bearing waste; Decommissioning waste (soil, rubble etc.); Waste containing chemotoxic material such as beryllium, mercury, asbestos, lead; Legacy waste...
- ▶ 1st year :
 - ▶ up-to-date overview on radioactive waste categorisation/classification based on collection and synthesis of answers to questionnaire of Task, identification of challenges waste
 - ▶ Exchange meeting

ROUTES - Task 3

- ▶ **Description and comparison of radwaste characterisation approaches**
 - ▶ Identification of characterisation techniques for radioactive waste (waste selected in Task 2);
 - ▶ Comparison of the characterisation methods applied for the same radioactive waste in different countries;
 - ▶ Analysis of the existing approaches and identification of the knowledge gaps;
 - ▶ Recommendations for the future R&D to eliminate knowledge gaps;
 - ▶ Recommendations for characterisation approaches for countries with non-developed waste management concept.

- ▶ 1st year :
 - ▶ Organization of the first workshop of the subtask 3.1 (months 7) for collection, analysis and comparison of the existing knowledge about techniques and practices for radioanalytical characterisation of radioactive waste, identified in Task 2.

ROUTES - Task 4

- ▶ **Identification of WAC used in EU Member States for different disposal alternatives in order to inform development of WAC in countries without WAC/facilities**
 - ▶ Overview of the current application in member states of WAC at different stages in the waste lifecycle
 - ▶ Offer a structured approach to support decision-taking of “no regret” waste management measures
 - ▶ Sharing experience on waste management with/without WAC available
 - ▶ Identification of R&D needs and opportunities for collaboration between members states

- ▶ **1st year**
 - ▶ Based on the questionnaire, descriptions of the current use of WAC per country will be collected as well as the methodology for setting up WAC and link with waste classification. A review of available existing information (e.g. from NEA and IAEA) will be done and used as input. Also, how compliance with WAC is verified as well as how non-conformances are dealt with will be identified.
 - ▶ Case descriptions, per country, of challenging wastes (identified in Task 2) conditioning without a final disposal solution will be collected. The descriptions will be based on the questionnaire. Also, case descriptions derived from a review of existing information available from e.g. NEA and IAEA will be used.

ROUTES - Task 5

▶ **RWM solutions for small amounts of wastes**

- ▶ Collection, analysis and comparison of the actual existing knowledge about disposal options for small amounts of waste. This will be complementary to the relevant IAEA project taking into account the results of a planned IAEA consultancy meeting about disposal options for small radioactive inventories in Sept. 2018 and a Technical Meeting planned for mid-2019. The work of IAEA is based only on the contributions of their member states. Therefore, participants of this task will actively take part as IAEA Member States in this IAEA project.
- ▶ Description of the necessary predisposal routes for the disposal options
- ▶ Evaluation of the possible small-scale disposal solutions and description of their positive and negative aspects, knowledge and experience will be reviewed in order to identify knowledge gaps
- ▶ Dissemination of the results to other SIMS and description of the spin off for countries with large amounts of radioactive waste
- ▶ Identification of R&D gaps

▶ **1st year**

- ▶ A kick-off meeting will be organised (month: 7) in order to coordinate the collection and analysis of the existing knowledge about disposal options (with increasing depth from the surface) in principle suitable for SIMS. This work will be performed complementary to the relevant IAEA project.

ROUTES - Task 6



▶ **Shared solutions in European countries**

- ▶ Describe and assess knowledge on and approaches to sharing technology and facilities between members states.
- ▶ Provide an overview of the interest in and experience with sharing technology/facilities in the different steps of waste management.
- ▶ Identify gaps and define needs for R&D, strategic priorities and opportunities for collaboration between Member States, as applied to challenging wastes as defined in task 1 and early stage RWM programmes and Small Inventory Programmes.

▶ **Ist year**

- ▶ Summarise EC (including SAPIERR, SAPIERR II, Chance, Theramin) and IAEA studies on shared development and use of technologies and facilities for characterisation, treatment, storage and disposal. Summarise any existing or planned sharing of facilities between member states.
- ▶ A workshop will be organized for this subtask (month 7)
- ▶ The results and outputs of subtask 6.1 will be compiled in a dedicated chapter of the final task 6 deliverable

ROUTES - Task 7

▶ Interactions with Civil society

- ▶ To give a group of CS experts the opportunity to follow and discuss the work conducted in tasks 2-6 by using a civil society (CS) interaction framework developed and established for EURAD.
- ▶ To facilitate the translation of results and other output from tasks 2-6 to the civil society and creating the conditions for the CS group to discuss and the outcomes of the tasks.
- ▶ To enhance the possibilities of civil society participation in future situations where there are consultation processes as a part of safety case review.
 - **discuss in the dedicated presentation on civil society**