



Deliverable 9.15: Scoping of ROUTES, Initial ICS Input and ICS Action Plan

Work Package 9

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Authors	Nadja Zeleznik (EIMV), Johan Swahn (NTW), Jan Haverkamp (NTW), Niels Henrik Hooge (NTW), Honorine Rey (NTW)

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Executive Summary

In the initial phase of the WP, the civil society (CS) experts in Task 7 have established modes of interaction with the technical topics in ROUTES tasks 2-6 (Task 2: “Identify challenging waste streams”, Task 3: “Describe/compare characterisation approaches”, Task 4: “Identify waste acceptance criteria (WAC) used in member states (MS)”, Task 5: “Radioactive waste management (RWM) solutions for small amounts of wastes”, Task 6: “Shared solutions for European countries”). During the first year, in subtask 7.1, The CS experts performed a scoping of the objectives and actions in ROUTES tasks 2-6 in order to identify issues that are deemed of more specific interest in the perspective of developing interactions between CS and EURAD partners along the course of the WP.

In addition to the work of the CS experts in ROUTES there is also a general interaction with CS in EURAD with a CS larger group. A draft of this deliverable has been discussed at a meeting with this group and comments from the group have been taken into account.

The deliverable provides input from the CS experts in Task 7 on the work in tasks 2-6:

- Task 2 focuses on identifying challenging radioactive waste streams. The task has made a list of challenging wastes that have been identified in different member states. The CS experts have found that the issue of challenging radioactive waste can be interesting for the civil society in the different countries.
- Task 3 focuses on describing and comparing characterisation approaches for radioactive waste. The task has worked on identifying different characterisation techniques used in the member states and has collected and summarised the state-of-the-art knowledge on characterisation methods applied for the problematic radioactive waste in different countries. The work of Task 3 is quite technically oriented, and the CS experts will at least start with mainly working on informing the CS larger group about the work being done in the task.
- Task 4 focuses on waste acceptance criteria (WAC) for challenging wastes. The task group is currently in a phase of making an inventory of WACs used in different countries and mechanisms to implement them. The CS larger group expressed interest to be involved in understanding the waste acceptance criteria for challenging wastes for which there is no well-defined management solution yet.
- Task 5 focuses on radioactive waste management (RWM) solutions for small amounts of wastes. Here, further clarification of definitions of small and large inventory member states is needed. A solution to the problem that the small inventory member states often do not have sufficient resources or the expertise for planning, licensing, erection, operation and closure of a disposal facility also have to be addressed. Ethical issues related to the consideration of long-term interim storage and deep boreholes technology are important issues for CS as well.
- Task 6 on shared solution for European countries adopted a broadened definition of shared solutions which brought another view from CS. The interest for obtaining information about the public opinion on shared technologies/facilities was expressed. The discussion also highlighted some important issues to be investigated like governance, waste resulting from reprocessing of spent fuel, financial questions and conditions for joint solutions from a societal point of view.

The deliverable includes an Interaction with Civil Society (ICS) action plan for the next years of the project. The plan includes a description of possible further work in relation to Task 2, Task 5 and Task 6 for which several more specific issues were identified to be addressed in Task 7. Task 3 and Task 4 were assessed be of less interest for further investigation at the moment. The ICS plan will be regularly updated in the future deliverables that will be developed in Task 7, therefore the priorities of further work will be regularly reassessed.

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Glossary

CS – Civil Society

DU – depleted uranium

ICS – Interaction with Civil Society

CSOs – Civil Society Organizations

ERDO – European Repository Development organisation

IAEA – International Atomic Energy Agency

KM - Knowledge Management

LIMS – Large Inventory Member States

LTP – Link Third Party

MS – Member States

NEA – Nuclear Energy Agency

NTW – Nuclear Transparency Watch

PMO - Programme Management Office

REs - Nationally funded Research Entities

RD&D - Research, Development and Demonstration

RWM – Radioactive Waste Management

SIMS - Small Inventory Member States

SF – Spent Fuel

TSOs - Technical Support Organisations

UMAN – Uncertainty Management in a multi-Actor Network

VDBD – Very Deep Borehole Disposal

WAC - Waste Acceptance Criteria

WMOs - Waste Management Organisations

WP – Work Package

1. Introduction

1.1 EURAD Civil Society interactions

As stated in the EURAD vision document [1] one of the objectives of EURAD is to allow interactions between WMOs, TSOs, REs and Civil Society Organisations (CSO): *“These interactions will facilitate the translation of scientific/technical results and create the conditions for Civil Society Organisations to express their expectations and views. Such interactions shall improve the mutual understanding on RD&D performed to support the development of safe solutions of processing and disposal of radioactive waste. It shall also contribute to developing ideas, propositions and methodologies on how to interact with Civil Society on scientific and technical results uncertainties (inherently linked to the long timeframes and numerous processes considered for geological disposal), and on how to interact with Civil Society stakeholders in order to promote mutual benefit of the available knowledge, based on cooperation and sharing.”*

As described in the EURAD deployment plan [2], the interaction with Civil Society (CS) can be understood as a cross cutting component based on previously developed models of pluralistic interactions with Civil Society (e.g., SITEX-II, JOPRAD, Modern2020, etc.). The CS participation in EURAD can be related to, but is not directly part of, decision-making processes according to the Aarhus Convention¹ with rights to access information and effective public participation². The CS experts involved are not researchers, but generally have a long experience and deep knowledge in RWM, also on technical and scientific issues. The participation in EURAD give the experts the opportunity to develop a more profound knowledge that can be used by the civil society when participating in public participation processes in RWM decision-making. Also, the CS outreach in EURAD to the larger CS group and further out into society also improves the possibility for more effective public participation as the knowledge level of the civil society participating in decision-making processes may improve.

Interaction shall contribute to developing ideas, propositions and methodologies on:

- ▶ How to interact with Civil Society on translation of scientific and technical results, and how to extend them to the public,
- ▶ How to interact with Civil Society in order to promote mutual benefits in available knowledge and create synergies between research and civil society expertise,
- ▶ Dissemination of knowledge and results to the Civil Society (CS) larger group, and facilitation of wider Civil Society interaction where needed,
- ▶ Gathering CS views on future EURAD activities.

To do so, in EURAD Civil Society Interactions are organised in two ways, in the so-called Double Wing model of interaction with Civil Society, illustrated in *Figure 1 – Double Wing model of Interaction with Civil Society in EURAD* as presented in Deliverable 1.13 [3].

¹ More information about the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) can be found here: <https://www.unece.org/env/pp/introduction.html>.

² A developed discussion of effective interaction with civil society in the perspective of public participation in environmental decision-making is done in section 1.2.

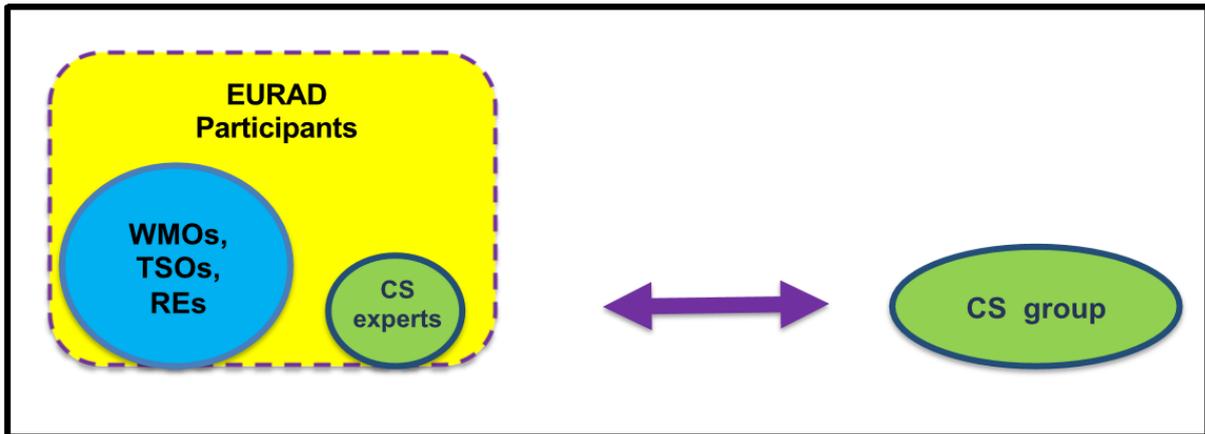


Figure 1 – Double Wing model of interaction with Civil Society in EURAD

A group of representatives of civil society (the CS larger group) was established at the start of EURAD via an open call by the EURAD consortium to civil society organisations, such as local communities having interest in RWM (local associations, local committees of information, local partnerships), national or European CS Organisations taking part in interactions in the field of RWM at the national or European level³. The candidates had to demonstrate evidence of a standing engagement in RWM activities⁴.). The CS larger group will have the opportunity to bring its views and exchange with EURAD participants (WMOs, TSOs, REs) along the programme. The objective of the composition of the CS larger group is to assure an appropriate representation from more and less advanced RWM programmes, citizens from Western and Eastern European countries, people with various interests in different fields related to RWM (health, environment, science, energy, etc.) and persons of different genders and generations [3]. The interactions with the CS larger group are facilitated by Civil Society facilitators (also called CS experts), working for Linked Third Parties of mandated actors in EURAD, and actively involved in the EURAD WPs. The CS experts have a long-term engagement in RWM and/or skills/experience in the involvement of Civil Society in scientific and technical issues. The CS experts interact with the institutional experts from the WMOs, TSOs and REs in order to understand the field of study and to prepare interactions with the CS larger group. The process enables the CS larger group members to express their views on the activities, both RD&D and the Strategic Studies, performed to support the development of safe solutions for processing and disposal of radioactive waste. The CS experts work in an organised process together with representatives from WMOs, TSOs and REs in EURAD.

The structure of the ICS activities in EURAD, based on the Double Wing model, is presented in *Figure 2 – Interaction with Civil Society in EURAD*. CS teams of experts are directly involved in the Strategic Studies WPs (in UMAN and in ROUTES), and in the EURAD Programme Management Office (PMO) WP 1 (Task 8 – Coordination, organisation and reporting on interaction with CS). Interaction between EURAD participants and the CS larger group should be organised annually.

³ The selection of the CS larger group is described in EURAD deliverable “Deliverable 1.13” List of Members of the Civil Society Group” [3].

⁴ As it was stressed during the ICS workshop, this might be a limit to the inclusion process. One challenge will remain: how to include new publics who know nothing about RWM and who want to be involved anyway? How to envision including societies and not only one society at a particular time?

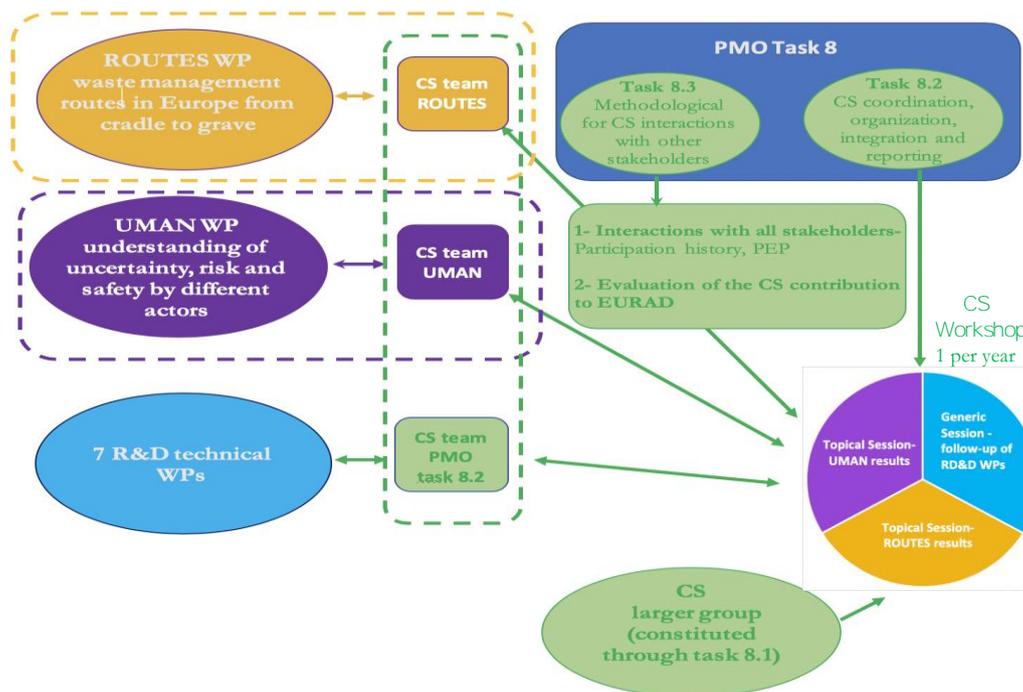


Figure 2 – Interaction with Civil Society in EURAD

1.2 Conditions for effective interaction with Civil Society (ICS)

The conditions for effective interaction with Civil Society within the realm of research and development (R&D) in radioactive waste management (RWM) can be compared to the conditions for effective transparency in the governance on decision-making in RWM. Transparency in decision-making is essential for the enduring and constructive engagement of Civil Society. Such engagement can be important for improving the safety of RWM projects, facilities and repositories. Effective transparency leads to better decision-making and can thereby increase Civil Society's confidence in the quality and fairness of RWM decision-making processes. Effective CS interaction in R&D for RWM can build up competence that will allow for better understanding of issues of importance during decision-making.

National processes for transparency governance in RWM have been developed in all Member States (MS) of the EU. These commonly reflect national implementation of the Aarhus Convention in environmental and nuclear legislation but can be of a more or less advanced character. Although there has been much discussion and analysis about which transparency processes are effective, it remains unclear what effective transparency governance in RWM means and how it should be implemented.

With the adoption of the Joint Convention on The Safety of Spent Fuel Management and on The Safety Of Radioactive Waste Management [4], signed by all EU member states, the structured exchange on status, trends and challenges in RW and SF management started within the responsible institutions improving de facto transparency. Based on the Radioactive Waste Directive (2011/70/Euratom) [5], EU member states also have to implement Article 10 of the directive that deals with transparency. This opens up the possibility of a common European approach on transparency governance within RWM. As Article 10 of the directive defines general principles, there is a need for elaboration on what efficient transparency in RWM might mean. An attempt to do this was carried out in the BEPPER project by Nuclear Transparency Watch, that led to the publication of the BEPPER report in December 2015 [6]⁵.

⁵ The BEPPER (Broad Framework for Effective Public Information and Participation in Environmental Decision-making in Radioactive Waste Management) report can be found here: <http://www.nuclear-transparency-watch.eu/a-la-une/new-publication-bepper-report.html>.

The report describes the NTW BEPPER pillars for effective transparency in RWM. These pillars are based on the Aarhus Convention pillars (access to information, access to public participation and access to justice) and also includes access to resources as well as more innovative processes for communication and decision-making, such as deliberation. The report includes a discussion of how public participation can be made more effective to allow the inclusion of as many actors as possible in a truly participatory way.

It should be noted that enhancement of transparency and public participation in regard to RWM and R&D is not an isolated phenomenon, but part of a larger political trend. During the next “trio” 18 months EU-presidency (Germany, Portugal and Slovenia), starting in July 2020, strengthening of the Aarhus Convention is expected to play a role⁶. Furthermore, probably the biggest public participation project in European history – the Conference on the Future of Europe – was about to be launched on Europe-day May 9th but is postponed at least until September 2020⁷.

One of the pillars for an effective transparency identified in the BEPPER Project is that the information could not just be made available, but also clearly processed and conveyed to be correctly understood by the public. The ROUTES WP provides the framework and an opportunity both for CS and Technical/Scientific Experts to enhance their mutual understanding.

1.3 ROUTES Task 7

Waste management routes in Europe from cradle to grave (ROUTES) WP [7] is one of the Strategic Studies WPs, in which Task 7 is devoted to Interaction with Civil Society. The objectives of ROUTES are:

- 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).

The ROUTES WP is divided in seven tasks, Task 1 being devoted to the Work Package management and coordination. There are 5 tasks (Task 2 to Task 6) which address the different technical topics of RWM from the generation to final disposal:

- ▶ Task 2: Identify challenging waste streams,
- ▶ Task 3: Describe/compare characterisation approaches,
- ▶ Task 4: Identify Waste Acceptance Criteria (WAC) used in MS,
- ▶ Task 5: Solutions for small amounts of wastes,
- ▶ Task 6: Shared solutions for MS.

Task 7 Interaction with Civil Society is carried out by CS experts and has the following objectives:

⁶ https://www.dnr.de/fileadmin/Publikationen/Steckbriefe_Factsheets/2020-02-18-Ratspraesidentschaft_Steckbrief.pdf

⁷ The Conference on the Future of Europe, which is supported by the European Council, the European Parliament and the Commission, involves establishing thematic fora of citizen representatives from all member states in the next two years. The citizen representatives will partake in discussions with national parliament representatives, Council ministers, Commission Vice-Presidents and representatives of other EU institutions, bodies and social partners.
https://ec.europa.eu/commission/presscorner/detail/en/ip_20_89

- ▶ To facilitate the translation of scientific/technical results of the ROUTES WP to allow effective interaction with the CS larger group,
- ▶ To create the conditions for the CS larger group to express its expectations or views linked to the topics addressed in the ROUTES WP,
- ▶ To improve mutual understanding⁸ on the RD&D needed to develop safe acceptable solutions in processing and disposal of radioactive waste.

Task 7, as part of the ROUTES WP, cooperates with other tasks and also interacts with the CS larger group according to the methodology described in the previous chapter.

According to the description of work in the Grant Agreement of the ROUTES WP in the EURAD project [4] Task 7 has 3 subtasks:

Subtask 7.1 – Scoping of ROUTES tasks 2-6, initial input from the CS experts and development of Interaction with Civil Society (ICS) action plan (from Month 1 (June 2019) to Month 12 (May 2020)).

The initial phase of the WP will be an opportunity for CS experts to better apprehend and scope the subjects and activities performed in ROUTES tasks 2-6. During the first-year, subtask 7.1 will perform a scoping of the objectives and actions in ROUTES tasks 2-6 in order to identify issues that are deemed of more specific interest in the perspective of developing interactions between Civil Society and EURAD partners along the course of the WP. This will be done in dialogue and collaboration between the CS experts and scientific/technical experts from WMOs, TSOs and REs in the WP. Part of the work of the CS experts will be to analyse the ROUTES WP in a larger context – how it is related to on-going RWM activities and connected with disposal projects and the challenges they are facing. The CS experts were to attend the kick-off meetings of EURAD and the ROUTES WP in June 2019 (Month 1) and representatives of Task 7 were to attend a selection of task 2-6 meetings during the first year. In reality, the ROUTES WP kick-off meeting was held in Paris on September 16, 2019, and all the WP workshops were held in Athens on March 2-6, 2020.

The scoping exercise carried out during the first year will give the CS experts the possibility to identify specific interests and actions that will allow more input and participation in the WP. Although it is too early to know exactly what topics the CS experts in consultation with the CS larger group will identify as especially interesting, possible topics include the comprehension of RD&D activities and strategic needs required for implementation of the different SF and radioactive waste management and disposal routes in Europe, radioactive waste management options for unusual or small amounts of wastes, and an analysis of the advantages and disadvantages of shared radioactive waste management options in Europe.

The result will be described in an ICS action plan. Therefore, the focus of the work of Task 7 will be primarily oriented each year (year 2, 3 and 4) to a specific topic as selected in the development of the action plan.

Work performed

As part of the subtask, a dedicated meeting involving CS experts and a panel of WMOs, TSOs and REs representatives from tasks 2-6 was foreseen in February 2020 (Month 8) in order to discuss the draft ICS action plan (at least by videoconference). In reality Task 7 had a workshop at the ROUTES WP Athens workshops on March 2-6, 2020 to generally describe the work of Task 7 to the ROUTES WP. In addition, Task 7.1 organised a dedicated ROUTES session within the CS larger group at the ICS workshop in May 2020, organised at EURAD level by the EURAD PMO WP 1, Task 8⁹. The ROUTES

⁸ As it was pointed out during the ICS workshop, the mutual understanding must be seen as a two ways communication between RD&D experts and CS representatives and support a learning process for everybody.

⁹ This workshop was originally to be held in Paris but was successfully carried out as a web meeting instead.

WP Tasks leaders and co-leaders had the opportunity to comment an early draft of the deliverable before this workshop.

The present deliverable (Deliverable 9.15 “Scoping of ROUTES, initial ICS input and ICS action plan” (planned in Month 11) is the result of this Subtask. The outcomes presented here are based on the exchanges during the ROUTES WP workshops held in Athens on March 2-6, 2020, where a special session of Task 7 was organised and the ICS ROUTES session within the CS larger group at the ICS workshop in May 2020.

The outcomes of the Subtask will be presented at the first WP annual meeting, originally planned for May 2020 (Month 12) but now delayed until the autumn due to COVID 19 situation, within a specific session (CS experts + WP Board) including attendance from members of the CS larger group.

Subtask 7.2 – Implementing the ICS action plan (from Month 13 (June 2020) to Month 48 (May 2023)).

Subtask 7.2 will implement the ICS action plan (D9.15). Interactions involving both the CS larger group and a panel of WMOs, TSOs and REs will be steered by the CS experts on the yearly specific topics (year 2, 3 and 4) identified in the ICS action plan.

The subtask will contribute to enhance mutual understanding and dialogue skills among the different categories of participants. The CS experts will continuously follow and discuss the tasks 2-6 in the work package and the results (with a focus on each of the yearly specific topics). This will be done in dialogue and collaboration between the CS experts and scientific/technical experts from WMOs, TSOs and REs in the WP.

CS experts will, with a reservation about available resources, attend the meetings of other tasks, and comment some of the deliverables from tasks 2-6 of the WP (preferably in the draft versions) that are the most relevant for Task 7.

In order to better support interactions with the CS larger group, Task 7.2 will organise a dedicated ROUTES session within the CS larger group workshops (year 2, 3 and 4) organised at programme level by the EURAD PMO WP 1, Task 8.

At each annual WP meeting (Month 24, Month 36, Month 48), the CS experts in Task 7 will present the progress of their work including comments, suggestions, questions and other observations. These activities will give the opportunity to present the work achieved and discuss the results.

Annual feedback to the ROUTES 2-6 tasks will be organised by subtask 7.2, providing them with an input on the first, second and third specific topics identified in the ICS action plan (D9.16 Implementation of ROUTES action plan first phase, D9.17 Implementation of ROUTES action plan second phase, D9.18 Implementation of ROUTES action plan third phase).

Subtask 7.3 – Synthesis work and dissemination (from Month 49 (June 2023) to Month 60 (May 2024)).

Towards the end of the WP, the CS experts will summarise the conducted work in Task 7 and the interaction framework developed in the work package will be documented. This will be done in dialogue and collaboration between the CS experts and scientific/technical experts from WMOs, TSOs and REs in the WP.

Subtask 7.3 will organise a dedicated ROUTES session within the ICS workshops (year 5) organised at programme level by the EURAD PMO WP 1, Task 8.

D9.19 will be a synthesis report of the work and results of Task 7 including the documentation of the interaction framework developed and used, including recommendations for future CS interaction within EURAD. The results and deliverable D9.19 Final synthesis report of the work and results of Task 7 will be presented at the final WP annual meeting.

Subtask 7.3 will contribute to a popularised description of the results of the WP in collaboration with the other tasks in the WP and the KM WP (as part of D9.20).

2. Organization

2.1 First meeting

CS experts involved in ROUTES Task 7 Interaction with Civil Society organised themselves during the first meeting in Paris, August 2019, back to back with the EURAD PMO WP 1 Task 8 meeting. The Task 7 co-leaders presented the WP 9 ROUTES and discussed the objectives and activities in Task 7 and relations to other tasks (i.e.: Task 2: Identify challenging waste streams, Task 3: Describe/compare characterisation approaches, Task 4: Identify WAC used in MS, Task 5: RWM solutions for small amounts of wastes, Task 6: Shared solutions for MS).

Task 7 members agreed to be organised on several levels and had to assure:

- Collaboration with the different ROUTES tasks and participation in the coordination at the WP level,
- Management of and exchange on activities performed within Task 7, and
- Interaction with the CS larger group which is organised in the frame of the EURAD PMO WP 1, Task 8.

For the day to day management and collaboration with the ROUTES WP coordinator and tasks leaders it was agreed that the responsibility is taken by co-leaders of the Task 7 who have much experience in project management and have participated also in previous EURATOM projects. The co-leaders will also present Task 7 in different ROUTES meetings, like the kick-off meeting and tasks leaders' meetings. It was decided that Task 7 CS experts' meetings will take place at least every two months for exchange of information, discussion of important questions raised in the tasks and exchange of views arising from the work.

The CS experts of Task 7 also decided to form small teams, consisting of two CS experts, to closely follow the activities in the individual ROUTES tasks based on their experience, interest, education and also their locality in order to reduce travel costs. For each of the tasks, a CS expert was assigned as main contact person and another as stand-in. Both experts were also supposed to attend task meetings either in person or virtually and to take notes for better exchange with other Task 7 members. Some other members also expressed their interest to be more actively involved. Based on the adopted strategy, an initial letter to task leaders (Appendix A) was sent to establish productive working relationships and to set up the first virtual meetings between tasks.

Although the interaction with other EURAD partners and the CS larger group is organised in the EURAD PMO WP1, Task 8, it was agreed that all Task 7 CS experts will participate in those activities. The main objective of this interaction is to obtain feedback from other CS experts in EURAD and the CS larger group and adopt the viewpoints in the deliverables that Task 7 is responsible for.

For all Task 7 members, access to the EURAD Project Place was organised in collaboration with the ROUTES coordinator.

2.2 CS experts in Task 7

The term “CS expert” should be understood in the wider sense as “knowledgeable person” or “person recognized as such”, typically ranging from academics and non-institutional experts with a scientific background to people spending significantly more time than the average population on the issues raised by RWM. CS experts are not necessarily scientists but people who develop a capacity to enter technical or strategic issues and to express knowledgeable views in a refutable way (logical argumentation based on reliable data, etc.).

The technical and scientific background, as well as the relevant experiences in the frame of EURAD, of the CS experts who have been appointed to work on Interaction with Civil Society activities in the frame of ROUTES Task 7 are detailed below.

Johan Swahn, MKG (Swedish NGO Office for Nuclear Waste Review), NTW, Coordinator of the ICS activities in EURAD - WP9 ROUTES



Johan Swahn PhD. (1959) is since 2005 the director of the Swedish NGO Office for Nuclear Waste Review (MKG). Together with the Swedish Society for Nature Conservation and the Swedish Friends of the Earth, MKG takes an active part and has an important role in the decision-making processes regarding the Swedish nuclear industry's licence applications for Swedish repositories for radioactive waste.

Johan Swahn has a Master of Science in Engineering Physics and a doctorate degree in Science, Technology and Global Security from the Chalmers University of Technology, Göteborg Sweden. His doctorate and post-doc work focused on the issues of nuclear non-proliferation, nuclear waste and military fissile material disposition. He has also studied one year of Radiation Physics at the University of Gothenburg/Sahlgrenska Hospital.

Johan Swahn is a member of the Management Board of Nuclear Transparency Watch (NTW) and co-ordinator of the NTW work on radioactive waste management. He is a co-chair of the SITEX_Network. He is also a member of the International Panel for Fissile Materials, IPFM, a member of the International Nuclear Risk Assessment Group, INRAG, and a member of the Scientific Board of the Swedish chapter of International Physicians for the Prevention of Nuclear War, IPPNW.

Under the leadership of Johan Swahn, MKG was a partner in the EU research project SITEX II and he leads now for MKG a work package on civil society interaction in the EU research project Beacon.

Johan Swahn has a large general interest in all R&D issues for radioactive waste management and therefore all aspects of the EURAD project.

Nadja Zeleznik, EIMV (Elektroinstitut Milan Vidmar, Slovenia), NTW Chairwoman, Coordinator of the ICS activities in EURAD - WP9 ROUTES



Nadja Zeleznik Ph.D. (1963), master's degree in physics and in reactor physics and Ph.D. in psychology, all University of Ljubljana, employed as senior researcher in EIMV which is Slovenian TSO and LTP to Josef Stefan Institute.

Nadja Zeleznik is a specialist for nuclear technology and radioactive waste management, including emergency preparedness and response and for risk perception, communication, education and training in environmental projects. She has as civil servant with governmental examination in radiation protection nuclear safety more than 30 years of experience in research activities, regulatory function (nuclear regulatory body and TSO) and in the waste implementation organisation.

She has authored and co-authored strategies and programs in the nuclear area, contributions for new legislation, cost assessment and investment programs for different projects, feasibility studies for environmental projects, remediation plans and their implementation, safety assessments and reports for nuclear facilities, radiological investigations and dose assessments, QA/QC plans and procedures, communication strategies and plans, assessments of public acceptability and related surveys, carried out education and training in communication and stakeholder involvement, and developed information materials and tools, and related research.

She has been involved in more than 30 international projects, also as coordinator and leader and is author of more than 200 papers and several chapters in books. She serves also as an expert for the International Atomic Energy Agency (IAEA) and was evaluator of different proposals in EU framework programs.

Jan Haverkamp, Greenpeace and the World Information Service on Energy (WISE), NTW, CS expert involved in EURAD - WP9 ROUTES



Jan Haverkamp M.Sc. (1959) is nuclear energy and energy policy specialist with Greenpeace Netherlands and the World Information Service on Energy (WISE), and he is co-founder and vice-chair of Nuclear Transparency Watch. He is a Dutch citizen and has a bachelor's degree in biochemistry from the State University in Leiden, the Netherlands, and a bachelors and master's degree (academic engineer – Ir.) in environmental sciences from Wageningen University, the Netherlands.

His work as developer of environmental organisations in Central Europe and as energy campaigner and nuclear energy specialist brought him into contact with nuclear power and energy policy in all EU countries operating, having operated or having taken moves to operate nuclear power stations, as well as Belarus, Russia, Ukraine, Switzerland, Canada, Japan, South Korea, South Africa, Taiwan, Turkey, and the USA. He also worked for four years as Greenpeace's EU nuclear policy advisor in Brussels, among others during the start of the Fukushima nuclear crisis and the following nuclear stress tests. He was involved in the development and following implementation of the Euratom Nuclear Safety Directive, the Nuclear Waste Directive and the Directive on Basic Radiation Standards. He has a long track record on issues of nuclear transparency, especially the implementation of the Espoo and Aarhus Conventions in the nuclear sector. Jan Haverkamp received his level 5B certificate as radiation protection advisor from the Technical University Delft. He was involved in radiation protection work in Spain, Japan and Ukraine.

His interest in EURAD ROUTES stems from his involvement in advising citizens and citizens organisations around planned and operational nuclear waste facilities in Belgium, Bulgaria, the Czech Republic, Germany, the Netherlands, Romania, Slovenia and Ukraine.

Niels Henrik Hooge, NOAH / Friends of the Earth Denmark, NTW, CS expert involved in EURAD - WP9 ROUTES



Niels Henrik Hooge LL.M., M.A. (1956) has a Master of Law and a Master of Arts in Philosophy, specialising in environmental law and environmental ethics respectively. He has for several decades been active and worked in and with the Danish and European NGO community in various fields and in different capacities.

In 2014, he co-founded NOAH / Friends of the Earth Denmark's Uranium Group. The group provides information on the nuclear fuel chain, including the environmental, energy, foreign and security policy consequences of uranium extraction, processing, transport and trade, as well as nuclear waste disposal. From the outset, one of its main objectives was to amend the initial concept for a final repository for the Danish low and intermediate level radioactive waste and to increase public participation in the decision-making process. NOAH's Uranium Group also lobbied for the establishment of a national contact forum for the Danish nuclear waste, involving all relevant stakeholders. This triggered his interest for public participation in nuclear waste management in Europe, particular in countries like Denmark, with small amounts of nuclear waste.

Representing NOAH, he holds a seat in the national contact forum for nuclear waste under the auspices of the Danish Ministry of Higher Education and Science, which was established in 2016, and also in the local contact forum in Roskilde Municipality, where the Danish radioactive waste will be stored in an interim storage facility for up to fifty years.

Honorine Rey, NTW, CS expert involved in EURAD - WP9 ROUTES



Honorine Rey M.Sc. (1996) is a French self-employed woman with a degree in political sciences and a Master's degree in European project management.

In her third year, Honorine Rey experienced a European student mobility programme at the Catholic University of Leuven (Belgium), where she studied human rights, European foreign policy and institutions, and Russian politics. This opportunity strengthened her knowledge on the EU and its functioning.

In the frame of her Master's in International and European studies, she acquired significant skills in European project management. More specifically, she attended classes on the EU structural funds as well as project development workshops in the fields of social action, NGOs, cultural and environmental policies, European citizenship, youth, and decentralised cooperation. In parallel, she worked as an intern for Caritas France and she went on a European Voluntary Service (EVS) for Young Caritas in Europe. That led her to reflect and write her master's thesis on the role of European and French authorities and NGOs in the involvement of young people for the common good, in France and within the EU.

Social and environmental issues being of great interest for her, Honorine Rey started working for Nuclear Transparency Watch as a support in the organization of the network's activities, notably in the EURAD project. In this frame, she is involved in two WPs, in the EURAD PMO WP 1 task 8 and ROUTES.

2.3 Organisation of work

Based on the experience, interest, educational background and geography the following division of responsibilities and involvement in the ROUTES tasks was agreed upon:

- for Task 2: Honorine Rey (contact person) and Johan Swahn (stand-in),
- for Task 3: Johan Swahn (contact person) and Niels Henrik Hooge (stand-in)
- for Task 4: Jan Haverkamp (contact person) and Honorine Rey (stand-in),
- for Task 5: Niels Henrik Hooge (contact person), Nadja Zeleznik (stand-in),
- for Task 6: Nadja Zeleznik (contact person), Jan Haverkamp (stand-in).

In each of the composed teams there is one CS expert with technical / natural science education background and extensive experience with RWM. The adopted organisation structure enables the Task 7 members to follow and participate in the other tasks' activities. As some of the CS experts have a special interest in certain tasks, we have also added the possibility for them to easier follow the work of other tasks than they are directly involved in as contact person or stand-in. For example, Johan Swahn also has a special interest in Task 5 and Niels Henrik Hooge in Task 6.

The coordinators of Task 7 participated at the ROUTES management and coordination meetings, such as the kick-off meeting in September 2019 providing the description of the CS experts group and Task 7 objectives and activities. They also participated at the other tasks' meetings, giving feedback on Task 7 activities and suggestions for future work.

Task 7 members adopted active modes of interaction and launched monthly virtual meetings assuring the appropriate exchange of information, interpretation and registration of needs also from the CS larger group. The members are included in the ROUTES work and the findings and results are addressed during these meetings. In the frame of the meetings, the following was discussed:

- Interaction of Task 7 with the other tasks and outcomes from the virtual meetings, inclusion of CS experts in the different tasks' activities.

- Review of the ROUTES Questionnaire (Milestone13, described in 3.1), with possible inputs from the CS experts in Task 7.
- Participation in the other tasks' workshops and organisation of the Task 7 meeting in Athens.
- Work on “Deliverable 9.15 Scoping of ROUTES, initial CS input and ICS action plan”.
- Contributions for the interim progress report and annual plan for year 2.
- Suggestions and plans for interaction with the CS larger group.

3. Scoping of the Tasks

During the first year of ROUTES WP, the Task 7 CS experts participated in different tasks to fulfil the objectives of Task 7. In this chapter the main results of the scoping are provided.

3.1 Review of ROUTES Questionnaire

A Questionnaire, common to task 2, 3, 4 and 6, was developed in the first months of the Project to be sent to all the participants in order to collect inputs and data for analyses in tasks. The questionnaire aimed at gathering information about the existing challenging waste in each Country, their foreseen management pre-disposal routes and available solutions, the mechanisms in place to set up Waste Acceptance Criteria through the whole lifecycle of waste and the existing Projects and Experiences to develop shared solutions.

Task 7 members were involved in the review of the ROUTES Questionnaire (available at ProjectPlace <https://service.projectplace.com/#project/1775977252/documents>). The Task 7 members proposed to add somewhere general questions to address the following:

- About specific Challenging Waste streams
 - Importance to report about all waste streams, also TENORM which are sent to different non-EU countries (e.g. Russia).
 - Challenging waste inventory and management routes: are NORM from oil and gas extraction included?
- Mechanisms to ensure public Participation
 - Are there any institutional mechanisms in place to ensure public participation and stakeholder representation in the nuclear waste management process (fora, commissions, etc.)?
 - Are there any independent expert information sources in place (contact points, expert panels, etc.), available to the public and to stakeholders?
 - Is there specific government funding or funding from the nuclear industry available for NGO activities in regard to the nuclear waste management process (e.g. is there a provision in the annual national budget law, etc.)?
- Funding and financing of Waste management
 - Is there a nuclear waste fund already established in your country to cover the costs of nuclear waste management, including disposal, and where does the funding originate from (industry, consumers, government, etc.)?

- Do nuclear waste funds sufficiently cover the costs of nuclear waste management¹⁰?

These questions are also related to several articles of the Waste Directive 2011/70/EURATOM [5], as for example Article 5 (National framework), Article 9 (Financial resources) and Article 10 (Transparency). Some of the comments were assessed to be out of scope for ROUTES, however they show the legitimate interest of CS.

The coordinator of ROUTES provided the following explanation: “The questions about NORM and TENORM were not included in the final ROUTES Questionnaire in an explicit manner firstly because NORM and TENORM were already included in the tentative list of challenging waste mentioned in the ROUTES Questionnaire mainly as uranium thorium-bearing waste and secondly because participants were free to add any Waste stream considered as challenging in their country. The WP Board considered that there were no valuable technical reasons to ask specific questions for a specific waste stream, especially for the first questionnaire whose main objective was to gather information about all the waste streams considered as challenging.

Regarding the questions related to funding, although they can be considered as legitimate from a general perspective, funding and financial issues were considered out of the scope of the Project since they are not part of the EURAD SRA and the Project Call.

Finally, regarding mechanisms in place to ensure effective participation and stakeholder representation in the nuclear waste management process, this question was not finally asked in an explicit way¹¹. Following the discussions during the Workshops it was concluded that the questions about the public participation and involvement should have been asked.

A specific discussion in the next WP meeting will be devoted to a review of the mechanisms in place in the different MS to ensure public participation.

3.2 Task 2 - Identify challenging wastes to be collaboratively tackled within EURAD

3.2.1 Overview of Task 2

The objectives of Task 2 are:

- Identify challenging wastes and related difficult issues to be collaboratively tackled within the Joint Programme, such as: sludge; organic waste; ion exchange resin; bituminized waste; graphite waste; uranium/radium/thorium bearing waste; decommissioning waste (soil, rubble etc.); particular spent fuel such as metal uranium and aluminium cladding; disused radioactive sealed sources (from category 1 to 5, including neutron sources and radium sources); waste containing reactive metals such as aluminium, magnesium, zirconium, sodium; waste containing chemotoxic material such as beryllium, mercury, asbestos, lead; legacy waste.
- Map and share understanding at EU level of the practical issues on waste management routes, taking into account specific issues relating to challenging wastes and small inventory programmes.

Task 2 is coordinated by ANDRA from France and SSTC NRS from Ukraine. It will last from Month 1 of EURAD (June 2019) to Month 48 (May 2023). The activities are divided in two subtasks:

¹⁰ Funding is a vital part of public participation and transparency should apply to the nuclear economy. Also, early availability of sufficient amounts of funding will increase the quality of the waste management and reduce the burden on future generations. Ideally, any final repository should be fully funded when construction starts.

¹¹ The Question “Are the responsibilities of the different stakeholders defined for each step of the waste management? Waste management steps include: Characterisation, Treatment, Conditioning, Storage and Disposal. If so, please provide a brief description of the waste management policy, giving details about responsibilities of stakeholders” was asked in the Questionnaire.

Subtask 2.1 – 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. (Month 1 (June 2019) - Month 24 (May 2021)).

- Make an up-to-date overview on radioactive waste categorisation / classification based on contributions from the participants (collection and synthesis of answers to a questionnaire).
- Share experience and knowledge on pre-disposal steps, describe and compare the different approaches, define R&D needs and identify opportunities of collaboration.
- Describe particular problems to be solved for challenging wastes, relating to their pre-disposal steps and in view of their disposal.
- Establish an accurate and consistent list of challenging wastes in terms of their categorisation as well as their management route.

An exchange meeting was planned during month 7 (January 2020) but in reality, it took place on March 2020 during the task 2-6 workshops in Athens. The results and outputs of Task 2.1 will be compiled in a final report D9.4.

Subtask 2.2 - Understanding at EU level of the practical issues on RWM routes for challenging waste. (Month 13 (July 2020) - Month 48 (May 2023)).

- Map and share knowledge on waste inventories, classification and pre-disposal steps with regard to disposal routes.
- Provide an overview of issues related to management and disposal of challenging wastes. This overview makes it possible to identify R&D needs, to be considered as part of future activities of EURAD.

The results and outputs of Subtask 2.2 will be compiled in final reports D9.5 and D9.6. Draft and final syntheses will be prepared and shared with participants.

3.2.2 Feedback from interactions with Task 2

Task 7 asked for a remote introductory meeting with Task 2 leaders, held in December 2019. During this meeting, Task 2 leaders presented the work already done and the objectives of the task. They explained that Task 2 started with getting answers from the participants on the challenging waste part of the ROUTES general questionnaire. They added that in the longer term, Task 2 aims at collecting information from other tasks about what is needed on R&D and what R&D projects could be collaboratively launched. Task 7 was looking for a way to follow the work of Task 2 and to interact with the leaders. Task 2 leaders agreed to keep Task 7 in the loop (emails, interactions with Task 2 participants, etc).

In March 2020 (month 9), Task 7 attended the ROUTES task workshops organized in Athens. The Task 2 workshop was an opportunity for the participants to complete the list of challenging waste that was elaborated during the preparatory phase of the project, as well as to identify the differences and similarities between waste classification and categorization systems within the EU in the perspective of Subtask 2.1 deliverable 9.4 “Overview on existing work on categorization/classification of RWs in participating states”. The main conclusions were that almost all the countries had already identified management routes (and often disposal routes) for most of their challenging wastes. Some wastes are still considered so called no-routes waste. It was observed that the list of challenging waste included in the project funding proposal was quite conclusive and no major discrepancies were found in analysing the answers to the ROUTES Questionnaire sent out. There are similar challenging wastes in different countries, but solutions have been found in some. This means that it can be possible to collaboratively tackle finding management routes in other countries by sharing experiences and technical exchanges of good practices. Finally, it was observed that the reason a specific waste is considered as challenging

is similar in the member states, including in the SIMS, i.e., lack of characterization, or the presence of a specific problematic radionuclide, or the lack of a treatment or conditioning technique. This also is a key reason for initiating joint R&D programmes and collaborative efforts.

Common R&D programmes could increase transparency, which requires that all involved organisations fulfil their obligations regarding transparency and public participation.

For Task 7, the question remains on how the public is informed on those topics in the EU Member States. Together with Task 2 leaders and the CS larger group, Task 7 will explore how CS experts and the CS larger group can be involved in Task 2. An important issue is what types of waste are considered to be challenging. There is a preliminary list of challenging waste in the description of work as listed above but this list will be further developed in the work of Task 2. One type of waste mentioned in the “Interactions with Civil Society” (ICS) workshop n°1 was control rods and certain activated internals from nuclear reactors.

3.3 Task 3 - Description and comparison of radwaste characterisation approaches

3.3.1 Overview of Task 3

The objectives of Task 3 on “Description and comparison of radwaste characterisation approaches” as described in the ROUTES project (work package) are the following:

- 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.

Task 3 is coordinated by CIEMAT from Spain and FZJ from Germany. The activities are divided in two subtasks planned to be implemented continuously and finished after three and a half years, i.e. in March 2022 (month 33 of the project). The subtasks are as follows:

Subtask 3.1 - Radioanalytical characterisation of radioactive waste and waste with complex/toxic properties (Month 7 (January 2020) to Month 24 (May 2021)).

Collection, analysis and comparison of the existing knowledge about techniques and practices for radioanalytical characterisation of radioactive waste identified in Task 2. The motivation and criteria for characterisation of radioactive wastes (e.g. treatment, reprocessing, WAC for existing repositories) will be identified (input from Task 4), like certain radionuclides and their inventories, requirements of waste acceptance regarding radionuclides limits, radionuclide release rates and different radionuclides. This will happen on the basis of the experience of the contributors with the characterisation of radioactive waste in different countries. Along with that, issues in characterisation of radioactive wastes with complex chemical properties (e.g. organic wastes) and toxic radioactive wastes (e.g. beryllium, mercury, asbestos) will be addressed. Due to their special behaviour, routine waste characterisation approaches might not be directly applicable or adequate and will require some methodological refinements. Knowledge and experience on characterisation of these wastes will be collected and systematically analysed in order to identify the main issues and knowledge gaps in order to give recommendations for further R&D to eliminate them. The subtask will also consider the means of providing an efficient transfer

of knowledge and experience to countries without a mature waste disposal concept, e.g. to EU member states with a small inventory (SIMS). The outcome of this subtask will be a report summarising good practices for radioanalytical characterisation of selected radioactive, toxic wastes and wastes with complex chemical properties, highlighting the main motivation for characterization, issues and difficulties in handling these materials, including knowledge gaps and recommendation for future R&D for closing them.

A first workshop on Subtask 3.1 took place in March 2020 in Athens (month 9), two further workshops will be organized, planned for September 2020 (month 16) and January 2021 (month 20). The last meeting will be held in common with the first meeting of subtask 3.2 (see below).

This subtask will take into account information gained in the CORI WP, SFC WP and GAS WP. The results and outputs of subtask 3.1 will be compiled in a report as deliverable D9.7 with the title “Review of radioanalytical characterisation of selected radioactive wastes and wastes with complex chemical and toxic properties”.

Subtask 3.2 - Characterization and segregation of legacy waste (Month 19 (January 2021) to Month 33 (March 2022)).

Characterization and segregation of legacy waste as well as of small amounts of waste will be investigated. The contributors will provide systematic collection and analysis of existing knowledge about historical and legacy wastes, like amounts and key radionuclides, in order to identify management issues. Contributors will also share their experience in handling or provide knowledge for building up an approach for characterization. Depending on the status of the radioactive wastes (e.g. conditioned, interim storage or undefined), further steps in R&D must be identified in order to be included into designing an integrated approach for management of historical and legacy wastes. This will include retrieval, sampling, characterization as well as treatment, conditioning and disposal.

The outcome of this subtask will be a comprehensive report on sampling and characterization methods for historical and legacy wastes, required for determining the acceptability of these of radioactive wastes for disposal. This is deliverable D9.8 with the title “Review of characterization of legacy and historical wastes”. This deliverable consolidates information on characterization approaches for historical and legacy wastes, and data on waste inventory, and provide good practice on handling and conditioning for disposal.

Two workshops will be organized during Subtask 3.2 in February 2021 (month 20) and February 2022 (month 32). The first meeting will be in common with the last meeting of subtask 3.1.

3.3.2 Feedback from interactions with Task 3

On 17 December, 2019, Johan Swahn and Niels Henrik Hooge had a Skype meeting with co-leaders of Task 3. At this time, they were busy with the questionnaire, so the main discussion was besides the objectives of Task 3 devoted to issues raised in questionnaire. They also reported that they will to a large extent rely on the input from Task 2 to identify the challenging wastes to be focused on in ROUTES. There were also some discussions on the difficulty for Task 7 to communicate the work of Task 3 to the CS larger group as it is very technically oriented.

Task 3 of ROUTES had a workshop during the ROUTES workshops in Athens from March 2-6, 2020 (month 9). At the workshop there was an introductory presentation prepared by the task co-leaders (Ciemat) and (Forschungszentrum Jülich) on “Characterization Methodologies in Waste Life Cycle”. The important properties to be characterised were presented, each property was explained and a method for characterization was described.

At the workshop the main Task 3 objectives were described as:

- Identification of characterisation techniques for radioactive waste, selected in Task 2;
- Collection, analysis and comparison of the state-of-the-art knowledge on characterisation methods applied for the problematic radioactive waste in different countries;

- Identification of the knowledge gaps in the existing approaches of radwaste characterization.

Also, a short update on the progress of analysing the contributions from national responses to the questionnaire was made.

Presentations on national radioactive waste characterisation approaches were also made by representatives from Bulgaria, Germany, Spain and Ukraine.

There was also a presentation on and discussion of the first deliverable from Task 3: “Review of radioanalytical characterisation of selected radioactive wastes and wastes with complex chemical and toxic properties”. The deliverable will include a description of where in the waste cycles characterization is used, and a description of which characterization methods are already implemented (in different countries for different waste streams).

3.4 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

3.4.1 Overview of Task 4

The Task 4 objective is to give an overview of how EU Member States use and apply waste acceptance criteria (WAC) at different stages in the life-cycles of different kinds of radioactive waste, especially of “challenging” wastes – sometimes referred to as problematic waste streams.

On the basis of that overview, Task 4 should develop an approach to support decision makers choosing concrete waste management measures without later having to regret their choices (e.g. because of policy changes made or because of new technical developments), so called “no regret” waste management measures.

R&D needs and opportunities for collaboration between Member States should be identified.

Task 4 is coordinated by ONDRAF/NIRAS from Belgium and VTT (GSL) from the UK. The work is divided into three subtasks:

Subtask 4.1 – Current use of WAC – to be completed in Month 15 (September 2020).

On the basis of the input from external material gathered from, among others, the NEA and the IAEA and the ROUTES questionnaire, this subtask will provide an up-to-date overview per country on the use of WAC in Member States, focusing on the use of WAC as a tool for waste cycle management.

For each country, a description will be made of:

- currently used WAC (including proposals for WAC in countries that are developing them);
- how these criteria work and are linked with waste classification;
- how compliance is verified;
- how non-conformance is dealt with.

If the participants wish, they can include a comparison with earlier work such as THERAMIN. The output will be an internal memorandum presenting the above-mentioned overview per country.

Subtask 4.2 – Sharing experience on waste management with/without WAC available - from Month 6 (December 2020) to Month 29 (October 2021).

An analysis to assess whether different waste management approaches deliver what is needed for an “ideal solution” (a gap analysis), in line with different options for (final) disposal. This will examine how

decisions can be made that do not lead to problems later down the line (“no regret” waste management measures).

During a workshop in month 25 (June 2021), this analysis will be made on the basis of concrete examples from different countries with regard to difficult waste groups for which there is no final disposal solution available yet, including information from Task 2, from the questionnaire and from external sources such as the NEA and the IAEA.

The output will be another internal memorandum presenting the outcomes of the workshop.

Subtask 4.3 – R&D needs and opportunities for collaboration – from Month 29 (October 2021) to Month 40 (September 2022).

An inventory will be made of research and development needs related to management of problematic waste groups as identified in Task 2. The emphasis will be on what is needed to condition those wastes in an optimal way for the foreseen option(s) for disposal. This inventory will be made for each Member State.

During a workshop in month 33 (February 2022), on the basis of this inventory and the results from the memorandum from Subtask 4.2, a final list of R&D needs will be prepared, and it will be assessed whether different Member States can cooperate in that research. A third internal memorandum will record the outputs from this workshop.

The outcome of the workshop and the internal memoranda from subtasks 4.1, 4.2 and 4.3 will be combined in a report as deliverable D9.9 “Report suggestions for the management of challenging wastes while maintaining compatibility with the option(s) for disposal”.

3.4.2 Feedback from interactions with Task 4

Task 7 organised, as presented in chapter 2, in December 2019 an online meeting with the co-leaders of Task 4, where the role of CS experts and the set-up of CS participation was discussed, as well as an overview of the task, including information on activities, especially in the first year, and the interaction possibilities related to Task 4, such as meetings, events and workshops. Ideas for collaboration between Tasks 7 and 4 were exchanged, and it was agreed that CS Experts of Task 7 will be actively involved in the work of Task 4. It was also agreed that the relevant supporting documents will be made available to the Task 7 CS experts, and the reports developed will be exchanged at an early stage so as to allow for feedback, comments and suggestions.

During the ROUTES workshop in Athens, on 3 March 2020 (month 9), it was remarked that – not only for Task 4 – experiences on waste acceptance criteria from countries outside of EURAD should at least be explored and where necessary integrated. This included EURAD countries that are not represented in ROUTES (Finland, Switzerland), but also outside of EURAD: Croatia, Estonia, Italy, Latvia, Luxembourg and Malta. Inclusion could be through involvement as observers at workshops or in the EURAD end-user groups.

CS experts also mentioned the importance of the national programmes and reports under Directive 2011/70/Euratom as a source of information. In 2016 and 2019, NTW undertook an access to information request to the European Commission, following which the European Commission has made all national programmes and reports available to the public in a central location:

- The national programmes: https://ec.europa.eu/energy/topics/nuclear-energy/radioactive-waste-and-spent-fuel/national-programmes-management-spent-fuel-and-radioactive-waste_en?
- The national reports from 2018: <https://ec.europa.eu/energy/en/topics/nuclear-energy/radioactive-waste-and-spent-fuel/national-reports-implementing-radioactive-waste-and-spent-fuel-management-directive>

Links to national programmes and reports according to the Waste Directive are also given in Appendix B.

The coordinators of Task 4 are currently assessing the responses to the questionnaire and literature from the IAEA, NEA and the national programmes and reports, as discussed in Athens. Civil Society will be asked for the feedback once this analysis is complete, first as Task 7 members, and secondly true discussions with the CS larger group.

During the ICS workshop in May, the CS larger group indicated special interest in the question of WAC for challenging wastes where disposal methods are still being developed.

3.5 Task 5 - RWM solutions for small amounts of wastes

3.5.1 Overview of Task 5

The objectives of Task 5 on “RWM solutions for small amounts of wastes” as mentioned in the ROUTES project (work package) description of work are as follows:

- Collection, analysis and comparison of the existing knowledge of disposal options for small amounts of waste. This will be complementary to the relevant IAEA project taking into account the results of an IAEA consultancy meeting about disposal options for small radioactive inventories held in Sept. 2018 and a technical meeting in mid-2019. The work of IAEA is based only on the contributions of their Member States. Thus, the participants in 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 possible small-scale disposal solutions and description of their positive and negative aspects, knowledge and experience, which will be reviewed in order to identify knowledge gaps.
- Dissemination of the results to other Small Inventory Member States (SIMS) and description of the spin off for countries with large amounts of radioactive waste.
- Identification of R&D gaps

Task 5 is coordinated by DMT (LTP of NCSR) from Germany and SURO from the Czech Republic. The activities are divided in two subtasks, planned to be implemented continuously (and partly overlapping) and finished after three years, i.e. in May 2022 (month 36 of the project). The subtasks are as follows:

5.1 Collecting and analysing actual existing knowledge about disposal options for SIMS.

Start: Month 6 (November 2019) - End: Month 24 (May 2021).

It needs some of the results of subtasks 2.1 and 2.2, including information from the questionnaire with regard to information from the SIMS, as well as from the workshops in Greece, Athens and from workshop in Austria in December 2020 at Nuclear Engineering Seibersdorf GmbH (NES), which will be organized together with Task 3. The waste data can be complemented by data for non-problematic waste for SIMS to get a reliable basis for the required size of a disposal facility. Information from EC Candidate Countries with a small inventory of radioactive waste will be included if available. Several options are in principle suitable. These might be (listed here with increasing depth from the surface):

- (a) Long-term interim storage on surface for decay to reduce the amount of waste.
- (b) Disposal near surface e.g. in silo-type facilities, shallow borehole (some tens meters), bunkers and caverns underground.
- (c) Disposal in old mines, tunnels, deep shafts or boreholes adjusted to amount and activity (some 100 meter).
- (d) Very deep borehole disposal (some km).

The results and outputs of subtask 5.1 will be compiled in a final report as deliverable D9.10 with the title “Report about the knowledge for existing and potential disposal options for SIMS” (responsible institution is NCSR, Greece).

5.2 Description of the necessary predisposal routes for the disposal options of subtask 5.1. Start: Month 18 (September 2020) – End: Month 36 (May 2022).

Using the information on waste volumes and characteristics from Task 2, Task 4, Task 6 and the questionnaire, an evaluation will be made available of predisposal routes coming from subtask 2.2, which are suitable even without waste acceptance criteria (WAC): subtask 5.2 will be discussed in more detail at the next Task 5 workshop by the end of 2020 at NES, Austria. Finally, a workshop will be organised in December 2021 (month 31). The report of the workshop is the deliverable of this subtask. The scope of this subtask is not within the scope of the planned activities of IAEA for small inventories. The results and outputs of Task 5.2 will be compiled in a final report as deliverable D9.11 with the title “Report presenting the results of the workshop dealing with possible conditioning routes for SIMS” (responsible institution NES).

3.5.2 Feedback from interactions with Task 5

As described in chapter 2, Task 7 took the initiative of an online meeting in November 2019 with the co-leaders of Task 5. Here a work plan for Task 5 was presented. The involvement of Task 7 was discussed, including passing on information on future activities and the possibilities of interaction related to Task 5, such as meetings, events and workshops. Ideas for collaboration between both tasks were exchanged, and it was agreed that the Task 7 CS experts will be involved in the work of Task 5. Information will be shared via Project Place and exchanges take place in virtual or live meetings, etc. Support documents will be made available to the Task 7 CS experts, and the reports to be developed will be exchanged in the early phases to allow for feedback, comments and proposals.

At the Task 5 workshop in Athens in March 2020, the tasks’ leaders and co-leaders moderated the presentations and discussions which focused on how the SIMS should be defined, the storage and disposal options available to SIMS, which glossary to use in the deliverables, and what steps to be taken next.

Priority was given to clarification of the definition of SIMS (what is a “small” inventory). The Task 5 proposal is so far:

- Amount of low-level waste mainly with short half-life ($T_{1/2} < 32y$) suitable for disposal in a Near Surface Disposal Facility: $< 10.000 m^3$ per country;
- and Intermediate / High Level Waste requiring disposal in a Deep Geological Disposal Facility: $< \text{some } 100 m^3$ per country (amounts for conditioned waste).

Some further characteristics of SIMS: they have small amounts of waste from research reactors (incl. prototype reactors) and from medicine, industry and research, but typically not from nuclear power plants. Their management strategies are less advanced, under development or in some cases not yet established or implemented as required by EC regulatory framework. solutions are in most cases not available regarding safety, time and costs. Often, the SIMS do not have sufficient resources (human, financial, infrastructure, etc.) or the expertise for planning, licensing, erection, operation and closure of a pre-disposal or disposal facility. Downscaling of disposal concepts for small amounts of waste are failing and special concepts for SIMS are needed, including relevant predisposal activities.

Based on these criteria, there are approximately 7-8 SIMS and the rest are by exclusion LIMS (Large Inventory Member States), assuming that no Member State is without an inventory. However, there are also candidate states (Serbia, Albania, North Macedonia) and EU neighbouring countries (e.g. Norway) with the same characteristics as SIMS. Task 5 is still working on the criteria for the definition and will present a more elaborated version in the near future.

Presentations were given at the workshop on (a) long-term interim storage, (b) near surface disposal and deep geological disposal, (c) very deep borehole disposal, (d) introduction to the group works at the workshop and summary of the group works.

- (a) The first of the two presentations on long-term interim storage focused on the strategy of COVRA in The Netherlands, where most of the waste can be cleared during the long-term interim storage. The other presented the Austrian approach to this type of storage. Although in many cases the thick walls of a long-term interim storage facility are more comforting to the public than a near surface disposal facility, it was concluded after the presentations, that long-term interim storage is not a sound disposal solution, because it places undue burdens on future generations. Furthermore, there are serious safety issues, because the longevity of concrete and other engineered parameters for hundred or more years cannot be guaranteed. Nevertheless, the amount of waste can be clearly reduced by using an acceptable decaying time during a long-term interim storage or it might be a required part of a disposal option to reduce the activity to be in line with elaborated WAC.
- (b) The presentation on near surface disposal gave examples of Near Surface Disposal Facilities as well as caverns and silos. Also, deep geological disposal (some hundred to 1000m depth) like used mines and deep caverns as well as tunnels having some hundred meters of rock on top were discussed.
- (c) In the presentation of the Very Deep Borehole Disposal (VDBD) concept, it was emphasized that it is mostly relevant when no other solution is realistically available, and the amount of waste is small. However, VDBD may be convenient when early disposal of specific waste material is required for a number of reasons (cost, safety, security, stakeholder pressure etc.). The volume of waste disposed in a VDBD can be calculated from the dimensions of the borehole. An efficient way of disposing of larger amounts of waste could be a VDBD with one entrance and then several Deep Horizontal Boreholes, like a Christmas tree.
- (d) Finally, a session with group work in three groups was introduced. The basis was the summary of answers to the questionnaire received from SIMS and status of Waste Acceptance Criteria in the national RWM programmes, including predisposal. The RW inventories of Greece, Poland, Portugal, Austria, Slovenia, Denmark and The Netherlands were compared. Cyprus was not included. This preliminary discussion led to the conclusion that The Netherlands/Slovenia, Denmark/Austria and Portugal/Greece are comparable as SIMS in terms of the volume of waste.

Also, a discussion emerged on the glossary to be included in the deliverable D9.10 Report about the knowledge for existing and potential disposal options for SIMS. It was agreed that the terminology of Euratom has to be used and that further definitions are available in the IAEA glossary. In case of conflict with IAEA terminology, this should be mentioned in the deliverable. It was pointed out by CS Experts of Task 7 that in a heavily regulated process such as radioactive waste management, in which legislation in most phases of the process require a permit, all definitions have legal implications. European law takes precedence over national law, so once something has a legal definition in the EU acquis, there is only this one definition, although it often leaves some room for discretion.

During the workshop, it was also clarified which organizations were interested in contributing to the deliverable D9.10. These were: Netherlands/COVRA, VDBD; Denmark/DEKOM, DBD; Greece/EEAE (support in developing the deliverable); Portugal/IST (long-term interim storage), Portugal/IST-ID, near-surface disposal facility (NSDF), and Slovenia/JSI, NSDF.

Finally, it was agreed that the next steps to be taken were the following: (I) to check if it is possible to invite other SIMS from candidate countries; (II) to take into account the different levels of answers received from the questionnaire when performing analyses; (III) to address or consider cooperation with institutions involved in predisposal, i.e. waste characterization, etc.; (IV) to increase exchange with LIMS; (V) to develop the D 9.10 structure, prepare a final list of contributors to this deliverable and define responsibility for chapters and subchapters; (VI) to set up next steps and deadlines for D9.10 development; (VII) and to make a decision on Glossary creation.

During the “Interactions with Civil Society” (ICS) workshop n°1, organized by Task 7 in May 2020, it was revealed that some of the main subjects at Task 5’s workshop in Austria in December will be commensurability and lack of funding in regard to the necessary disposal solutions. Task 5 made it clear that it expects support from CS and the Task 7 group on the funding issues. IAEA will also be invited to the workshop.

3.6 Task 6 - Shared solutions in European countries

3.6.1 Overview of Task 6

The objectives of Task 6 on “Shared solutions in European countries” as given in the ROUTES description of work are the following:

- To describe and assess knowledge on and approaches to sharing technology/facilities between Member States.
- To provide an overview of the interest in and experience with sharing technology/facilities in the different steps of waste management.
- To identify gaps and define needs for R&D, strategic priorities and opportunities for collaboration between Member States, as applied to challenging wastes, early stage RWM programmes and Small Inventory Programmes.

Task 6 is coordinated by COVRA from the Netherlands and ORANO (LTP CEA) from France. The activities are divided into three subtasks and are planned to be implemented continuously and finished after three and a half years, i.e., in December 2022 (month 42 of the project). The subtasks are as follows:

6.1 State of the art on shared development and use of technologies/facilities (from Month 0 to 12, i.e., to be completed by May 2020).

Summarise the knowledge on and approaches to existing and planned sharing technology/facilities (for characterisation, treatment, storage and disposal) between MS and under the coordination of IAEA or ERDO working group. A deliverable 9.12 with the title “Studies and plans for developing shared solutions for RWM in Europe” will provide a state-of-the-art of the European experience in developing shared solutions for radioactive waste management. The workshop to support discussion was organised in Athens.

6.2 Case studies on shared development and use of technologies/facilities (from Month 13 (June 2020) to Month 30 (November 2021)).

Prepare a general description of experience with sharing (several cases) and lessons learnt (to be coordinated between contributors within a country) and a viability matrix identifying waste processing steps and streams versus technologies, in order to illustrate and better communicate the work of the subtask. A deliverable 9.13 with the title “Case studies of shared development and use of technologies and facilities” will report on results, including also feedback from a devoted workshop.

6.3 Assess the feasibility of developing further European shared solutions for waste management from cradle to grave (from Month 25 (June 2021) to Month 42, i.e., to be completed by November 2022).

Perform a gap analysis where the interests and needs of Member States to share technologies and facilities are compared, and an assessment of possible approaches to and structures for sharing technologies and facilities. In addition, the needs for R&D, strategic priorities and opportunities for collaboration will be undertaken with a value assessment of key opportunities for sharing and participation. A deliverable 9.14 with the title “Report on feasibility of developing further shared solution for waste management from cradle to grave” will be developed also with feedback from a devoted workshop.

3.6.2 Feedback from interactions with Task 6

Task 7 organised, as presented in chapter 2, an online meeting with the co-leaders of Task 6 in October 2019 and discussed an overview of the task, including information on activities, especially in the first year, and the interaction possibilities related to Task 6, like meetings, events and workshops. Ideas for collaboration between both tasks were exchanged, and it was agreed that The CS experts of Task 7 are going to be actively involved in the work of Task 6. All information will be shared via the Project Place, exchanges in virtual or life meetings, or following any other suggestions. It was agreed that the support documents will be made available to the Task 7 CS experts, and the reports which will be developed will be exchanged in an early phase to allow for feedback, comments and proposals.

The Task 7 CS experts provided two comments to the shared solutions part of the questionnaire. One relates to the Q23, sub-question about “*Which national regulations apply to the shared solution?*”. The suggestion was to reformulate the question as in many countries there are no specific regulations for shared solutions. Another comment was to change in Q23, the sub-question from “*How was the public involved in the process and how was it accepted?*” to “*How was the public involved in the process and how was this taken into due account?*”. This sub-question was recognised to be linked with Task 7. In the final version of the questionnaire, Task 7 proposals were not included.

During the Task 6 workshop in Athens in March 2020 (month 9), the task co-leaders moderated presentations and discussions which focused on the definition of shared solutions, an overview of on-going initiatives, like the ERDO working group and IAEA activities, presentation of several examples of shared solutions given by participants (e.g. Bulgaria, France, Denmark, Germany, the Netherlands, Slovenia/Croatia, Ukraine and others). A proposal of what is a shared solution was discussed and adopted to include:

- Knowledge is given free of charge,
- Bi- or multilateral co-operation on:
 - Shared information,
 - Shared resources (in-kind work),
 - Shared costs,
- Commercial services:
 - Customer-supplier relationship.

Based on this new and also broadened definition of shared solutions, discussions with participants proved that there are many examples of shared solutions in the countries, between the countries and with international organisations (like IAEA). The discussion showed that there is an interest of Task 6 for obtaining information about the public opinion on shared technologies/facilities, for example on a facility which is in use by many countries, like the Studsvik facility in Sweden. Also, a reflection would be welcome on the attitude and perception towards different kind of shared solutions (i.e. mobile solutions versus classical waste management facilities).

Some issues were pointed out by CS experts in relation to Task 6. Most of the activities and examples which were presented during the workshop were dealing with technical and natural sciences research questions. But important issues that also need to be addressed, are those related to governance (e.g. transfer of responsibility for radioactive waste, return of waste from (temporary) management abroad, Waste Directive provisions in article 10, also for shared solution, discussion the option of all alternative solutions), waste resulting from processing abroad (e.g. enrichment DU exports to Russia), financial questions (what is included in financial estimates, the issues of compensation, contingencies for unexpected events, ...) or conditions for joint solutions from a societal point of view. They are according to the project description out of scope, but they would need to be investigated as they present basic questions from society. It was also noted that financial issues will be part of the ERDO Multinational Repository Costs and Financing project.

One important issue of shared solution presented at the ICS workshop is also transparency of such activities: one example is Bohunice Center (Slovak Republic) which has started international waste

treatment activities that according to report from local civil society experts (CS larger group as in [3]) is not clearly documented for the public, including plans to expand these international activities. More information is summarized in chapter 4.2 and in the Milestone 82 report [8].

4. ICS action plan for ROUTES

The planned work of Task 7 during the second, third and fourth years of the project is to be described in this deliverable as an “Interaction with civil society (ICS) action plan”. The topics below have been developed by Task 7 CS experts after consultation with the other tasks’ leaders, all CS experts in the EURAD project, EURAD participant that attended ICS workshop [8] and the CS larger group.

The plan consists of an inventory of issues that the ROUTES CS expert group has identified during the first year of scoping of the ROUTES work package. In addition, some issues that the CS experts have understood may interest the broader Civil Society, have been pinpointed. It is also planned to modify and upgrade the ICS action plan in the future, according to the activities and deliverables developed in tasks 2-6 when new issues will be addressed.

4.1 Proposition of topics from Task 7

Task 3 on “Radwaste characterisation approaches” and Task 4 on “Identification of waste acceptance criteria” are largely technically oriented. They are accessible and understandable to the CS experts in Task 7 but might be less understandable for the CS larger group. The CS expert group will for these two tasks mainly inform the CS larger group of the work being done. However, one specific issue that the CS larger group has said may be of interest is the question of WAC for challenging wastes where disposal methods are still being developed. The CS experts will continue to follow and scope tasks 3 and 4, considering that it is possible that more issues of special interest to a broader civil society will appear as the project develops.

The CS expert group has identified the work of Task 2 “Identifying challenging wastes to be collaboratively tackled within EURAD” as interesting in that there will be a description of such inventories for many countries. It may certainly be of interest to Civil Society in those countries to know more about this and about the on-going plans to manage and dispose of this waste. Task 7 will therefore work on understanding and communicating information about the inventories to the CS larger group and where applicable, also into Civil Society as a whole.

In the frame of Task 5 “RWM solutions for small amounts of wastes” the exploration on how the conditions for CS involvement in SIMS differ from CS involvement in LIMS can be looked at. Also, some factors which impact these can be investigated together with comparison for SIMS and LIMS. Another important topic that comes from the discussions is related to ethical issues that are introduced by the consideration of deep boreholes technology in the CS larger group. The CS experts will make an inventory of considerations within the CS larger group about possibilities for SIMS to organize international management solutions for low and intermediate level wastes, including the need for and form of stakeholder involvement and funding.

Task 6 on “Shared solutions in European countries” and Task 5 on small inventories also represents an overlap in the conditions for CS involvement. Related questions, i.e. how CS involvement in SIMS also affect CS in shared solutions and vice versa, can be added. Some hypotheses which come out of discussion can be studied – for example: the smaller the RW quantities, the easier is the CS involvement process, and the possibility of getting a favourable public perception of shared facilities. On the other hand, the bigger the RW quantities that are strongly related to the operation of nuclear power plants, the bigger the opposition against final RW disposal¹² could be and the harder the CS involvement could

¹² Empirical observations have long since confirmed that public acceptance of GD is smallest in countries with the largest amounts of particularly HLW, such as France, United Kingdom and Germany.

be - what does that mean for the structure of the CS involvement process? Such hypotheses should be investigated to reveal the reality and will be taken on board.

Other examples identified and relating to Task 6 on shared solutions include the shared responsibility for radioactive waste from the Slovenian / Croatian Krsko NPP, the management of metal waste from all over Europe at the Studsvik facility in Sweden, the export of depleted uranium for uncertain management in Russia. This includes suggestions concerning public perception and processes to guarantee inclusiveness also in situations of a wide difference of opinions.

With respect to Task 6 on shared solutions, the CS experts have identified the understanding of the public perception of transnational nuclear facilities, particularly final repositories for nuclear waste, as a key issue with respect to CS involvement. The CS experts intend to look into how public perceptions of shared nuclear facilities between two or more MS differs from public perceptions of nuclear facilities within one MS, if at all, and how a process of localization of a shared nuclear facility, involving all the relevant stakeholders, could be structured. The methodology will be developed in the approach, including the related MS for investigation and the target audiences. Transparency (public participation and information) from an early stage is important for a good decision-making process. Good transparency improves the safety of the radioactive waste management projects. The CS experts in ROUTES see the discussion on effective transparency based on the Aarhus and Espoo Conventions, including resourcing of participation, as described in the BEPPER report [6] by Nuclear Transparency Watch, as a good foundation for proceeding.

There are obligations of transboundary public participation in decision-making processes when activities have or may have environmental impacts in other states than the state of origin of the activities in question. These obligations are defined in the Aarhus Convention, the Espoo Convention and EU Directive 2011/92/EU as amended by Directive 2014/52/EU. Citizens and NGOs (civil society) in impacted countries have a right to be heard at an early stage. Although such obligations exist, public participation until now seldomly takes place, but when citizens insist, it is clear that they have a strong case under European law for wanting to participate. Such participation can have large benefits for those responsible for the activities - a clearer picture of potential environmental impacts, and social and economic dynamics.

The CS experts will look for some suggestions together with the CS larger group on how responsibility for the production of radioactive waste outside of Europe for consumption of radioactive substances in Europe (e.g. waste from uranium mining, fuel production, waste management, etc. countries outside of the EU) can be defined in regard to consumer states.

4.2 Feedback from EURAD participants and ICS

The Interaction with Civil Society (ICS) workshop n°1 was organized in the frame of EURAD under Work Package (WP) Programme Management Office (PMO), Task 8: Coordination, organization and reporting on Interactions with CS. It was the opportunity for the EURAD participants (CS experts and panel of WMOs, TSOs and REs participants) to get to know the CS larger group members who have been appointed according to a process described in the “Deliverable 1.13 List of members of the Civil Society group” to follow the ICS activities [3]. During the sessions of ICS workshop, ROUTES WP was presented and main outcomes from this deliverable 9.15 were discussed. The details from the ICS workshop n°1 are collected in milestone report [8].

During the presentation of the ROUTES Work Package, special attention was given to the scope of the work package, what it means for the investigations and also how it could limit the feedback from the participants. Although the scope provides a set of boundary conditions for the project which are needed in order to define the outcomes for particular activities, still the comments from participants, even if assessed to be outside of the scope, can be addressed in an intelligent way by enlarging the issues already analysed in the tasks, or by including them in the plans for future activities under the EURAD programme.

One important focus from the plenary discussion was whether security issues in RW and spent fuel management were taken into account within ROUTES and EURAD. Below are the main elements which were identified:

- Spent fuel, apart from spent fuel such as metal uranium, is not specifically mentioned to be part of the ROUTES project that is focusing on other challenging and no-routes radioactive wastes. Nevertheless, spent fuel, especially from nuclear energy production, is included in EURAD, in the technical WP8 SFC (Spent fuel characterization and evolution until disposal). In addition, some spent fuel issues are dealt with in other WPs (e.g. UMAN and uncertainties related to spent fuel management). As spent fuel from energy production as well as activated components from nuclear power plants are real challenge for management, they would need to be addressed.
- The objectives of ROUTES cover safety related issues, but not security issues as decided by the project proposal. Yet, security issues are directly related to safety issues (security breaches often result in safety problems). Thus, they could be included in the work, both in ROUTES (security plays a role for several categories of challenging waste) and in UMAN. Those issues are often raised by the CS persons involved in EURAD on different levels but are almost always considered as “out of the scope”. Security issues could be included in the EURAD activities in the intelligent way as they are part of the related risk.
- An issue is how the framework of ROUTES, UMAN and the EURAD project in general could evolve such as to take civil society’s concerns and broader concerns more into account, thus widening the scope of the projects. The framework should enable all parties to bring forth their main concerns, and security is a very good example of this.

Some key issues from ICS workshop were further pointed out during the ROUTES session which impact the deliverable 9.15 and ICS action plan:

- Task 4 deals with WAC and an issue which could be relevant for CS is how challenging waste with no disposal routes are treated. This question also relates to Task 2 on identification of challenging waste. The question can be looked at again at a later phase of ROUTES, where more information has been collected and it is clear, which challenging wastes have, as yet, no clear disposal solutions. Part of the ROUTES is also to contribute to identify R&D activities that could support the implementation of solutions or the management of challenging waste, including different disposal options.
- Task 5 will organize a workshop in Austria in December 2020. Some of the main subjects here will be commensurability and lack of funding in regard to the necessary disposal solutions. Task 5 made it clear that it expects support from CS and the Task 7 group on the funding issues. IAEA will also be invited to the workshop.
- Deliverable 9.15 should also be amended with reference to two basic documents: a) Joint Convention on Safety of SF and safety of RW and b) the EC Waste Directive. The list in the appendix of examples of challenging wastes that need further attention, including also e.g. control rods should be provided. It would be beneficial to introduce the issue of nuclear security in parallel to nuclear safety, maybe by introducing minimum or generic DBT - Design Basis Threat for SF and RW facilities and transports and by reducing vulnerabilities of waste types and facilities.
- The example of bituminized waste raises in addition to the safety issues also security questions due to possibility of induced fire, therefore the security could be added as a subject for discussion in ROUTES.
- It is also important to point out that there are shared solutions for RWM that are not developed in a transparent way – e.g. the Bohunice Centre, established to treat the waste from A1 NPP accident, but now rebuilt for larger quantities of radioactive waste to also treat the waste from

Italy¹³. Therefore, the process of transparency (together with information and participation, as defined in the Waste Directive) is extremely important and should be reflected in Deliverable 9.15. The impacts of private RWM companies on the transparency issues are very important.

- Another significant issue in regard to any proposed solution is to implement the requirements of the Environmental Impact Assessment Directive, where reasonable alternatives should be looked at for each of the addressed proposals, like for example deep boreholes as an alternative to DGR.
- Framing of the ROUTES WP is also important: most of the time we talk about transparency but it is not the only consideration to be included in the CS interactions. Also, other issues are important. E.g. we can ask, what are the concerns and main expectations of people? Just by answering, a completely different frame could emerge. Also, to challenge the scope and provide new framing is one of the roles of CS. How to address this is a very difficult question. A further expectation from CS is the translation of the technical concerns and results.
- The understanding of public perception of radioactive waste projects is an extremely important topic, but what can be seen as “acceptable” in the eye of the public has to be closely connected to the safety of storage or repository concepts as well the appropriate geological conditions, especially with the current practice of offering large compensations from the governments to the hosting communities.
- Social science and humanities research, although excluded from EURAD, is one of the issues which should enter the future EURAD programme. It is evident that technical project cannot be addressed only from one view (technical) but should be approached holistically and include social and societal views.
- The Aarhus convention is one of the bases for the activities in the EURAD project, and also in ROUTES. The terms of references for CS interactions are based on this convention.
- Training activities are scheduled in the frame of EURAD and could also be proposed or requested in the frame of ROUTES, supporting ICS activities.

The issues and proposals from the ICS workshop n°1 were taken into account as much as possible in this deliverable, some will be further discussed and referred in the future activities during ROUTES implementation.

4.3 Interaction with civil society (ICS) action plan

Based on the outcomes of the Task 7 investigation of tasks 2-6 in the ROUTES WP and additional feedback from EURAD participants and interaction with the CS larger group, an action plan for interaction with civil society has been developed. It is a dynamic proposal and will be further revised each year to include the development of the work done and results produced in tasks 2-6 in the ROUTES WP and in interaction activities with CS larger group. There may also be input from other EURAD participants, influence from developments in different international arenas (e.g. the European Commission and international organisations engaged in the field), or developments at the national level in participating countries. As was already discussed in chapter 4.1, and further supported by feedback from interaction with CS in chapter 4.2, the proposed topics for the next 3 years of work will be:

- In the frame of Task 2, “Identifying challenging wastes to be collaboratively tackled within EURAD”, the CS expert group has identified the work as interesting in that there will be a description of such inventories for many countries. It may certainly be of interest for Civil Society in those countries to know more about this and about the on-going plans to manage and dispose of this waste. Task 7 will therefore work on understanding and communicating information about the inventories to the CS larger group and where applicable also beyond into Civil Society. The CS experts group will study and take into account deliverable D9.4 “Overview of existing work on categorization/classification of RWs in participating states” (due June 2020, rescheduled

¹³ <https://www.enviroportal.sk/eia/dokument/295761?uid=d2a0163c74ad66c58fa0e38dfd2b8e25156f123> .

draft scheduled in September and final version in November 2020) to assist communication on the categorisation and classification schemes provided by the participating countries. During EURAD year 2, the focus will be on following the production by Task 2 of the deliverable D9.5 “Overview of issues related to challenging wastes”. The CS experts will send their feedback on the deliverable to the Task leaders as inputs for the work.

- In the frame of Task 5, “RWM Solutions for small amounts of waste”, the examination of how the conditions for CS involvement in small inventory states (SIMS) differ from CS involvement in large inventory states (LIMS) could be an interesting issue to follow by Task 7. Also, some factors which impact these could be investigated together with comparison for SIMS and LIMS, not least how the level of funding in regard to the problem that SIMS often do not have sufficient resources or the expertise for planning, licensing, erection, operation and closure of a disposal facility also affects CS involvement. Another important topic with ethical implications is the consideration of deep boreholes technology in the CS larger group, and also concern about long-term interim storage.
- In the frame of Task 6, “Shared solutions in European countries”, the work in the Task 7 will concentrate on issue of understanding the public perception of transnational or shared nuclear facilities, particularly storage and repositories for nuclear waste, as a key issue with respect to CS involvement. The CS experts intend to look into how the understanding of the public perception of shared nuclear facilities between two or more MS differs from public perception of nuclear facilities within one Member State, if at all, and how a process of localization of a shared nuclear facility, involving all the relevant stakeholders, could be structured. Also, the requirements of European law will be identified. The methodology will be developed on the approach, the related Member States for investigation and target audience. Some examples of shared solutions will support the investigated topic: like share of responsibility for radioactive waste from the Slovenian / Croatian Krsko NPP, the management of metal waste from all over Europe at the Studsvik facility in Sweden, the export of depleted uranium for uncertain management in Russia, Bohunice centre in Slovak Republic, established to treat the waste from A1 NPP accident, but now rebuilt for treatment of larger quantities of RW. The activity will also include an overview of some selected case studies of international waste streams (at least which facilities are treating foreign wastes, which types and from which countries).
- There is an overlap between the work of tasks 5 and 6. The CS experts can make an inventory of considerations within the CS larger group about possibilities for SIMS to organize international management solutions for low and intermediate level wastes with a focus on challenging waste, including the need for and form of stakeholder involvement and funding. Related questions, i.e. how CS involvement in SIMS also affect CS in shared solutions and vice versa, can be added. Some hypothesis can be studied – for example: the smaller the RW quantities, the easier is the CS involvement process, and possibilities of understanding then public perception of shared facilities. On the other hand, the bigger the RW quantities that are strongly related to the operation of nuclear power plants, the bigger is the conflict and the harder the CS involvement - what does it mean for the structure of the CS involvement process
- Task 7 recognises that the objectives of ROUTES cover nuclear safety-related issues, but not nuclear security issues. Yet, nuclear security issues are directly related to safety issues (security breaches often result in safety problems). The inclusion of security related issues can be relevant, both in the ROUTES WP where security plays a role for several categories of challenging waste and in the UMAN WP on uncertainties. Security issues are often raised by the CS experts and members of the CS larger group involved in EURAD and even if they can be considered as “out of the scope” they will inevitably be raised and have to be managed in an serious and acceptable way. Security issues must not be forgotten in the years to come in EURAD as they are part of the related risk and need to be addressed. It would be of benefit to introduce issue of nuclear security in parallel to nuclear safety, maybe by introducing minimum or generic DBT - Design Basis Threat for SF and RW facilities and transports and by reducing vulnerabilities of waste types and of facilities.

Having said the above, in year 2 of the ROUTES WP the main focus of the work of Task 7 would be on Task 6 on “Shared solutions for European countries”, as this topic obtained a lot of attention also from CS larger group. In the yearly deliverable D9.16 Implementation of ROUTES action plan first phase (May 2021) the results of the investigation will be provided, including the comments, suggestions, questions and other observations collected in the interaction with EURAD participants and CS larger group. Besides, the ongoing interactions and progress of activities will be reported also in relation to tasks 2-5. This deliverable will also include any changes in priorities or content for further work, which will be reported later in D9.17 Implementation of ROUTES action plan second phase (May 2022) and D9.18 Implementation of ROUTES action plan third phase (May 2023).

The CS experts in Task 7 will during the whole project actively follow the development of deliverables by all the Tasks 2-6 and give input suggested by both the CS expert group and the CS larger group. The suggestions from the CS experts are meant to be discussed with ROUTES participants to also define R&D activities in the different tasks.

5 Conclusion

Deliverable 9.15 “Scoping of ROUTES, Initial ICS Input and ICS Action Plan” is developed by the CS experts of Task 7 in the ROUTES WP with interaction with CS larger group and other EURAD participants. It focuses on scoping of the objectives and actions in ROUTES tasks 2-6 in order to identify issues that are deemed of more specific interest in the perspective of developing interactions between Civil Society and EURAD partners along the course of the WP.

The ICS action plan proposes a plan of further work on issues related to Task 2, Task 5 and Task 6 that proved to be the most interesting and relevant for next years from CS point of view. The first future deliverable D9.16, planned for end of year 2 (May 2021), will deal mainly with Task 6 on “Shared solutions in European countries” and some identified issues presented in this deliverable. In addition, the follow up of all other tasks 2 to 5 will be summed up, and the priority for year 3 and 4 will be reassessed. The very important cross-cutting issue of security in relation to safety for all different waste management steps was identified and will be included in the work of Task 7.

Appendix A. Initial letter to task leaders

Dear ROUTES task leaders,

As you know, Nuclear Transparency Watch (NTW) is involved in EURAD as a linked third party over the French Institute for Radiological Protection and Nuclear Safety (IRSN). NTW represents European civil society with related scientific or organisational expertise and participates in the different projects of EURAD to give their views on the issues that will be addressed in the frame of the program.

Concerning WP9 ROUTES, we are a team of 5 civil society experts with various backgrounds:

- Johan Swahn (Sweden) - physics and environmental science
- Nadja Zeleznik (Slovenia) - physics and reactor physics, psychology
- Niels Henrik Hooge (Denmark) – law and environmental ethics
- Jan Haverkamp (the Netherlands) - environmental science and nuclear safety
- Honorine Rey (France) - political sciences and project management

Johan Swahn and Nadja Zeleznik are co-leaders of Task 7 dedicated to “Interactions with civil society”.

The civil society experts will be divided up to have main responsibility regarding contacts with the other tasks in ROUTES:

- For Task 2, Honorine will be the contact person and Johan will stand-in
- For Task 3, Johan (contact person) and Niels (stand-in)
- For Task 4, Jan (contact person) and Honorine (stand-in)
- For Task 5, Niels (contact person), Nadja and Johan (stand-in)
- For Task 6, Nadja (contact person), Jan and Niels (stand-in)

We are very happy to be able to bring our contributions to ROUTES, and we are eager to work with you all. We would be interested in having an introductory Skype meeting with each of the task leaders to get to know each other a bit better. This would also be an opportunity for us to know about your task schedule and meetings, and to see how we can take part. We would like to have this call within the coming three weeks, and would be happy if you can suggest a few possible times.

Do not hesitate to contact us for further details.

Looking forward to meeting you,

Best regards,

Honorine Rey

Nadja Zeleznik

Johan Swahn

Jan Haverkamp

Niels Henrik Hooge

Appendix B. National programmes and reports according to the Radioactive Waste Directive

The EU's [Radioactive Waste and Spent Fuel Management Directive](#) (2011/70/Euratom) requires that EU countries have a national policy for spent fuel and radioactive waste management and that they draw up and implement [national programmes](#) for the management of these materials, including the disposal, of all spent nuclear fuel and radioactive waste generated on their territory¹⁴.

The table below links to the national programmes submitted to European Commission by the member states, showing the language version. The link goes either to the national website where the report is hosted, or to a PDF version of the report.

Table of national programmes

Country	Programmes on national websites	Programmes in PDF
Austria	DE (2018)	
Belgium	FR NL (2015)	EN (2015)
Bulgaria	BG (2015)	
Croatia		HR (2018)
Cyprus		EN (2015)
Czechia	CS (2019)	CS (2019)
Denmark	DK (2015)	
Estonia	ET (2019)	ET (2019)
Finland		FI EN (2015)
France	FR EN (2016-2018)	
Germany	DE EN (2015)	
Greece	EN	EL (2015)
Hungary		HU (2016)
Ireland		EN (2018)
Italy		IT (2018)
Latvia	LV (2017)	
Lithuania		LT (2015)

¹⁴ https://ec.europa.eu/energy/topics/nuclear-energy/radioactive-waste-and-spent-fuel_en

Country	Programmes on national websites	Programmes in PDF
Luxembourg	FR (2015)	
Malta		EN (2019)
The Netherlands	NL EN (2016)	
Poland	PL (2015)	
Portugal	PT (2017)	
Romania		
Slovakia		SK (2015)
Slovenia	SL EN (2016)	
Spain	ES EN (2006)	
Sweden	EN (2015)	
United Kingdom*	EN (2015)	

*According to the provisions of the Withdrawal Agreement, during the transition period, Council Directive 2011/70/Euratom continues to apply to and within the UK.

As of August 2015, EU countries also submit every three years a national report to the Commission, on the implementation of the Radioactive Waste Directive. On the basis of these reports, the Commission drafts a report on the overall implementation of the directive and an inventory of radioactive waste and spent fuel present in the Euratom community's territory and future prospects.

The table below links to the second national reports as submitted by the EU countries in 2018, showing the language version. The link goes either to the national website where the report is hosted, or to a PDF version of the report.

Table of second national reports

Country	Reports on national websites	Reports in PDF
Austria		DE
Belgium		EN
Bulgaria		BG
Croatia		EN
Cyprus		EN
Czechia	CS EN	
Denmark		EN
Estonia		ET
Finland		EN
France		FR
Germany		DE EN

Country	Reports on national websites	Reports in PDF
Greece	EN	
Hungary		HU
Ireland		EN
Italy		EN
Latvia		LV
Lithuania		EN
Luxembourg		FR
Malta		EN
The Netherlands	NL	EN
Poland		PL
Portugal		EN
Romania		
Slovakia	SK EN	EN
Slovenia		SL
Spain	ES	
Sweden	EN	
United Kingdom*		EN

* As required under Article 14(1) of Council Directive 2011/70/Euratom, the second national reports on the implementation of the Directive had to be submitted to the Commission by 23 August 2018. In the reference period covered by these second national reports, the United Kingdom was a Member State of the Euratom Community.

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