Nuclear Waste Services

2025 Summary of UK Radioactive Waste and Materials Inventory for International Reporting

Part of the NDA group

Department for Energy Security & Net Zero

Conditions of Publication

Contents

Aerial view of the Low Level Waste Repository, West Cumbria

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

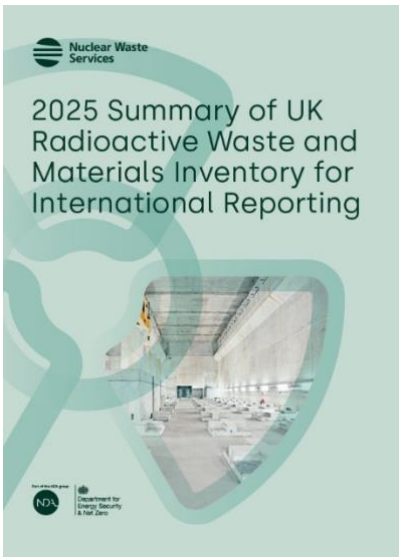
Describes the sources, volume, composition and activity of radioactive waste in the UK, and a comparison with the previous inventory

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 presents summary information in support of the UK's international reporting obligations on radioactive wastes and materials. This comprises reporting to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Section 3), and to the "Status and Trends Project" (Section 4).[1,2,3]

500 litre radioactive waste drum

[1] The UK is also a Member State of the Organisation for Economic Cooperation and Development (OECD) Nuclear Energy Agency (NEA). The NEA seeks to assist its member countries in developing safe, sustainable and societally acceptable strategies for the management of all types of radioactive materials. There is a particular emphasis on the management of long-lived waste and spent fuel as well as on decommissioning of disused nuclear facilities. The NEA does not currently compile or maintain information on the quantities of radioactive wastes generated in the member countries.

[2] The UK is no longer required to report information on waste disposals and safeguards to the European Union or to Euratom.

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

2. Waste Classification

Material that has no further use, and is contaminated by, or incorporates, activity above certain levels defined in UK legislation[4,5,6] is known as radioactive waste. 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), see Figure 1.

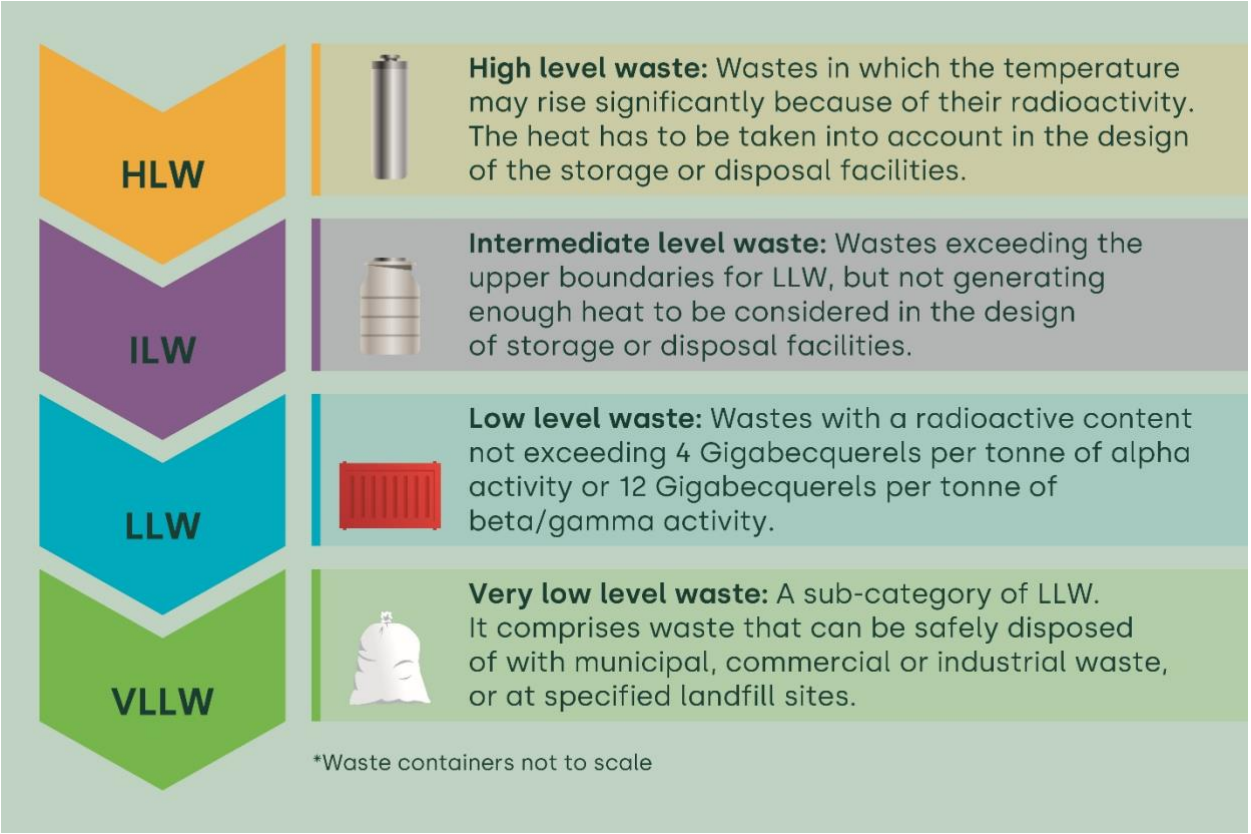


Figure 1 UK radioactive waste classification

Very Low Level Waste comprises:

- High Volume VLLW – wastes with maximum concentrations of 4 MBq (megabecquerels) 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 containing less than 400 kBq (kilobecquerels) of total activity, or single items containing less than 40 kBq of total activity. There are additional limits for C-14 and tritium in wastes containing these radionuclides.

[4] Radioactive Substances Act 1993 (as amended), 27 May 1993.
[5] Statutory Instruments 2016 No. 1154. Environmental Permitting (England and Wales) Regulations 2016 (as amended), 11 December 2016.
[6] Environmental Authorisations (Scotland) Regulations 2018 (as amended), 28 June 2018.

The 2009 International Atomic Energy Authority (IAEA) classification scheme for radioactive waste[7] is used throughout this report where quantities of radioactive waste are given.

The IAEA classification scheme is based on consideration of long-term safety provided by the different disposal options currently adopted or envisaged for radioactive waste. The IAEA classification scheme provides international bodies with a common framework for the purposes of reporting to them. There are six classes of waste:

- Exempt Waste (EW)
- Very Short Lived Waste (VSLW)
- Very Low Level Waste (VLLW)
- Low Level Waste (LLW)
- Intermediate Level Waste (ILW)
- High Level Waste (HLW).

A conceptual illustration of the IAEA classification scheme (see Figure 2) shows the disposal options for each waste class and the relationship with activity content and half-life.

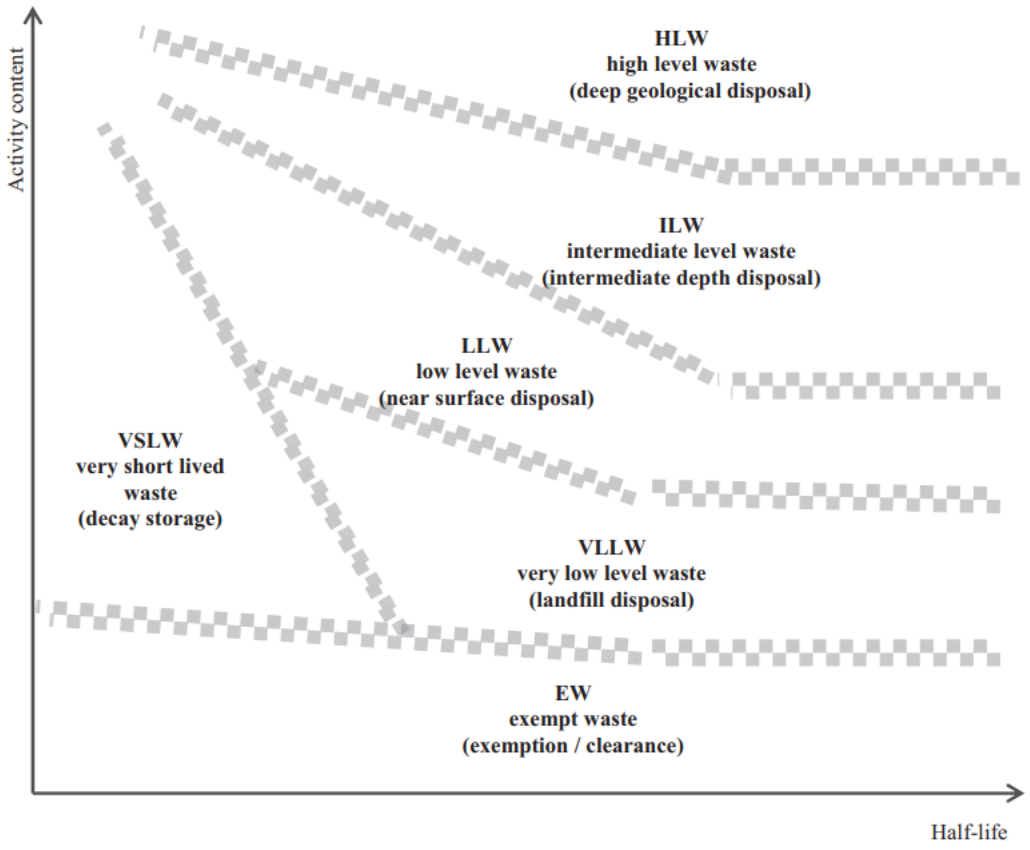


Figure 2 Conceptual illustration of the waste classification scheme

Information on EW and VSLW is not collected for the UK Inventory. EW is out of scope of regulatory control (i.e. not radioactive for the purposes of UK legislation). VSLW requires limited storage time before it is out of scope of regulatory control. The other four classes of waste

[7] International Atomic Energy Agency, "IAEA Safety Guide Classification of Radioactive Waste," GSG-1, 2009.

remain subject to regulatory control and so are recorded in the UK Inventory; Table 1 describes them.

Table 1 IAEA Waste classification

IAEA class
Very Low Level Waste (VLLW) Waste that does not necessarily meet the criteria of EW, but does not need a high level of containment and isolation. This waste is therefore suitable for disposal in near surface landfill type facilities with limited regulatory control. Such landfill type facilities may also contain other hazardous waste. Typical waste in this class includes soil and rubble with low levels of activity concentration. Concentrations of longer-lived radionuclides are generally very limited.
Low Level Waste (LLW) Waste that is above clearance levels, but with limited amounts of long-lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years and is suitable for disposal in engineered near surface facilities. This class covers a very broad range of waste. LLW may include short-lived radionuclides at higher levels of activity concentration, and also long-lived radionuclides, but only at relatively low levels of activity concentration.
Intermediate Level Waste (ILW) Waste that, because of its content, particularly of long-lived radionuclides, requires a greater degree of containment and isolation than that provided by near surface disposal. However, ILW needs no provision, or only limited provision, for heat dissipation during its storage and disposal. ILW may contain long-lived radionuclides, in particular, alpha-emitting radionuclides that will not decay to a level of activity concentration acceptable for near surface disposal during the time for which institutional controls can be relied upon. Therefore, waste in this class requires disposal at greater depths, of the order of tens of metres to a few hundred metres.
High Level Waste (HLW) Waste with levels of activity concentration high enough to generate significant quantities of heat by the radioactive decay process or waste with large amounts of long-lived radionuclides that need to be considered in the design of a disposal facility for such waste. Disposal in deep, stable geological formations usually several hundred metres or more below the surface is the generally recognised option.

Figure 3 shows how the UK classifications are mapped to the IAEA classes for the purpose of reporting. The criteria used to allocate individual waste streams within the classification are determined by their UK classification and their known or planned disposal routes. The ‘Waste stream’ is the fundamental designation used in the UK 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. It is often distinguishable by its radionuclide content and in many cases also by its physical and chemical characteristics.

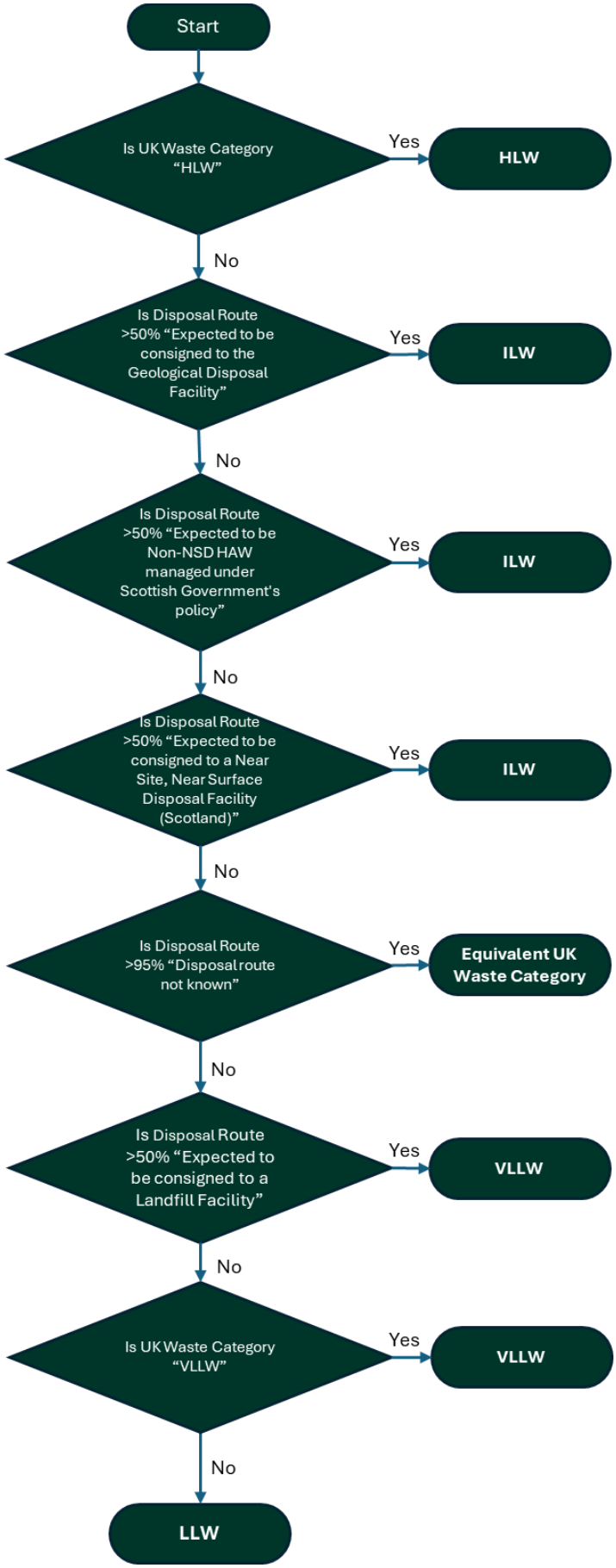


Figure 3 *How UK Inventory waste streams are mapped to the IAEA classification scheme*

Sizewell B power station

3. Reporting to the Joint Convention

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was negotiated under the auspices of the IAEA. Its primary objective is to achieve and maintain a high level of safety worldwide in spent fuel and radioactive waste management. The Joint Convention came into force on 18th June 2001.

Article 32 includes an obligation to submit *"an inventory of radioactive waste that:*

- *Is being held in storage at radioactive waste management and nuclear fuel cycle facilities;*
- *Has been disposed of; or*
- *Has resulted from past practices.*

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides."

Article 32 also includes an obligation to submit

"an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity".

The UK's latest national report, demonstrating compliance with the Joint Convention, was provided in March 2025 demonstrating compliance with the Joint Convention and was based on the 2022 Inventory. National reports are subject to a process of peer review by the Contracting Parties and are updated every three years. The national report includes the following data on radioactive wastes and spent fuel:

- Volumes of HLW, ILW and LLW in stocks (including wastes that are packaged and not yet packaged[8])
- Expected total volumes of HLW, ILW and LLW (in terms of final packaged volume) for stocks and projected future arisings
- Annual disposals of LLW
- Mass of spent fuel in stocks, reported as either fuel still within reactor cores or fuel that has been removed from reactor cores and transferred to storage facilities.

The following tables provide information from the 2025 Inventory in a form compliant with the obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. The waste types listed use the 2009 IAEA classification system.

[8] Wastes that are not yet packaged exist in an untreated or partly treated state. Packaging is the preparation of waste for long-term management or disposal. The packaged waste volume is the displacement volume of the waste packages.

The reported volume (stocks, estimated future arisings, and total) of waste in the 2025 Inventory by IAEA waste category is given in Table 2.

Table 2 UK radioactive waste inventory and estimates of future arisings by waste category (as of 1st April 2025)

IAEA Waste category	Volume (m^3)		
	Reported at 1st April 2025	Estimated future arisings	Total
HLW (1)	1,960	-814	1,150
ILW	91,900	158,000	250,000
LLW	31,800	727,000	759,000
VLLW	48,200	3,410,000	3,460,000
Total	**174,000**	**4,300,000**	**4,470,000**

(1) From 1.4.2025 there is a net decrease in the reported volume of HLW. This is because accumulated Highly Active Liquor (HAL) is being conditioned, which reduces its volume. It is also because vitrified HLW is being exported to overseas customers. Thus, the volume of 1,960 m^3 at 1.4.2025 is expected to fall by 814 m^3, to 1,150 m^3, by 2037. This is when all HAL plus Insoluble Fission Products (IFP) residues and contaminated plant items is expected to be conditioned.

The mass of UK-owned spent fuel (stocks and estimated future arisings) is given in Table 3.

Table 3 UK-owned spent fuel inventory (as of 1st April 2025) and estimated future arisings

Location	Spent Fuel Type (1)	Inventory (tHM) (2)		Estimated future arisings (tonnes)
		In reactor core	In storage (out of reactor core)	
Sellafield	Magnox		272	
	AGR		3,200	
	SGHWR		68	
	WAGR		21	
	Other		791 (3)	
Dounreay	DFR	6.4	4.2	
	PFR		10.1	

Location	Spent Fuel Type [1]	Inventory (tHM) [2]		Estimated future arisings (tonnes)
		In reactor core	In storage (out of reactor core)	
AGR power stations	AGR	1,130	105	344
PWR power station	PWR	89	677	238

(1) AGR – Advanced Gas-cooled Reactor, SGHWR – Steam Generating Heavy Water Reactor, WAGR – Windscale Advanced Gas-cooled Reactor, DFR – Dounreay Fast Reactor, PFR – Prototype Fast Reactor, PWR – Pressurised Water Reactor.

(2) Fuel 'In reactor' is that in reactor cores; fuel 'In storage' has been removed from reactor cores to storage facilities.

(3) Includes miscellaneous fuels (~725 tHM) and overseas Light Water Reactor (LWR) fuel transferred to UK ownership (~66 tHM).

The volume (reported and packaged) and mass of waste in stock by IAEA waste category is given in Table 4.

Table 4 Radioactive wastes from all sources, stock at 1st April 2025

IAEA Waste category	At 1st April 2025	Reported Volume (m^3) [1]	Reported Mass (tonnes) [1]	Packaged Volume (m^3)
HLW	Total	1,960	3,690	1,380
	Not yet packaged	1,040	1,260	186
	Already packaged	917	2,430	1,200
ILW	Total	91,900	118,000	178,000
	Not yet packaged	55,500	52,400	126,000
	Already packaged	36,300	65,700	51,800
LLW	Total	31,800	33,000	30,400
	Not yet packaged	30,200	29,900	28,700
	Already packaged	1,570	3,100	1,720

IAEA Waste category	At 1st April 2025	Reported Volume (m^3) (1)	Reported Mass (tonnes) (1)	Packaged Volume (m^3)
VLLW	Total	48,200	39,400	46,500
	Not yet packaged	48,200	39,400	46,500
	Already packaged	0	0	0

(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 for wastes that have been encapsulated with a cement-based material, polymer or glass (i.e. waste streams with a /C in the identifier).

The volume (reported and packaged) and mass of waste estimated to arising in the future by IAEA waste category is given in Table 5.

Table 5 Estimated future arisings of radioactive waste

IAEA Waste category	Reported Volume (m^3)	Reported Mass (tonnes)	Packaged Volume (m^3)
HLW	See note 1	See note 1	See note 1
ILW	158,000	146,000	353,000
LLW	727,000	882,000	584,000
VLLW	3,410,000	3,660,000	3,250,000
Total	**4,300,000**	**4,680,000**	**4,190,000**

(1) From 1st April 2025 there is a net decrease in the reported volume and mass of HLW because accumulated Highly Active Liquor (HAL) is being conditioned, which reduces its volume and mass, and also because vitrified HLW is being returned to overseas customers.

The total volume (reported and packaged) and mass of waste by IAEA waste category is given in Table 6.

Table 6 Total wastes in stock at 1st April 2025 and estimated future waste arisings

IAEA Waste category	Reported Volume (m^3)	Reported Mass (tonnes)	Packaged Volume (m^3)
HLW	1,150	2,820	1,340
ILW	250,000	264,000	531,000
LLW	759,000	915,000	614,000
VLLW	3,460,000	3,700,000	3,300,000
Total	**4,470,000**	**4,880,000**	**4,440,000**

Annual disposals to the Low Level Waste Repository (LLWR) and Dounreay Low Level Waste Facility are given in Table 7 and Table 8 respectively.

Table 7 Total annual disposal to the Low Level Waste Repository (LLWR) (2009-2024)

Year(1)	Total volume (m^3)	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	1,040
2015	3,320	2023	624
2016	3,350	2024	218

(1) For period 1st April to 31st March.

(2) Volume is for the waste and its primary containment and represents volumes for waste received with the intent for disposal.

Table 8 Total annual disposals to the Dounreay Low Level Waste Facility (2015-2025)

Year[1][2]	Total volume (m^3)	Year[1][2]	Total volume (m^3)[3]
2015	2,050	2021	0
2016	1,900	2022	137
2017	643	2023	19.5
2018	0	2024	156
2019	375	2025[4]	156
2020	195		

(1) For period 1st January to 31st December.
(2) Waste transfers to the facility began in 2015.
(3) Volume is for packaged waste.
(4) Up to 31st March 2025.

4. Reporting to the Status and Trends Project

In June 2014 the IAEA, the Organisation for Economic Cooperation and Development (OECD)/Nuclear Energy Agency (NEA) and the European Commission established a Joint Working Group to coordinate and support the preparation of a report providing a global perspective on radioactive waste and spent fuel management, including information on current inventories and future arisings. This initiative is known as the “Status and Trends Project”. It is envisaged that the planned report will serve as a comprehensive and authoritative reference for worldwide status and trends concerning arisings of spent fuel and radioactive waste and provisions for the long-term management of these materials. The most recent project report was published in 2022[9] and covers global status and trends up to December 2016.

The tables in the Appendix provide information from the 2025 UK Inventory in a form for the Status and Trends Project. The waste types listed use the 2009 IAEA classification system.

Robot assisting in decommissioning work

[9] IAEA, “IAEA Nuclear Energy Series No. NW-T-1.14 (Rev. 1). Status and Trends in Spent Fuel and Radioactive Waste Management,” 2022.

Appendix: Information for the Status and Trends Project

Table A1 *Nuclear power fuel cycle strategies*

Strategy		Adopted in the UK (Y/N)
Commercial Scale Reprocessing Facility	Existing	N
	Planned	N
Spent fuel currently in another country for reprocessing		N
Earlier reprocessing, but practice currently ceased		Y
Planning direct placement of spent fuel in a repository		Y
Keeping options open		N

Table A2 *Extended at reactor and away from reactor (AFR) storage for spent fuel*

Spent fuel storage type
Wet storage at centralised storage pending potential disposal to a deep geological repository. Dry cask storage at one site.

Table A3 Reported spent fuel discharged from nuclear power plants

Type	Wet Storage (tHM)	Dry Storage (tHM)	Reprocessed (tHM)
Nuclear power plants	4,480	677	~55,000

Table A4 Reported spent fuel stored from research and other reactors

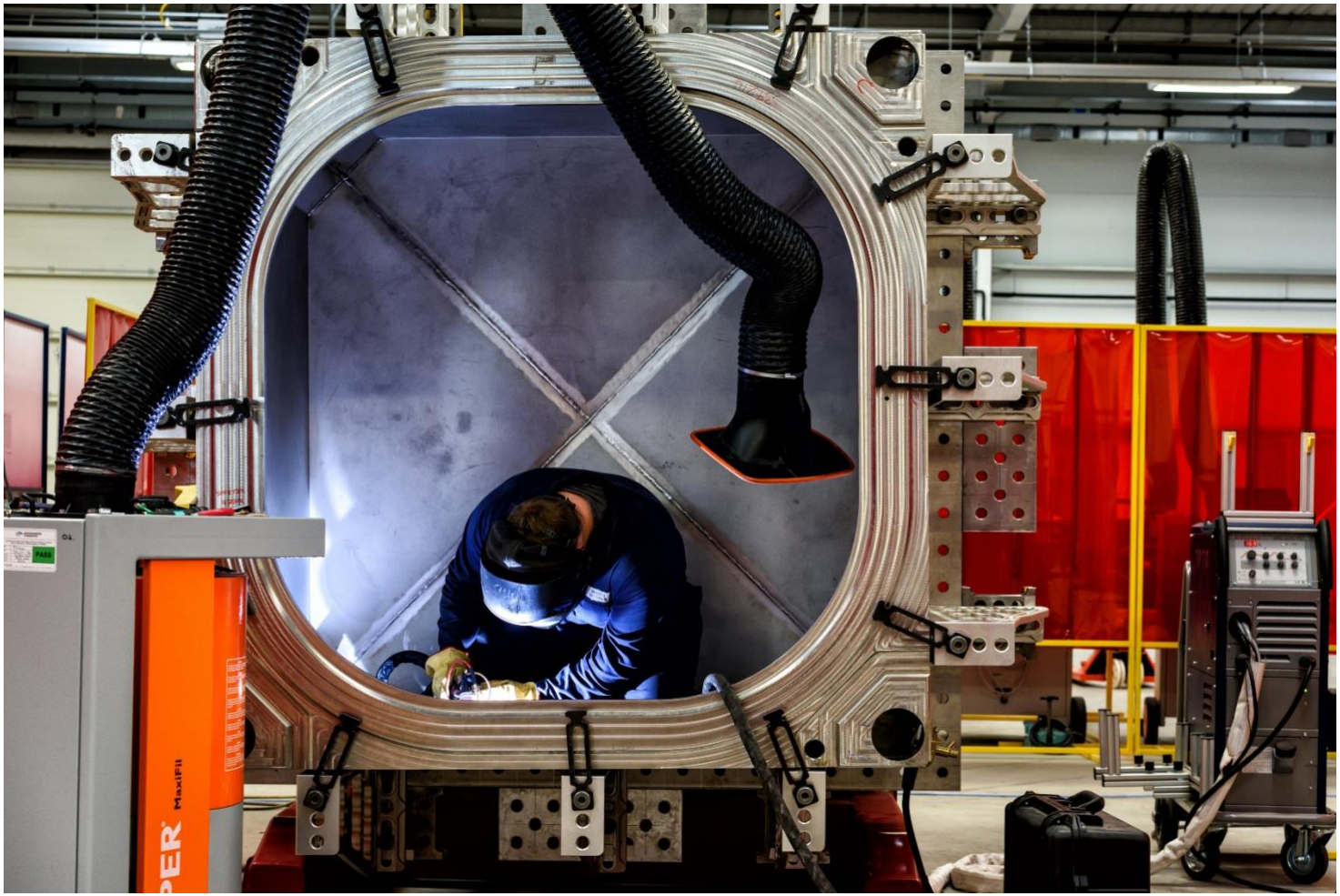
Type[1]	Current amount (research and other reactors) (tHM)
Wet storage	N/A
Dry storage	N/A

(1) Research and development programmes at Sellafield, Dounreay, Harwell and Winfrith that included a number of research and prototype reactors, many of these reactors also produced electricity for the grid.

Table A5 Reported radioactive waste in storage and disposal

Type	Waste Type	VLLW (m^3)	LLW (m^3)	ILW (m^3)	HLW (m^3)
Storage	Solid Waste	48,200	31,800	91,900	1,960
Disposal	Solid Waste	Not reported in UK Inventory	~1,000,000 (1)	~33,000 (2)	0

(1) Comprises ~1,000,000 m^3 at the LLWR and ~6,000 m^3 at Dounreay
(2) N Atlantic and UK coastal waters (1949-1982)



3m^3 box manufacture

Glossary

A ▸	**AGR**	Advanced Gas-cooled Reactor.
B ▸	**Becquerel (Bq)**	The standard international unit of measurement of radioactivity – corresponding to one disintegration per second.
D ▸	**DFR**	Dounreay Fast Reactor (shut down in 1977).
E ▸	**EW**	Exempt Waste.
G ▸	**GBq**	Gigabecquerel (equal to 1,000,000,000 Becquerels).
H ▸	**Half-life**	For a radionuclide, the time required for the activity to decrease, by a radioactive decay process, by half.
	HAL	Highly Active Liquor.
	HLW	High Level Waste.
I ▸	**IAEA**	International Atomic Energy Agency.
	ILW	Intermediate Level Waste.
K ▸	**kBq**	Kilobecquerel (equal to 1,000 Becquerels).
L ▸	**LLW**	Low Level Waste.
	LLWR	Low Level Waste Repository. The LLWR in West Cumbria has operated as a national disposal facility for LLW since 1959.
	LWR	Light Water Reactor.
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.
N ▸	**NEA**	Nuclear Energy Agency.
	NWS	Nuclear Waste Services.
O ▸	**OECD**	Organisation for Economic Cooperation and Development.
P ▸	**PFR**	Prototype Fast Reactor (at Dounreay; shut down in 1994).
	PWR	Pressurised Water Reactor.
S ▸	**SGHWR**	Steam Generating Heavy Water Reactor (at Winfrith site; shut down in 1990).
T ▸	**tHM**	Tonnes of heavy metal. A unit of mass used to quantify uranium, plutonium and thorium including mixtures of these elements.
V ▸	**VLLW**	Very Low Level Waste.
	VSLW	Very Short Lived Waste.
W ▸	**WAGR**	Windscale Advanced Gas-cooled Reactor (at Sellafield site; shut down in 1981).

Nuclear Waste Services

Where to find more information

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NWS Helpdesk

0300 369 0000

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