Nuclear Waste Services

2025 UK Radioactive Waste Inventory

Part of the NDA group

NDA

Department for Energy Security & Net Zero

Contents

1. Introduction

1.1. The Inventory

An inventory of radioactive waste and materials in the UK is compiled every three years under the strategic oversight of the Nuclear Decommissioning Authority (NDA) and the Department for Energy Security and Net Zero (DESNZ). Nuclear Waste Services (NWS) prepares and publishes the Inventory on behalf of the NDA, working with radioactive waste producers and custodians across the UK.

The Inventory provides up-to-date information about radioactive waste to:

- Inform policy and strategy development
- Enable the UK to meet international reporting obligations
- Aid radioactive waste and material management planning
- Support stakeholder engagement.

The inventory is used by a wide range of stakeholders:

Government departments and agencies	Develop policies and strategies for managing UK radioactive waste and regulating nuclear operations
Supply chain organisations	Process waste and use data to support the planning, operation and performance of their facilities
Waste planners	Ensure that radioactive waste management facilities meet local and national needs
Researchers and academics	Develop innovative technologies and processes for managing the range of radioactive waste in the UK
Members of the public	Increase understanding about the types and quantities of radioactive waste produced in the UK

The 2025 UK Radioactive Waste and Materials Inventory (the 2025 Inventory) is the latest public record on the sources, quantities, and properties of radioactive waste and materials in the UK at 1st April 2025 and predicted to arise after that date.

1.2. Inventory documents

The 2025 Inventory comprises four reports:

Radioactive Waste Inventory

Describes the sources, volume, composition and activity of radioactive waste in the UK, and a comparison with the previous inventory

Radioactive Materials Inventory

Summarises the quantities of UK civil nuclear materials that might have to be managed as waste in the future

Radioactive Waste Detailed Data

Provides further information on the radioactive waste inventory including a list of waste streams

Summary for International Reporting

Gives information to meet the UK's international reporting obligations in the field of radioactive waste and materials

As part of the commitment to openness, reports can be found on a website maintained by NWS, https://inventory.nuclearwasteservices.uk. All of the 2025 Inventory reports can be found together with other information about radioactive waste at this location.

1.3. This report

This report provides information on the 2025 UK Radioactive Waste Inventory:

- The inventory scope and process
- Waste volumes, radioactivities, and material compositions
- Assumptions used to estimate future radioactive waste arisings (the inventory scenario)
- Potential future scenarios
- Uncertainty in waste volumes and radioactivities
- How the 2025 Inventory compares with the 2022 Inventory
- Waste disposals and overseas waste.

It also provides supporting information on the origins and categorisation of UK radioactive waste, and how the waste is managed.

More detailed data are provided in the 2025 UK Radioactive Waste Detailed Data report. This includes an analysis of waste volumes by region and from each organisation, ‘Site Information Sheets’ containing a description of the operations at each UK site that produces radioactive waste with volumes and radioactivities of the wastes, a list of waste streams in the 2025 Inventory and their volumes, the radionuclide composition of wastes, and a description of the inventory data reporting conventions.

ILW Packages

2. Sources of Radioactive Waste

2.1. Origin of radioactive waste

Material that has no further use, and is contaminated by, or incorporates, activity above certain levels defined in UK legislation,[1,2,3] is known as radioactive waste.

Radioactive waste is the by-product of activities associated with the use of natural or man-made radioactive materials (such as uranium or irradiated nuclear fuel).

Transfer of radioactive material onto items it comes into contact with can lead to contamination and radioactive wastes being generated. Also, items that have been subjected to neutron radiation (as in a nuclear reactor) can become radioactive, a process known as activation.[4]

Contaminated and activated process wastes will be generated during the operation of facilities that use radioactive materials. Also contaminated and activated components will arise as radioactive waste when facilities are eventually shut down and decommissioned.

As a pioneer in the development and use of nuclear technology, the UK has accumulated a substantial legacy of radioactive waste and nuclear materials from electricity generation, defence programmes, and other industrial, medical, and research activities. Some of this waste is already in storage, but much of it still forms part of existing facilities and will only become waste over the next century or so as plants are shut down, and decommissioned. Radioactive waste continues to be produced where radioactive substances are used. More information about how radioactive waste is generated is found on the UK Radioactive Waste Inventory website.

Radioactive waste from the nuclear power industry

The civil nuclear power industry is the source of most radioactive waste in the UK. This includes waste from:

- Manufacture of nuclear fuel
- Operation and decommissioning of nuclear power stations
- Reprocessing of spent nuclear fuel
- Research and development (R&D) programmes.

The manufacture of nuclear fuels (fuel fabrication and uranium enrichment) produces wastes that have only low levels of uranium contamination.

At 1st April 2025 the UK had five operating nuclear power stations. The stations comprise four Advanced Gas-cooled Reactors (AGRs) sites each with two reactors and a single Pressurised Water Reactor (PWR) - together generating about 14% of the UK's electricity supply.[5] Eleven

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[1] The Radioactive Substances Act 1993 (as amended), 27 May 1993.
[2] Statutory Instruments 2016 No. 1154. Environmental Permitting (England and Wales) Regulations 2016 (as amended), 11 December 2016.
[3] The Environmental Authorisations (Scotland) Regulations 2018 (as amended), 28 June 2018.
[4] Activation can also occur as a result of irradiation of materials with other particles (e.g. protons in the ISIS facility at the Rutherford Appleton Laboratory).
[5] Department for Energy Security & Net Zero, Digest of United Kingdom Energy Statistics Annual data for UK, 2024, July 2025.

Magnox nuclear power stations and three AGR stations have stopped producing electricity; they are now being decommissioned.

Reprocessing of spent Magnox reactor fuel at Sellafield came to an end in 2022. Reprocessing of spent AGR fuel in the Thermal Oxide Reprocessing Plant (THORP) came to an end in 2018.

Nearly all of the waste from nuclear energy R&D is a legacy of government-funded programmes stretching back to the 1940s. Many test and prototype reactors were operated at research sites across the country. These reactors and associated facilities are now shut down and site operations are concerned with decommissioning, dismantling, and clean-up.

The civil nuclear power industry is expected to grow in the coming decades, with the introduction of new large-scale reactors such as Hinkley Point C and Sizewell C, as well as advanced nuclear technologies such as Small Modular Reactors. This will generate radioactive waste arisings in the future.

Other sources of radioactive waste

Outside of the civil nuclear power industry, radioactive wastes are generated in the UK by:

- Defence activities
- Research establishments
- Medical and industrial uses of radioactivity.

The main sources of defence waste are nuclear weapons production and operation of the UK fleet of nuclear-powered submarines. Smaller waste quantities arise from general use of radioactive materials within the armed forces and at defence establishments.

Research into fusion reactor technology continues at Culham Centre for Fusion Energy (CCFE) with the Joint European Torus (JET) and Mega Amp Spherical Tokamak (MAST) experiments. JET ceased operations before the stock date for the 2025 Inventory but decommissioning waste will be generated. The Rutherford Appleton Laboratory supports the work of a diverse research community using its neutron sources.

The remaining waste results from the use of radioactivity in medical diagnosis and treatment, and in industrial applications. These include sterilisation of medical equipment and food, and non-destructive testing of materials (for integrity, thickness, density). Some radioactive materials used in research, medicine and industry, which give rise to radioactive wastes, are produced in particle accelerators rather than in nuclear reactors.

2.2. Waste producers

Figure 1 shows the main sites in the UK where radioactive waste is produced or anticipated to be produced. The waste producers are:

- The NDA estate[6]
- The Ministry of Defence (MOD)
- EDF Energy
- NNB Generation Company Ltd (NNB GenCo)
- The United Kingdom Atomic Energy Authority (UKAEA)
- GE Healthcare Ltd

[6] Includes Sellafield Ltd, Nuclear Restoration Services Ltd (NRS), NWS – Low Level Waste Repository, and Springfields Fuels Ltd.

- Urenco (comprising Urenco Nuclear Stewardship (UNS), Urenco UK (UUK) and Urenco Chemical Plants (UCP))
- UK Research and Innovation
- Minor waste producers.

The figure also shows the sites where radioactive waste is disposed.

In the 2025 UK Inventory, there is only one 'small user', Marcegaglia, which is referred to as a 'Minor Waste Producer'. Other 'small users' of radioactive substances such as hospitals and industrial, educational, and research establishments also produce small quantities of radioactive wastes. There are a number of supply chain organisations treating UK radioactive wastes at facilities that may produce small amounts of secondary waste. These additional sites are not shown in Figure 1.

Figure 1 *Major waste producing sites and waste disposal facilities*

3. Categories of Radioactive Waste

3.1. Definitions

In the UK, radioactive waste is classified according to how much activity it contains and the heat that this activity produces. Categories are High Level Waste (HLW), Intermediate Level Waste (ILW), Low Level Waste (LLW), and Very Low Level Waste (VLLW).[7] The following information boxes give the definitions and characteristics of the different waste categories.

HLW

HIGH LEVEL WASTE

Definition

Wastes in which the temperature may rise significantly as a result of their radioactivity. The heat therefore must be accounted for in the design of storage or disposal facilities.

Characteristics

HLW was generated from reprocessing spent nuclear fuel at Sellafield. It is initially produced as a concentrated nitric acid solution containing waste fission products. The 2025 Inventory includes the nitric acid solutions awaiting conditioning in the Waste Vitrification Plant (WVP), some insoluble fission products that settle in the storage tanks, tank liquor heels, the glass product of conditioning, and small quantities of contaminated plant items from the WVP (mostly metal and ceramic).

Volume

~1,340 m^3 total packaged

Level of radioactivity

~1,100,000 TBq at 2200

HLW canisters

[7] Department for Energy Security & Net Zero, UK policy framework for managing radioactive substances and nuclear decommissioning, May 2024.

ILW

INTERMEDIATE LEVEL WASTE

Definition

Wastes exceeding the upper boundaries for LLW, but do not generate sufficient heat to be considered in the design of storage or disposal facilities.

Characteristics

The major components are steels, graphite, concrete, cement and sand, sludges, ion exchange resins, and flocculants. There is a wide range of steel items, including plant items and equipment, fuel cladding, and reactor components. Most graphite is in the form of moderator blocks from final stage reactor dismantling at Magnox and AGR power stations.

The majority of waste reported as cementitious materials is cement associated with conditioned waste. The remainder is mostly higher activity concrete from the decommissioning of buildings.

Volume

~618,000 m^3 total packaged

Level of radioactivity

~470,000 TBq at 2200

ILW Magnox fuel cladding swarf

LLW

LOW LEVEL WASTE

Definition

Wastes having a radioactive content not exceeding 4 GBq per tonne of alpha activity or 12 GBq per tonne of beta/gamma activity.

Characteristics

The major components of LLW are building rubble, soil and steel items. The LLW can include framework, pipework, and reinforcement from the dismantling and demolition of nuclear reactors and other nuclear facilities, and the clean-up of nuclear sites.

LLW also comprises miscellaneous contaminated wastes from the operation of nuclear facilities which is mainly scrap metal items, plastics, and paper.

Volume

~1,280,000 m^3 total packaged

Level of radioactivity

~110 TBq at 2200

Packages of LLW

VLLW

VERY LOW LEVEL WASTE

Definition

A sub-category of LLW. It comprises waste that can be safely disposed of with municipal, commercial or industrial waste, or can be disposed of at specified landfill sites.

VLLW comprises:

- High Volume VLLW – wastes with maximum concentrations of 4 MBq per tonne of total activity that can be disposed to specified landfill sites. There is an additional limit for tritium in wastes containing this radionuclide.
- Low Volume VLLW - wastes that can be safely disposed of to an unspecified destination with municipal, commercial or industrial waste. Each 0.1 m^3 of material must contain less than 400 kBq of total activity, or single items must contain less than 40 kBq of total activity. There are additional limits for carbon-14 and tritium in wastes containing these radionuclides.

Characteristics

The major components of VLLW are building structural materials (principally concrete, with brick, metal, and other materials) from the dismantling and demolition of nuclear facilities.

There are also smaller quantities of excavated soil from construction and demolition activities.

Volume

~2,690,000 m^3 total reported

Level of radioactivity

~13 TBq at 2200

Demolition work

3.2. Summary of key changes

Key changes from the 2022 Inventory are summarised below with further detail given in Section 13 regarding reported and packaged volumes along with changes to package numbers and activities.

Key changes

- The number of waste streams is 1280 compared with 1324 in the 2022 Inventory. A number of streams have been removed from the 2022 Inventory due to being fully consigned, with other waste being reallocated to new waste streams
- The total packaged volume (4,440,000 m^3) is <1% higher than in the 2022 Inventory
- The total HLW packaged volume (1,340 m^3) has decreased from the 2022 Inventory by ~9%
- The total ILW packaged volume (618,000 m^3) has increased from the 2022 Inventory by ~25%
- The total LLW packaged volume (1,280,000 m^3) has decreased from the 2022 Inventory by ~5%
- The total VLLW reported volume (2,690,000 m^3) has decreased from the 2022 Inventory by ~2%

4. Radioactive Waste Management: Overview

Key facts

- Radioactive wastes are managed in-line with the waste hierarchy, as shown by the diversion of waste from disposal at the LLWR to management routes higher up the waste hierarchy.
- The UK radioactive waste management policy[8] allows a risk-based approach to waste management, which could (subject to permitting and planning) see further application of the waste hierarchy through diversion of less hazardous ILW to the LLWR.

Radioactive waste management in the UK is undertaken within a framework of Government policy, regulatory oversight and delivery organisations. UK Government and the devolved administrations set policy for radioactive waste management.

Government radioactive waste management policy is supported by a regulatory framework that aims to ensure that radioactive wastes are managed by a risk-informed approach, that results in the appropriate management route being chosen. The NDA provides strategic oversight for the management of radioactive waste from the civil nuclear sector.

Throughout its lifecycle (see Figure 2), radioactive waste should be managed safely and compliantly according to the waste hierarchy.

The UK Inventory is essential to the successful planning and preparation stage of the lifecycle. The UK Inventory includes information on how wastes are currently being managed and future plans, such as treatment and packaging for storage and disposal of waste.

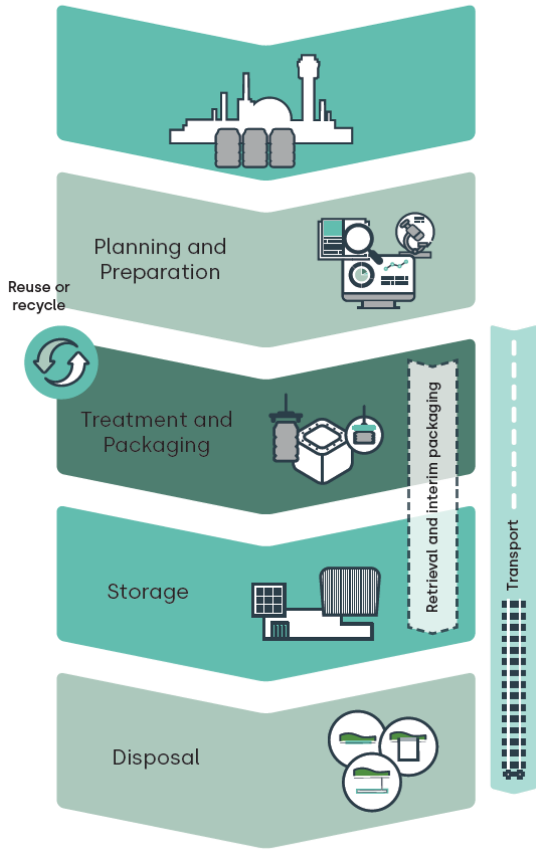

Figure 2 The nuclear waste management lifecycle

[8] Department for Energy Security & Net Zero, UK policy framework for managing radioactive substances and nuclear decommissioning, May 2024.

4.1. Integrated waste management

The management of radioactive waste is underpinned by radiological protection principles and a proportionate risk-based approach. The three fundamental principles are justification, optimisation of protection, and dose limitation. The properties of the waste and hazards those properties pose, which informs waste management plans, need to be understood and the risks taken into account when managing the waste. The waste management options will be subject to regulatory scrutiny and need to meet the Best Available Techniques (BAT) / Best Practicable Means (BPM) and as low as reasonably practicable (ALARP) requirements.

A central theme of UK radioactive waste management is the waste hierarchy, which ranks management options according to the best outcome for the environment. There is a preference for managing wastes at higher levels in the hierarchy. The waste hierarchy (see Figure 3) includes:

- Prevention of waste where practicable
- Minimisation where creation is unavoidable
- Re-use and recycling where possible
- Disposal for wastes that cannot be managed using any other method.

Although disposal is the least preferred option, without the disposal capability waste management would not be possible.

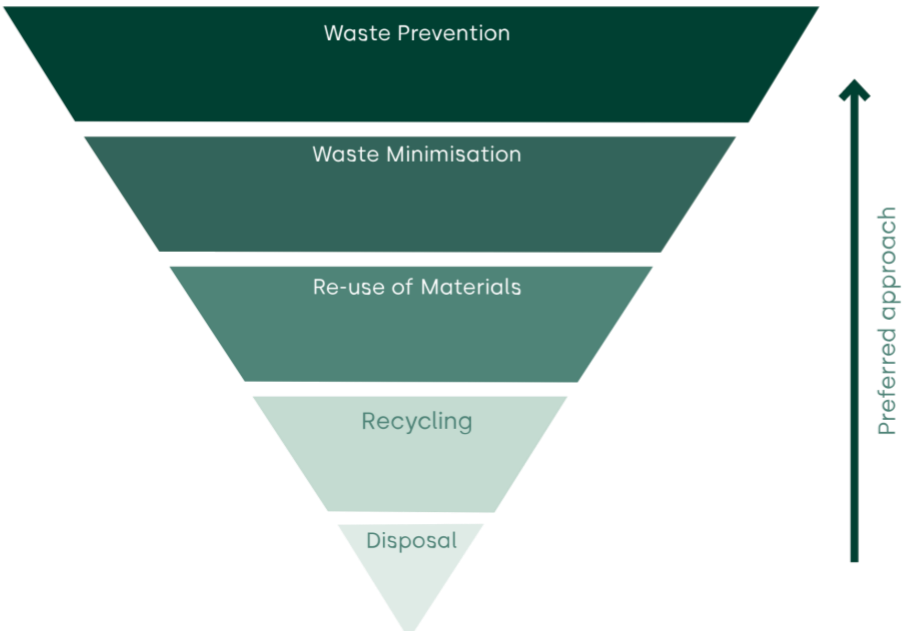

Figure 3 The Waste Hierarchy

Where waste disposal cannot be avoided, the options (which are discussed further in Section 4.4) are:

- Disposal near to the surface, which could include:
    - Appropriately licensed commercial waste landfill sites
    - On-site disposal facilities

- LLW disposal facilities
- Near-surface disposal (NSD) facilities for ILW
- Deep geological disposal for the most hazardous waste

4.2. Application of the waste hierarchy

The Low Level Waste Repository (LLWR) is a valuable but finite resource for LLW disposal. The proportion of LLW being disposed in the UK has been greatly reduced through more effective application of the waste hierarchy to identify ways to: avoid creating waste, better characterise materials, identify new opportunities to re-use or recycle materials and physically reduce the volume of the remaining waste.

This has seen a shift from 95% of waste arising in 2009 going straight to disposal at the LLWR, to only 1% of waste arising in FY 2024-2025[9] going to disposal (see Figure 4). The rest has been successfully diverted.

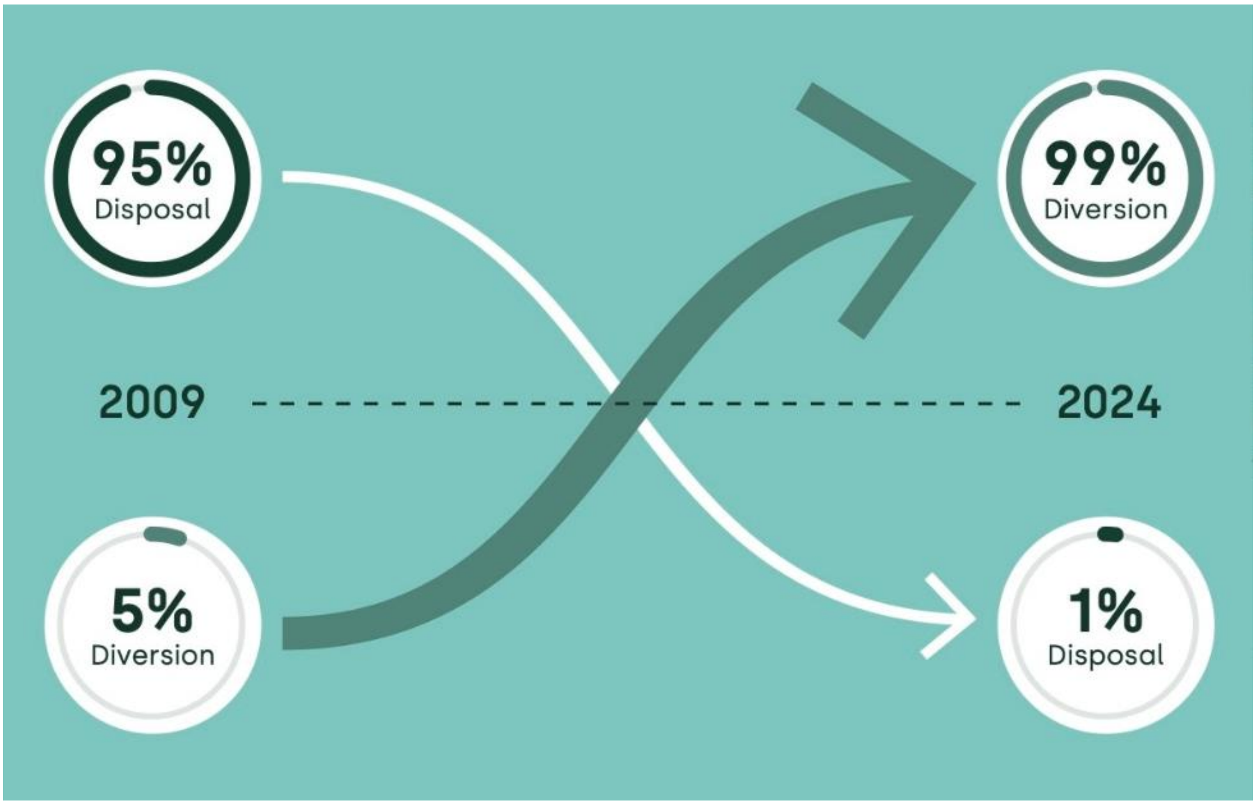

Figure 4 The change in waste routed to the LLWR with time

4.3. Waste services: treatments

NWS offers a single, standardised contracting model enabling any radioactive waste generator to access a suite of waste management services. NWS works closely with supply chain partners to maintain capability and capacity, coordinating around 800 consignments of radioactive waste each year to treatment and disposal facilities across the country.

A comprehensive range of enabling, treatment, and disposal options supporting the full waste lifecycle is provided (see Figure 5). This includes Expert and On-site Support across the waste lifecycle, Characterisation such as access to laboratories and on-site waste assay, Packaging

[9] Diversion and disposal ratio varies each year due to variable waste composition.

through the manufacture of and provision of compliant waste containers such as drums, International Organisation for Standardisation (ISO) containers, and soft-sided packages. In addition, NWS manages a fleet of Type B containers for higher activity waste. Transport by road, rail, and sea is provided in partnership with specialist logistics providers and Nuclear Transport Solutions.

Treatment includes metallic waste treatment through decontamination and recycling, combustible waste incineration, and high-force supercompaction of drummed waste to significantly reduce volume. Additionally alternative treatment, such as liquid waste encapsulation, and development of new fit for purpose treatment approaches can also be offered. The disposal options (discussed below) include VLLW disposal at permitted landfill sites and disposal at the LLWR, as well as disposal at a Geological Disposal Facility (GDF) in the future.

Figure 5 Options provided by NWS Waste Services

4.4. Waste management and disposal

A flexible approach to adopting waste management routes and alternative management options will be used as part of the application of the waste hierarchy, where they provide benefits. They include decay storage, decontamination, and sort and segregation. Appropriate use of waste treatment techniques, decay storage and disposal facilities will allow the optimisation of the lifecycle management of radioactive wastes.

The disposal facilities range from those that could accept the most hazardous radioactive waste that needs to be isolated and contained for hundreds of thousands of years in order to protect people's health and the environment, to facilities where no special controls are necessary, which are suitable for less hazardous radioactive waste. Each disposal facility has or will have waste disposal criteria, which sets out the characteristics of the waste that can be disposed of at the particular facility.

For the less hazardous radioactive waste, disposal near to the surface is possible; for more hazardous wastes deep geological disposal will be needed. The current and future disposal options are discussed below.

Decay storage

Waste can be stored prior to disposal to allow the radioactivity to decay; this can lead to different treatment, packaging, or disposal options becoming available. Decay storage can be utilised anytime between the "Planning and Preparation" and "Disposal" stages of the waste life cycle, see Figure 2.

Appropriately licensed commercial waste landfill sites

High-volume, low-activity waste can be disposed of at these sites. This enables the disposal of very lightly contaminated waste which does not require the same degree of engineered protections provided by the LLWR. Waste managed via this route typically includes rubble, soil and other demolition wastes from decommissioning and site restoration activities.

At the time of publication, the East Northants Resource Management Facility (ENRMF) at Kings Cliffe is the only available facility.

On-site disposal facilities

Currently this only includes the Calder Landfill Extension Segregation Area (CLESA) on the Sellafield site; this is an authorised Low Activity - Low Level Waste containment landfill for the disposal of non-hazardous radioactive waste generated at Sellafield.

LLW repositories

This includes two facilities: the LLWR and the Dounreay LLW facility.

- Dounreay LLW facility is a shallow, engineered LLW disposal facility constructed next to the Dounreay site in Caithness. Waste transfers started in 2015.

  The disposal facility receives LLW from decommissioning at the Dounreay site, as well as being intended for retrieved and repackaged LLW from the historical disposal pits. It will also receive waste from the neighbouring Vulcan nuclear site that cannot be recycled. Suitable LLW is first super-compacted to minimise its volume. There is a dedicated ‘Demolition LLW’ vault for waste with radioactivity at the lower end of the LLW scale.

  Views of the facility are shown on page 27.

- Low Level Waste Repository

  The LLWR is a national facility owned by the NDA and operated by NWS. This disposal route is available via the NWS Waste Services Framework for waste from both the nuclear and non-nuclear industries in the UK. Prior to waste being received, a comprehensive technical assessment is undertaken against the latest Waste Acceptance Criteria (WAC), Environmental Permit and appropriate safety case for the facility. Once authorised for receipt, the waste is transported via road or rail and later immobilised in cement within mild steel ISO containers prior to their final emplacement.

  Current disposals are made in an engineered facility with concrete-lined disposal vaults. A cap is currently being constructed in stages over the vaults and trenches, with the final cap being completed after the last disposal has been received and emplaced.

  An aerial view of the LLWR showing containers in disposal vaults is shown on page 25.

Near-surface disposal facilities for ILW

The policy framework for managing radioactive substances and nuclear decommissioning enables implementation of NSD of less hazardous ILW in England and Wales. Current near-surface facilities are used solely for the disposal of LLW. A NSD facility for ILW is a facility that can be located at or below the surface (up to 200 metres, the minimum depth of a GDF) and may make use of existing structures. It differs from a GDF in the degree of isolation provided by the facility, including host geology, depth and design.

The Scottish Government policy is that long-term management of higher activity wastes should be in near-surface facilities. Developers will need to demonstrate how the facilities will be monitored and how waste packages, or waste, could be retrieved.

Geological disposal

For the most hazardous radioactive wastes, the long-term management policy of the UK Government and devolved administrations for Wales and Northern Ireland is geological disposal. The specially engineered vaults and tunnels deep underground that will house the waste are called a GDF.

A GDF involves isolating the most hazardous waste deep underground in suitable geological formations and placing it in highly engineered vaults and tunnels.

A GDF will be constructed 200 to 1,000 metres below ground or beneath the seabed. At this depth, waste will be protected from natural events like earthquakes and long-term environmental changes such as future ice ages or sea level rises.

The facility works by using a multi-barrier approach in which natural and engineered barriers work together to contain and isolate the most hazardous radioactive waste, keeping it safe and secure over the many thousands of years it will take for the radioactivity to naturally reduce. Visualisation of a GDF layout and size are shown below (see Figure 6 and Figure 7).

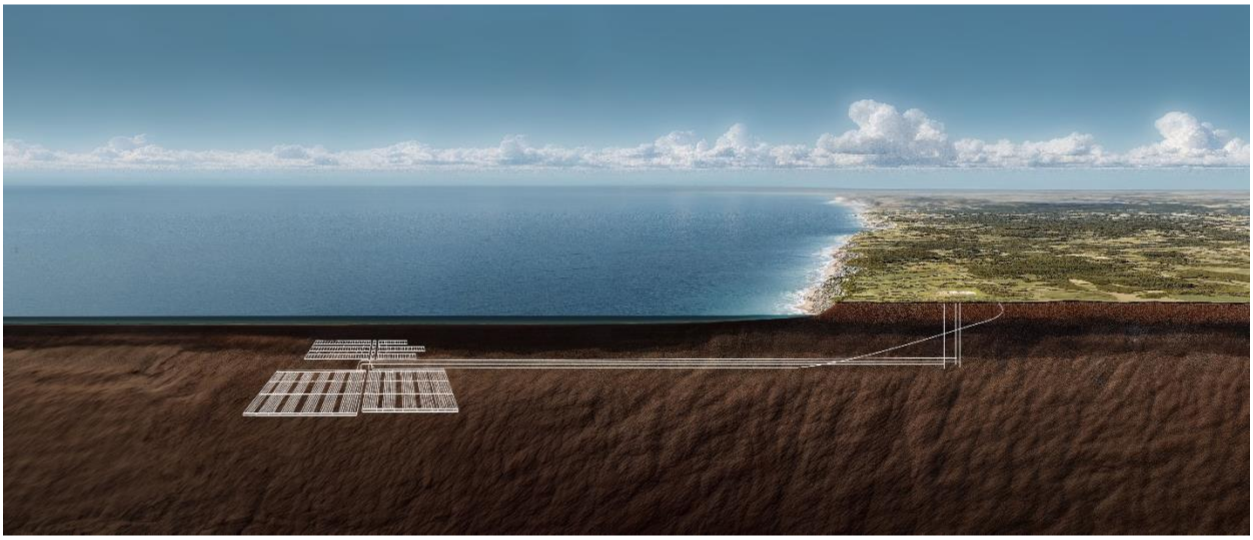

Figure 6 Visualisation of a GDF

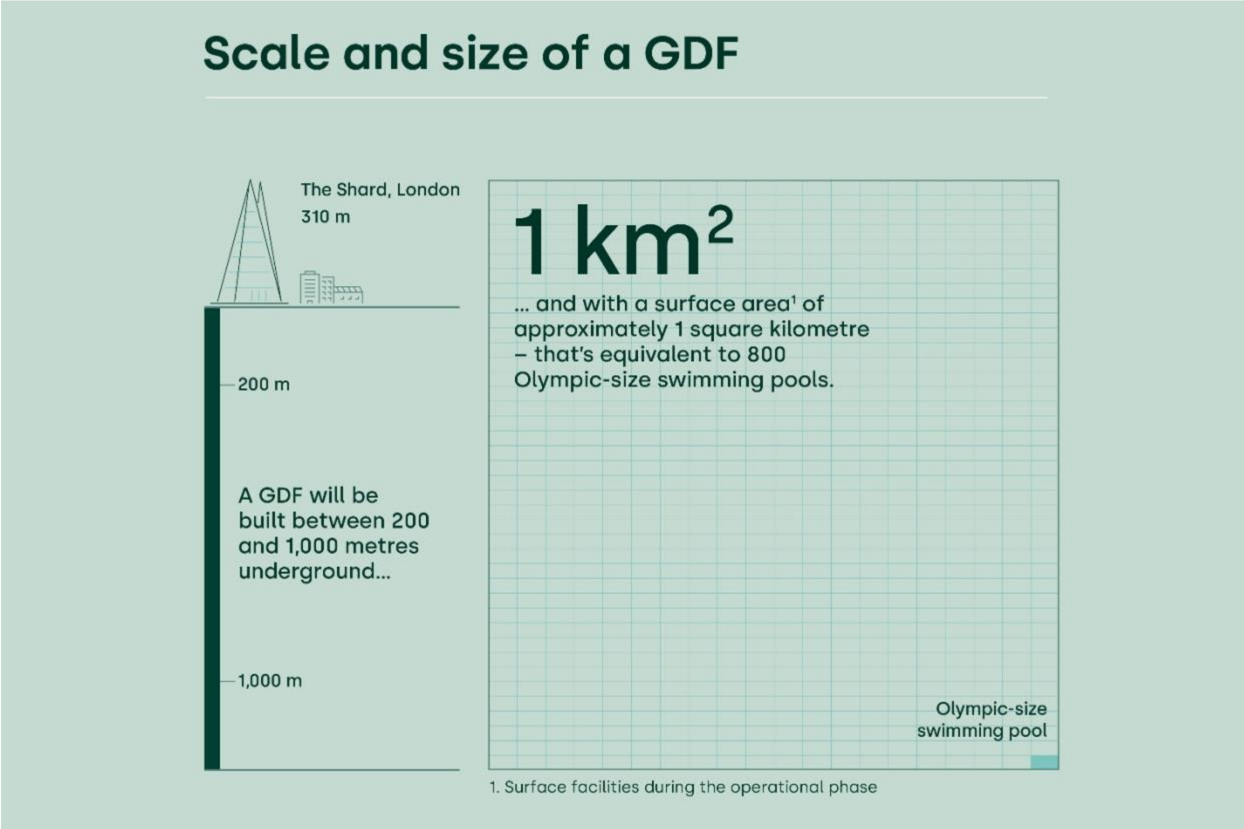

Figure 7 Visualisation of the scale and size of a GDF

5. Scope of the Radioactive Waste Inventory

5.1. Scope

The Inventory includes HLW, ILW and LLW, and some High Volume VLLW (HVVLLW) where there is reasonable certainty of the total waste arisings. This is illustrated in Table 1.

Table 1: Wastes reported in the inventory

Category	Major waste producers	Minor waste producers
HLW		None produced
ILW		None produced
LLW	See Note 1	See Note 2
VLLW sub category	See Note 3	See Note 4

Wastes included in the 2025 Inventory

Note 1: Some waste producers have chosen to report potentially contaminated land in the 2025 UK Radioactive Material Inventory report. This has been done until there is more certainty on the disposal route and the volumes that might arise.

Note 2: Excludes low volumes of waste that can be disposed of by 'controlled burial' at permitted landfill sites.

Note 3: Includes HVVLLW from facilities decommissioning and site clean-up at nuclear licensed sites. Some waste producers have chosen to report potentially contaminated land in the 2025 UK Radioactive Material Inventory report. This has been done until there is more certainty on the disposal route and volumes that might arise.

Note 4: Not reported in the Inventory. Such VLLW is of low volume and is disposed of separately, or with municipal, commercial and industrial wastes, at landfill sites.

The Inventory does not include:

- Liquid and gaseous wastes containing very low concentrations of activity that are routinely discharged to the environment in accordance with statutory regulations. Discharges are made within authorised limits, usually after some form of treatment.
- Small quantities of solid wastes with very low concentrations of activity typically from hospitals, universities, and the non-nuclear industry (so-called 'small users'), as well as devices such as tritium light sources and smoke detectors, that can be disposed of with domestic refuse to landfill, either directly or after incineration.
- Naturally occurring radioactive materials (NORM), which accumulate as scale on pipework during the extraction of oil and gas. These scales have raised levels of activity and are treated as radioactive waste.

Estimates of waste and spent fuel from the development of new nuclear power stations in the UK is not included in the UK Inventory until development work starts and there is greater certainty. Operational waste from Hinkley Point C meets this criterion and is therefore included in the 2025 Inventory.

5.2. Data collected

Radioactive waste is divided into waste streams for the purpose of compiling the inventory. A waste stream includes waste or a collection of waste items at a particular site, usually in a particular facility and/or from a particular process or operation.

The Inventory covers radioactive wastes that existed on 1st April 2025 and those forecast to arise in the future, and for each radioactive waste stream gives its:

- Identification code
- Name
- Waste classification
- Volume in stock at 1st April 2025, and forecast in the future and the timing of these arisings
- Physical and chemical composition
- Radioactivity and radionuclide composition
- Current or planned treatment and packaging
- Current or planned disposal route.

Full information about each waste stream is contained within individual Waste Stream Data Sheets (WSDS). These are forms generated as MS Excel and pdf files, and are available on the UK Radioactive Waste Inventory website.

Aerial view of the Low Level Waste Repository

6. Overview of the Inventory Process

Updating the Inventory is a major task which happens every three years. It involves engaging with radioactive waste producers and collecting information for ~1,300 radioactive waste streams and ~60 radioactive material streams.[10] The Inventory process deployed in 2025 follows the approach set out below; NWS deployed a contractor to deliver the 2025 Inventory.

The process for compiling the 2025 Inventory is illustrated below.

Develop plan and approach

- Develop and agree a plan, and the best way to work with waste producers and to record data.
- Take on board lessons learned from the previous exercise and implement recommendations where these are endorsed and are achievable. Address any changes in inventory requirements.
- Produce a specification and outline programme of work.

Confirm data requirements

- Review data to be collected to confirm they continue to meet user needs, to ensure the UK's international inventory reporting requirements can be met, and to ensure the reflection of and alignment with policy updates.
- Maintain an inventory data improvement plan for each waste producer.
- Update the inventory scenario for each site (see Section 7) before data collection.

Develop data collection tools

- Develop the data collection tools; the waste producers are involved in this process.
- Preload previous 2022 Inventory data for waste producers to update. Guidance and conventions are developed to help in compiling data in a consistent form.

Compile data and verify

- Inventory data are obtained from a number of sources - waste sampling, measurement and calculation. Waste producers are responsible for quality checking their data before submission.
- The data are processed and independent checking is carried out. Checking confirms that data are consistent with the inventory data reporting conventions.

Publish reports and data

- 'Freeze' the inventory database once all data have been collected and checked with sites.
- The inventory contractor then produces a suite of reports that are reviewed and approved by NWS. Finally, the inventory is ready for publication.

Review project

- After inventory publication, NWS works with all those involved to agree improvements for the next inventory cycle. This includes improvements to the process itself as well as identifying specific improvements to the data.
- NWS reviews the strategy for management of inventory data and updates the strategy as needed.

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[10] Radioactive waste producers also maintain their own inventories to support their ongoing site activities.


Aerial view of the Dounreay LLW facility

7. Scenario For Future Waste Arisings

7.1. Scenarios

The Inventory scenario sets out the assumptions used by waste producers to estimate the amount of radioactive waste that will arise from their sites in future. The assumptions consider the nature, scale, and timings of operations and activities at each site.

These assumptions were made at the 2025 Inventory stock date, 1st April 2025 and may change in future due to a range of commercial, policy or funding reasons, or as improved data become available.

Table 2 provides the key assumptions and programme dates used to forecast radioactive waste arisings at UK waste producing sites. Site Information Sheets in the companion 2025 UK Radioactive Waste Detailed Data report provide further information on the basis for estimates of future waste arisings.

Table 2 List of assumptions used to estimate future waste arisings in the 2025 Inventory

Organisation/site	Operations	Decommissioning
Nuclear Decommissioning Authority sites:		
Sellafield (1)	Magnox reprocessing plant completed operations in July 2022	Following the end of spent fuel reprocessing the site continues to focus on high hazard reduction and environmental remediation, including waste retrieval and treatment, Post Operational Clean Out (POCO), and the decommissioning of redundant facilities All site decommissioning activities will be largely completed by 2090 All buildings/waste stores (except product stores and supporting ancillary buildings) are assumed to be demolished by 2120
Magnox reactor sites	All reactors are shut down	All defuelling and initial decommissioning works by 2041 Reactor dismantling and site clearance work scheduled by 2099
LLWR	Waste forecast to 2135	-
Dounreay	All reactors and supporting facilities are shut down	Decommissioning of all facilities and remediation of the site, apart from the ILW stores, will be completed by 2079
Harwell	All reactors and supporting facilities are shut down	All facilities decommissioned by 2061
Winfrith	All reactors and supporting facilities are shut down	All facilities decommissioned by 2037
Springfields	Oxide fuel manufacture to continue until 2028	All facilities decommissioned by 2045 Final site clean-up and remediation ~2100

Organisation/site	Operations	Decommissioning
Ministry of Defence sites:		
Atomic Weapons Establishment (AWE) – Aldermaston	-	End of operations at 2080[(2)] (Notional date when all legacy and currently operational facilities are assumed to be decommissioned, and the associated waste has been disposed)
Dockyards	Operations continue to 2110	The MOD is considering future submarine dismantling activities at Rosyth
Submarine decommissioning	-	Includes 27 submarines currently in scope of the Submarine Dismantling Project (SDP) programme and seven existing/planned Astute boats and four future Dreadnought class boats
EDF Energy sites:		
AGR power stations	Reactors shut down by 2030	All defuelling and Care & Maintenance (C&M) preparations completed by 2049 Final site clearance work scheduled over the period 2106-2125
Sizewell B PWR power station	Reactor operates to 2035	Defuelling and C&M Preparations 2035-2045 Reactor Dismantling and Final Site Clearance 2043-2053
United Kingdom Atomic Energy Authority (UKAEA) site:		
Culham	-	Site clearance completed 2040
Urenco site:		
Capenhurst	Waste volumes from the enrichment plant are estimated up to 2039 Uranium oxide store is forecast to be maintained until 2119	Decommissioning complete 2124
GE Healthcare site:		
Amersham	-	Decommissioning complete 2030
UK Research and Innovation sites:		
Rutherford Appleton Laboratory	Waste forecast to 2045	Decommissioning currently planned to commence around 2045

Organisation/site	Operations	Decommissioning
Power stations under construction:		
Hinkley Point C	60 year operating life	Decommissioned after 60 years operation (3)

(1) Includes Calder Hall on the Sellafield site.

(2) 2080 is a notional date for planning purposes and a realistic quantification of volumes over a specific time, this is in no way an indication of the cessation of the UK's strategic capability at a point of time in the future.

(3) Anticipated decommissioning waste from Hinkley Point C is not included in the 2025 UK Inventory.

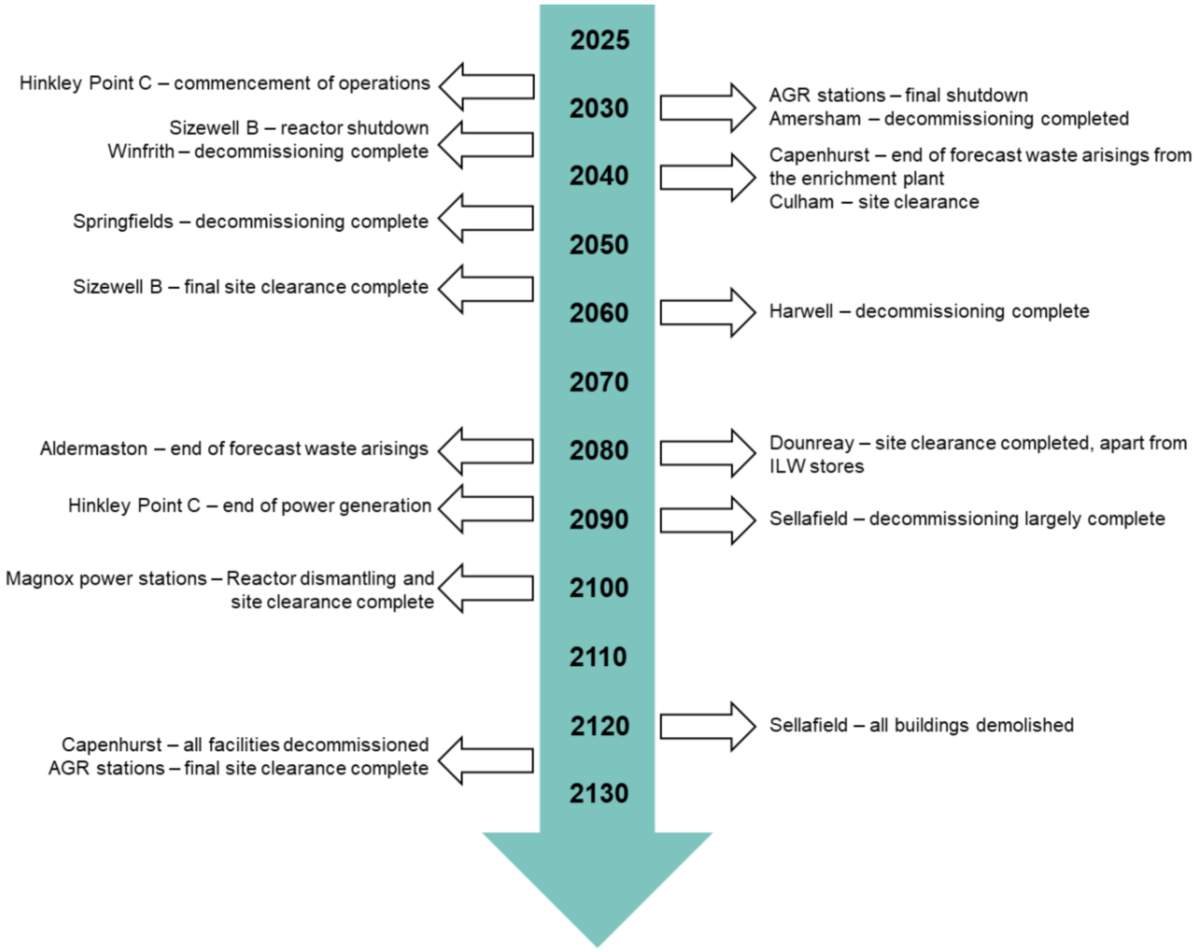


Figure 8 Timeline of key events underpinning the 2025 Inventory

7.2. Potential future developments

This section discusses potential developments that could occur in the future which could result in changes (and uncertainty) in the inventory data presented in the 2025 UK Inventory.

- **Nuclear new build**

The UK is progressing with the deployment of new nuclear power stations, with the expectation of Hinkley Point C becoming operational in the early 2030s. When operational, Hinkley Point C will supply 3.2 GW of secure, low carbon electricity for around 60 years. This iteration of the UK Inventory only includes the forecasted arisings of operational wastes from Hinkley Point C. The Hinkley Point C decommissioning wastes will be included in later UK Inventory iterations as information becomes available with construction nearing completion.

The UK Government took a final investment decision for Sizewell C in July 2025, the first for a nuclear project in nearly a decade. As an above ground, near-replica of Hinkley Point C, Sizewell C is expected to generate the same amount of electricity from the mid to late 2030's. Sizewell C operational and decommissioning wastes are expected to be comparable to the Hinkley Point C wastes. However, as the final investment decision was made after the stock date of 1st April 2025, wastes that will originate from Sizewell C were not included in the 2025 UK Inventory, and will be added into later UK Inventory iterations.

EDF Energy announced its intention to extend operations for the Heysham 1 and Hartlepool power stations up until 2028. They have also announced the extension of Heysham 2 and Torness power stations until 2030.

The UK Government has also awarded £13m to Westinghouse for investment in uranium fuel conversion services as a crucial enabler for deploying civil nuclear power and energy security in the UK. This will deliver the first of a kind domestic High Assay Low Enriched Uranium (HALEU) fuel supply chain in the UK by the early 2030s to grow domestic fuel cycle capabilities. In addition, the UK Government has commenced a £300m programme for delivering HALEU fuel at a commercial scale for 2031 to support the advanced reactor market. The wastes associated with the HALEU fuel production will be included in the future UK Inventory iterations as the information regarding operational and decommissioning wastes would be limited at this point in time.

Rolls-Royce has also been selected by Great British Energy – Nuclear (GBE-N) as its preferred bidder and partner to deliver the UK's first Small Modular Reactors (SMRs), subject to final UK Government approvals and contract signature. Aiming to deploy to the UK energy grid from the mid-2030s, the initial project could provide up to 1.5 GW of low carbon electricity. The wastes associated with the SMRs were not included in the 2025 UK Inventory as the preferred partner was announced after the UK Inventory stock date and will be included in the later UK Inventory iterations.

In February 2026, the UK Government published the Advanced Nuclear Framework. The Framework establishes a pathway to market through the introduction of the UK Advanced Nuclear Pipeline, which clarifies the enabling policy landscape to unlock private finance for advanced nuclear projects in the UK.

- **Opportunity routes**

In addition to information on the baseline management route for radioactive waste streams, the UK Inventory process collects information on opportunities for alternative waste management routing. The objective of collecting this information is to support the identification and implementation of waste stream opportunities that align with the principle of optimised waste management. This includes the use of the waste hierarchy, timely characterisation and segregation of waste which delivers effective waste management, and the seeking of opportunities to share treatment and interim storage assets, capabilities and learning.

If the identified opportunities become the baseline disposal and treatment options in future inventories, then it can be expected that changes will be seen in the number and type of packages destined for disposal facilities.

- **Risk-informed waste management**

Risk-informed waste management is a culture adopted during decision making processes, to ensure the best outcomes, where the physical risks from waste are considered across the whole waste lifecycle. Historically, waste was mostly managed based on the traditional categories of HLW, ILW, LLW, and VLLW. Changes to the management strategy could have significant consequences to both the timing and routing of waste listed in the inventory. For example, for certain waste types where the overall hazard is deemed to be low, the timing for packaging and disposal could be accelerated. This could be a result of the waste no longer needing to be stored for long periods of time before final disposal.

Demolition at Oldbury Magnox station

8. Waste Volumes

Key facts:

- At 1st April 2025 the total reported volume of waste was 174,000 m^3.
- Future waste arisings volume is estimated to be 4,300,000 m^3.
- About 93% of the total waste volume is of low activity (LLW and VLLW).
- About 72% of the total waste volume is at Sellafield.

Radioactive waste quantities are reported by waste producers as:

- Stocks - waste at 1st April 2025 comprises radioactive materials that had been declared as waste and were being held at this date
- Future waste arisings - estimates of waste that will be generated based on assumptions about the nature, scale, and timing of future operations and activities.

Waste quantities in this section are presented in terms of reported volume and mass, packaged volume, and the number of packages:

Reported volume	For stocks, the volume that waste occupies in tanks, vaults, silos, drums etc. in which it is contained. Some wastes are being conditioned directly in suitable containers for long-term management as they arise and others have been retrieved from stores and conditioned; for these wastes, the reported volume at 1st April 2025 is the conditioned volume.[11] For future arisings, the projected volume in general reflects current waste management practice. For most future arisings the reported volume is that for untreated or partly treated waste. For those waste streams where fresh arisings are being conditioned the reported volume is the conditioned volume.
Reported mass	The mass of the waste corresponding to the reported volume.
Packaged volume	The packaged volume is the displacement volume of the waste packages.

Where totals are presented, these represent the contributions from stocks at 1st April 2025 and all estimated future arisings.[12]

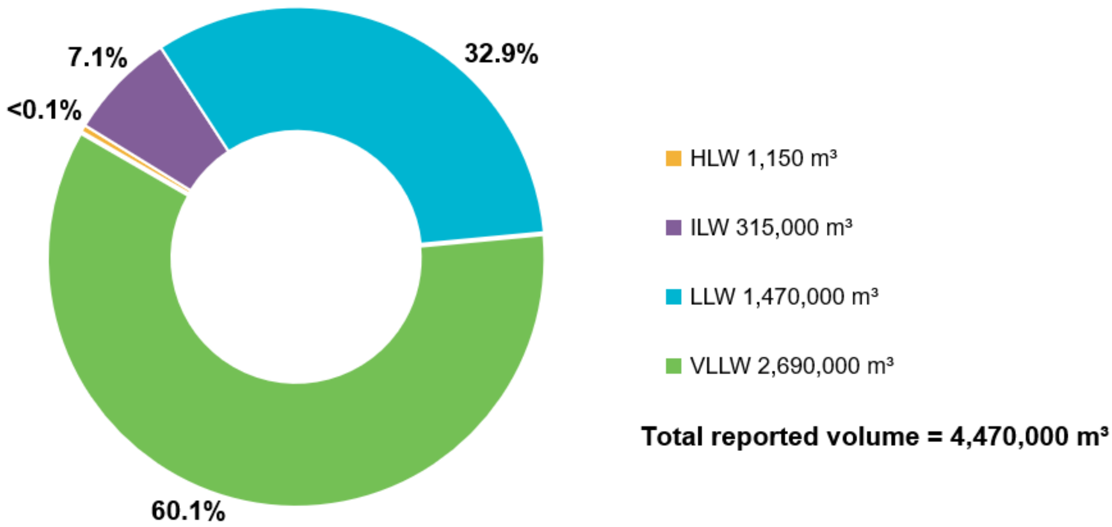
8.1. Summary for all wastes

Figure 9 illustrates the relative contributions of HLW, ILW, LLW, and VLLW to the total radioactive waste volume in stocks and all future arisings from all sources for reported volumes

[11] The conditioned volume is the volume of the wasteform (waste plus any immobilising medium) within the waste package.

[12] Within the tables the totals are presented as the sum of the unrounded values which are then rounded.

(top chart) and for packaged volumes (bottom chart). Most waste is of low activity (LLW and VLLW).



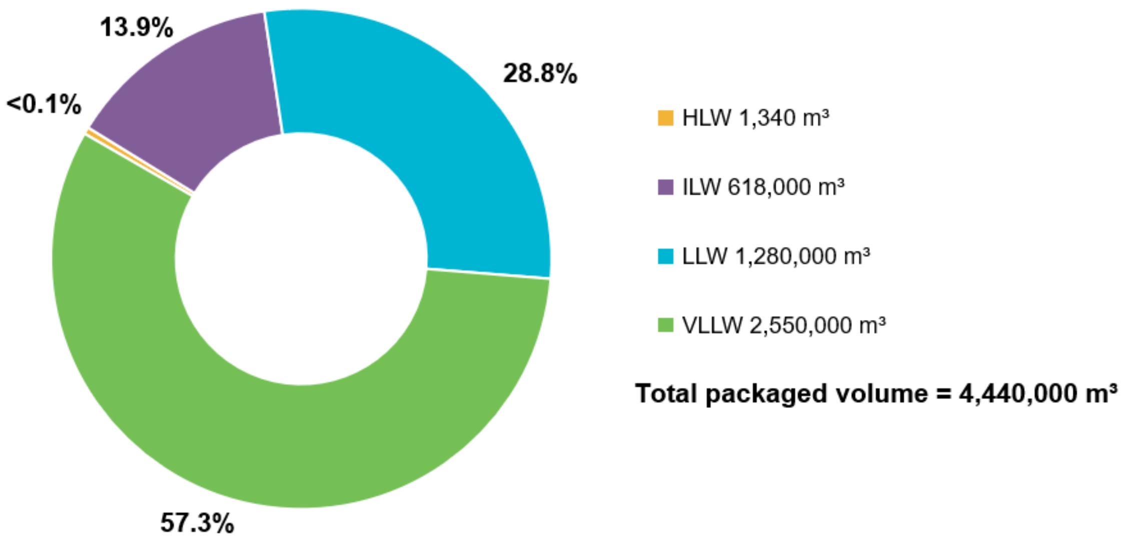


Figure 9 *Proportion of waste volume by category for reported volume (top chart) and packaged volume (bottom chart)*

Table 3 presents total values (i.e. stocks at 1st April 2025 and all estimated future arisings) for the following parameters in each waste category:

- reported waste volume
- waste masses
- number of packages
- packaged volume.

Table 3 Total wastes at 1st April 2025 and all estimated future arisings

Waste category	Reported volume (m^3)	Reported mass (tonnes)	Packaged volume (m^3)	Number of packages[(2)]
HLW [(1)]	1,150	2,820	1,340	6,830
ILW	315,000	364,000	618,000	341,000
LLW	1,470,000	1,830,000	1,280,000	80,800
VLLW	2,690,000 [(3)]	2,690,000	2,550,000	See Note 4
Total	**4,470,000**	**4,880,000**	**4,440,000**	**429,000**

(1) The volume and mass do not include waste from reprocessing overseas spent fuel that will be exported to the country of origin. It assumes substitution arrangements are implemented (see Section 14 for further information).

(2) Includes only those wastes packaged for disposal. Excludes streams and component parts of streams whose characteristics make them suitable for recycling, incineration or appropriately permitted landfill disposal.

(3) Includes 2,650,000 m^3 reported volume from facility decommissioning at Sellafield. However, the current best estimate, albeit based on limited decommissioning experience, is that 70% of this material may be ‘out of scope’ of regulatory control.

(4) As VLLW can be disposed to appropriately permitted landfill sites no package numbers are collated for this waste category in the Inventory.

Reported volumes show that about 2,690,000 m^3 (65%) of all LLW falls into the VLLW sub-category. Much of this waste is forecast to arise from decommissioning and site clearance activities. In general, current arisings are disposed of at appropriately permitted landfill sites shortly after they arise.

Approximately 2,650,000 m^3 (99%) of VLLW is forecast from plant decommissioning at Sellafield, including reprocessing and associated plants, storage and treatment plants, and site service facilities. However, there is a large uncertainty in potential radioactive waste arisings from decommissioning. Current expectations are that about 70% of VLLW at Sellafield may be out of scope of regulatory control (i.e. not radioactive for purposes of UK legislation). As decommissioning projects at the site are progressed and opportunities for further characterisation arise, the projected amounts of radioactive waste will continue to be refined.

Most radioactive waste in the UK originates from the nuclear power industry (see Section 2). The majority of radioactive waste from the nuclear power industry is from historical operations that include Magnox reactors at eleven sites, Magnox and oxide fuel reprocessing at Sellafield, and R&D programmes at Sellafield, Dounreay, Harwell, and Winfrith that included a number of research and prototype reactors. Waste volumes from the operating AGR power stations and the PWR power station at Sizewell B are lower than those from these legacy operations.

Figure 10 illustrates the origin of radioactive waste.

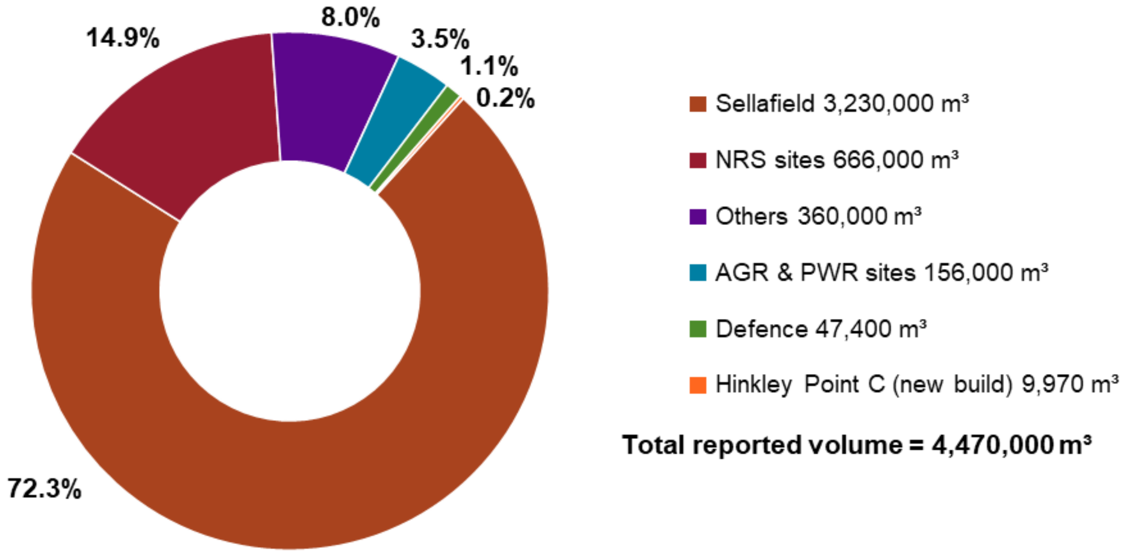


Figure 10 Wastes by origin (% all wastes at 1st April 2025 and all estimated future arisings)

8.2. Volumes by region

Figure 11 illustrates the relative contributions of radioactive waste in England, Scotland, and Wales to the total reported volume in the UK. There are currently no nuclear licensed sites in Northern Ireland; only very small quantities of radioactive waste are produced there from hospitals and industry. These wastes can be incinerated or disposed of in landfill and are not within the scope of the 2025 Inventory.[13]

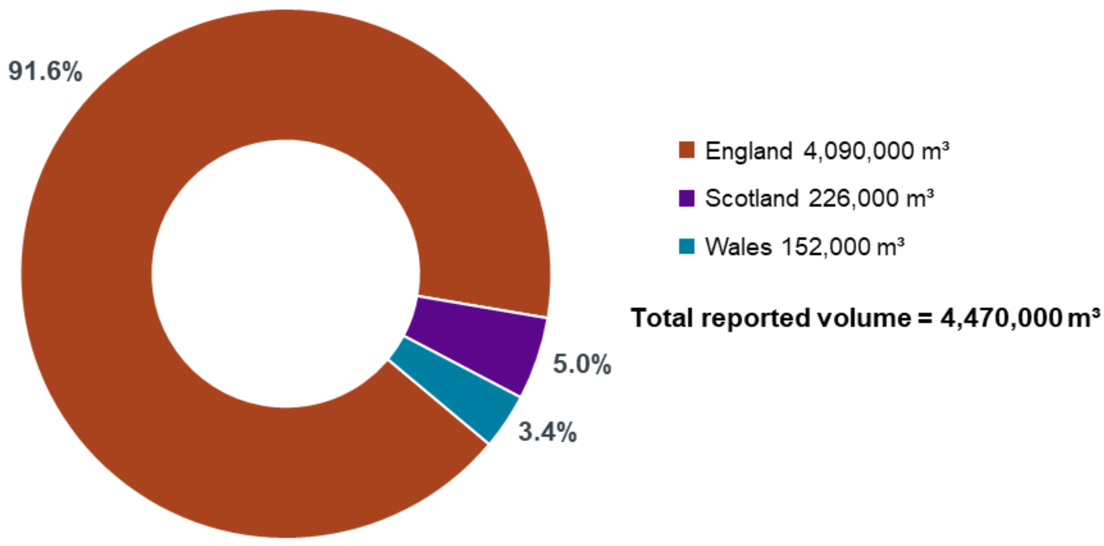


Figure 11 Proportion of total waste reported volume by country (at 1st April 2025 and all estimated future arisings)

[13] Some redundant radioactive sources are transferred for storage in the Miscellaneous Beta/Gamma Waste Store (MBGWS) at Sellafield and so are included in the Inventory.

Approximately 91.6% of all radioactive wastes are located in England, 5.0% in Scotland, and 3.4% in Wales. This is based on the combined total of UK reported volume at 1st April 2025 and all estimated future arisings.

For England radioactive waste production is dominated by Sellafield. For Scotland most waste is from Dounreay and the legacy Magnox power station sites at Chapelcross and Hunterston. For Wales nearly all waste is from the legacy Magnox power station sites at Trawsfynydd and Wylfa.

The 2025 UK Radioactive Waste Detailed Data report gives further information on waste volumes for England, Scotland, and Wales, including volumes at 1st April 2025 and in projected future arisings, and for each waste category.

8.3. Volumes by waste category

Table 4 - Table 7 give the reported waste volumes and corresponding masses at 1st April 2025, and the volumes already packaged at 1st April 2025 with corresponding numbers of packages for each waste category. The tables also give figures for future radioactive waste arisings that are projections made by the organisations operating the sites. These projections are based on assumptions about the nature, scale, and timing of future operations and activities at their sites (see Section 7). The 2025 Inventory includes forecast radioactive wastes from future operations and activities up to 2136.

High Level Waste

At 1st April 2025 the reported volume of HLW at Sellafield was about 1,960 m^3.

HLW is being safely stored at Sellafield pending the availability of a disposal route for this waste category. The quantity of packaged HLW being stored is increasing as waste, which is initially managed in a liquid form known as Highly Active Liquor (HAL), undergoes an evaporation process before vitrification into glass blocks within stainless steel canisters. At 1st April 2025 there were 6,114 packages of conditioned HLW in long-term storage. For disposal the waste will be further packaged in disposal containers.

Table 4 HLW at 1st April 2025 and all estimated future arisings (Reported volumes, masses, packaged volumes, and package numbers)

		Reported volume (m^3) (1)	Reported mass (tonnes) (1)	Packaged volume (m^3)	No of packages
Stocks at 1.4.2025	Not yet packaged	1,040	1,260	-	-
	Already packaged	917	2,430	1,200	6,114
Future arisings		See note 2	See note 2	See note 2	See note 2
Total		**1,150**	**2,820**	**1,340**	**6,830**

(1) Volume and mass "not yet packaged" are for HAL; volume and mass "already packaged" are the conditioned volume and corresponding mass for waste that has been encapsulated in glass.
(2) From 1st April 2025 there will be a net decrease in the reported volume and mass of HLW. This is because accumulated HAL is being conditioned, which reduces its volume and mass by about two-thirds. It is also because vitrified HLW is being exported to overseas customers.

Reported volumes of HLW will fall in the future. There are two reasons for this. Firstly, and most significantly, due to evaporation and vitrification (the vitrified glass blocks are roughly one-third of the volume of the original HAL). Secondly future arisings of HLW are net of exports to overseas reprocessing customers (see Section 14 for more information).

Further vitrified wastes will arise during the subsequent POCO phase. Total HLW generated is forecast to be 6,830 waste packages (1,340 m^3 packaged volume).

Intermediate Level Waste

At 1st April 2025 the reported volume of ILW was about 100,000 m^3, of which about 76,200 m^3 (76%) was at Sellafield. Most of the other ILW was at the Magnox and AGR power stations (9,870 m^3 and 3,800 m^3 respectively), Dounreay (4,890 m^3), Aldermaston (4,340 m^3), and Harwell (603 m^3).

ILW is also being safely stored pending the availability of a disposal route for this waste category.[14] At 1st April 2025 there were 71,958 packages of ILW in long-term storage facilities. Of these 62,527 (87%) were at Sellafield.

[14] Discrete items of short-lived ILW may be suitable for disposal in near-surface facilities after a period of decay storage.

Table 5 ILW at 1st April 2025 and all estimated future arisings (Reported volumes, masses, packaged volumes, and package numbers)

		Reported volume (m^3) (1)	Reported mass (tonnes) (1)	Packaged volume (m^3)	No of packages
Stocks at 1.4.2025	Not yet packaged	63,500	60,300	-	-
	Already packaged	36,800	66,800	52,400	71,958 (2)
Future arisings		215,000	237,000	429,000	192,000
Total		**315,000**	**364,000**	**618,000**	**341,000**

(1) Volume and mass "not yet packaged" are for untreated or partly treated waste. Volume and mass "already packaged" are the conditioned volume and corresponding mass e.g. conditioned in a cement-based material.

(2) ILW package numbers include 1,977 1803-type mild steel drums. These drums are expected to be overpacked in larger capacity boxes (6 drums per box).

The reported volume for forecast future arisings of ILW is about 215,000 m^3. About 139,000 m^3 (65%) is from Sellafield. Most of the other ILW is from Magnox power station sites (43,700 m^3) and AGR power station sites (20,200 m^3).

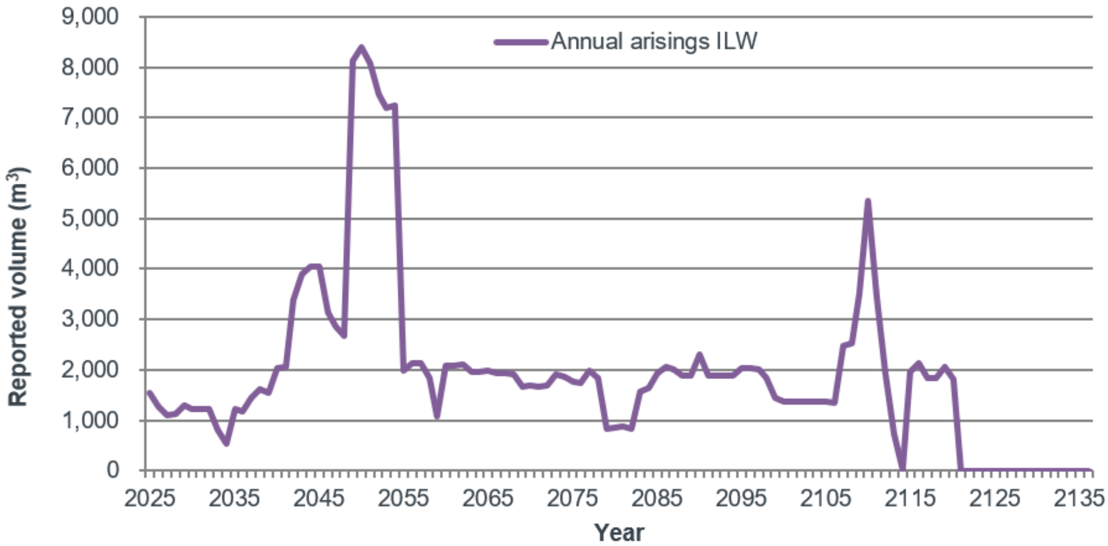


Figure 12 ILW future arisings (Annual reported volumes)

Figure 12 illustrates the pattern of future ILW arising volumes. Forecast annual arisings of ILW average about 1,940 m^3 in the period up to about 2049. The arisings are largely from legacy waste conditioning and facilities decommissioning at Sellafield. The large peak in arisings between 2049 and 2054 is due to a large increase in annual volumes from decommissioning at Sellafield. The dismantling and final site clearance of AGR stations between 2107 and 2120 gives rise to higher annual volumes over this period.

Low Level Waste

At 1st April 2025 the reported volume of LLW was about 69,900 m^3, of which about 45,600 m^3 (65%) was at Springfields. Most of the other LLW was at Dounreay (15,500 m^3). Most LLW at 1st April 2025 was in temporary storage awaiting recycling if suitable, or disposal to landfill or the LLWR.

Table 6 LLW at 1st April 2025 and all estimated future arisings (Reported volumes, masses, packaged volumes, and package numbers)

		Reported volume (m^3) (1)	Reported mass (tonnes) (1)	Packaged volume (m^3)	No of packages
Stocks at 1.4.2025	Not yet packaged	68,800	60,000	-	-
	Already packaged	1,100	2,030	1,140	56
Future arisings		1,400,000	1,760,000	1,210,000	76,800
Total		**1,470,000**	**1,830,000**	**1,280,000**	**80,800**

(1) Volume and mass "not yet packaged" are for untreated or partly treated waste. Volume and mass "already packaged" are the conditioned volume and corresponding mass e.g. conditioned in a cement-based material.

The forecast future arisings of LLW are about 1,400,000 m^3. About 491,000 m^3 (35%) of all forecast future LLW arisings are from Magnox power station sites (excluding Calder Hall). Much of the other LLW is from Sellafield (361,000 m^3 - including 34,900 m^3 from Calder Hall), Springfields (279,000 m^3), and AGR power stations (106,000 m^3).

Approximately 1,140,000 m^3 (82%) of all forecast future arisings of LLW are from the decommissioning of reactors and other facilities, and from site remediation. Only 255,000 m^3 (18%) are from plant operations; about 133,000 m^3 of which is from Sellafield.

Figure 13 LLW future arisings (Annual reported volumes)

Figure 13 illustrates the pattern of future LLW arisings volumes. Forecast annual arisings decrease from about 29,100 m^3 to about 14,500 m^3 over the period up to 2039. The decrease is the result of a number of factors including:

- Lower volumes of decommissioning and operational waste at Sellafield
- The completion of reactor dismantling and site clearance at Winfrith
- The closure of AGR power stations
- Lower volumes of decommissioning and operational waste at Aldermaston
- Lower volumes of decommissioning waste at Capenhurst.

From 2040 up to 2049, forecast annual arisings are higher as a result of the decommissioning of uranium processing and fabrication facilities at Springfields and reactor dismantling and site clearance at Hunterston A and Dungeness A.

Very Low Level Waste

At 1st April 2025 the reported volume of VLLW was about 1,610 m^3. 1,340 m^3 of this was at Harwell, 130 m^3 was at Capenhurst, and 123 m^3 was at the LLWR. All VLLW was in temporary storage awaiting treatment or disposal.

Table 7 VLLW at 1st April 2025 and all estimated future arisings (Reported volumes, masses, packaged volumes, and package numbers)

		Reported volume (m^3) (1)	Reported mass (tonnes) (1)	Packaged volume (m^3)	No of packages (2)
Stocks at 1.4.2025	Not yet packaged	1,610	1,430	-	-
	Already packaged	0	0	0	-
Future arisings		2,680,000	2,680,000	2,540,000	-
Total		**2,690,000**	**2,690,000**	**2,550,000**	**-**

(1) Volume and mass "not yet packaged" are for untreated or partly treated waste.
(2) As VLLW can be disposed to appropriately permitted landfill sites, no package numbers are collated for this waste category in the inventory.

Figure 14 illustrates the pattern of future VLLW arising volumes. The forecast future arisings of VLLW are about 2,680,000 m^3. About 2,650,000 m^3 (99%) of this volume is attributable to waste from the decommissioning of reprocessing and associated plants, waste storage and treatment plants, and site service facilities at Sellafield. However, there is a large uncertainty about how much of this will be managed as radioactive waste; current expectations are that about 70% of the material, which comprises concrete, brick, and metal from building structures, may be out of scope of regulatory control. As decommissioning projects at the site are progressed and opportunities for further characterisation arise, the projected amounts of radioactive waste will continue to be refined.

Forecast annual arisings of VLLW are on average about 8,500 m^3 in the period up to 2049. Thereafter they increase due to planned decommissioning projects at Sellafield.

Figure 14 *VLLW future arisings (Annual reported volumes)*

Aerial view of Sellafield site

9. Radioactivity in Wastes

Key facts:

- Radioactivity in LLW and VLLW is significantly lower than that in HLW and ILW.
- Total radioactivity at 1st April 2025 (54 million TBq) is mainly in HLW.
- Total radioactivity reduces over time - by 2200 total radioactivity will be more than 35 times lower, in 1,000 years it will be approximately 340 times lower and in 100,000 years it will be approximately 4,200 times lower.

Information on radioactivity is important for managing the safe handling, storage, transport, and disposal of radioactive wastes.

Waste producers report the radioactivity concentration of waste in stocks at the inventory reference date of 1st April 2025 or, for future waste arisings, this is reported at the time that the waste will be generated. Activities (in TBq) given in this section have been derived from reported radioactivity concentrations (in TBq/m^3) and volumes (in m^3) for each waste stream.[15]

The radioactivity of waste generally reduces over time as it undergoes radioactive decay. This means that the total radioactivity of all wastes in the 2025 Inventory will change as new wastes arise and existing wastes decay. Hence, we can only determine the total radioactivity of wastes by selecting reference points in time and calculating the radioactivity at those dates.

Total radioactivity is made up of the sum of the radioactivities of radionuclides (or radioisotopes) present in the wastes. The waste origin determines the types and proportions of radionuclides present (called a ‘fingerprint’). Information on 114 radionuclides relevant to understanding the safety performance of disposal facilities is collected.

In the 2025 Inventory there are about 120 waste streams where radioactivity concentration is not quantified because characterisation work has yet to be completed. These streams have been reviewed, and the overall impact on total radioactivity and individual radionuclide activity estimates will be small. This is because these streams have relatively low volumes and/or are expected to have relatively low radioactivity.

Because radioactivities in wastes can cover a wide range, it is sometimes necessary to use scientific notation in tables of data. For example, 16,000 TBq is expressed as 1.6E+04 TBq and 0.00016 TBq is expressed as 1.6E-04 TBq.

Summed waste stream radioactivities reported in this section are rounded to two significant figures.

9.1. Summary for all wastes

To determine total radioactivity in waste at 1st April 2025, the radioactivities of all relevant waste streams are summed. This is valid, because the radioactivities of waste at 1st April 2025 refer to a particular point in time. For selected future dates, the total radioactivity of accumulated wastes is calculated by taking account of the radioactive decay of each waste stream. The period of

[15] For conditioned waste streams the radioactivity concentration and volume reported are those for the conditioned product.

decay for wastes that existed at 1st April 2025 is from that date, and for waste generated after 1st April 2025 is from the time that the waste is generated.

The radioactivities given in Table 8 are those for all wastes at 1st April 2025, 2050, 2100, and 2200. The values show that most of the activity is in HLW.

Table 8 Total activity of all wastes

Waste category	Total radioactivity (TBq)			
	At 1.4.2025	At 1.4.2050	At 1.4.2100	At 1.4.2200
HLW	50,000,000	25,000,000	8,100,000	1,100,000
ILW	3,600,000	2,000,000	1,100,000	470,000
LLW	29	330	190	110
VLLW	0.10	1.4	8.5	13
Total	**54,000,000**	**27,000,000**	**9,200,000**	**1,500,000**

Although the majority of radioactivity is associated with HLW, this waste category represents a very small volume relative to other categories in the 2025 Inventory. In contrast, very little radioactivity is associated with LLW and VLLW although these waste categories represent most of the waste volume in the 2025 Inventory. Figure 15 below illustrates this relationship between radioactivity and volume for each waste category at 2200.

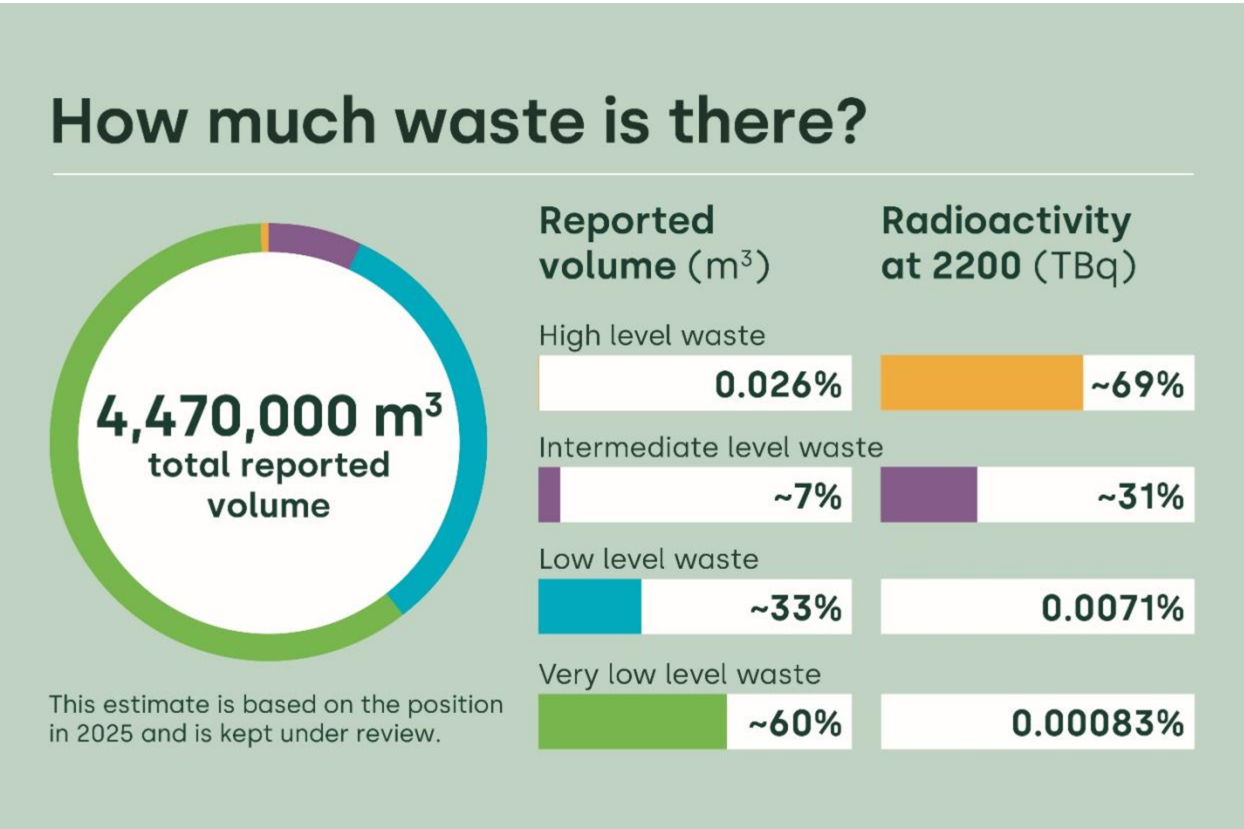


Figure 15 Relationship between the total reported volume and its radioactivity at 1st April 2200

Figure 10 illustrates how the total radioactivities of HLW, ILW, LLW, and VLLW change with time after 1st April 2025.

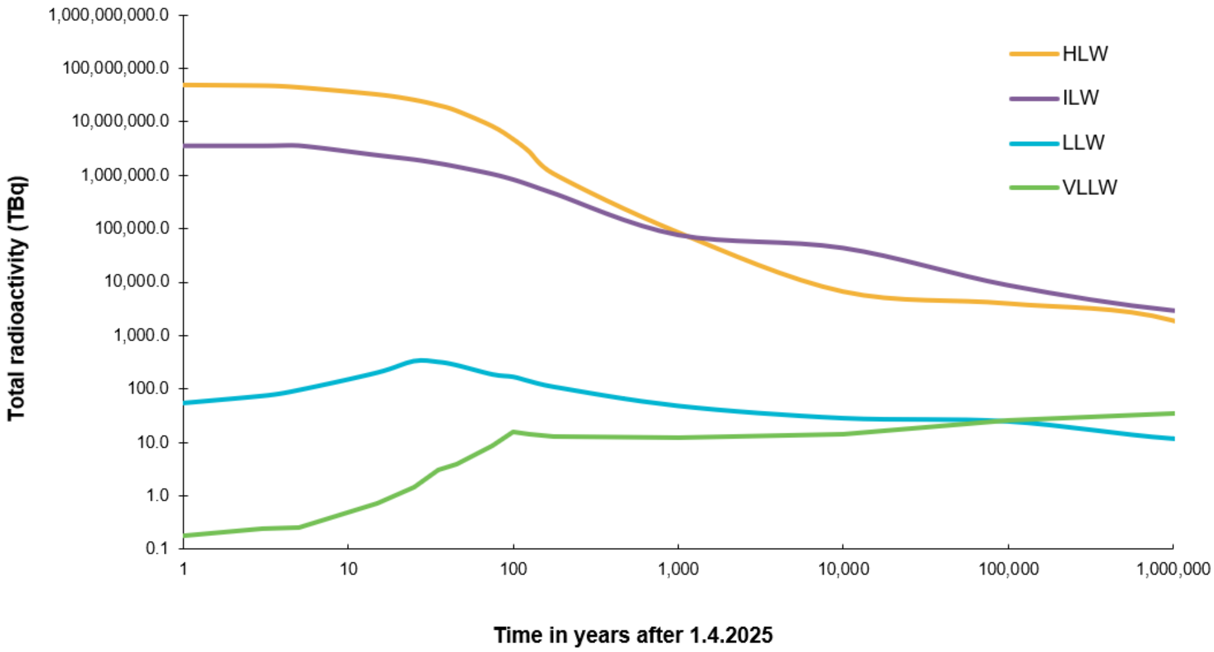


Figure 16 *Total radioactivity of wastes as a function of time post 1st April 2025*

There are a number of aspects to note:

- Total radioactivities of HLW and ILW initially decrease slightly as a result of the reduction in radioactivity from the decay of accumulated arisings. The reduction due to decay is greater than the additional radioactivity in projected future arisings. In contrast total radioactivities of LLW and VLLW increase; this is because stocks at 1st April 2025 are relatively small and projected future arisings over the next 100 years are considerably larger (see Figure 13 and Figure 14)
- Once all projected waste has arisen, total radioactivities fall in a manner that reflects the decay of the major radionuclide species. No HLW is projected to arise after 2037 and there are no further arisings of ILW, LLW, and VLLW beyond 2136. By this time, the final stage decommissioning of existing power reactors, the dismantling of all other nuclear plants, and site clean-up activities are forecast to be complete
- The total radioactivities of HLW and ILW exhibit decreases of many orders of magnitude over time as radionuclide components with shorter half-lives decay
- LLW shows a markedly smaller decrease in radioactivity over time from its peak level than either HLW or ILW. This is because a relatively high proportion of the radioactivity at the time of generation is from uranium, which has a very long half-life
- There is an initial rise in the radioactivity of VLLW because large quantities of waste are generated over the next 100 years. Thereafter the radioactivity of VLLW is dominated by uranium and its daughter products.

9.2. Radioactivity at 1st April 2025

The total radioactivity of all wastes at 1st April 2025 was about 54,000,000 TBq. Figure 17 shows the relative contributions of HLW, ILW, LLW, and VLLW to this total.

Most of the radioactivity was contained in HLW. The total radioactivity in ILW was lower, while the radioactivity contents of LLW and VLLW were comparatively very small. HLW is produced from spent fuel reprocessing at Sellafield.

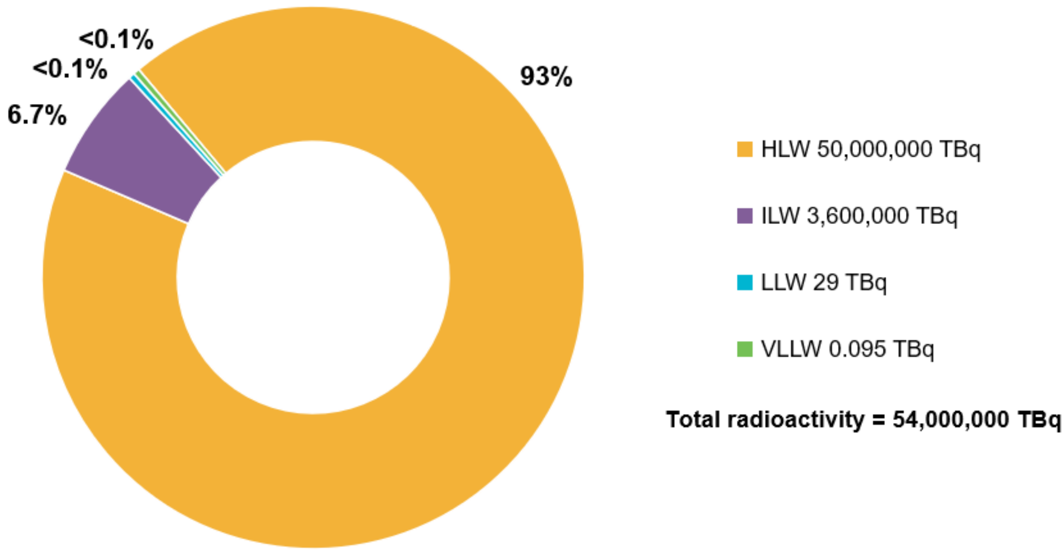


Figure 17 Proportions of radioactivity by waste category at 1st April 2025

Figure 18 illustrates the origin of radioactivity in ILW at 1st April 2025. The major contributor to ILW was from spent fuel reprocessing at Sellafield, where radioactivity is present in fuel cladding and process wastes. The AGR and PWR power stations are the other major source of radioactivity. Most of this radioactivity is generated as activation products in fuel element and reactor core components that have been subjected to neutron irradiation.

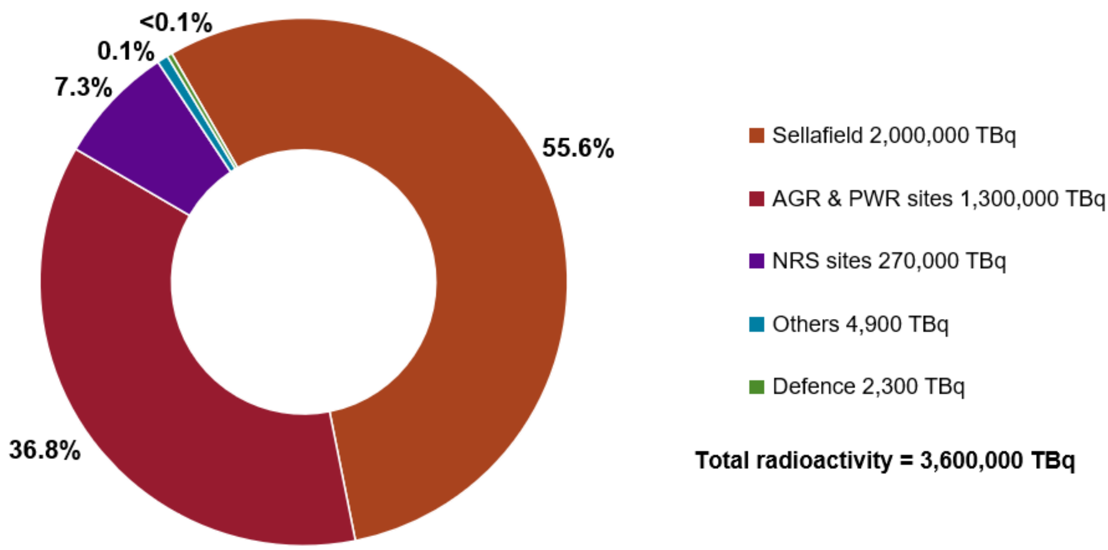


Figure 18 Proportions of radioactivity by waste origin in ILW at 1st April 2025

Most LLW is held in storage on the site of arising for a short period before being consigned to disposal, recycling, or management through metal treatment or incineration routes. VLLW is similarly managed.

10. Waste Composition

Key facts:

- Radioactive wastes arise in a variety of chemical and physical forms.
- HLW is processed into a glass wasteform.
- ILW is ~42% by volume graphite and Plutonium Contaminated Material (PCM).
- LLW is ~69% by volume miscellaneous contaminated materials and concrete & rubble.
- VLLW comprises approximately 90% by volume of concrete & rubble.
- The total mass of all wastes (at 1st April 2025 and all future arisings) is 4,880,000 tonnes.

In the UK, materials with radioactive properties are used for a wide range of purposes, including nuclear power generation and a variety of medical, industrial, and research activities. The radioactive wastes that are produced from these activities take many different forms and have varying physical, chemical, and radiological properties. Waste can range from large solid items that are relatively inert to chemically reactive sludges and liquids. Key contributors to the waste component masses in the UK Inventory are given in Figure 19.

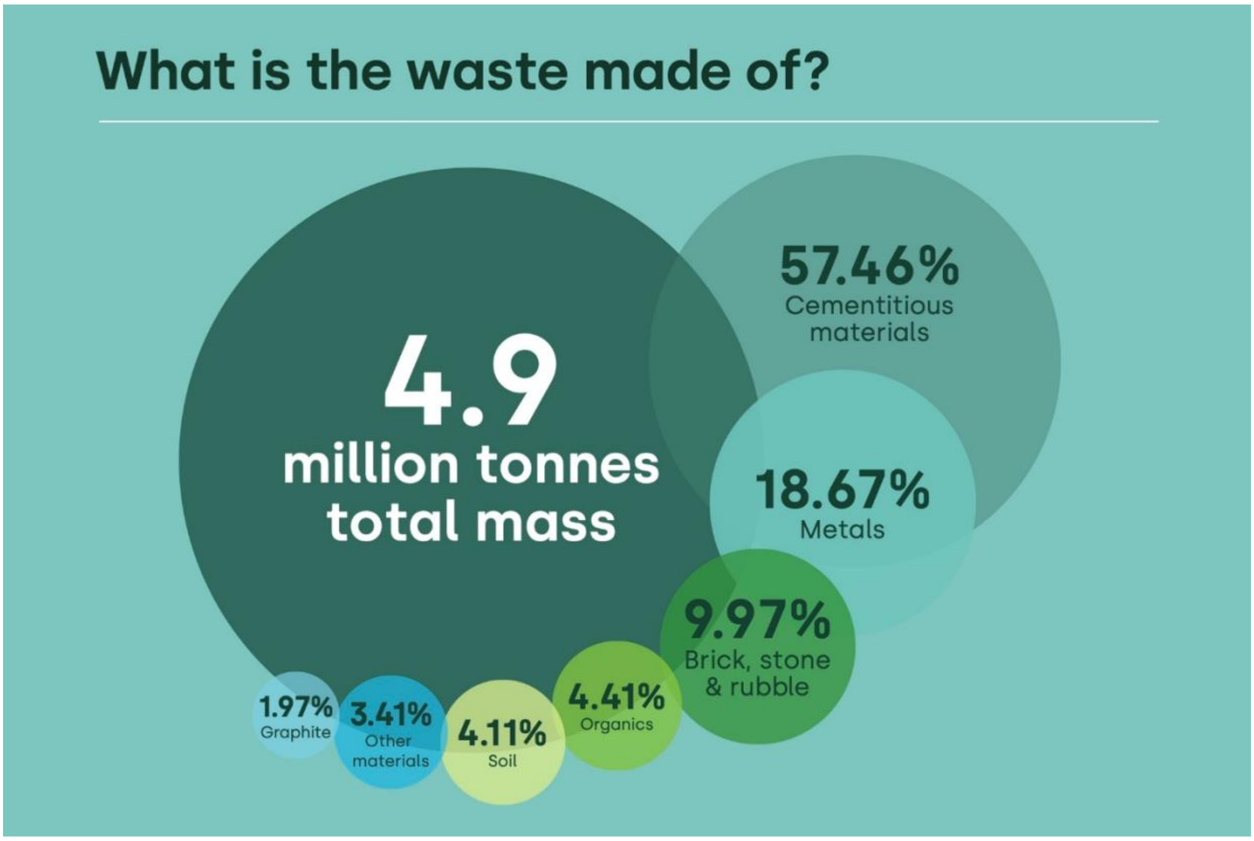


Figure 19 Composition of the UK Inventory

The different forms of waste may need separate management arrangements. This could include particular treatment and packaging solutions appropriate for their properties. The different forms of waste are assigned to 24 individual waste groups. The assignment is done to facilitate an explanation of the different forms that are generated and how these forms are to be processed and stored.

Subsections 10.1-10.3 below describe the composition of ILW, LLW, and VLLW in terms of the volumes of these waste groups. HLW has its own single waste group because it is all vitrified, meaning that it is processed into a glass wasteform.

Section 10.4 gives a separate breakdown of the wastes in terms of their component material masses (metal, organic, and inorganic species).

The mass of conditioned HLW at 1st April 2025 was 2,430 tonnes. A further 1,260 tonnes of liquid waste remained to be conditioned. Once all waste at 1st April 2025 and projected future arisings are conditioned the total mass will be about 2,820 tonnes.

10.1. Intermediate Level Waste

Figure 20 illustrates the waste groups that make up the total reported volume of ILW.

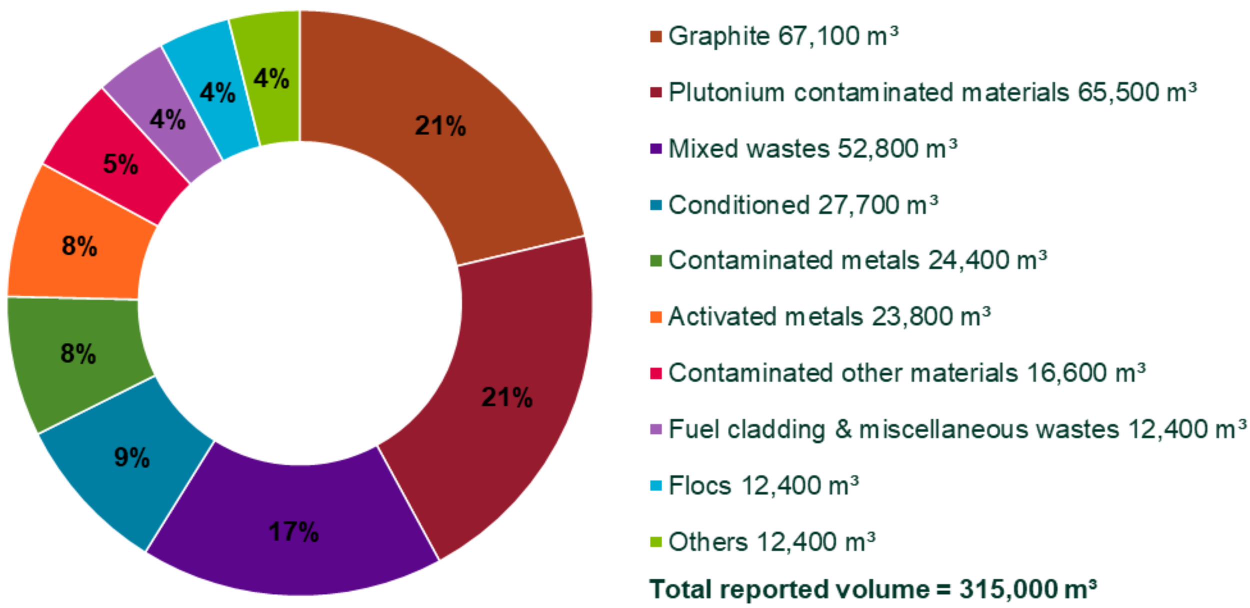


Figure 20 Composition of ILW by waste group

The two largest waste groups – graphite and PCM – account for over 42% of the total ILW reported volume. Most graphite is associated with Magnox and AGR cores and will arise during decommissioning of the reactors. PCM is mainly from spent fuel reprocessing and future facilities decommissioning at Sellafield as well as plutonium plant decommissioning at Aldermaston.

One other waste group, mixed waste, contributes more than 10% of the total ILW reported volume. The majority of the mixed waste is at Sellafield.

10.2. Low Level Waste

Figure 21 illustrates the waste groups that make up the total reported volume of LLW.

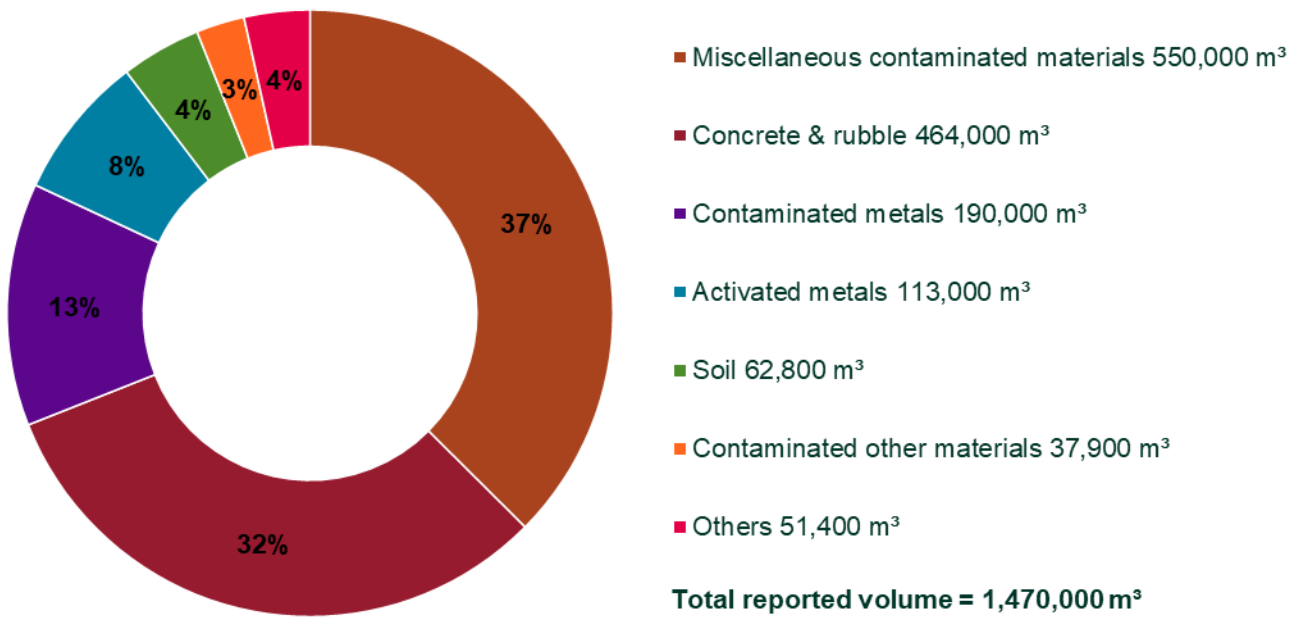


Figure 21 Composition of LLW by waste group

Two waste groups - miscellaneous contaminated materials and concrete & rubble – account for about 69% of the total LLW reported volume. Miscellaneous contaminated materials are mainly from routine operations, demolition, and excavation projects at Sellafield and the decommissioning of uranium processing and fabrication facilities at Springfields. Concrete and rubble arise mostly from the decommissioning of Magnox reactors, while most contaminated metals are from decommissioning and arise across the inventory.

10.3. Very Low Level Waste

Figure 22 illustrates the waste groups that make up the total reported volume of VLLW.

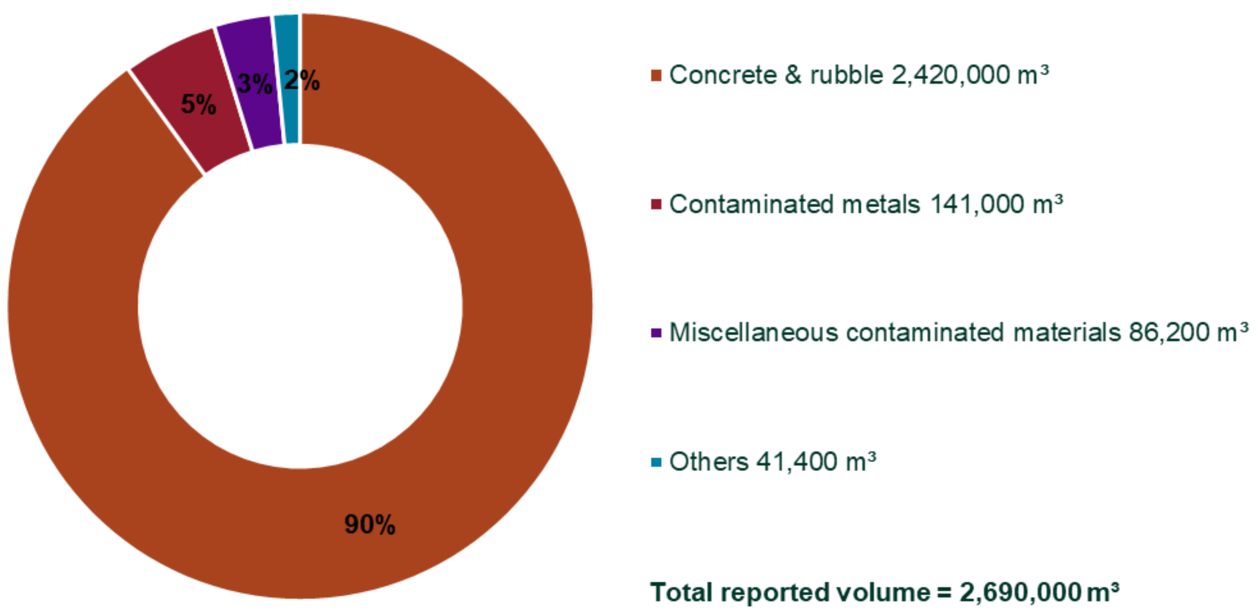


Figure 22 Composition of VLLW by waste group

Almost 90% of VLLW is comprised of concrete & rubble, with smaller quantities of contaminated metals, and miscellaneous contaminated materials. Most VLLW is from the decommissioning of reprocessing and associated plants, waste storage and treatment plants, and site service facilities at Sellafield. Sellafield's best estimate, albeit based on limited decommissioning experience, is that about 70% of this waste may be out of scope of regulatory control.

10.4. Waste component masses

Table 9 gives the total masses of material components in HLW, ILW, LLW, and VLLW. This includes wastes at 1st April 2025 that had already been conditioned as well as future arisings that are reported as conditioned waste.

Table 9 Mass of materials by waste category

Material	Mass (tonnes)			
	HLW	ILW	LLW	VLLW
Metals:				
Stainless steel	-	38,000	140,000	1,500
Other steel	-	81,000	390,000	690
Iron	-	120	45,000	3,700
Magnox/magnesium	-	5,900	210	-
Aluminium	-	1,800	19,000	510
Zircaloy/zirconium	-	1,300	2.1	-
Copper & alloys	-	760	9,200	430
Nickel & alloys	-	96	840	-
Uranium	-	900	830	-
Other metals	-	2,100	36,000	140,000
Organics:				
Cellulosics	-	1,400	46,000	41,000
Plastics	-	7,100	53,000	660
Rubbers	-	2,000	16,000	180
Ion exchange resins	-	940	990	-
Hydrocarbons	-	220	7,100	21
Other organics	-	170	24,000	14,000
Inorganics:				
Asbestos	-	630	25,000	28,000
Cementitious materials	-	62,000	750,000	2,000,000
Graphite	-	80,000	16,000	-
Sand, glass & ceramics	2,600	1,100	11,000	13

Material	Mass (tonnes)			
	HLW	**ILW**	**LLW**	**VLLW**
Ion exchange materials	-	4,600	18	-
Brick, stone & rubble	-	27,000	43,000	420,000
Sludges, flocculants & liquids	180	33,000	12,000	28
Other inorganics	-	830	300	26,000
Soil	-	42	170,000	27,000
Unspecified materials (1)	-	9,300	11,000	140
TOTAL	**2,800**	**360,000**	**1,800,000**	**2,700,000**

(1) Includes wastes for which no material breakdown or only a partial breakdown is reported.

The breakdown includes only the major contributors to radioactive waste mass; there are many other minor components present in the wastes. For waste streams where characterisation data are uncertain, waste producers may have reported no material composition or only a partial composition. The unspecified materials mass is shown in the table.

11. Uncertainty in the Inventory

Key facts:

- The greatest uncertainties sit with future waste arisings where future strategies have not yet been confirmed. Currently a small number of waste streams make a large contribution to uncertainty in volumes and radioactivities. These can be targeted as priorities for data improvement.
- Uncertainties will reduce in the future as decommissioning experience feeds into improved inventory estimates and waste is packaged for long-term management. Effective characterisation will drive lower uncertainties of radioactivity levels.
- The size of nuclear new build will impact on future inventories.

There are a number of reasons why there is uncertainty in UK Inventory data:

- Much waste is in situ (e.g. activated reactor structures) and hasn't been fully characterised
- Waste producers' plans for their future activities, including plant operating lifetimes, can change
- Waste management strategy can change
- New waste treatment solutions and packaging technologies may be developed.

There is the highest level of confidence in the volumes, material composition, and activity of waste streams that have already been packaged for long-term management because they have been well characterised. The greatest uncertainties rest with future arisings of waste. This uncertainty is particularly from facilities decommissioning and site clean-up where past operational experience is less relevant and future strategies may not yet be confirmed. As decommissioning projects progress through initial scoping studies, detailed planning and then implementation, and as land contamination surveys are extended and refined, waste volumes can be estimated with greater certainty.

Legacy waste streams generated many years ago may lack detailed contemporary records. As these waste streams are retrieved from storage and characterised, the uncertainties on the amounts and compositions are greatly reduced.

Consequently, waste estimates can change from one inventory to the next (Section 13 provides a comparison of the 2025 Inventory with the previous 2022 Inventory). Furthermore, NWS maintains an inventory Data Improvement Plan for each waste producer to support a programme of continual UK Inventory improvement.

11.1. Volumes

The 2025 Inventory includes information on the confidence levels in reported waste stream volumes. Where lower and upper uncertainties[16] on the reported best estimate volumes can be quantified, waste producers have provided appropriate factors. These data have been used to calculate lower and upper waste volume estimates for each waste category (see Table 10).

[16] It should be noted that summing uncertainties may not provide a representative total uncertainty. Boundary wastes can cause uncertainty in more than one waste stream therefore summing results in double counting.

Table 10 Estimated uncertainties in reported volumes for each waste category (1)

Waste category	Best estimate (m^3)	Lower estimate (m^3)	Upper estimate (m^3)
HLW	1,150	470	1,680
ILW	315,000	229,000	490,000
LLW	1,470,000	1,040,000	2,470,000
VLLW	2,690,000	944,000	3,910,000
Total	**4,470,000**	**2,210,000**	**6,880,000**

(1) The 2025 Inventory includes numerical lower and upper volume uncertainty factors on the best estimate volumes for waste streams covering more than 99% of the total reported waste volume.

For HLW, the calculated lower volume estimate is 677 m^3 (59%) less than the best estimate volume. The calculated upper volume estimate is 538 m^3 (47%) more than the best estimate volume.

For ILW, the calculated lower volume estimate is 86,000 m^3 (27%) less than the best estimate volume. The calculated upper volume estimate is 175,000 m^3 (55%) more than the best estimate volume.

A large percentage of the uncertainties in the ILW volume can be attributed to a small number of waste streams. The major contributors are shown in Figure 23. (A list of waste streams is given in the 2025 UK Radioactive Waste Detailed Data report). They comprise:

- Operational PCM arisings and plant decommissioning wastes at Sellafield (2D streams)
- Operational PCM arisings and plutonium plant decommissioning waste at AWE Aldermaston (7A streams).

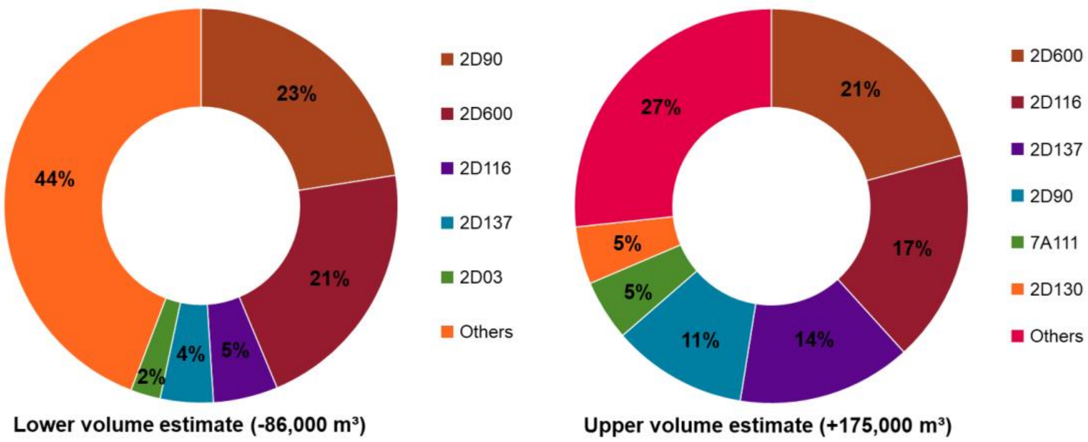


Figure 23 Waste stream percentage contribution to the change in reported best estimate volume associated with lower and upper volume uncertainty for ILW

For LLW, the calculated lower volume estimate is 432,000 m^3 (29%) less than the best estimate volume. The calculated upper volume estimate is 1,010,000 m^3 (68%) more than the best estimate volume.

A large percentage of the uncertainties in the LLW volume can be attributed to a small number of waste streams. The major contributors are shown in Figure 24. They include:

- Plant decommissioning wastes and miscellaneous wastes contaminated by aerial discharges at Sellafield (2D and 2X streams)
- General waste and decommissioning waste at Springfields (2E)
- Radioactive contaminated land at AWE Aldermaston (7A)
- Concrete decommissioning waste at Calder Hall (2A).

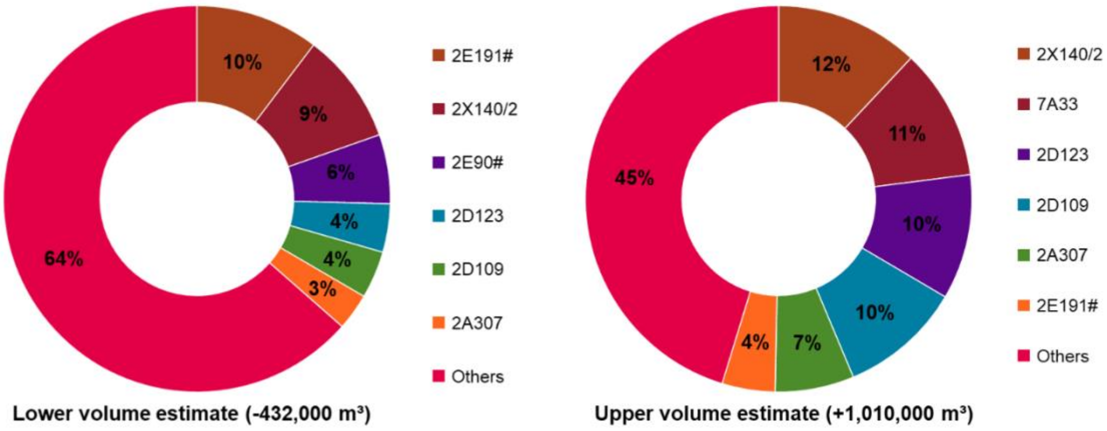


Figure 24 Waste stream percentage contribution to the change in reported best estimate volume associated with lower and upper volume uncertainty for LLW

Most VLLW reported in the Inventory is generated from future decommissioning projects at Sellafield. The best estimate of Sellafield VLLW volume is 2,650,000 m^3, but there is a large uncertainty in the potential arisings. Improved inventory assessments have refined the likely lower and upper bounds to be 1,000,000 m^3 and 4,000,000 m^3. Also, Sellafield has stated its current best estimate volume, based on limited decommissioning experience, is that approximately 70% of the waste may be out of scope of regulatory control.

Strategies for site end states can differ; hence some sites might generate much more VLLW from land remediation work than others.

Radioactive land contamination and radioactively contaminated subsurface structures at certain sites have not been included in the Radioactive Waste Inventory where clean-up plans have not been confirmed and there is significant uncertainty over the management route and waste quantities. Volume estimates can be found in the 2025 UK Material Inventory report. As land contamination surveys are extended and refined, and there is more certainty on management routes, waste volumes can be determined with increasing confidence.

11.2. Radioactivities

The 2025 Inventory includes information on the confidence levels in waste stream radioactivities and radionuclide concentrations. These data have been used to calculate lower and upper waste radioactivity estimates at the stock date of 1st April 2025. They have also been used to calculate decayed radioactivities at 2200 for each waste category (see Table 11).

Table 11 *Estimated uncertainties in total radioactivity for each waste category*

Waste category	At 1.4.2025 (TBq)			At 1.4.2200 (TBq)		
	Best estimate	Lower estimate	Upper estimate	Best estimate	Lower estimate	Upper estimate
HLW	50,000,000	42,000,000	63,000,000	1,100,000	710,000	1,700,000
ILW	3,600,000	1,400,000	20,000,000	470,000	110,000	3,200,000
LLW	29	10	230	110	15	950
VLLW	0.10	0.04	0.53	13	0.15	130
Total	**54,000,000**	**43,000,000**	**84,000,000**	**1,500,000**	**820,000**	**4,900,000**

The uncertainties on radioactivity are greater than those on volume because there are greater uncertainties associated with the sampling, measurement, and calculation processes.

The uncertainties in the HLW radioactivity are relatively small, as HAL and the vitrified product are well characterised.

For ILW, the calculated lower radioactivity estimate at 2200 is 360,000 TBq (76%) less than the best estimate radioactivity. The difference between the upper radioactivity estimate and the best estimate radioactivity is over 2,700,000 TBq (580%).

A large percentage of the uncertainties in the ILW radioactivity can be attributed to a small number of waste streams. The major contributors are shown in Figure 25. They are fuel cladding wastes at Sellafield (2D and 2F streams), AGR activated components and fuel component debris (3K, 3L 3N), and decommissioning stainless steel at Trawsfynydd. The radioactivities of the AGR streams are based on theoretical estimates and have associated lower and upper uncertainty factors of 0.1 and 10.

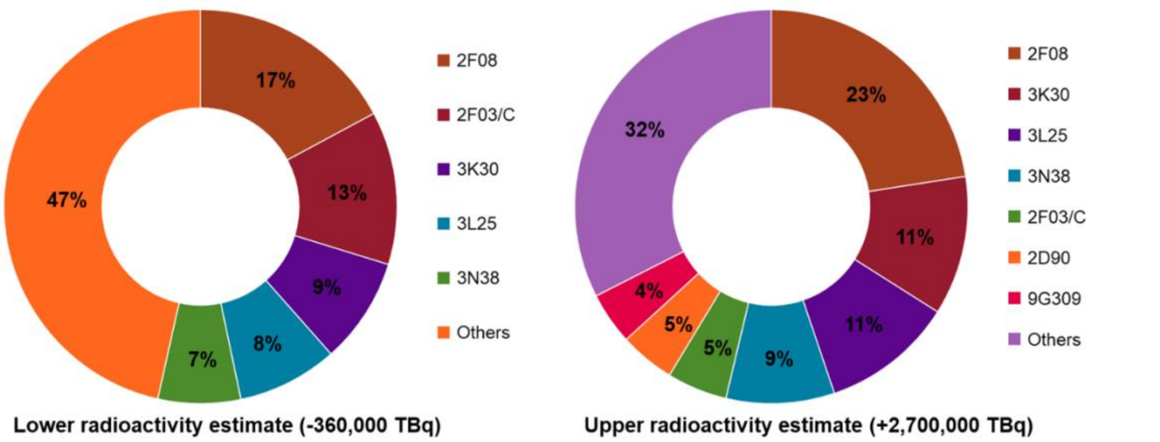


Figure 25 *Waste stream percentage contribution to the difference in reported best estimate activity associated with lower and upper activity uncertainty for ILW at 2200*

The radioactivities of LLW and VLLW are small in comparison to HLW and ILW. Uncertainties are relatively high because the majority of radioactivity is from plant decommissioning wastes, but their impact on total radioactivity in the 2025 Inventory is negligible.

For LLW the calculated lower radioactivity estimate at 2200 is 94 TBq (86%) less than the best estimate radioactivity. The difference between the upper radioactivity estimate and the best estimate radioactivity is about 850 TBq (780%).

About a third of the uncertainties in LLW radioactivity can be attributed to a small number of waste streams, as illustrated in Figure 26. They are mostly made up of decommissioning wastes from the Sizewell B PWR (3S streams) and Magnox power stations (2A, 9D, 9E, 9F, and 9G streams) and Harwell decommissioning wastes (5C streams).

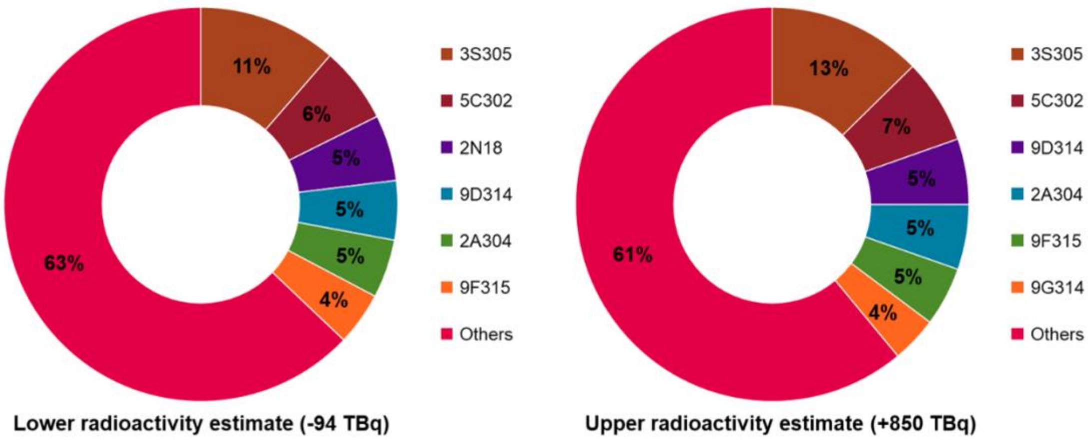


Figure 26 Waste stream percentage contribution to the difference in reported best estimate activity associated with lower and upper activity uncertainty for LLW at 2200

Uncertainties in VLLW radioactivity are dominated by waste arisings from future decommissioning projects at Sellafield, where lower and upper uncertainty factors are 0.1 and 100.

12. Waste Disposals

Key facts:

- Annual disposals are at historical lows at the LLWR with other disposal routes such as disposal to landfill continuing to be utilised.
- Disposals are being made to the Dounreay LLW facility from decommissioning at the site.

The UK Inventory compiles data on waste producers' waste disposal plans. Disposal routes for HLW, ILW, LLW, and VLLW in the 2025 Inventory are illustrated in Figure 27. All HLW and the majority of ILW will be disposed to a GDF. Small fractions of ILW are to be managed using NWS's waste services framework for metal treatment, incineration or disposal at the LLWR where it is appropriate to do so. A small proportion of ILW is declared as being routed to landfill, this ILW is all subject to decay and segregation from higher activity waste to appropriate levels.

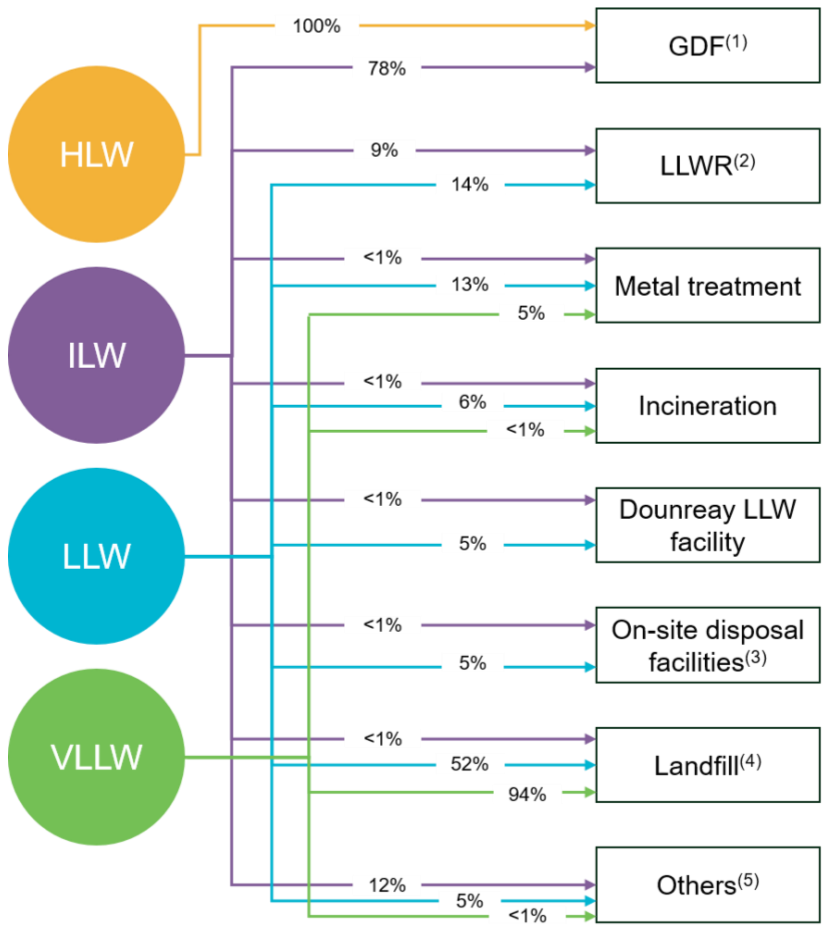


Figure 27 Projected disposal routes for radioactive wastes in the 2025 Inventory (% of reported volumes)

(1) The Scottish Government policy is that long-term management of HLW and ILW should be in near-surface facilities (included in GDF category for plot).
(2) All ILW (at the time of its arising) projected for disposal to the LLWR will have decayed to LLW by the time of its disposal.
(3) On-site disposal facilities comprise the CLESA facility at Sellafield.

(4) A small proportion of ILW is declared as being routed to landfill, this ILW is all subject to decay and/or segregation from higher activity waste to appropriate levels.
(5) 'Others' comprises recycling/reuse, material expected to be 'out of scope' once recharacterised, and wastes where no disposal route is given in the 2025 Inventory.

There is greater certainty in how LLW and VLLW will be managed in the near term.

Figure 28 shows the disposal routes for LLW forecast to arise over the next six years (2025-2030 inclusive). Only about 7% of the reported volume is expected to be disposed of at the LLWR. All other LLW is expected to be disposed of at the Dounreay LLW facility or alternative disposal and treatment routes such as appropriately permitted landfill sites, or metal treatment or incineration. Almost all VLLW in this period is expected to be disposed of at appropriately permitted landfill sites or sent for metal treatment.

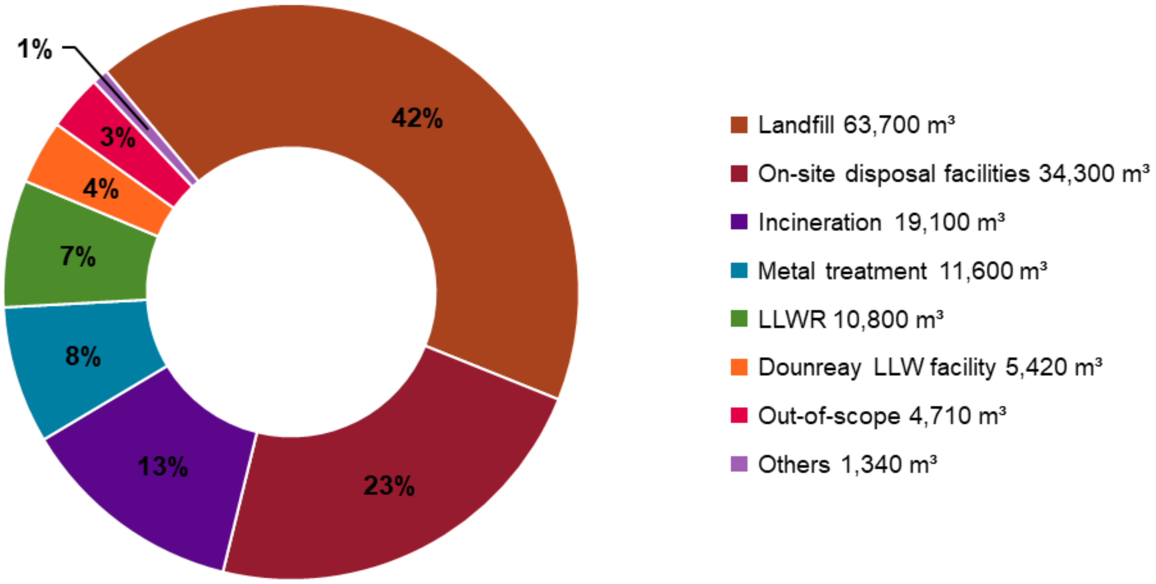


Figure 28 Projected routing of LLW arising in the period 2025-2030

Table 12 provides an analysis of projected disposal routes for LLW and VLLW in the 2025 Inventory, comprising stocks at 1st April 2025 and all forecast future arisings. The arisings are projected far into the future and so have higher uncertainties associated with them than the nearer term arisings. The table shows that about half of all LLW by volume is expected to be disposed of at off-site landfill facilities, with ~15% expected to be disposed of at the LLWR. There is uncertainty in the management routes for future wastes with further information of the waste expected to be collected during waste processing to inform the management route.

Most VLLW is consigned for disposal at suitably authorised and permitted landfill sites. Smaller amounts are disposed at on-site landfill facilities or sent for metal treatment or incineration.

Table 12 Projected routing of LLW and VLLW - wastes at 1st April 2025 and estimated for future arisings

Expected waste route	LLW		VLLW	
	Reported volume (m^3)	Reported volume (%)	Reported volume (m^3)	Reported volume (%)
LLWR	210,000	14.3	0	0
Off-site landfill facilities	757,000	51.6	2,540,000	94.5
On-site disposal facilities (1)	76,200	5.2	0	0
Dounreay LLW facility	72,500	4.9	0	0
Metal treatment	187,000	12.7	140,000	5.2
Incineration	94,600	6.4	633	0.02
Recycled/reused	13,900	0.9	21.3	0.0008
Out-of-scope (2)	44,100	3.0	531	0.02
Unconfirmed	13,100	0.9	6,660	0.2
Total	**1,470,000**	**100**	**2,690,000**	**100**

(1) Comprises the CLESA facility at Sellafield.
(2) Following treatment or characterisation, waste is expected to contain activity below regulatory levels.

Consignments to the LLWR over the past sixteen years have totalled about 44,500 m^3 (see Table 13). Annual consignment volumes have reduced, driven primarily by application of the waste hierarchy, and by use of alternative treatment and disposal routes.

Table 13 Consignments to the LLWR 2009 to present

Year (1)	Total volume (m^3) (2)	Year (1)	Total volume (m^3) (2)
2009	6,190	2017	1,810
2010	5,700	2018	1,720
2011	6,070	2019	693
2012	5,000	2020	436
2013	4,170	2021	533
2014	3,650	2022	1,042

Year (1)	Total volume (m^3) (2)	Year (1)	Total volume (m^3) (2)
2015	3,320	2023	624
2016	3,350	2024	218

(1) For period 1st April to 31st March.
(2) Volume is for waste and its primary containment and represents volumes of waste received with the intent for disposal.

Consignments to the Dounreay LLW facility started in 2015. Total disposals to date are given in Table 14.

Table 14 Consignments to Dounreay LLW facility 2015 to present

Year (1)	Total volume (m^3) (2)
2015	2,050
2016	1,900
2017	643
2018	0
2019	375
2020	195
2021	0
2022	137
2023	19.5
2024	156
2025(3)	156

(1) For period 1st January to 31st December.
(2) Volume is for packaged waste.
(3) Up to 31st March 2025.

Table 15 gives a projection of total waste consignments to the LLWR and Dounreay disposal vaults over the next few years. The values are reported volumes for waste streams that are identified in the 2025 Inventory as expected to be consigned to the LLWR or for disposal at Dounreay.

Table 15 Projected future consignments to disposal facilities

Year (1)	Total reported volume (m^3) (2)	
	LLWR	Dounreay LLW facility (3)
2025	1,910	1,060
2026	1,740	940
2027	1,780	772

(1) For period 1st April to 31st March.
(2) Volume is the reported volume and reflects volume of the waste currently (prior to containerisation).
(3) Provisional volumes.

13. Comparison with the 2022 Inventory

Key facts:

- A number of waste streams show changes in volume as inventories have been updated.
- Package numbers in stock have increased as progress continues in conditioning HLW and ILW for long-term management.

This section summarises the changes in the 2025 Inventory compared with the previous 2022 Inventory.

Information about radioactive wastes may change from one inventory to the next due to a range of technical, commercial or policy reasons:

- **Understanding of the waste streams has improved.** Some radioactive waste streams generated many years ago lack detailed contemporary records. As these waste streams (often referred to as legacy wastes) are characterised a better understanding of amounts and compositions are gained.
- **The waste stream category has changed.** Opportunities may arise to optimise the waste lifecycle where waste streams are close to the boundary between categories. For example, decay storage or decontamination of ILW to LLW or of LLW to VLLW.
- **The strategy for managing wastes has been updated.** This may be due to more sustainable and cost-effective techniques being used such as new treatment, packaging, and disposal options.
- **Operational activities have affected the volume of waste.** Volumes of waste recorded may change as waste continues to be generated, treated, conditioned, and packaged.
- **Forecasts of future volumes have been updated.** Waste arisings are projected over many decades. Because of this, there will be inevitable changes in future estimates and updated assumptions underpinning the forecasts and plant operating lifetimes.

13.1. Reported volumes

Stocks

Table 16 gives the changes in the reported volumes of waste stocks compared with the 2022 Inventory.

Table 16 Changes in stocks reported volume between the 2025 and 2022 Inventories

Waste category	Reported volume (m^3)		Change	
	2022 Inventory	2025 Inventory	(m^3)	(%)
HLW	1,990	1,960	-29.1	-1.5
ILW	102,000	100,000	-1,490	-1.5
LLW	32,100	69,900	+37,800	+118
VLLW	1,490	1,610	+120	+8.0
Total	**137,000**	**174,000**	**+36,400**	**+26.5**

The principal reasons for changes are:

- For HLW, decreases in liquid waste from fuel reprocessing and a reassessment of the volume of conditioned waste from vitrification.
- For ILW, a decrease due to the reassessment of the volume of aluminium ferric floc from effluent treatment at Sellafield.
- For LLW, an increase at Springfields as disposal of waste in the year of generation has not been assumed as for previous Inventories.
- For VLLW, the increase is from building decommissioning and land remediation at Harwell.

Total

Table 17 gives the changes in total projected reported volumes compared with the 2022 Inventory.

Table 17 Changes in total reported volume between the 2025 and 2022 Inventories

Waste category	Reported volume (m^3)		Change	
	2022 Inventory	2025 Inventory	(m^3)	(%)
HLW	1,670	1,150	-528	-31.5
ILW	249,000	315,000	+65,800	+26.4
LLW	1,580,000	1,470,000	-114,000	-7.2
VLLW	2,750,000	2,690,000	-62,800	-2.3
Total	**4,580,000**	**4,470,000**	**-111,000**	**-2.4**

The principal reasons for changes are:

- For HLW, revised estimates of arisings from reprocessing operations and transfers to the Waste Vitrification Plant for final vitrification.
- For ILW, increase due to the inclusion of future arisings of floc storage tank decommissioning wastes at Sellafield for the first time and revision of future arisings for wastes generated (PCM drums) from routine plant operations and current decommissioning projects at Sellafield.
- For LLW, a decrease due to a revised forecast for waste generated from authorised site aerial discharges at Sellafield.
- For VLLW, a decrease due to the reassignment of waste from VLLW to LLW for excavated spoil from construction at Sellafield and reduced future arisings of contaminated land wastes from Capenhurst.

13.2. Packaged volumes and package numbers

Most wastes in stock at 1st April 2025 are in an untreated or partly treated state. However, increasing amounts of legacy wastes are being retrieved from stores and packaged for long-term management. Progress in the packaging of wastes is indicated by the accumulation in the number of waste packages over time, illustrated in Table 18.

Table 18 Numbers of waste packages accumulated (1)

Date	HLW	ILW	LLW (2)	Total
At 1.4.2001	2,281	21,654	23	**23,958**
At 1.4.2004	3,037	31,557	123	**34,717**
At 1.4.2007	4,319	40,797	8,527	**53,643**
At 1.4.2010	5,108	47,662	1,288	**54,058**
At 1.4.2013	5,626	55,326	2,549	**63,501**
At 1.4.2016	5,781	60,407	648	**66,836**

Date	HLW	ILW	LLW [2]	Total
At 1.4.2019	6,101	67,307	1,324	**75,694**
At 1.4.2022	6,191	69,894	1,260	**77,345**
At 1.4.2025[3]	6,114	71,958	56	**78,128**

(1) The table gives the numbers of packages accumulated at various Inventory reference dates. As VLLW can be disposed to appropriately permitted landfill sites, no package numbers are collated for this waste category in the inventory.

(2) LLW package numbers exclude those in short-term storage before consignment for disposal. Packages at 1.4.2007, 1.4.2010, and 1.4.2013 include those held in vaults at the LLWR and which were not classed as disposed under existing environmental permits. Most of the packages reported at 1.4.2007 were subsequently classed as disposed.

(3) At 1.4.2025 HLW packages were at Sellafield, ILW packages were at Sellafield, Dounreay, Harwell, Berkeley, Bradwell, Chapelcross, Dungeness A, Oldbury, Trawsfynydd, Wylfa, Sizewell B, and Hunterston A, and LLW packages were mostly at Dounreay.

Table 19 gives the changes in total projected packaged volumes compared with the 2022 Inventory.

Table 19 Changes in total packaged volume between the 2025 and 2022 Inventories

Waste category	Packaged volume (m^3)		Change	
	2022 Inventory	2025 Inventory	(m^3)	(%)
HLW	1,470	1,340	-134	-9.1
ILW	496,000	618,000	+122,000	+25.0
LLW	1,340,000	1,280,000	-67,200	-5.0
VLLW	2,610,000	2,550,000	-66,000	-2.5
Total	**4,450,000**	**4,440,000**	**-10,800**	**-0.2**

The principal reasons for changes are:

- For HLW, there has been a decrease in the volume of liquid waste (2D02 High Level Liquid Waste) because it has been transferred to Waste Vitrification Plants for vitrification.
- For ILW, an increase at Sellafield is due to updated packaging data for a number of waste streams.
- For LLW, a decrease due to the reassessment of waste generated as a result of authorised site aerial discharges at Sellafield.
- For VLLW, a decrease due to reassignment of the waste category for excavated spoil from construction from VLLW to LLW and contaminated land wastes at Capenhurst no longer included in the UK Inventory.

Table 20 gives the changes in the total projected numbers of packages compared with the 2022 Inventory.

Table 20 Changes in total number of packages between the 2025 and 2022 Inventories

Waste category	Number of packages		Change	
	2022 Inventory	2025 Inventory	Packages	(%)
HLW	7,520	6,830	-685	-9.1
ILW	282,000	341,000	+58,900	+21.0
LLW	19,900	80,800	+60,800	+305
VLLW (1)	-	-	-	-
Total	**310,000**	**429,000**	**+119,000**	**+38.0**

(1) As VLLW can be disposed to appropriately permitted landfill sites, no package numbers are collated for this waste category in the inventory.

For LLW, the increase in package numbers as opposed to the decrease in packaged volume is due to the inclusion of additional LLW package types. For example, 1 tonne flexible intermediate bulk container bags for demolition wastes at Dounreay (~ 45,800 packages) are included within the total.

13.3. Radioactivities

Table 21 gives the changes in total radioactivities at 1st April 2200 compared with the 2022 Inventory.

Table 21 Changes in radioactivity between the 2025 and 2022 Inventories

Waste category	Total radioactivity at 2200 (TBq)		Change	
	2022 Inventory	2025 Inventory	(TBq)	(%)
HLW	1,900,000	1,100,000	-840,000	-44.3
ILW	430,000	470,000	+39,000	+9.0
LLW	81	110	+28	+34.2
VLLW	14	13	-1.1	-8.2
Total	**2,300,000**	**1,500,000**	**-800,000**	**-34.5**

The principal reasons for changes are:

- For HLW, the decrease in radioactivity due to revised estimates of arisings from reprocessing operations and a reassessment of specific activities.
- For ILW and LLW, the change in radioactivities is largely the result of a reassessment of specific activities.

14. Wastes from Overseas Materials

Key facts:

- Waste from reprocessing overseas spent fuel is returned to the country of origin.
- About 1,780 canisters of vitrified HLW and smaller quantities of other wastes will be exported.

A proportion of the waste from the THORP and Magnox reprocessing plants at Sellafield results from reprocessing overseas spent fuel. All reprocessing contracts with overseas customers signed since 1976 include a provision to return packaged wastes or their equivalent (by internationally agreed substitution arrangements) back to the country of origin.

Government policy is that wastes resulting from the reprocessing of overseas spent fuel should be returned to the country of origin. This policy also means that HLW should be returned as soon as practicable after vitrification. The policy allows “waste substitution” arrangements that ensure broad environmental neutrality for the UK. Waste substitution is the process whereby an additional amount of HLW from reprocessing would be returned, which is smaller in volume but equivalent in radiological terms to customers’ ILW and LLW from reprocessing that would otherwise be returned.

Exports of vitrified HLW started in January 2010 and are planned to be completed by around 2031. In total about 130 m^3 vitrified HLW are planned for export.[17]

Future arisings of HLW reported in the inventory are net of exports to overseas reprocessing customers, so that the total volume/number of containers reported represents only the HLW that is a UK liability.

During the 1990s materials test reactor fuel was reprocessed at Dounreay for customers in Belgium, Germany, the Netherlands, and Australia. The contracts and regulatory authorisations required that the radioactive wastes produced be returned to the countries of origin within 25 years of reprocessing. The contracts are backed by inter-governmental letters. A total of 123 containers of cemented waste were returned to Belgium between 2012 and 2014. In 2012 the Scottish and UK governments agreed in principle to allow waste substitution, with such arrangements currently being at various stages of implementation.

[17] Nuclear Decommissioning Authority, Mission Progress Report, 2024/25

Glossary

	~	About.
A	**AGR**	Advanced Gas-cooled Reactor.
	ALARP	As Low As Reasonably Practicable.
	AWE	The Atomic Weapons Establishment develops nuclear warheads for the UK's deterrent at Aldermaston and Burghfield in Berkshire.
B	**BAT**	Best Available Techniques.
	Becquerel (Bq)	The standard international unit of measurement of radioactivity – corresponding to one disintegration per second (see also kBq, MBq, GBq, and TBq).
	Beta/gamma activity	Radioactivity associated with the emission of beta particles and/or gamma radiation.
	BPM	Best Practicable Means.
C	**CCFE**	Culham Centre for Fusion Energy.
	CLESA	Calder Landfill Extension Segregated Area.
	C&M	Care and Maintenance.
	Conditioned volume	The volume of waste after conditioning, consisting of the waste material and encapsulating matrix.
	Conditioned waste	Radioactive waste that has undergone conditioning.
	Conditioning	The process used to prepare waste for long-term storage and/or disposal by converting it into a solid and stable form. The conditioning material may be cement, glass or polymer.
	Controlled burial	The authorised disposal of some LLW, arising principally in the non-nuclear sector, at suitable landfill sites that possess good containment characteristics.
D	**Decommissioning waste**	Wastes arising after shutdown of a facility associated with the use or handling of radioactive materials. They can consist of plant or equipment, building debris, and material from the clean-up of surrounding ground.
	DESNZ	The Department for Energy Security and Net Zero replaced BEIS in 2023. It is responsible for energy policy, energy security, and emissions reduction to achieve net zero.
	Disposal	The emplacement of waste in a suitable facility without intent to retrieve it.
E	**Enriched uranium**	Uranium where the U235 isotope content is above the naturally occurring 0.711% by mass..
	Enrichment	The process of increasing the abundance of fissionable atoms in natural uranium.

	ENRMF	East Northants Resource Management Facility.
F	**FED**	Fuel Element Debris.
	Fission	Spontaneous or induced fragmentation of heavy atoms into two (occasionally three) lighter atoms, accompanied by the release of neutrons and radiation.
	Fission products	Atoms, often radioactive, resulting from nuclear fission.
	Flocculant	A product of flocculation, a process of coagulation by the use of reagents.
	Fuel cladding	The metal casing around the fuel.
	Fusion	A nuclear reaction in which atomic nuclei of low atomic number fuse to form a heavier nucleus with the release of energy.
G	**GE Healthcare Ltd**	A company that provides products and services for use in healthcare and life science research. This includes radioisotopes for medical and research users.
	GDF	Geological Disposal Facility. Deep underground facility for the disposal of the UK's most hazardous radioactive waste.
	GBq	Gigabecquerel (equal to 1,000,000,000 Becquerels).
	Government	A collective term for the central government bodies responsible for setting radioactive waste management policy within the UK. It comprises the UK Government, the Scottish Government, and the devolved administrations of Wales and Northern Ireland.
H	**HAL**	Highly Active Liquor.
	HLW	High Level Waste.
	HVVLLW	High Volume Very Low Level Waste.
I	**ILW**	Intermediate Level Waste.
	ISO	International Organisation for Standardisation.
	IWMP	Integrated Waste Management Programme
J	**JET**	Joint European Torus - the internationally funded fusion project sited at Culham.
K	**kBq**	Kilobecquerel (equal to 1,000 Becquerels).
L	**LLW**	Low Level Waste.
	LLWR	Low Level Waste Repository. The LLWR in Cumbria has operated as a national disposal facility for LLW since 1959.
M	**Magnox**	An alloy of magnesium used for fuel element cladding in natural uranium fuelled gas-cooled power reactors, and a generic name for this type of reactor.
	MAST	Mega Amp Spherical Tokamak - fusion project sited at Culham.

	MBGWS	Miscellaneous Beta Gamma Waste Store (at Sellafield).
	MBq	Megabecquerel (equal to 1,000,000 Becquerels).
	MOD	Ministry of Defence.
N	**NDA**	Nuclear Decommissioning Authority. A non-departmental public body responsible for overseeing the decommissioning and cleanup of 17 of the UK's civil public sector nuclear sites.
	NNB GenCo	NNB Generation Company Ltd.
	NORM	Naturally occurring radioactive materials.
	NSD	Near-surface disposal. A disposal option for some suitable, less hazardous ILW.
	Nuclear fuel	Fuel used in a nuclear reactor. Most fuel is made of uranium metal or oxide, and produces heat when the uranium atoms split into smaller fragments.
	NWS	Nuclear Waste Services.
O	**Operational waste**	Wastes arising from the day-to-day operations of a facility or site.
P	**Packaged volume**	The volume of waste after packaging, consisting of waste material, any encapsulating matrix, any capping grout and ullage, and the container.
	Packaged waste	Radioactive waste that has undergone packaging.
	Packaging	The loading of waste into a container for long-term storage and/or disposal.
	PCM	Plutonium Contaminated Material.
	Plutonium	A radioactive element created in nuclear reactors. It can be separated from spent nuclear fuel by reprocessing. Plutonium is used as a nuclear fuel, in nuclear weapons, and as a power source.
	POCO	Post Operational Clean Out. Activity after final shutdown that prepares a plant for decommissioning.
	PWR	Pressurised Water Reactor.
R	**R&D**	Research and Development.
	Radioactivity	Radioactivity is the release of energy from a nucleus through emission of one or more sub-atomic particles and/or radiation.
	Reprocessing	The chemical extraction of reusable uranium and plutonium from waste materials in spent nuclear fuel.
S	**SDP**	Submarine Dismantling Project.
	Small users	Organisations that use radioactive materials and create radioactive waste that are not part of the nuclear sector licensed under the Nuclear Installations Act 1965 (as amended), including hospitals, universities, and industrial undertakings.

	Storage	The emplacement of waste in a suitable facility with the intent to retrieve it at a later date.
T	**TBq**	Terabecquerel (equal to 1,000,000,000,000 Becquerels).
	THORP	Thermal Oxide Reprocessing Plant (at Sellafield).
	Treatment	A process that changes the state or form of radioactive waste to facilitate its future management.
	Tritium	An isotope of hydrogen (H-3) having a radioactive half-life of about 12 years.
	tU	Tonnes of Uranium – a measure of mass.
U	**UCP**	Urenco Chemical Plants.
	Ullage	The space remaining within a container above the conditioned waste matrix and any capping matrix.
	UKAEA	United Kingdom Atomic Energy Authority. A public body that manages the UK fusion research programme and operates the Joint European Torus (JET).
	UK Research and Innovation	UK Research and Innovation operates Rutherford Appleton Laboratory in Oxfordshire.
	UNS	Urenco Nuclear Stewardship.
	Uranium	A radioactive element that occurs in nature. Uranium is used for nuclear fuel and in nuclear weapons.
	UUK	Urenco UK.
V	**Vitrification**	The process of converting materials into a glass or glass-like form. Vitrification is the process used to convert liquid HLW into a borosilicate glass.
	VLLW	Very Low Level Waste.
W	**WAC**	Waste Acceptance Criteria.
	Waste package	A container and its content of conditioned radioactive waste.
	WVP	Waste Vitrification Plant (at Sellafield).
Z	**Zircaloy**	An alloy of zirconium used for the cladding of nuclear fuel – particularly in water reactors.

Nuclear Waste Services

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