epa Research

Evidence Synthesis Report 10

Training and Capacity Building for Radiological Waste Management Activities in Non-nuclear European Union Member States

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Rialtas na hÉireann
Government of Ireland

Environmental Protection Agency

The EPA is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

Regulation: Implementing regulationandenvironmental

compliance systems to deliver good environmental outcomes and target those who don't comply.

Knowledge: Providing high quality, targeted and timely environmental data, information and assessment to inform decision making.

Advocacy: Working with others to advocate for a clean, productive and well protected environment and for sustainable environmental practices.

Our Responsibilities Include:

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> Large-scale industrial, waste and petrol storage activities;
> Urban waste water discharges;
> The contained use and controlled release of Genetically Modified Organisms;
> Sources of ionising radiation;
> Greenhouse gas emissions from industry and aviation through the EU Emissions Trading Scheme.

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> Audit and inspection of EPA licensed facilities;
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> Support National, EU and UN Climate Science and Policy development activities.

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> Oversee the implementation of the Environmental Noise Directive;
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> Coordinate and fund national environmental research activity to identify pressures, inform policy and provide solutions;
> Collaborate with national and EU environmental research activity.

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> Monitoring radiation levels and assess public exposure to ionising radiation and electromagnetic fields;
> Assist in developing national plans for emergencies arising from nuclear accidents;
> Monitor developments abroad relating to nuclear installations and radiological safety;
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> Provide independent evidence-based reporting, advice and guidance to Government, industry and the public on environmental and radiological protection topics;
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> Work with international and national agencies, regional and local authorities, non-governmental organisations, representative bodies and government departments to deliver environmental and radiological protection, research coordination and science-based decision making.

Management and Structure of the EPA

TheEPA is managed bya fulltimeBoard, consistingof a Director General and five Directors. The work is carried out across five Offices:

1. Office of Environmental Sustainability
2. Office of Environmental Enforcement
3. Office of Evidence and Assessment
4. Office of Radiation Protection and Environmental Monitoring
5. Office of Communications and Corporate Services

The EPA is assisted by advisory committees who meet regularly to discuss issues of concern and provide advice to the Board.

EPA RESEARCH PROGRAMME 2021–2030

Training and Capacity Building for Radiological Waste Management Activities in Non-nuclear European Union Member States (FTP-2025-04)

EPA Research Evidence Synthesis Report

Independent scientific research funded by the Environmental Protection Agency

Prepared by

Enconet Consulting Ges.m.b.H.

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The EPA Research Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

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Executive Summary

The management of radioactive waste arising from various applications is a crucial final stage in the life cycle of radioactive materials. This process encompasses the safe handling, treatment, conditioning, transport, storage and, ultimately, disposal of materials that contain radioactive substances, to protect humans and the environment from radiation. In Ireland, which has no nuclear facilities, radioactive waste originates mainly from the use of radioactive sources in industry, medicine and research. The implementation of a programme in 2011 to reduce the number of disused radioactive sources has successfully reduced the radioactive waste inventory in Ireland from approximately 3200 long-lived sources in 2010 to 14 in 2025. The remaining radioactive waste is managed in accordance with the requirements of national legislation, which transposes the provisions of Council Directive 2011/70/Euratom (the Radioactive Waste Directive (RWD)). However, as noted by the international review missions that have visited Ireland in the past (the International Atomic Energy Agency's Integrated Regulatory Review Service (IRRS) and Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (ARTEMIS)), there is still room for improvement in education, training and capacity building related to radioactive waste management, as required under Article 8 of the RWD.

To support the further development of national arrangements, the Environmental Protection Agency initiated a study to examine how European Union Member States (EU MSs) that are not operating nuclear power plants ("non-nuclear MSs") implement the requirements of the RWD related to training and capacity building. The study focused on 10 non-nuclear EU MSs considered comparable to Ireland. Cyprus, Luxembourg and Malta were identified as the most similar, while Austria, Croatia, Denmark, Estonia, Greece, Latvia and Portugal, being non-nuclear countries but with larger inventories (including radioactive waste from research reactors, historical radioactive waste and radioactive waste from anticipated future activities), were included to provide additional insights into capacity-building practices. In addition, training opportunities in radioactive waste management offered by organisations and companies in the UK were explored.

The analysis was based on a review of the findings of international peer review missions; European Commission reports on the status of the transposition of the RWD; national reports on implementation of the RWD; and reports submitted to the review meetings of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Publicly available information was verified and, where necessary, complemented by replies to inquiries from the project team from all countries involved in the study.

The study found that the provision of education, training and capacity building related to the management of radioactive waste in all non-nuclear MSs is a common challenge. The management of low- and very low-level radioactive waste, and particularly waste from the use of radioactive sources, generally receives less attention from governments than waste associated with the nuclear fuel cycle or nuclear power plant operations, which results in limited strategic planning for knowledge development, and persistent underfunding. Consequently, building, maintaining and sustaining the necessary expertise over time is challenging.

Several recurring issues related to education, training and capacity building were identified across the countries studied. These include insufficient financial and human resources; reliance on ad hoc training opportunities provided through international organisations or cooperation programmes without systematic mechanisms for knowledge transfer within organisations; long intervals between operational activities (such as waste conditioning or source return campaigns), leading to the erosion of practical skills; and limited availability of formal education and structured training programmes in radioactive waste management.

This study highlights opportunities for further strengthening arrangements to build and sustain expertise for the management of radioactive waste. Key recommendations include:

- the establishment of a formal national framework for capacity building that links education, training and knowledge management to existing and anticipated radioactive waste management activities;
- the further systematic identification of skills and knowledge required for all categories of staff involved in radioactive waste management, in line with national responsibilities and regulatory requirements;
- the establishment of a structured national training plan and programme focused on the needs identified in terms of expertise.

Over time, these measures will contribute to the long-term sustainability of Irish radioactive waste management.

1 Introduction

Radioactive waste (RW) arises from a variety of activities involving radioactive materials. The greatest volume of RW is generated during production of electricity in nuclear reactors and other activities within the nuclear fuel cycle. Decommissioning of nuclear installations and, in some cases, complex radiological installations are further sources of significant volumes of RW. For countries such as Ireland without nuclear reactors or other (more) complex nuclear or radiological installations, the main source of such waste is the use of radioactive materials in industry, medicine and research.

Ireland is one of the European Union Member States (EU MSs) where most RW is short-lived and originates from radiological medical applications. The remainder of the RW consists of disused sealed radioactive sources (DSRSs) that in many cases will remain active – although not sufficiently for their intended use – for decades, requiring specific storage and ultimately safe disposal. These comprise long-lived DSRSs that:

- were imported before the licensing system came into force in Ireland in 1977;
- were purchased from manufacturers/suppliers that have ceased trading;
- were purchased before the introduction of mandatory “take-back agreements”; or
- are orphan or legacy sources.

Among the 27 EU MSs, more than half use nuclear power for electricity production, while others have operational research reactors or research reactors that have been shut down (meaning that there is decommissioning waste) and/or other complex radiological facilities. There are few MSs, Ireland being among them, where RW is mainly institutional waste, largely consisting of DSRSs.

The EU legal framework covering safe management of RW is Council Directive 2011/70/Euratom establishing a “community framework for the responsible and safe management of spent fuel and radioactive waste”. The Radioactive Waste Directive (RWD), as it is known, aims to ensure the safe management of RW across the EU and in particular is designed to avoid imposing undue burdens on future generations. The requirements laid down by the RWD have been transposed into national legislation in all EU MSs, irrespective of the amounts or types of RW. Ireland transposed the RWD into its national legislation as Regulation 17(7) of the Radiological Protection Act 1991 (Ionising Radiation) Regulations 2019 (Statutory Instrument (S.I.) No. 30/2019). The Ionising Radiation Regulations 2019 also transpose Council Directive 2013/59/Euratom (EU basic safety standards) into Irish law.

While Ireland, as a country with no nuclear facilities, is not obliged to transpose the provisions related to spent nuclear fuel, all other provisions of the RWD are mandatory. Some of the RWD provisions are a challenge for the EU MSs that, like Ireland, possess only a small quantity of RW, as some of the RWD requirements can be rather onerous to implement. Among them is Article 8 of the RWD, obliging MSs to ensure that “the national framework require[s] all parties to make arrangements for education and training for their staff, as well as research and development (R&D) activities to cover the needs of the national programme for spent fuel and radioactive waste management in order to obtain, maintain and to further develop necessary expertise and skills”. Expertise and skills are an important element of ensuring the safety of RW management, and of protecting workers and the general public against the dangers associated with ionising radiation from RW. It is not just the RWD that requires a national framework to be in place for education and training. The International Atomic Energy Agency (IAEA) safety standards, including General Safety Requirements Part 1, “Governmental, Legal and Regulatory Framework for Safety”, and Part 3, “International Basic Safety Standard”; and Specific Safety Guide 44, “Establishing the Infrastructure for Radiation Safety”, also establish requirements for maintaining competence through adequate provision of education and training.

Given that most RW in Ireland consists of DSRSs, the IAEA Code of Conduct on the Safety and Security of Radioactive Sources adds to the relevant framework

guidance. In particular, it requires "availability of appropriate programmes for the training of all those involved in the management of disused radioactive sources", which clearly includes proper management of DSRSs that are considered RW.

The RWD does not prescribe how specific elements are to be transposed into the legislation of each MS, and even less how these are to be implemented in practice. This is evident because, given the different arrangements across MSs – and, in Ireland's case, the specific framework (with very limited amounts of RW) and corresponding needs (probably involving only a small number of staff in RW management) – these factors will shape practical implementation. However, achieving the right balance between what is formally required (i.e. by the legislation) and what is actually delivered (i.e. in the implementation) remains a challenge.

An IAEA Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (ARTEMIS) mission that assessed the arrangements related to RW management in Ireland in 2021 determined that Ireland might benefit from "strengthening existing arrangements for the provision of the education and training required for building and maintaining the competence of all persons and organizations with responsibilities relating to the management of radioactive waste and disused sources". The ARTEMIS mission noted that Ireland's national policy mandates that licensees must educate and train their employees. However, national policy lacks specific provisions for capacity building and expertise related to RW management.

The Department of Climate, Energy and the Environment, being the government department that sets policy for the management of RW, received an ARTEMIS mission suggestion that "it might be relevant to make arrangements, as appropriate, for the education and training of its staff, as well as R&D activities to cover the needs of the national programme for radioactive waste management, in order to obtain, maintain and to further develop necessary expertise and skills". The Environmental Protection Agency (EPA), which is the competent authority in Ireland for enforcing the regulations governing RW in Ireland, is tasked under Regulation 17(7) of S.I. No. 30/2019 to make the above arrangements. It is this regulation that implements Article 8 of the RWD in Ireland.

1.1 Objectives

The aim of this research project is to establish the basis upon which the EPA could develop a framework for education and training activities to support Ireland's RW management programme. This project in particular aims to:

- provide an overview of the status of Article 8 implementation in Ireland and establish recommendations to assist the EPA in fulfilling its statutory function(s) under the RWD;
- provide recommendations to support the development of national expertise in RW management;
- recommend activities, and a framework, to address the ARTEMIS mission's recommendations and suggestions related to RW management;
- recommend actions to address gaps in national arrangements for developing and maintaining RW management expertise prior to the follow-up Integrated Regulatory Review Service (IRRS) mission (approximately 4 years after the 2026 IRRS mission).

2 Overview of the Research

The project analysed the implementation of Article 8 of the RWD in several selected non-nuclear EU MSs and the UK, with a focus on arrangements for education, training and capacity building in RW management. The objective was to identify good practices, challenges and lessons learned that could inform the EPA in fulfilling its statutory functions under the directive and in responding to the recommendations of recent IAEA peer reviews.

The study covered 10 MSs – Austria, Croatia, Cyprus, Denmark, Estonia, Greece, Latvia, Luxembourg, Malta and Portugal – and the UK, looking at the training available in the area of RW management. These MSs were selected by the EPA as being non-nuclear MSs with regulatory and institutional contexts possibly comparable to that of Ireland. In addition, the UK was chosen in order to explore possibilities for arranging education activities and training on RW management within UK organisations. However, the authors recognised that several of these MSs have more complex RW management challenges than Ireland. For example, Croatia shares responsibility for managing RW generated by Krško Nuclear Power Plant (NPP) (which it co-owns with Slovenia), and Austria, Denmark, Estonia, Greece and Portugal manage legacy waste from nuclear research reactors.

2.1 Methodology and Data Sources

The study followed a multi-step research methodology combining extensive desktop review and targeted data validation.

2.1.1 Step 1: Data collection

A comprehensive desk-based review was conducted using multiple sources, including:

- European Commission (EC) reports on transposition and implementation of the RWD;
- national reports submitted to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereafter 'the Joint Convention') and reports describing the transposition and the implementation of the requirements of the RWD;
- IAEA peer review reports (IRRS and ARTEMIS) and relevant documents from the Organisation for Economic Co-operation and Development (OECD)/Nuclear Energy Agency (NEA);
- national RW management strategies, programmes and legal frameworks;
- information from national authorities, regulators and RW management organisations.

All relevant documentation was collected and systematically reviewed to extract information relevant to capacity building, education and competence management.

2.1.2 Step 2: Data analysis

The analysis of data on RW management capacity building in EU MSs focused on identifying:

- legal and institutional requirements for training, education and competence management;
- practical arrangements for capacity building and knowledge retention;
- examples of good practice and recurring challenges;
- lessons learned applicable to Ireland's national framework.

Each country's arrangements were examined against the requirements of Article 8 of the RWD. The findings from the IAEA peer review missions were cross-referenced to ensure consistency and provide further detail.

3 Examination of the Findings

3.1 Management of Radioactive Waste in Ireland

3.1.1 National framework and legal basis

The Irish government adopted its national policy on RW management in 2010. Ireland originally transposed the RWD through the Radiological Protection Act 1991 (Responsible and Safe Management of Radioactive Waste) Order 2013 (S.I. No. 320/2013), covering all aspects of RW management, from generation through to long-term storage. The relevant updated national legislation is Regulation 17(7) of the Radiological Protection Act 1991 (Ionising Radiation) Regulations 2019 (S.I. No. 30/2019). This legislation defines RW management across all stages – from generation to disposal – and upholds the principle that no RW is imported into, or exported from, Ireland unless a disposal agreement is in place. The legislation provides exceptions for the repatriation of DSRSs to a supplier.

According to Ireland's fourth report on the implementation of the RWD, government strategy and policy are commensurate with national activities, given the extent of RW management in Ireland. The report also notes that the government to a large extent funds third-party institutions that provide training in certain disciplines related to the provisions of the RWD. Such training arrangements are made as the need arises and are conducted locally, with no central coordination mechanism in place.

3.1.2 Inventory and management of DSRSs and low-level RW

All RW generated in Ireland comes from medical, industrial and research applications. The small amounts of naturally occurring radioactive material (NORM) generated as a result of Ireland's exploitation of natural resources have to date either been found to be below the regulatory threshold of 1 Bq/g or been otherwise cleared from regulation. Ireland's inventory of RW falls into the low-level waste category per the IAEA definition in its publication *General Safety Guide 1: Classification of Radioactive Waste*.

Current practices for managing RW in Ireland include decay-in-storage, which is widely used for short-lived medical waste (particularly in hospitals), and the requirement for take-back agreements with suppliers of sealed sources, which is how most DSRSs are managed. This policy has been implemented effectively since 2019 when regulations were introduced requiring take-back agreements.

Based on the small number of disused sources currently in Ireland and the enforcement of policies to ensure that the number of disused sources tends towards zero, it was determined that the establishment of a national RW storage facility is currently not a priority (see https://www.iaea.org/sites/default/files/2025-08/ireland-national-report-8rm.pdf). Ireland has a Temporary Operating Protocol for the management of orphan sources. However, as no central RW storage facility exists, any legacy or orphan sources normally remain on-site until disposal arrangements are made.

3.1.3 Regulatory oversight

The EPA (specifically the Office of Environmental Enforcement) is the national competent authority under Article 8 of the RWD and is responsible for licensing, compliance and enforcement of all matters related to RW management.

3.1.4 Implementation of Article 8 of the RWD: Capacity building, education and training – peer review and recommendations

Ireland has hosted two IAEA peer review missions: an IRRS mission in 2015 and the ARTEMIS mission in 2021. Both missions reviewed arrangements for RW management, including aspects related to capacity building. Since the IRRS mission in 2015, Ireland has made progress in the management of RW, particularly in reducing its inventory. Some findings, such as reliance on the training of experts abroad, were noted by both review mission teams. The ARTEMIS mission report identified capacity building as one of the areas for improvement, suggesting strengthening

the arrangements for the provision of education and training required for building and maintaining the competence of personnel engaged in the management of RW and DSRSs.

3.2 Implementation of Article 8 in EU Member States with Small Inventories of Radioactive Waste

3.2.1 Austria

National and legal framework

The competent authority for radiation protection in Austria is the Directorate for Radiation Protection under the Federal Ministry for Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management. Its responsibilities include issuing ordinances that establish provisions for the safe handling of RW prior to its disposal and for the transport of RW.

Current and future RW generated in Austria comes from two types of waste producers: institutional users (medicine, industry and research) and the decommissioning (decontamination and dismantling) of radiation facilities. All such waste falls within the low- and intermediate-level RW categories, as defined in Austria's National Programme for the Management of Radioactive Waste. The programme, established in line with the requirements of the RWD, sets out the applicable principles, the existing legal framework and the practice of managing RW in Austria, and provides an overview of the existing and expected quantities of RW. It presents further steps for the disposal of RW and considers the available options for disposal, taking into account the RW inventory. The programme also provides the basis for the creation of the Advisory Board for Radioactive Waste Management to advise the Austrian government on matters relating to the implementation of the National Programme for the Management of Radioactive Waste. While the programme focuses on strategy, it also implicitly signals the need for the regulator and implementing organisations to be staffed and trained.

Austria has legal requirements concerning the competence of staff within both the regulatory body and organisations engaged in RW management. The General Radiation Protection Ordinance of 2020 sets out provisions for the training of persons entrusted with tasks related to RW management, including the structure of training programmes and a required 5-year interval for refresher training. Competence requirements for personnel carrying out regulatory and oversight duties are established in the Radiation Protection Act 2020 (Strahlenschutzgesetz 2020) and related regulations. According to these regulations, qualified experts supporting the regulatory authority in the oversight of RW management facilities must, at a minimum, meet the same education and training requirements as personnel working in such facilities.

Training programmes

In Austria, education, training and competence development for RW management are embedded in the national strategy and implemented through coordinated institutional, academic and operational measures. Universities and technical colleges offer bachelor's and master's programmes in relevant fields, which serve as prerequisites for radiation protection officer roles, for staff at RW management facilities and for personnel of the regulatory authority involved in RW management oversight. Specialised training in radiation safety, including the safe management of RW, is provided by the Seibersdorf Academy, operated by Seibersdorf Laboratories Ltd.

In practice, staff at RW management facilities must complete specialised training before commencing their duties and must subsequently attend refresher courses every 5 years. Nuclear Engineering Seibersdorf (NES), Austria's sole operator of RW management facilities, has an integrated management system that ensures education and training are formalised, regularly assessed and compliant with legal requirements. Staff of the regulatory authority carrying out duties related to RW management must complete the same training required for personnel working in waste management facilities. The regulations for national civil service require regular training throughout the career of civil servants to ensure that their knowledge and skills remain aligned with the state of the art. This requirement may be fulfilled by participating in thematic workshops, courses or conferences organised by national and international organisations (e.g. the Austrian Association for Radiation Protection, the Federal Security Academy, the IAEA, the International Radiation Protection Association and the OECD/NEA) and through involvement in international

working groups (including the European Nuclear Safety Regulators Group – Working Group 2, the IAEA Waste Safety Standards Committee, and the Western European Nuclear Regulators Association Working Group on Waste and Decommissioning). Each year, the head of the Directorate for Radiation Protection agrees with each employee an individual training plan for the coming year(s), taking into account personal strengths and weaknesses as well as the assessed needs of the regulatory authority.

The 2022 ARTEMIS mission visited Austria and recognised its commitment to safe predisposal RW management, noting state-of-the-art waste treatment and interim storage at Seibersdorf, and highlighting modern practices such as effective training and operational references. The review also observed that Austrian universities and training centres provide the academic prerequisite training for regulatory and waste management staff under applicable ordinances, although it noted that a consolidated national evaluation of personnel competence had not yet been performed.

Competence management and sustainability of expertise

In the case of NES, personnel planning aims to ensure continuity of staffing. For key positions, recruitment for successor personnel begins as early as possible to ensure an overlap period that allows sufficient time for effective knowledge transfer between personnel. This approach, together with a mentoring system and detailed documentation of waste management processes, is embedded in the NES Integrated Management System.

Regarding the regulatory authority, the Directorate for Radiation Protection does not have a human resource development plan in place, as its personnel and financial planning is determined through the annual budgeting plan. However, what is required to fulfil the duties bestowed upon the regulatory authority, in terms of financial resources and personnel, are annually assessed. Education and training requirements for staff are described in the previous section. Additionally, Austria's National Waste Management Programme contains a key performance indicator that takes into account the number of technical visits by international experts to NES facilities and Austrian experts' participation in training, congresses and facility visits abroad, with a target of more than 30 such contacts per year. This approach formalises international exchange as a tool for maintaining competence.

With respect to disposal, the ARTEMIS review noted that national stakeholders assess existing capacities and future expectations separately, and highlighted that a consolidated national evaluation of competences and future needs would be beneficial. The review further recommended that the federal government develop a disposal implementation plan that incorporates capacity-building considerations for future disposal steps.

3.2.2 Croatia

National and legal framework

Croatia's current RW inventory is relatively small, comprising institutional waste generated in medical, industrial, scientific research and military applications, and NORM. Croatia has an obligation under a bilateral agreement with Slovenia to receive and manage half of the low- and intermediate-level waste generated during the operation and decommissioning of Krško NPP.

The Act on Radiological and Nuclear Safety provides the legal basis for RW management, setting obligations in terms of qualified personnel and requirements for the national programme. The Strategy for the Management of Radioactive Waste, Disused Sources and Spent Nuclear Fuel (2014) and its national programme (2018, amended) define milestones, including the establishment of the Radioactive Waste Management Centre (RWMC) and the Fund for Financing the Decommissioning of the Krško Nuclear Power Plant and the disposal of its RW and spent fuel. Both regulations explicitly address the need for training, education and R&D in this area. It should be noted that the RWMC has not yet been established.

The Ordinance on the Management of Radioactive Waste and Disused Sources (see Official Gazette No. 12/18) requires licence holders to appoint a person responsible for the management of RW and disused sources, and specifies competence requirements only for that person. It does not define competence requirements for other workers involved in RW management. Workers handling radioactive

sources must have professional qualifications and, once it is established, the RWMC will be required, via its management programme, to demonstrate that it employs trained staff and applies appropriate radiation protection measures.

The 2023 ARTEMIS review identified that Croatia currently has no formal national framework for long-term competence management and highlighted this as a key gap in the implementation of Article 8 of the RWD.

Training programmes

Training in RW management in Croatia is delivered through a combination of IAEA technical cooperation, regional workshops and national courses, and through cooperation with scientific and academic institutions, such as the Ruđer Bošković Institute and several university faculties in Zagreb and Rijeka. Together, these institutions form a strong domestic base for technical education, research and R&D projects related to the siting, safety assessment and management of RW.

The 2023 ARTEMIS mission confirmed that Croatia has an adequate legal and institutional structure for competence development but observed that implementation remains fragmented. Staff training for regulatory and operational institutions is mainly ad hoc, typically linked to IAEA or EU projects rather than provided through a continuous national programme. The RWMC, once established, is expected to become the focal point for systematic operator training and practical exercises. Until then, competence development is primarily achieved through international engagement and participation in externally organised courses.

The Fund for Financing the Decommissioning of the Krško Nuclear Power Plant, which is responsible for establishing and managing the RWMC, initiated certified training for its staff on radiological safety, organised in the Krško NPP itself. The Fund plans to continue the practice, both to provide refresher training for existing staff and to train future staff for RW operations.

Competence management and sustainability of expertise

Specific training on management of RW and DSRSs for both the regulator's personnel and RW operators is mostly delivered through training courses and workshops organised under the umbrella of international cooperation, mainly with the IAEA. The strategy, plan and programme for capacity building in RW management in Croatia is an issue that needs to be addressed, especially given the country's obligations related to RW from Krško NPP.

At present, Croatia reports that its resources are sufficient for routine activities (pretreatment, conditioning and transport of RW). However, international peer reviews noted that Croatia may not have a sufficient number of staff, either in the regulatory body or in the waste management organisation. The Ministry of Interior, as the regulator, and the Fund, as the RW management organisation, plan to expand and train staff, according to national reports, but progress is slow.
Sustainability of expertise in Croatia's RW management sector is challenged by the small number of personnel and the delayed establishment of the RWMC, which limits opportunities for practical, hands-on experience.

International peer reviews recognised that Croatia has a domestic research base at its universities and research institutions to support all steps in establishing the RWMC, such as site characterisation, safety assessments, monitoring and modelling. However, peer reviews also highlighted the need for clearer and more structured competence management.

The ARTEMIS review mission observed that while training opportunities exist, they are not yet embedded in a structured system, ensuring continuity, refresher cycles and succession planning. Croatia's reliance on individual experts and international cooperation, although effective in the short term, poses sustainability risks.

The main challenge for Croatia is moving from ad hoc training to documented, sustainable competence management that aligns with the goals set in the national programme, which include the establishment of the RWMC and obligations related to the decommissioning of Krško NPP.

3.2.3 Cyprus

National and legal framework

Cyprus has a small inventory of RW, with the majority coming from medicine, industry and research. Like Ireland, there are also some legacy sources that were used in the past in medical applications, smoke detectors and lightning rods.

Cyprus implements education, training and competence building for RW management under a coherent legislative and institutional framework. The national law on nuclear safety and radiation protection, and dedicated regulations issued under it, transpose the key provisions of the RWD into the national framework and established the Radiation Inspection and Control Service, within the Department of Labour Inspection, as the national regulatory authority. Article 8 requirements are further elaborated through the National Programme for the Management of Spent Fuel and Radioactive Waste (2015), which includes explicit provisions for training, education and competence development across all institutions involved in RW management.

Cyprus uses a facility at the Nicosia General Hospital as a national centralised storage facility (CSF), and the licence holder is the State Health Services Organisation.

National legislation requires all parties, including the regulatory authority, to ensure that staff involved in safety-related activities receive appropriate education and training to acquire, maintain and enhance the necessary expertise and skills to perform their duties competently and in accordance with established procedures. The regulatory body requires that the competence of regulatory staff is assessed annually via a training committee. This training committee is established by the regulatory authority and acts independently from the management of the regulatory body. Based on the assessment of each individual employee, the committee gives recommendations to the senior management of the regulatory body on training needs and the associated budget.

Training programmes

Training in radiation and nuclear safety is delivered through training sessions, IAEA/EU cooperation activities, workshops and professional visits. However, most of these training activities appear to be ad hoc. In its national report on the implementation of the RWD, Cyprus confirms that licensing for central storage and RW management facilities requires demonstrating that staff are adequately trained and that radiation protection measures are in place.

The national programme recognises education, training and R&D needs, where national R&D activities are mentioned as one of the options but not specifically prioritised. The national programme points to international cooperation as a core pillar of R&D.

Cyprus has maintained a long-standing bilateral agreement with Greece on cooperation in radiation safety, including RW management. More recently, similar agreements have been concluded with other countries. These agreements are intended to complement national arrangements, for example by facilitating the exchange of regulatory and operational experience. Such exchanges may include capacity-building activities from which Cyprus could benefit, whether by replicating training programmes, requesting qualified trainers or sharing experience, challenges and good practices that could be adapted to the Cypriot context. However, there has been no practical implementation of these arrangements to date, so their applicability has not yet been demonstrated.

Given that Cyprus manages only a very small inventory of institutional RW and DSRSs, the practical implementation of training obligations remains proportionate to the national context. The Radiation Inspection and Control Service/Department of Labour Inspection oversees compliance with radiation protection and RW management requirements and ensures that licensed facilities employ adequately trained personnel.

Competence management and sustainability of expertise

In practice, Cyprus relies mainly on international training in radiation safety, and in particular training in RW management. As in other cases, this international training is valuable, but it is not tailored to national needs. The main challenges of RW management in Cyprus are the small number of personnel, limited hands-on opportunities due to the small national inventory, limited opportunities to carry out complex

tasks, and reliance on irregular training opportunities provided by international agencies, rather than a documented, systematic competence plan. Peer reviews have recommended documenting training activities, succession planning, regular drills (e.g. RW shipment, orphan sources scenarios) and formal secondments/knowledge transfer arrangements.

Cyprus possesses the legal and institutional basis for competent RW management but should move from ad hoc training towards a documented, durable competence management system, especially for CSF operators and regulatory staff overseeing RW management activities.

3.2.4 Denmark

National and legal framework

Denmark's RW inventory is significantly larger than that of Ireland due to legacy waste from past research reactors. RW in Denmark is also produced in medical, industrial and research applications. As a result, Denmark has a greater need for resources, including personnel development and capacity building, to manage its RW effectively.

Denmark transposed the provisions of Article 8 of the RWD through a well-established legal and institutional framework. The Nuclear Installations Act (Act No. 244 of 1979, as amended) and associated regulations assign responsibility for RW management to Danish Decommissioning (DD), operating under the supervision of the Danish Health Authority (DHA). The Danish National Programme for the Management of Radioactive Waste (2015; revised in 2023) outlines national strategies and explicitly includes objectives for maintaining and developing staff competence in RW management, particularly in connection with the decommissioning of the Danish reactors DR-1, DR-2 and DR-3 and the management of associated legacy waste at Risø laboratory. The programme integrates training, knowledge transfer and participation in international networks as key components of national capacity building.
Under Circular No. 9450, regulatory bodies, including the Danish Emergency Management Agency (DEMA), must maintain competences in nuclear safety and emergency preparedness through education, training and international engagement. DEMA ensures that its staff maintain adequate qualifications through structured training schemes and active participation in international cooperation.

Training programmes

Education and training in RW management are carried out internally by DD; this is supplemented by participation in external courses, workshops and international cooperation initiatives. Denmark maintains a systematic approach to competence development, reflected in DD's management system, which includes documented procedures for staff qualification, training and knowledge retention.
Staff members undergo introductory and refresher training in radiation protection, waste handling and decommissioning operations. In addition, Denmark's regulatory and technical personnel regularly participate in IAEA, OECD/NEA and EU-wide initiatives, including the European Joint Programme on Radioactive Waste Management and the European Repository Development Organisation.

As specific educational and training programmes are not offered by Danish universities, DD has developed its own educational programme for new staff, as recognised by ARTEMIS. However, information on the specific internal training offered is not available. University collaborations (e.g. with the Technical University of Denmark (DTU)) provide additional technical and research capacity.

Competence management and sustainability of expertise

The national programme anticipates the long-term storage of Denmark's RW, making the retention of expertise a strategic concern. National reporting highlights the risk of knowledge loss due to small teams and reliance on a limited number of specialists. Training is often linked to specific projects (e.g. decommissioning campaigns), which may result in long gaps between major activities.

DD, operating in a context where national nuclear activities are limited and declining, prioritises maintaining and developing the expertise needed for safe RW management. In 2023, DD introduced a competence strategy to map current and future skills needs, strengthen international collaboration and support systematic knowledge transfer. It participates

in multiple international forums, such as the Club of Agencies, the European Repository Development Organisation, the European Joint Programme on Radioactive Waste Management and bilateral cooperation initiatives with Sweden and Norway. A formal collaboration with Norway was established in 2024. Furthermore, DD has established an international group of experts with representatives from RW management organisations in Finland, Norway, Sweden, the Netherlands and Switzerland in order to discuss matters on waste management, including disposal. These partnerships are used to exchange technical know-how, develop shared standards and maintain up-to-date expertise in RW management and decommissioning practices.

The DHA lacks a structured process for systematically developing and maintaining competences. A staffing assessment was carried out in 2014 but has not been updated since. The DHA's strategy anticipates maintaining competence through continuous training, but further work is needed to define the optimal number of staff and the range of skill sets required for future disposal operations.
According to the 2022 ARTEMIS mission, the RW management plan, which is to be updated every 2 years, outlines current needs for expertise, skills and resources. Denmark is still to formalise long-term human resource planning, especially in anticipation of the eventual closure of the Risø facilities and potential changes in institutional structure. The review also emphasised the importance of documenting expertise accumulated through operational experience to ensure continuity across generational transitions.
ARTEMIS and IRRS peer reviews recommended strengthening competence management, succession planning and staff retention strategies to ensure the availability of adequate competences for RW management.

Denmark's arrangements provide qualified staff for current decommissioning and waste management activities, but sustainability of expertise is the key challenge, especially with regard to future RW management activities that include the building of long-term storage and a planned geological disposal facility.

3.2.5 Estonia

National and legal framework

Estonia's RW inventory derives mainly from past use of a training reactor in Tallinn (now decommissioned) and from medical, industrial and research activities. The Environmental Board and the Ministry of the Environment oversee regulation, while the state-owned ALARA Ltd manages RW facilities at Paldiski.

Estonia's national framework for training and capacity building in RW management is anchored in the Radiation Act. The detailed requirements for radiation safety training are established by a ministerial regulation, specifically Regulation No. 57, Requirements for Radiation Safety Training of Exposed Workers and Radiation Safety Specialists. However, the regulation contains requirements for only for basic training in radiation protection, and not specific requirements for operators involved in RW management.

At the national policy level, the National Radiation Safety Development Plan 2018–2027 serves as the strategic framework for radiation safety, including aspects relevant to RW management and competence development. The plan anticipates the development of training, for example by planning an online introductory course on radiation protection for various licence holders and organisations.

The RW management policy is also guided by the National Action Plan for Radioactive Waste Management, which outlines existing and future waste streams, management methods, institutional responsibilities, technical and financial resources, and R&D needs until 2050.

Training programmes

Estonia's capacity for RW management is constrained by limited human resources across all key institutions. The ARTEMIS mission noted that personnel numbers were insufficient for the given tasks at the time of the mission and that, if not increased, they would become increasingly inadequate as disposal facility siting progresses.

Training remains difficult to organise, as dedicated academic programmes are not viable and in-house training burdens already overstretched staff.

International training, especially through the IAEA, is valuable when tailored to Estonia's context. ARTEMIS acknowledges the challenges of a small programme but stresses that Estonia must maintain a core group of qualified and experienced personnel in government, regulatory bodies and the operator, even if technical tasks are outsourced. A structured training plan is therefore essential.

Estonia funds R&D through competitive national grants and integrates radiation safety topics into national development plans. The operator identifies research needs within project-specific tasks, often collaborating effectively with universities. However, ARTEMIS found that R&D needs are recorded across multiple documents, resulting in a fragmented approach that lacks consistency, making it difficult to assess and plan comprehensively. Establishing a single, coherent national R&D plan and increasing participation in international R&D initiatives and cooperation with technical support organisations would enable more effective and cost-efficient delivery of research objectives.

Competence management and sustainability of expertise

It is noted that the number of staff in the regulatory authority is not sufficient for its given tasks and responsibilities. The significant work overload makes it very challenging for the management to put an additional burden on the experts to conduct training activities specific to RW management. Training is provided through national radiation protection courses and, importantly, through extensive use of and participation in the IAEA and EU workshops and projects.

The national programme highlights the challenge of maintaining skills in a very small organisation, where only a handful of individuals hold the relevant expertise. International review missions noted the risk of competence erosion due to infrequent operational activities and recommended that Estonia introduce competence matrices, refresher training and a long-term human resources strategy.

International cooperation plays a significant role, with Estonian experts regularly participating in IAEA training and regional projects to sustain capacity. Universities and technical institutes provide some domestic support in radiation protection and environmental monitoring.

Estonia meets current training requirements for operators and regulators but depends heavily on international cooperation. The main challenge in implementing Article 8 is ensuring competence retention and succession planning given the very small workforce.

3.2.6 Greece

National and legal framework

Greece's RW inventory comes from medical, industrial and research applications, and from the decommissioned research reactor at Demokritos. The Greek Atomic Energy Commission (EEAE) is the regulatory authority, with responsibilities covering radiation protection, licensing and oversight of RW management.

Greece has established a clear legislative and institutional framework to meet the requirements of Article 8 of the RWD on education, training and capacity building in RW management. Ministerial Decision 35225/12.04.2023 transposing the RWD into national legislation includes the national policy, applied to the management of RW from production to disposal, for all RW resulting from civilian activities. The ministerial decision also established the national programme for RW management.

The National Programme for the Management of Spent Fuel and Radioactive Waste (Article 25 of Ministerial Decision 35225/12.04/2023) explicitly includes objectives for developing and maintaining competence in RW management, identifying this as a core pillar of safe and sustainable operations. The programme highlights cooperation with universities and research institutions (notably the National Centre for Scientific Research Demokritos) to sustain domestic technical competence.

National legislation requires that licensees and workers handling ionising radiation, including RW management tasks, possess the necessary qualifications and professional training. Training obligations are enforced through licensing, where operators must demonstrate staff competence and radiation protection measures in their management programmes.

Training programmes

Training and competence development are delivered through a mix of national radiation protection courses, on-the-job training and active participation in IAEA and EU projects.

Training in Greece is coordinated primarily by the EEAE, which provides education and certification in radiation protection and the safe use of ionising radiation through national courses and licensing examinations. Operators handling RW (hospitals, research institutions and industrial users) are required to demonstrate that staff hold the appropriate qualifications. In addition, EEAE organises national and regional workshops in cooperation with the IAEA and EC, and facilitates the participation of Greek professionals in international training programmes.

Staff of the licensed operators (hospitals, research organisations and industrial facilities) train their personnel primarily through in-house programmes delivered by their radiation protection expert (RPE). New staff receive induction training in RW segregation, decay storage, documentation and emergency arrangements. Refresher training is provided according to the needs of the operator, or ad hoc when new equipment or RW streams are introduced. Tacit knowledge transfer plays a major role, with senior operators providing daily on-the-job instruction.

EEAE staff involved in RW management receive training ad hoc, when new technical tasks arise and when there is a recognised need based on the assessment carried out within the integrated management system. Training is provided by senior EEAE experts and external organisations (e.g. IAEA technical cooperation courses, EU workshops). The need for new expertise is assessed during annual staff performance reviews and in connection with emerging national projects (e.g. historical waste characterisation). Where national expertise is insufficient, EEAE requests targeted IAEA missions or contracts specialised companies, which also provide hands-on training to EEAE staff.

Competence management and sustainability of expertise

The sustainability of expertise in RW management in Greece is supported by a combination of structured national systems and international cooperation.

According to the national programme (2023) and Joint Convention Report (2023), Greece recognises the need to strengthen its national capacity-building system by expanding the network of academic and research institutions engaged in RW management education and R&D. Nevertheless, both the ARTEMIS (2022) and IRRS (2012; follow-up in 2017) missions acknowledged Greece's strong technical base but recommended that competence management be formalised and linked more closely to the activities of the national programme's life cycle. Challenges include maintaining skills for rare but complex tasks (e.g. decommissioning, source repatriation) and ensuring succession planning within small teams. While training and competence requirements are well defined, Greece still faces challenges in ensuring continuity of expertise across generations, especially as senior specialists retire.

In order to overcome these challenges, EEAE offers scholarships to Greek students to complete master's or PhD studies at universities recognised internationally for their work in the fields of nuclear technology and radiation protection. Recently, EEAE initiated a structured approach to raising awareness among the younger generation of responsible RW management, through lectures in undergraduate and postgraduate courses at relevant universities, at the summer school of the National Centre for Scientific Research Demokritos and at public festivals.

Greece has a comparatively strong scientific and educational base to support training and capacity building in RW management. The main challenge in implementing Article 8 is transforming this capacity into structured, sustainable competence management with clear succession planning and periodic refresher training to cover infrequent but critical RW management operations.

3.2.7 Latvia

National and legal framework

The Ministry of Environmental Protection and Regional Development is the responsible entity for legislative measures and policies related to the safety of RW management in Latvia. The regulatory authority, the Radiation Safety Centre of the state administrative institution, the State Environmental Service, is the sole regulatory body overseeing decommissioning

activities and RW management, including storage and disposal. The state limited liability company, the Latvian Environment, Geology and Meteorology Centre, is the operator responsible for management of the RW repository Radons and the Salaspils Research Reactor.

The main potential source of RW in Latvia is the decommissioning of the Salaspils Research Reactor. Given the type and amount of RW involved, Latvia's needs for training and expertise in RW management are significantly greater than those of Ireland.

Latvia's legal and institutional framework requires that personnel working with ionising radiation and RW hold appropriate qualifications and receive training; these arrangements are set out in the national legislation and reflected in the country's national programme as reported under the RWD and the Joint Convention.

Given the scope of the Latvian RW management programme, difficulties in establishing a special education programme in the field of RW management in Latvia have been recognised, and key measures identified for improvements in competence management. These measures recognise the challenges of establishing a dedicated education programme in RW management and the limited scope of training available nationally. The highly specialised nature of RW management makes it difficult to maintain all necessary skills solely within the domestic workforce.

Current resources are considered adequate for routine tasks such as conditioning, handling and transport of RW, although future activities will require additional expertise.

Training programmes

Latvia's national documents state that training is provided through national radiation protection courses, operator on-the-job training and substantial participation in international courses and projects. The State Environmental Service (Radiation Safety Centre) is the competent regulator responsible for licensing, oversight and verifying that licence holders maintain trained staff, while the national RW operator, RAPA (Radons for storage/disposal activities), and research institutions contribute to the delivery of practical skills training.

Basic education for radiation safety experts and other radiation protection specialists is offered at several universities. The University of Latvia provides a required refresher course for all employees from the Salaspils and Radons facilities, and for employees from other departments that are involved in activities with ionising radiation. R&D activities on RW management are limited, but the University of Latvia is involved in the European Concerted Programme on Radiation Protection Research and in fusion-related activities, mainly focused on issues related to tritium retention in materials (see the Latvia ARTEMIS mission report).

The ARTEMIS and IRRS peer reviews recognised that Latvia has a solid legal basis and adequate arrangements for current operations but recommended strengthening the arrangements for the long-term retention of a competent workforce.

Competence management and sustainability of expertise

Latvia recognises the vulnerability of a small workforce and addresses this by relying heavily on international cooperation (IAEA, EU and Nordic–Baltic exchanges) and by engaging domestic academic and technical institutes for R&D and targeted training; these measures are documented in the national programme and Joint Convention reporting. The country has taken steps to capture operational knowledge through documentation, training records and participation in peer reviews, but the small number of specialists means that dependency on a single person remains a risk.

While the reviewers of the ARTEMIS mission conducted in 2019 did not have suggestions or recommendations related to capacity building, they still encouraged Latvia to move from occasional training towards a more systematic approach to competence management, for example by establishing formal competence matrices, scheduled refresher cycles and explicit succession planning, to ensure continuity between infrequent operations and to reduce reliance on external experts. Latvia's recent national reporting indicates awareness of these recommendations and ongoing efforts (including IAEA technical cooperation projects) to strengthen human resources planning and knowledge transfer, but implementation of fully

formalised competence management tools is still in progress.

3.2.8 Luxembourg

National and legal framework

Luxembourg has a very small inventory of RW from medical, industrial and research applications. Its national programme outlines arrangements for safe storage of RW and return-to-supplier options for DSRSs. Moreover, Luxembourg has a contract with Belgium where all RW and DSRSs are being sent for processing and disposal in Belgian facilities.
The Ministry of Health and the Division of Radiation Protection are responsible for regulatory oversight and ensuring the competence of licensees and operators.

National law requires that operators seeking a licence for RW storage or transport activities demonstrate that appropriately trained personnel are in place, supported by quality assurance and management systems.

Training programmes

Given Luxembourg's limited inventory and very small national infrastructure, training is often delivered through ad hoc participation in international courses, study visits and exercises rather than through a sustained domestic programme.

Continuous training of Division of Radiation Protection staff is maintained through participation in international courses, conferences and seminars.

Competence management and sustainability of expertise

Luxembourg's national programme focuses primarily on the collection of legacy waste and orphan sources of waste. Since subsequent management steps, such as conditioning, storage and disposal, are carried out in Belgium, the programme does not anticipate a need for significant further development of domestic skills.

3.2.9 Malta

National and legal framework

Similarly to Ireland, Malta has a very small inventory of RW and disused sources. It operates a CSF but relies on DSRS return/export arrangements where feasible.

Malta has implemented the provisions of Article 8 of the RWD through the Nuclear Safety and Radiation Protection Act (Chapter 585) and its subsidiary legislation (SL585.03), which together provide the legal basis for education, training and competence in the management of RW.
The National Programme for the Management of Radioactive Waste (2015; updated 2022) outlines Malta's approach to ensuring that all personnel involved in the handling, storage and transfer of RW are adequately trained and qualified (Sections 5.13 and 5.14). Malta requires that the operator of the CSF has "staff that are trained in handling and dismantling of radioactive sources" as part of the operating conditions. The Radiation Protection Commission serves as the regulatory authority responsible for oversight of training requirements and ensuring that licensees maintain competence in radiation protection and RW management.

Training programmes

Given that Malta's RW inventory is limited to disused sources and small amounts of institutional waste from medicine, research and industry, the scale of the competence framework is proportionate to national needs.
Training is primarily delivered through international cooperation, as there are no dedicated national institutions offering specialised training in RW management. Malta relies on IAEA, EU and bilateral technical cooperation activities for building staff competence, particularly for regulatory and emergency preparedness functions. Ad hoc national training sessions are organised when new regulatory or safety requirements are introduced, but there is no formal, recurrent national training plan.

Competence management and sustainability of expertise

Training is delivered through courses for regulators and vendor support for specialised tasks. Like other countries with small inventories, Malta largely relies on IAEA/EU programmes to gain knowledge and competence in RW management.

The national report on the transposition and implementation of the RWD highlights that the small number of professionals engaged in RW management participate in international workshops and technical visits organised through IAEA regional projects, and this remains the main mechanism by which Malta ensures compliance with Article 8 requirements on training and skills development.

The sustainability of expertise and institutional knowledge in Malta's RW management system is a key challenge, as recognised by both the ARTEMIS (2022) and IRRS (2015, 2023) reviews. The national programme (2022) acknowledges that the small size of the regulatory authority and the limited operational base restrict the ability to maintain a broad range of in-house expertise. To mitigate this, the Radiation Protection Commission and licence holders rely on continuous participation in IAEA technical cooperation programmes. The ARTEMIS review noted that Malta effectively leverages these partnerships to maintain up-to-date knowledge, but it recommended developing a structured national competence plan that defines responsibilities, identifies training needs and integrates refresher cycles into regulatory and operational activities.

At present, Malta has no formal mechanism for succession planning or systematic knowledge transfer, and institutional memory is largely maintained through individual staff experience and documentation practices.

Peer reviewers have recommended that Malta adopt a formal competence matrix, documented training calendar with refresher cycles, succession measures (redundancy for critical roles), regular exercises (e.g. discovery/transport scenarios) and contractual knowledge transfer clauses when outsourcing. These measures would make the small national programme more resilient and auditable under Article 8.

Malta's legal framework and international cooperation provide for basic competence capacity. The priority in implementing Article 8, identified in international peer review mission reports, is to formalise and document training, succession and exercise programmes to sustain expertise despite the country's very small operational base.

3.2.10 Portugal

National and legal framework

Under the regulatory framework, established in 2018, the regulatory functions are performed by the Portuguese Environment Agency (Agência Portuguesa do Ambiente; APA), with the exception of inspection and enforcement duties, which are handled by the Inspectorate General for Agriculture, Sea, Environment and Spatial Planning (Inspeção-Geral da Agricultura, do Mar, do Ambiente e do Ordenamento do Território; IGAMAOT).

Portugal is set to decommission its research reactor and so future RW activities will include the management of decommissioning waste. This does not include the management of spent fuel, which was exported in 2019. The current RW inventory in Portugal includes low- and intermediate-level RW originating mainly from medical, industrial and research activities. An increasing amount of NORM waste from past activities is also contributing to the RW inventory.

The Technical Superior Institute (Instituto Superior Técnico; IST) is operating Portugal's centralised RW storage facility (Pavilhão de Resíduos Radioativos; PRR) under the regulatory oversight of APA. In addition to the inventory stored at the CSF, individual operators are licensed to store very short-lived waste for a period of up to 30 days for decay before authorised discharge or transfer to PRR for interim storage. Operators can also be licensed to store RW for short periods of time exceeding 30 days.

Training programmes

The regulatory authority has carried out an initial assessment of the staff numbers and competences needed to fulfil its regulatory functions in RW management, as noted in the final report of the ARTEMIS mission (2023). According to that report, APA and IGAMAOT have dedicated teams for work related to RW management. The training programme

for new staff relies on in-house training on legislative and procedural matters, complemented by on-the-job training and participation in internationally recognised courses and workshops organised by IAEA, OECD/NEA and the EC. Meanwhile, for operating organisations, such as IST/PRR, the National Programme for the Management of Spent Fuel and Radioactive Waste explicitly states that the operator "must have workers in sufficient number and with qualification and training adequate to guarantee the safety of the management of RW". Although the legislation sets the requirement (Decree-Law 156/2013, Article 3, etc.), the ARTEMIS report indicates that, in practice, staff competence is being developed via a mixture of internal training, practical experience and external training events. The frequency of training is not always specified in the publicly available documents, and it is not always clear whether the training arrangements constitute regular (ongoing) professional development or are mainly ad hoc events at irregular intervals, often not tailored to specific national needs or the needs of a licensee. The IRRS report (2022) also identified that in the case of some regulatory functions (e.g. transport of radioactive material) IGAMAOT was in a phase of capacity building, indicating the need for more training in those domains. Thus, Portugal implements competence development through structured induction and continuing professional development, participation in external courses (international technical cooperation and IAEA workshops) and internal on-the-job training, and needs assessments have been carried out by the regulator in terms of the number of staff and competence gaps.

Competence management and sustainability of expertise

Portugal noted that knowledge retention in the country is supported through structured education and specialised academic programmes. The following two master's degrees currently offered in Portugal include dedicated components on RW management, helping ensure long-term continuity of expertise:

1. Master's in Radiation Protection and Safety, offered by IST, which includes comprehensive training in RW management, environmental radioactivity, dosimetry, radiobiology, metrology, shielding, radiological and nuclear safety and the management of radiological and nuclear accidents and emergencies.
2. MINDER – Erasmus Mundus Joint Master in Nuclear Decommissioning and Environmental Remediation – a 2-year joint programme delivered by the University of Porto, the Norwegian University of Life Sciences, the Brazilian Institute of Radiation Protection and Dosimetry, the University of Hasselt in Belgium and the Czech Technical University in Prague, where RW management is specifically addressed through two dedicated modules (on RW management in environmental remediation projects and on decommissioning projects).

These specialised programmes contribute to succession planning and competence maintenance by ensuring a steady pipeline of trained professionals with knowledge of RW management, even in a context where operational experience may be infrequent. They also help formalise know-how through academic coursework, supervision and collaboration with partner institutions and associated industrial organisations.

3.2.11 UK

National and legal framework

In the UK, the responsibility for RW management, in terms of the regulation of non-nuclear activities, is shared among the Environment Agency in England, the Scottish Environment Protection Agency, Natural Resources Wales and the Northern Ireland Environment Agency, while the Office for Nuclear Regulation oversees nuclear safety and the transport of radioactive material. Licence and permit holders must demonstrate that they have competent and suitably trained staff and effective management systems. Regulators verify this through permitting processes and regular inspections, which include reviews of training and competence records.

The UK maintains well-developed arrangements for ensuring competence across regulatory bodies and operators. Nevertheless, sustaining a skilled workforce for both current operations and future nuclear programmes remains a recognised challenge. To address this, the government and industry and education partners now operate under the National Nuclear Strategic Plan for Skills, implemented by the

Nuclear Skills Delivery Group. This updated framework coordinates national actions to develop, attract and retain the skilled workforce required to support the UK's evolving nuclear and RW management sectors.

Training programmes

Competence development and training are supported through multiple channels. The Nuclear Decommissioning Authority (NDA) publishes strategy and business plans that include workforce capability objectives and commit to sustainable skills development. The NDA's Strategic Position on Radioactive Waste Treatment emphasises the need to ensure that "skills, capability and infrastructure are in place to deliver the decommissioning mission".

There is a diverse range of training bodies and skills programmes available, such as the National Skills Academy for Nuclear, National Nuclear Laboratory, National College for Nuclear and advanced and postgraduate training provided in partnership with universities.

Some of these training providers offer their training programmes internationally. For example, the National Skills Academy for Nuclear offers its products and services in Canada and Australia, where it works in collaboration with domestic companies to support the development of capabilities.

The above-mentioned training providers mainly offer programmes more appropriate for the nuclear industry. While they claim that they tailor the training to the specific needs of those who request the service, it is not fully clear to what degree the customisation focuses on the actual needs of very specific users.

Council Directive 2013/59/Euratom requires EU MSs to establish arrangements for the education, training and retraining of RPEs in relation to the type of practice. An RPE is required to have the knowledge, training and experience needed to give radiation protection advice, and his/her competence must be recognised by the competent authority. In the UK, RPEs giving advice on RW management matters are called radioactive waste advisers (RWAs); under the formal RWA recognition scheme, individuals or groups of individuals (corporate RWAs) must be trained in accordance with a defined syllabus in order to be approved by assessing bodies to act as RWAs. This provides an auditable route for regulatory oversight of RW management (see the UK environment agencies' guidance on RW advisers).

3.3 Challenges in Implementing Article 8 of the Radioactive Waste Directive in Non-nuclear Countries

To verify the accuracy of information and complement the findings from the review of publicly available documents, each EU MS covered by the study was contacted with questions on education, training and capacity building in RW management, including views on the sustainability of the arrangements in place. Practices and challenges related to the implementation of Article 8 of the RWD were also examined. The findings that are relevant for the implementation of Article 8 are summarised here by topic of interest.

3.3.1 Budgets and resources

- One of the main challenges in maintaining and strengthening national expertise in RW management is the availability of sufficient financial resources. There is little to no commercial interest in the field of RW management (the bulk of RW waste in non-nuclear countries being institutional waste). Consequently, there are limited educational opportunities and insufficient incentives to attract, sustain and retain a qualified workforce.
- The budgets of regulatory authorities and RW management organisations/facilities are almost entirely dependent on public resources.
- It is equally challenging to raise awareness among political decision-makers that it is necessary to take action and ensure that the financial resources are available for RW management activities, which must include resources for assuring the availability of a qualified and trained workforce.

3.3.2 Structural constraints

Non-nuclear countries face structural and resource constraints in building and maintaining long-term expertise in RW management. These challenges stem from the small scale of national programmes, limited staffing and the need to balance RW management with other regulatory responsibilities. Opportunities for

improvements are available through strong international integration.

- Regulatory bodies and RW facility operators often have only a few specialists dedicated to RW management. The loss of even one experienced person through retirement, a career change or a move to another organisation can significantly weaken regulatory or institutional capacity. Succession planning is difficult due to the absence of overlapping positions or parallel trainees, as having only one person in a position or only a single trainee makes the system vulnerable to staff turnover.
- Within regulatory organisations, RW management competes with other regulatory obligations (e.g. radiation protection, occupational safety, emergency preparedness). Non-nuclear countries often struggle to define a secure sustained structure for competence development or even to justify RW management-dedicated posts. Responsibilities allocated to staff involved in RW management-related activities often include activities related to other subject areas as well.
- Another challenge is the recruitment and retention of staff within public administration. As recognised in the assessments of several MSs, replacing departing staff can be a slow process, leading to periods in which regulatory or technical capacity is temporarily reduced. This can hinder continuity and create vulnerabilities in knowledge retention, particularly in niche technical areas.
- In many non-nuclear EU MSs, management systems, procedures, training packages and internal knowledge repositories are underdeveloped. Informal on-the-job training dominates, the provision of which is vulnerable to experienced staff leaving their positions.
- Non-nuclear countries handle very limited RW volumes, often in the form of DSRSs. Long intervals between operations (e.g. conditioning, source return campaigns) can lead to erosion of practical skills and reduced confidence among staff.

3.3.3 The knowledge base

- In general, the knowledge base for RW management in non-nuclear countries is much weaker than that in countries that operate NPPs. Nuclear facilities are a pool of knowledge, expertise and qualified human resource. They also provide more stable employment, and educational and training opportunities, strengthening the depth of national expertise. For non-nuclear countries, the IAEA and other international platforms are usually the most important sources of knowledge.
- Non-nuclear countries also have a lower level of political commitment and therefore lack a strong strategy for knowledge development, which leads to more unpredictability and fluctuation in levels of expertise. This leads to several challenges, including the inability to facilitate systematic knowledge transfer, and a lack of availability of new staff to fill the positions made vacant by retiring experts.
- The challenge lies in the limited quantities of RW, which means that there will be extended periods – sometimes lasting years – with very few practical activities. As a result, experts gain extensive theoretical knowledge but have little to no hands-on experience.
- There is increasing awareness of the need for nuclear knowledge among national stakeholders, prompted by a regional and global increase in interest regarding nuclear power as an energy source. This might be expected to be a positive development, reducing the challenge of limited availability of knowledgeable staff in non-nuclear countries. This process might simultaneously have negative consequences, with trained staff from non-nuclear countries taking jobs in nuclear countries, where more opportunities are available.

3.3.4 Capacity of the educational system

- The number of workers needed seems to exceed both the available trained workforce and the capacity of the education system. This appears to be the challenge facing the majority of non-nuclear MSs, with their lack of formal (domestic) university courses and their limited capacity, and a lack of opportunities for technical training in the field.
- Universities rarely provide courses relevant for RW management, because the national demand is too small. There is a lack of domestic practical training facilities (e.g. hot labs, conditioning facilities), limiting the possibilities for hands-on practice.

- The worldwide shift in interest towards nuclear power is expected to increase awareness of and interest in the broader field, but RW management is often thought of as happening at a later stage.
- There may be an opportunity for the EU to address this lack of educational opportunity and capacity as a common issue. Use of international university programmes, revised legislation to allow easier licence transfer between countries and a focus on shared solutions might be of interest.

3.3.5 Internationally available training

- For most countries, consistent and practical training comes from the IAEA, EU workshops and regional networks. These organisations understandably determine the training topics and training frequency, rather than tailoring the training to national needs. In addition, knowledge acquired abroad is often not systematically transferred to the national context.
- Because operational activities involving RW are infrequent, the staff of both regulatory bodies and operating organisations find it difficult to maintain hands-on competence and develop specialist know-how through experience alone. This situation increases reliance on ad hoc international training events, which, while valuable, may not always be tailored to specific national needs.

3.4 Summary of Observations

Analysis of the national reports on the transposition and implementation of the RWD; national reports prepared for the review meetings of the Joint Convention; IAEA peer review mission reports; and national arrangements as set out in national legislation, clearly show that all of the non-nuclear MSs have transposed Article 8 of the RWD into their regulations. These MSs have, and maintain, some form of training and competence development related to RW management. Arrangements for capacity building in RW management exist in all MSs covered by the study, although it is noted that countries with small inventories of RW and DSRSs and even some with larger inventories rely extensively on training provided through various international activities by organisations such as the IAEA.

International peer review missions, particularly ARTEMIS, have consistently identified areas where Article 8 implementation could be strengthened. Most of the non-nuclear MS peer reviews noted findings related to training and capacity building. International missions provided recommendations and suggestions for improvement for some but not all countries where such findings were noted. In the non-nuclear EU MSs, these international peer reviews did not identify any good practices/performances related to capacity building, although such practices/performances were identified in one or two of the largest nuclear MSs. Such findings also raise the question of what is the adequate level of training and capacity building for non-nuclear MSs that have a small RW inventory and few RW management-related activities. It is obvious that even the peer review missions struggled to identify an optimum level and provide consistent recommendations that could be implemented on a sustainable basis.

In non-nuclear MSs, activities involving radioactive sources, including management of RW arising from either current or historical activities, are often not given due attention. Additionally, in such countries there are often only few, if any, R&D activities related to the topic. Consequently, there is a lack of strong interest on the part of governments to address the issue and support it with adequate financial resources; in turn, there is a lack of strong interest among professionals, who do not see it as a sufficiently attractive field in which to pursue their career.

Another challenge identified in countries with small inventories of low-level RW is ensuring the sustainability of expertise. Regulators and RW operators/facilities alike are often small entities, staffed by just a handful of experts. This makes them vulnerable to the loss of (key) personnel. Then there is the significant workload pressure, in particular for the regulators, as their responsibilities go beyond RW management to include more general activities. This could adversely impact the effective fulfilment of regulatory responsibilities.

With a small number of staff and a lack of structured and formalised national training programmes, MSs are all using opportunities offered at the international level, mostly in the form of training courses, workshops and meetings organised by the IAEA or within EU activities

or projects. Some countries successfully collaborate with others at the regional level (e.g. Nordic countries).

International training events are organised occasionally, and not on a regular schedule. Furthermore, these events are mostly generic and not necessarily tailored to the specific needs of an individual country, unless they form part of a national project. The mechanism for transfer of knowledge gained at international training events is usually not well established in countries. There are many examples, not only in RW management, that demonstrate that without such mechanisms, capacity building through IAEA/EC training events is not sustainable. This is well noted and often recognised by international peer reviews.

4 Conclusions and Policy Recommendations

4.1 Conclusions

4.1.1 Formal framework for capacity building

Most or all of the EU MSs have clear qualification requirements for their regulatory staff, with (some) training and education provided. However, requirements for the staff of RW operators/facilities are not always defined. In both cases, the specific requirements for training and education in RW management, particularly retraining and maintaining qualifications, are not clearly defined and there are no procedures/arrangements in place to provide for this. Although Ireland's national programme prioritises reducing the RW inventory, maintaining competency in this area highlights the need for a national plan that integrates training, knowledge and competence management into both current and anticipated future RW management activities. Without this, training activities risk remaining fragmented and/or inconsistent.

4.1.2 Training programme for waste management

In many non-nuclear EU MSs with small RW inventories, staff training is often delivered through ad hoc events, participation in IAEA or EU workshops and on-the-job learning. Although these training delivery methods are valuable and facilitate engagement with relevant practices, they often fail to systematically align with competency needs. As a result, training may remain fragmented and insufficiently structured to ensure the systematic development of new personnel, the retraining and refreshing of skills of existing staff and the transfer of institutional knowledge.

A structured approach would provide a sustainable foundation for competence development, ensuring that qualified personnel and effective management capabilities are maintained commensurate to the need for RW management activities to be carried out over time.

4.1.3 International cooperation

Countries with small inventories largely rely on the training provided by the IAEA, OECD/NEA, EC and regional initiatives, which are not regular and not country specific. They can however help smaller programmes overcome the limits of their national capacity. MSs often use such cooperation to train their experts in RW management. Peer learning, secondments and joint training schemes are especially valuable for sharing expertise and keeping skills up to date. However, a country's capacity building cannot rely solely on these international initiatives, which do not offer regular training tailored to its needs.

The recurring recommendations from ARTEMIS suggest that, for countries with small inventories, ensuring continuity, resilience and the integration of competence into the long-term waste management strategy are the key factors that need to be improved when it comes to implementing Article 8. Maintaining staff expertise should be treated as a strategic, ongoing obligation, rather than as an occasional or ad hoc activity.

Nevertheless, successful examples of bilateral and regional cooperation could serve as a model for Ireland to explore available training opportunities. The potential for training professionals in Ireland through international expert-led programmes that address Ireland's specific needs warrants further exploration. Several training providers in the UK offer their services to interested parties outside the UK. Most of the programmes offered are more oriented towards management of nuclear waste, although all providers underline that the training they offer is tailored to the specific needs of the interested party. However, there are several providers that offer training based on the syllabus for RWAs in the UK, which might be more appropriate for Ireland's needs.

A review of the syllabus for RWAs, the completion of which is a requirement for certified RWAs in the UK, shows that the training topics are the ones commonly offered in the international courses on RW management offered by international organisations such as the IAEA or the EC. The UK training syllabus

does include topics related to the national legislative framework; however, in this context, none of these training providers can readily offer training tailored to the Irish legislative framework for RW management, which should be an important component of such training.

4.1.4 Retain sufficient national competence

Ireland, as well as some other countries, allows the import of radioactive sources only if the arrangements for repatriation of DSRSs are agreed beforehand (i.e. via a take-back agreement). Even when waste is transferred abroad (as in the case in Luxembourg, for example), the national authority must retain sufficient competence to contract services, oversee shipments and meet its regulatory obligations. Outsourcing operations does not remove the country's responsibility under Article 8.

4.1.5 Sustainability of expertise

One of the challenges identified in countries with small inventories of low-level RW is ensuring the sustainability of expertise. Operating and regulatory institutions in these countries are often small, staffed by just a handful of experts. Without a sustainable training programme in place, expertise can easily be lost though the loss of a trained individual, thus creating significant knowledge gaps.

To mitigate this, countries need to implement succession planning, establish robust knowledge management systems and secure long-term structures for competence development.

4.2 Recommendations

The provisions of Article 12 of the RWD set out the requirements for the content of national programmes. While the directive does not explicitly require the inclusion of capacity-building measures, it does require MSs to include research, development and demonstration activities necessary for implementing solutions for RW management. In this context, the following recommendations are made:

- Further strengthen Ireland's arrangements for R&D, along with its provisions for staff education and training, to ensure that the expertise and skills needed to implement the national programme are obtained, maintained and continuously developed. Including a systematic mapping and assessment of current and future competence needs, together with a structured plan for training activities and the introduction of related key performance indicators, in the next revision of the national programme would establish a clear basis for a coherent and sustainable capacity-building framework.
- Define the specific skills and knowledge required for all staff categories involved in RW management, aligned with national responsibilities and regulatory requirements, within the context of Ireland's current RW inventory, including reasonably foreseeable waste streams.
- Establish programmes to take advantage of support provided by external entities, ensure transfer of knowledge gained externally and reduce reliance on external entities over time.
- Combine internal training, international workshops and practical exercises in a coherent curriculum, ensuring continuity and progression.
- Develop mentoring, documentation and refresher training schemes to capture institutional knowledge and support personnel turnover.
- Regularly assess training effectiveness, update courses in line with evolving regulations and technologies, and ensure alignment with long-term capacity-building objectives.
- Further improve the implementation of requirements for competence building through a structured national training plan specifically focused on RW management.

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Abbreviations

APA	Portuguese Environment Agency (Agência Portuguesa do Ambiente)
ARTEMIS	Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation
CSF	Centralised storage facility
DD	Danish Decommissioning
DEMA	Danish Emergency Management Agency
DHA	Danish Health Authority
DSRS	Disused sealed radioactive source
EC	European Commission
EEAE	Greek Atomic Energy Commission
EPA	Environmental Protection Agency
EU	European Union
IAEA	International Atomic Energy Agency
IGAMAOT	Inspectorate General for Agriculture, Sea, Environment and Spatial Planning (Inspeção-Geral da Agricultura, do Mar, do Ambiente e do Ordenamento do Território; Portugal)
IRRS	Integrated Regulatory Review Service
IST	Technical Superior Institute (Instituto Superior Técnico; Portugal)
MS	Member State
NDA	Nuclear Decommissioning Authority
NEA	Nuclear Energy Agency
NES	Nuclear Engineering Seibersdorf
NORM	Naturally occurring radioactive material
NPP	Nuclear power plant
OECD	Organisation for Economic Co-operation and Development
PRR	Radioactive waste storage facility (Pavilhão de Resíduos Radioativos; Portugal)
R&D	Research and development
RPE	Radiation protection expert
RW	Radioactive waste
RWA	Radioactive waste adviser
RWD	Radioactive Waste Directive
RWMC	Radioactive Waste Management Centre
S.I.	Statutory Instrument

An Ghníomhaireacht Um Chaomhnú Comhshaoil

Tá an GCC freagrach as an gcomhshaol a chosaint agus a fheabhsú, mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaol a chosaint ar thionchar díobhálach na radaíochta agus an truaillithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialáil: Rialáilaguscóraischomhlíontacomhshaoiléifeachtacha a chur i bhfeidhm, chun dea-thorthaí comhshaoil a bhaint amach agus díriú orthu siúd nach mbíonn ag cloí leo.

Eolas: Sonraí, eolas agus measúnú ardchaighdeáin, spriocdhírithe agus tráthúil a chur ar fáil i leith an chomhshaoil chun bonn eolais a chur faoin gcinnteoireacht.

Abhcóideacht: Ag obair le daoine eile ar son timpeallachta glaine, táirgiúla agus dea-chosanta agus ar son cleachtas inbhuanaithe i dtaobh an chomhshaoil.

I measc ár gcuid freagrachtaí tá:

Ceadúnú

> Gníomhaíochtaí tionscail, dramhaíola agus stórála peitril ar scála mór;
> Sceitheadh fuíolluisce uirbigh;
> Úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe;
> Foinsí radaíochta ianúcháin;
> Astaíochtaí gás ceaptha teasa ó thionscal agus ón eitlíocht trí Scéim an AE um Thrádáil Astaíochtaí.

Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil

> Iniúchadh agus cigireacht ar shaoráidí a bhfuil ceadúnas acu ón GCC;
> Cur i bhfeidhm an dea-chleachtais a stiúradh i ngníomhaíochtaí agus i saoráidí rialáilte;
> Maoirseacht a dhéanamh ar fhreagrachtaí an údaráis áitiúil as cosaint an chomhshaoil;
> Caighdeán an uisce óil phoiblí a rialáil agus údaruithe um sceitheadh fuíolluisce uirbigh a fhorfheidhmiú
> Caighdeán an uisce óil phoiblí agus phríobháidigh a mheasúnú agus tuairisciú air;
> Comhordú a dhéanamh ar líonra d'eagraíochtaí seirbhíse poiblí chun tacú le gníomhú i gcoinne coireachta comhshaoil;
> An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaol.

Bainistíocht Dramhaíola agus Ceimiceáin sa Chomhshaol

> Rialacháin dramhaíola a chur i bhfeidhm agus a fhorfheidhmiú lena n-áirítear saincheisteanna forfheidhmithe náisiúnta;
> Staitisticí dramhaíola náisiúnta a ullmhú agus a fhoilsiú chomh maith leis an bPlean Náisiúnta um Bainistíocht Dramhaíola Guaisí;
> An Clár Náisiúnta um Chosc Dramhaíola a fhorbairt agus a chur i bhfeidhm;
> Reachtaíocht ar rialú ceimiceán sa timpeallacht a chur i bhfeidhm agus tuairisciú ar an reachtaíocht sin.

Bainistíocht Uisce

> Plé le struchtúir náisiúnta agus réigiúnacha rialachais agus oibriúcháin chun an Chreat-treoir Uisce a chur i bhfeidhm;
> Monatóireacht, measúnú agus tuairisciú a dhéanamh ar chaighdeán aibhneacha, lochanna, uiscí idirchreasa agus cósta, uiscí snámha agus screamhuisce chomh maith le tomhas ar leibhéil uisce agus sreabhadh abhann.

Eolaíocht Aeráide & Athrú Aeráide

> Fardail agus réamh-mheastacháin a fhoilsiú um astaíochtaí gás ceaptha teasa na hÉireann;
> Rúnaíocht a chur ar fáil don Chomhairle Chomhairleach ar Athrú Aeráide agus tacaíocht a thabhairt don Idirphlé Náisiúnta ar Ghníomhú ar son na hAeráide;
> Tacú le gníomhaíochtaí forbartha Náisiúnta, AE agus NA um Eolaíocht agus Beartas Aeráide.

Monatóireacht & Measúnú ar an gComhshaol

> Córais náisiúnta um monatóireacht an chomhshaoil a cheapadh agus a chur i bhfeidhm: teicneolaíocht, bainistíocht sonraí, anailís agus réamhaisnéisiú;
> Tuairiscí ar Staid Thimpeallacht na hÉireann agus ar Tháscairí a chur ar fáil;
> Monatóireacht a dhéanamh ar chaighdeán an aeir agus Treoir an AE i leith Aeir Ghlain don Eoraip a chur i bhfeidhm chomh maith leis an gCoinbhinsiún ar Aerthruailliú Fadraoin Trasteorann, agus an Treoir i leith na Teorann Náisiúnta Astaíochtaí;
> Maoirseacht a dhéanamh ar chur i bhfeidhm na Treorach i leith Torainn Timpeallachta;
> Measúnú a dhéanamh ar thionchar pleananna agus clár beartaithe ar chomhshaol na hÉireann.

Taighde agus Forbairt Comhshaoil

> Comhordú a dhéanamh ar ghníomhaíochtaí taighde comhshaoil agus iad a mhaoiniú chun brú a aithint, bonn eolais a chur faoin mbeartas agus réitigh a chur ar fáil;
> Comhoibriú le gníomhaíocht náisiúnta agus AE um thaighde comhshaoil.

Cosaint Raideolaíoch

> Monatóireacht a dhéanamh ar leibhéil radaíochta agus nochtadh an phobail do radaíocht ianúcháin agus do réimsí leictreamaighnéadacha a mheas;
> Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha;
> Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta;
> Sainseirbhísí um chosaint ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

Treoir, Ardú Feasachta agus Faisnéis Inrochtana

> Tuairisciú, comhairle agus treoir neamhspleách, fianaise-bhunaithe a chur ar fáil don Rialtas, don tionscal agus don phobal ar ábhair maidir le cosaint comhshaoil agus raideolaíoch;
> An nasc idir sláinte agus folláine, an geilleagar agus timpeallacht ghlan a chur chun cinn;
> Feasacht comhshaoil a chur chun cinn lena n-áirítear tacú le hiompraíocht um éifeachtúlacht acmhainní agus aistriú aeráide;
> Tástáil radóin a chur chun cinn i dtithe agus in ionaid oibre agus feabhsúchán a mholadh áit is gá.

Comhpháirtíocht agus Líonrú

> Oibriú le gníomhaireachtaí idirnáisiúnta agus náisiúnta, údaráis réigiúnacha agus áitiúla, eagraíochtaí neamhrialtais, comhlachtaí ionadaíocha agus ranna rialtais chun cosaint chomhshaoil agus raideolaíoch a chur ar fáil, chomh maith le taighde, comhordú agus cinnteoireacht bunaithe ar an eolaíocht.

Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil

Táan GCCá bainistiúagBordlánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóir. Déantar an obair ar fud cúig cinn d'Oifigí:

1. An Oifig um Inbhunaitheacht i leith Cúrsaí Comhshaoil
2. An Oifig Forfheidhmithe i leith Cúrsaí Comhshaoil
3. An Oifig um Fhianaise agus Measúnú
4. An Oifig um Chosaint ar Radaíocht agus Monatóireacht Comhshaoil
5. An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tugann coistí comhairleacha cabhair don Ghníomhaireacht agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.

epa Research

Evidence Synthesis Report 10

Training and Capacity Building for Radiological Waste Management Activities in Non-nuclear European Union Member States

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