

National Waste Programme

Strategic Review 2013 Non-Technical Summary



National Waste Programme

Strategic Review 2013 Non-Technical Summary

Document Management

	Name	Role
Originator:	Andrew Hetherington	National Programme Coordinator
Checker:	Helen Cassidy	National Programme Implementation Manager
Approver:	Hannah Kozich	Head of National Programme

Contents

1.	Introduction.....	4
2.	LLW Management Environment in 2013.....	5
2.1.	LLW Inventory	5
2.2.	LLW Management Strategy (NDA estate)	5
2.3.	Waste Management Performance	6
2.3.1.	Waste Management Performance 2008/09 to 2013/14 (NDA and non-NDA).....	6
2.3.2.	Projected Waste Management Performance FY2014/15 to FY2017/18 (NDA estate). 7	
2.4.	Research & Development	8
2.5.	Assets and infrastructure	8
2.6.	Cost and liabilities.....	10
3.	LLW National Programme and JWMP Synergies and opportunities.....	11
4.	Issues and Threats	11
5.	Conclusions	11
	References	13

1. Introduction

This non-technical summary of the Strategic Review 2013 describes the LLW management environment in the UK in 2013. Published on a three yearly basis, the purpose of the Strategic Review is to provide stakeholders with a “state of the nation” view of how LLW is managed in the UK, and how management of LLW has changed since the previous Strategic Review.

In 2008 and 2009 the NDA, working with LLW Repository Ltd as a strategic partner, developed the UK Nuclear Industry Low Level Waste Strategy [Ref. 1]. The Strategy was published in August 2010 following extensive stakeholder consultation. Key themes in the Strategy were the application of the waste management hierarchy, making best use of existing assets and the opening of new fit-for-purpose waste management routes.

Through the introduction of the National LLW Programme, led by LLW Repository Ltd on behalf of NDA, the period 2010-2013 has seen significant change in LLW management practices in the UK. SLC waste strategies have changed to align with the National LLW Strategy and, owing to availability of a range of new waste routes, waste diversion has mostly become routine across LLW generators. There have also been improvements in inventory management, reflected in changes to the UK Radioactive Waste Inventory (UKRWI) [Ref. 2].

The 2013 Strategic Review will inform ongoing implementation of the National LLW Strategy through the National LLW Programme as well as providing information for the next iteration of the National LLW Strategy, programmed for publication in summer 2015.

The UK LLW management environment in 2013 is described in terms of the following interrelated elements:

- The LLW National Inventory
- Current LLW management strategies for NDA estate Site Licence Companies (SLCs)
- Waste management performance
- Research and development
- Assets and infrastructure (existing and planned) for LLW management
- Costs associated with LLW management

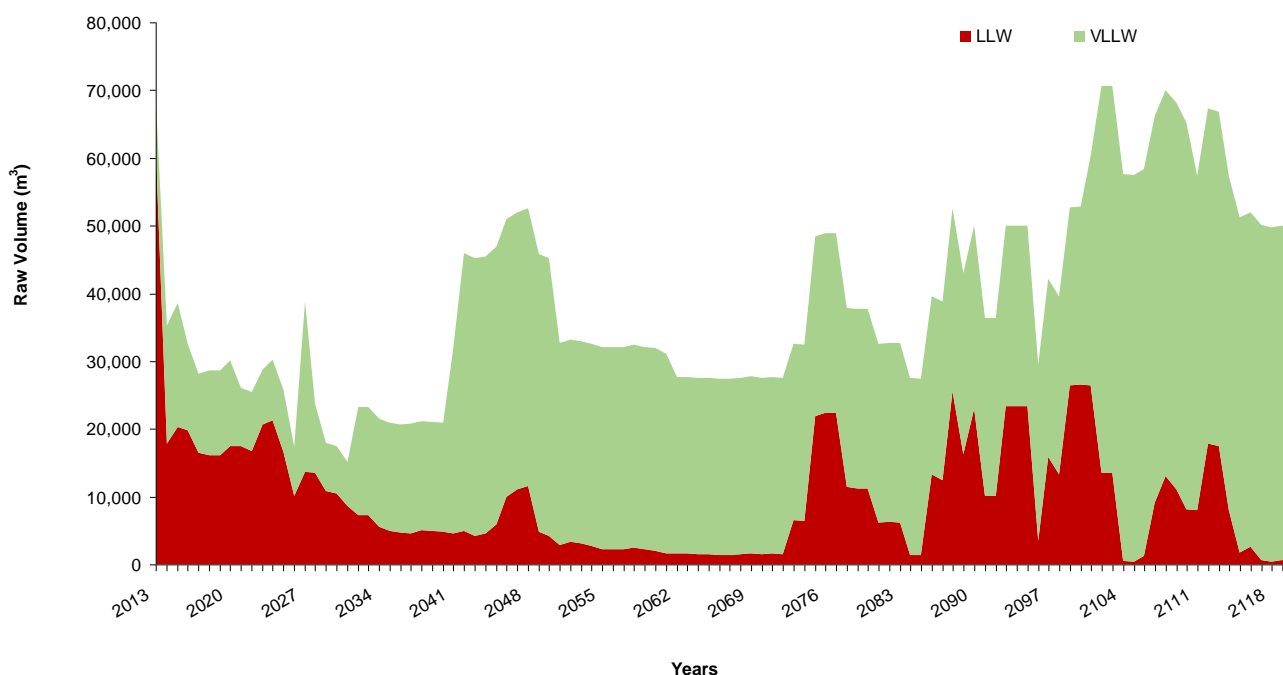
For each of the waste generator organisations included within the scope of this review (from the NDA estate and non-NDA organisations), baseline elements have been collated from key sources of information and “rolled up” to provide a national perspective. No data has been included for LLW arising from any future nuclear new-build, small generators of NORM or LLW outside of the nuclear industry, other than where the volumes are already included within the UKRWI.

2. LLW Management Environment in 2013

2.1. LLW Inventory

Up to 2120, a total raw volume of around 4.2 million m³ of LLW/VLLW is forecast to arise, with VLLW representing approximately two thirds of this volume. The waste comprises a broad spectrum of materials including concrete, rubble, soils, plastics, ferrous and non-ferrous metals, cellulosic materials and unknowns. The majority of this will be generated by NDA SLCs, with the largest volume arising at Sellafield Ltd (3.1 million m³), although non-NDA sites such as AWE, EDF Energy, Westinghouse Springfields, URENCO and Ministry of Defence (MoD) also collectively forecast significant volumes of LLW and VLLW. The main peaks in the profile of waste arisings over time (shown in Figure 1) reflects activities such as decommissioning programmes at Sellafield and final site clearance at Magnox Ltd Sites.

Figure 1 – Annual raw arisings of UK LLW and VLLW 2013 to 2120 [stacked]



2.2. LLW Management Strategy (NDA estate)

SLCs within the NDA estate are required by the NDA to produce and maintain an Integrated Waste Strategy (IWS) describing how a SLC optimises its approach to waste management. A review of the 2013 iteration of the IWS documents for the NDA estate has been undertaken to determine the current baseline LLW management strategy at each of the SLCs.

All SLCs have provided a clear statement of their waste management strategy relating to LLW, making clear their strategic preference for waste avoidance and minimisation in line with the Waste Hierarchy.

The importance of waste characterisation, segregation and application of the Waste Hierarchy is formally recognised by all the SLCs. A significant change from the waste management strategies reviewed for the previous Strategic Review has been a distinct increase in the use by SLCs (except DSRL) of the diverse range of waste management solutions now readily available via the supply chain. This demonstrates a decisive move away from disposal to LLWR as the default option. DSRL, whilst noting the potential benefits from the use of alternative waste management routes, maintain a default management strategy for LLW of disposal to the Dounreay near-site disposal facility.

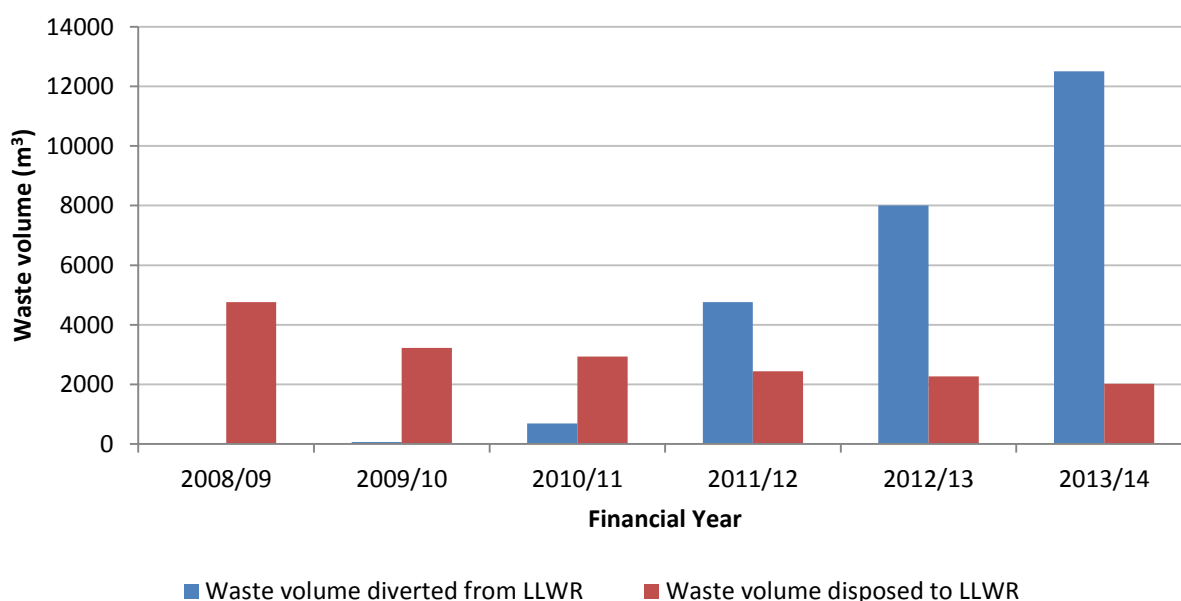
2.3. Waste Management Performance

Waste management performance for the UK is expressed in the Strategic Review 2013 in terms of the quantity of waste diverted from disposal at the LLWR site. Diversion therefore provides a measure of the progress made by waste generators in implementing the UK LLW Strategy. It should be noted that data relating to waste management performance for the non-NDA estate has been included in the analysis presented in Section 2.3.1, where available, but the non-NDA waste diversion performance reflected here is an underestimate (as it does not include waste diverted under direct contracts with the supply chain).

2.3.1. Waste Management Performance 2008/09 to 2013/14 (NDA and non-NDA)

The period 2008 to 2013 has seen a reduction in the number of container receipts from all generators at the LLWR from 372 in 2008/2009 to 202 in 2013/14, whilst the volume of waste diverted to alternative treatment and disposal routes has increased year-on-year since 2009. This reflects the improvements in waste management practice, driven by the National LLW Programme, to divert LLW away from disposal to LLWR.

Figure 2 - Overall trends in waste diversion and waste disposal for UK for the period FY2008/09 to FY2013/14

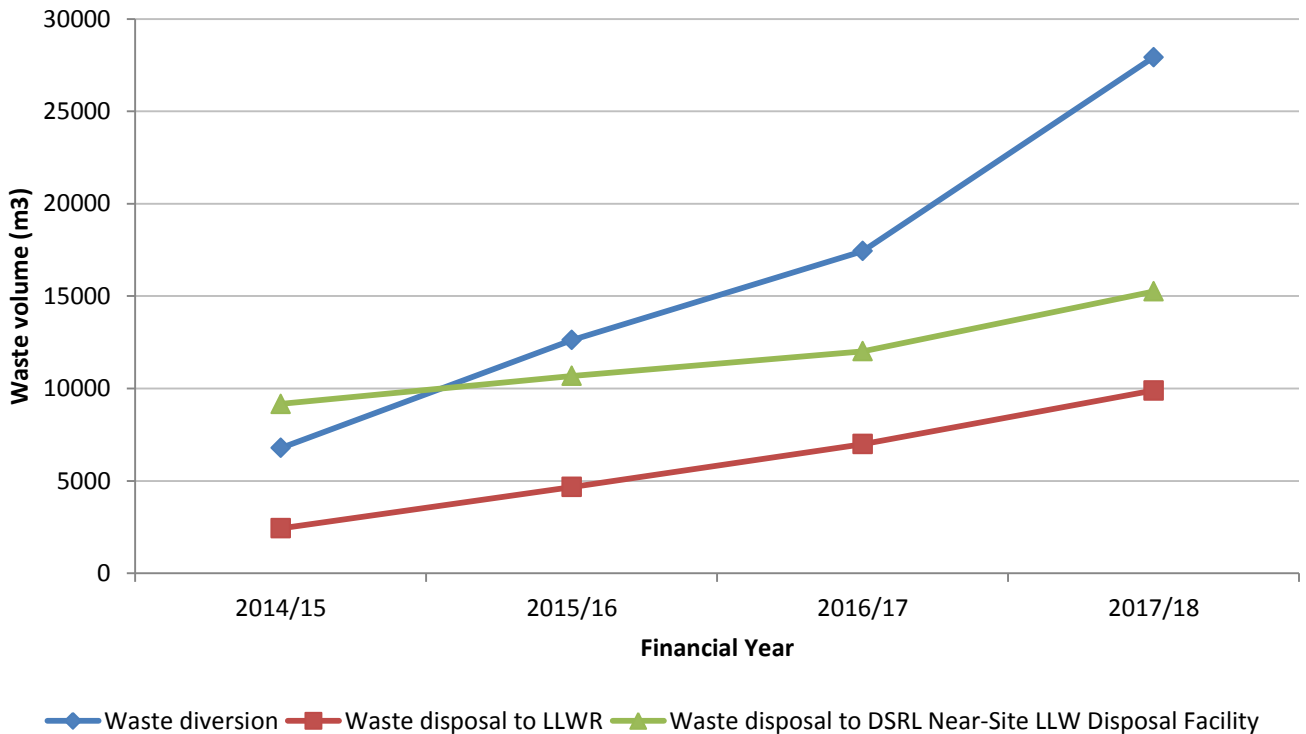


Whilst there is evidence that waste diversion performance has progressed significantly since the previous Strategic Review, there has been variability in the take-up and utilisation of different waste management routes by different waste generators. During this period there was a substantial increase in waste arisings managed via the VLLW / LA-LLW route, corresponding with the transfer from “trial” loads to more routine usage of the route with larger volumes of waste. Subsequently, there has been a rapid increase in the usage of this route as a consequence of the maturing of the route (e.g. opening up access to more than one landfill site). The usage of metallic waste treatment has also demonstrated a strong upward trend during this period. The usage of thermal treatment for combustible waste is significantly less than for metallic and VLLW / LA-LLW waste, and has increased at a steadier rate.

2.3.2. Projected Waste Management Performance FY2014/15 to FY2017/18 (NDA estate)

It is projected that between 2014/15 and 2017/18 disposal to the LLWR from the NDA estate is expected to remain significantly lower than waste diversion, albeit with a small increase in volumes by 2017. This reflects a ramp up in decommissioning activity within the NDA estate – particularly for RSRL Winfrith, which is scheduled to reach an interim end state in 2021, and activity within the Magnox Ltd estate with Care and Maintenance (C&M) preparations – and a corresponding increase in the volume of waste that requires disposal.

Figure 3 – Cumulative projected trends in waste diversion and waste disposal for the NDA estate for the period FY2008/09 to FY2013/14



The volume of waste being diverted is projected to decrease between 2014 and 2016 due to the cessation of operations at the two accelerated Magnox Ltd sites (Bradwell and Trawsfynydd), which will enter C&M during this time period. Waste diversion is projected to strongly increase again in 2017 as a consequence of increased decommissioning activity at RSRL Winfrith and further C&M preparations work within the Magnox Ltd estate. Waste disposal by DSRL at their near-site facility is expected to commence and increase over the period 2014 to 2017/18, as a consequence of the availability of the facility which is anticipated to open in 2014 and the management of a backlog of waste which is currently being stored.

The greatest contribution to the projected decrease in waste diversion between 2014 and 2016/17 is attributed to a projected decrease in disposal of VLLW / LA-LLW. The volume of metallic waste and combustible waste diversion is projected to remain relatively stable over the time period, but there is a marked decrease in VLLW / LA-LLW disposal until 2017/18. This again reflects activities within the wider NDA decommissioning programme, particularly for the Magnox Ltd estate (as the amount of demolition associated with the transfer of Bradwell and Trawsfynydd to C&M will decrease sharply in this period).

2.4. Research & Development

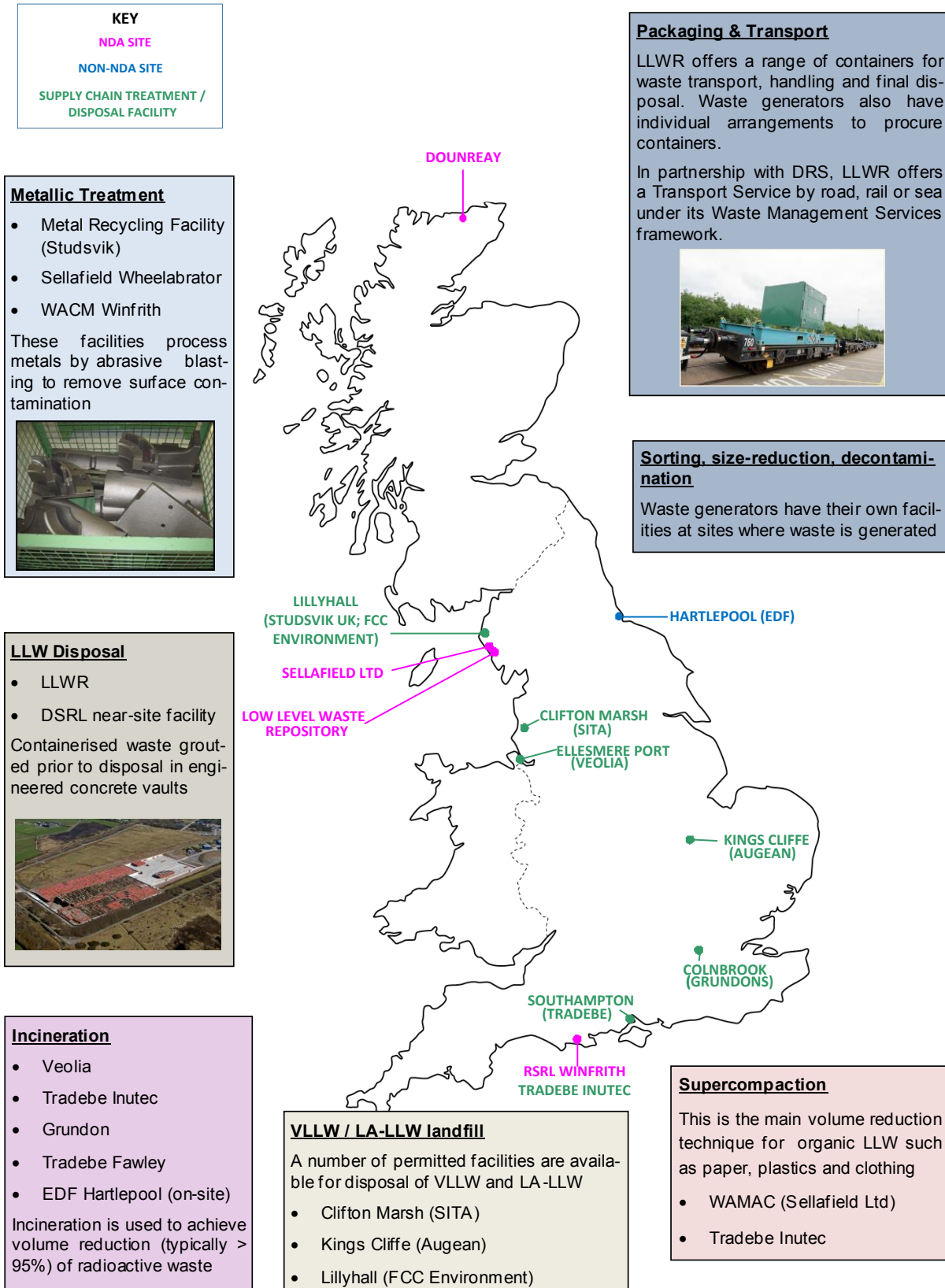
R&D associated with LLW management in the UK is predominantly needs-driven; although for some organisations (notably Magnox Ltd and RSRL) R&D is specifically related to opportunities and threats. The majority of R&D activities being undertaken by LLW Repository Ltd are focussed on delivery of the 2011 Environmental Safety Case and optimisation of the LLWR site. R&D activities for the remainder of the NDA estate are focussed on specific wastestreams, projects and / or specific waste management routes. R&D relating to LLW management in 2013 is focussed on development rather than research; involving technologies that are at high technology readiness level (TRL). For example, DSRL have an R&D project relating to the development of a mercury treatment process using extant technologies and Sellafield Ltd have an R&D project to develop suitable waste management arrangements for multi-element bottles.

There is some R&D being undertaken by waste generators or their supply chain partners on the management of orphan and problematic wastes, but there is an opportunity for a more joined up, collaborative, cross-SLC approach to R&D activities relating to LLW management. The development of a collaborative, needs-driven R&D plan for LLW management, particularly in the area of non-standard waste, should be considered by the LLW National Programme. This would assist in the timely execution of R&D activities and the adoption of / access to new technologies to support timely and cost-effective LLW management within the UK.

2.5. Assets and infrastructure

Figure 4 presents an illustrative summary of the UK treatment and disposal facilities currently available to manage LLW and VLLW at nuclear sites and commercially via the supply chain.

Figure 4 – Illustrative summary of UK assets and infrastructure to manage LLW

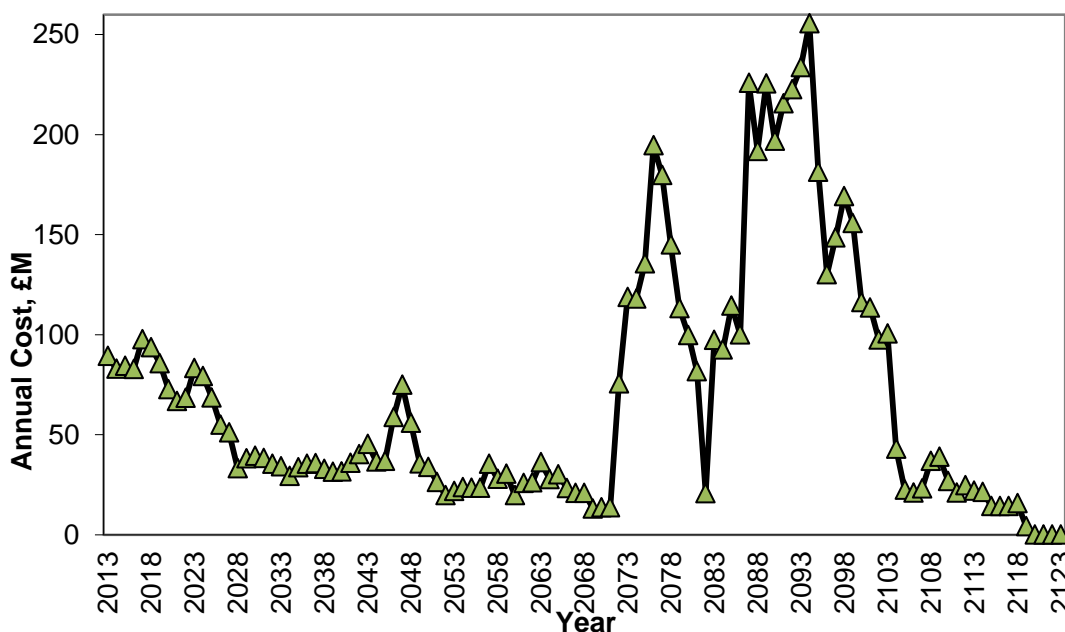


2.6. Cost and liabilities

The costs and liabilities associated with LLW management across the NDA estate include the full lifecycle costs related to management and disposal of solid LLW and VLLW. These include construction, operation and decommissioning of solid LLW management facilities; waste pre-treatment and treatment; and transport and disposal. Those costs are then rolled up individually to give a national figure, the Nuclear Provision (NP), for LLW.

The undiscounted cost of LLW management across the NDA estate in March 2014 is estimated as £7.60bn. Around half of that total cost baseline can be attributed to off-site treatment and disposal; with the next most significant contributor being treatment operations (approximately 25%), followed by transport costs (approximately 12%). The profile of projected spending per year on LLW management over the period 2013 to 2120 is illustrated in Figure 5.

Figure 5 – LLW liability profile over time for the period 2013 to 2120 (£M)



The LLW liability profile in Figure 7 tracks a similar profile to that of projected waste arisings (as described in Figure 1). Overall, site programmes are expected to deliver around £90M spend on LLW management per year until about 2020, reducing on an annual basis (with exception of a peak during the 2040s) until 2070 before significant ramp up. The significant peaks in LLW spending between 2070 and 2100 correspond to key decommissioning and demolition activities around the NDA estate (such as the decommissioning of the Magnox and THORP reprocessing plants at Sellafield and final site clearance of the Magnox Ltd estate).

3. LLW National Programme and JWMP Synergies and opportunities

The National LLW Programme was established to drive implementation of the UK LLW Strategy. The work of the programme has involved identification and delivery of a range of opportunities and initiatives. A key function of the LLW National Programme is the promotion and facilitation of collaboration between waste generators, LLWR and other stakeholders, as appropriate. Collaboration drives efficiency (by avoiding duplication of effort) and supports sharing of good practice and lessons learned between organisations, driving improvements in LLW management practice.

A key initiative between the Strategic Review 2010 and 2013 was the introduction of Joint Waste Management Plans (JWMP). These are produced jointly by waste generators and LLW Repository Ltd on a six-monthly basis. JWMPs provide visibility of the activities undertaken by waste generators to transform and improve their LLW management practices to deliver the UK LLW Strategy. JWMPs also enable the identification and delivery of collaborative, cross-estate opportunities to improve LLW management practice around the UK.

Cumulatively, it is anticipated that the delivery of effective, business-as-usual LLW management practice as well as transformational and (where funding and schedule allows) opportunity projects will continue to drive the realisation of benefits in terms of reduction to the NP. Based on the current operation and decommissioning plans for the NDA estate, waste diversion (facilitated by execution of the JWMP) will yield cost avoidance of approximately £164M across the NDA estate over 2013/14 to 2017/18 compared to the cost of disposal of the volume. The greatest cost benefit will be delivered through the use of the VLLW / LA-LLW disposal route (which contributes 56% of the total savings).

4. Issues and Threats

A number of issues and threats that have arisen since the 2010 Strategic Review, which could adversely impact effective LLW management practice, have been identified. These include:

- The fragility of the supply chain and the potential for one, or more, suppliers to become unavailable
- The quality, accuracy and completeness of waste inventory data which is used to make waste management and, for the supply chain, investment decisions
- Changes and uncertainties in asset and infrastructure availability

Further work is required by the wider UK LLW management community and the National Programme to resolve these issues so as to ensure the ongoing success of strategy implementation.

5. Conclusions

This 2013 baseline shows that there has been significant progress made since 2010 in terms of the successful implementation of the UK LLW Strategy and the cultural change in waste management practice within the UK. Whilst it is recognised that progress has been made, further work is required to resolve the issues / threats that have been identified and to embed effective LLW management into sustained cultural change.

Glossary

Term / Acronym	Definition
DRS	Direct Rail Services
DSRL	Dounreay Site Restoration Ltd
C&M	Care and Maintenance
IWS	Integrated Waste Strategy
JWMP	Joint Waste Management Plan
LLW	Low Level Waste
LLWR	Low Level Waste Repository
Low Activity Low Level Waste (LALLW)	This is a waste classification not formally described in legislation or policy; describing a sub-category of LLW with a maximum concentration of radionuclides bounded by the upper definition of HV-VLLW (4 MBq/te) and the upper threshold of the Waste Acceptance Criteria for specified landfill sites (this is typically 200 MBq/te). There is a different limit for tritium in wastes containing this radionuclide. This is waste predominantly produced by the Nuclear Industry.
Low level waste (LLW)	Radioactive waste having radioactive content not exceeding 4 GBq/te alpha or 12 GBq/te beta/gamma.
M	Million
MOD	Ministry of Defence
MRF	Metal Recycling Facility
NDA	Nuclear Decommissioning Authority
NORM	Naturally Occurring Radioactive Materials
NP	Nuclear Provision
R&D	Research and Development
RSRL	Research Site Restoration Ltd
SLC	Site Licence Company
TRL	Technology Readiness Level
UK	United Kingdom
UKRWI	UK Radioactive Waste Inventory

Term / Acronym	Definition
Very Low Level Waste (VLLW)	<p>Low-volume VLLW (LV-LLW) is a sub-category of LLW (otherwise known as “dustbin loads”) including wastes that can be safely disposed of to an unspecified destination with municipal, commercial or industrial waste, each 0.1m³ of material containing less than 400kBq of total activity or single items containing less than 40kBq of total activity. There are different limits for carbon-14 and tritium in wastes containing these radionuclides. This is principally generated by small users.</p> <p>High-volume VLLW (HV-VLLW) is a sub-category of LLW (otherwise known as “bulk disposals”) including wastes with a maximum concentration of 4MBq/te of activity that can be disposed of to specified landfill sites. There is a different limit for tritium in wastes containing this radionuclide. This is principally generated by the nuclear industry.</p>
WACM	Winfrith Abrasive Cleaning Machine
WAMAC	Waste Monitoring and Compaction Facility

References

- 1 UK Strategy for the Management of Solid Low Level Waste from the Nuclear Industry, Issue 1, NDA, August 2010
- 2 UKRWI 2013 suite of documents available via <https://www.nda.gov.uk/ukinventory/>