



# Integrated Waste Management Programme

VirtualEvent 2020



Dounreay



LLW Repository Ltd



Sellafield Ltd



Magnox



Radioactive Waste  
Management

# A one NDA group approach

Our combined mission is to clean up the UK's earliest nuclear sites safely, securely and cost-effectively with care for people and the environment.

The One NDA approach holds at its core a group of businesses unified by a mission, working together more effectively and efficiently.

We've made some significant changes to how we operate. In July 2020, we announced that DSRL and LLWR will separately become wholly owned subsidiaries of the NDA during 2021. This is part of a strategic plan to build a strong and cohesive NDA group and drive more effective and efficient decommissioning and clean-up, so delivering more value for the UK taxpayer. It follows similar changes at Sellafield and Magnox, where the benefits of working more closely and delivering cross-group synergies are already being felt.

We are also creating a single leading nuclear transport division, which will bring together our shipping and rail businesses INS and DRS. This will provide further opportunities to harness the expertise and skills of both organisations to support wider UK nuclear and transport strategic priorities and work with overseas governments.

Through the publication of our Radioactive Waste Strategy we have outlined how we want to change our approach to managing and disposing of the UK's radioactive waste, moving towards a risk-informed approach that considers the complete waste lifecycle. To deliver this strategy, we are developing a programme of work that will integrate radioactive waste management activities across our NDA businesses from waste generation right through to final disposal.

The Integrated Waste Management (IWM) Programme will drive forward activities to enable the whole of the nuclear industry to manage its radioactive waste in a more sustainable, efficient and integrated way.

## Our strategy for managing the UK's radioactive waste

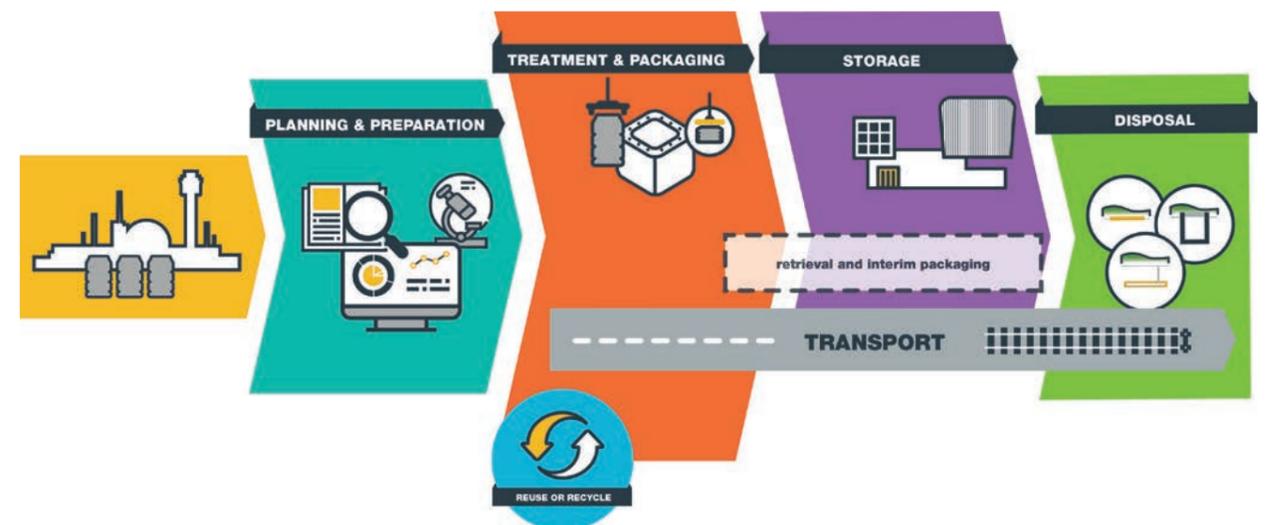
Decommissioning our facilities and structures produces large quantities of diverse waste, both radioactive and conventional. Safe, effective management of these materials is essential to the success of our programme throughout its lifetime

Our strategy provides a high-level framework to enable flexible decision-making, aimed at identifying safe, environmentally acceptable and cost-effective solutions for the full range of waste materials.

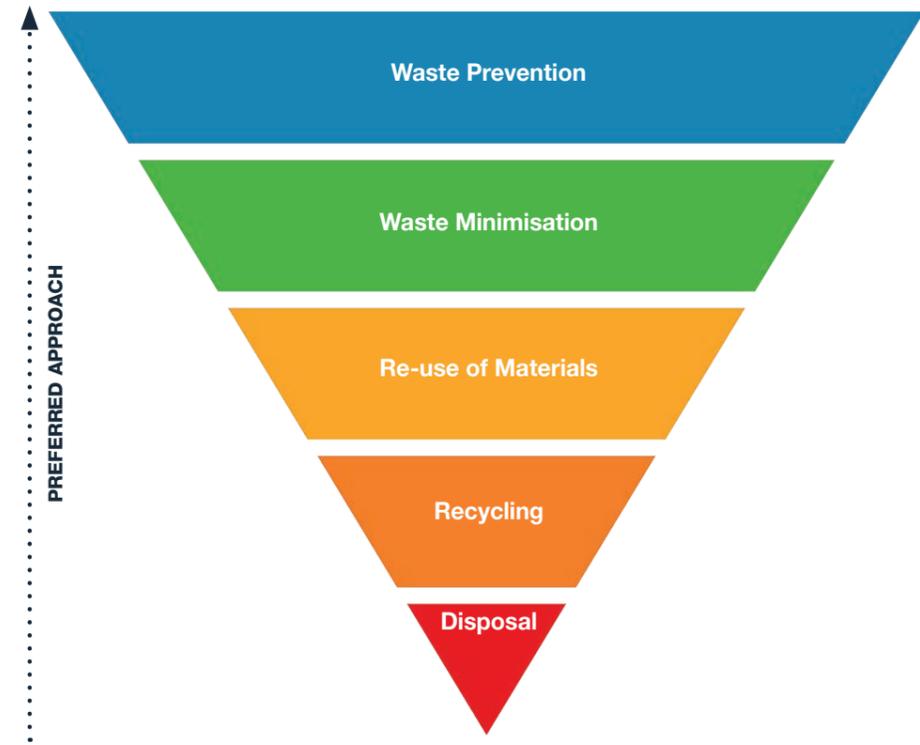
The wastes have extremely diverse radiological, chemical and physical properties. Some of the waste already exists and more will arise in the decades to come. We need to manage this broad range of wastes now, while seeking

opportunities, wherever possible, to optimise processes and deliver robust, cost-effective and sustainable infrastructure.

We are developing an integrated management approach that provides the flexibility for a range of treatment, storage and disposal capabilities. This will ensure we are able to make the right choices to deliver lifecycle solutions for all of our waste.



# From strategy to implementation



## A new approach

We're looking to move to a risk-informed approach where waste is managed on the basis of its chemical, physical and radiological properties, and the safety case, rather than according to radiological classification alone. This will provide us with greater flexibility in seeking solutions for treatment, packaging, storage and disposal of both radioactive and non-radioactive wastes.

This risk-informed approach also enables more effective application of the Waste Hierarchy (pictured above) which underlines the importance of minimisation, re-use, recycling and other environmentally sustainable options, as well as more optimal use of all waste infrastructure.

Waste management is becoming a more significant activity as our sites move away from operations to full-scale decommissioning and site remediation. We're generating larger volumes of lower-activity radioactive wastes, as well as non-radioactive wastes, which in turn increases our opportunities for waste minimisation, re-use and recycling.

The site licence companies (SLCs) need to use the waste hierarchy to extract as much value as practicable from their waste

and to manage the environmental impacts appropriately. Management of non-radioactive waste is increasingly important, as decommissioning and site remediation progresses. All waste management programmes need to be sustainable and environmentally acceptable over the full lifecycle, as our operations will continue for many decades.

## IWM principles

Our strategy embraces the IWM principles:

- supporting key risk and hazard reduction initiatives by enabling a flexible approach to long-term waste management
- taking into consideration the entire waste management lifecycle, including how it supports other NDA or wider UK strategic initiatives, such as large-scale decommissioning programmes
- applying the Waste Hierarchy which is recognised as good practice and should enable an effective balance of priorities in waste management decisions, including value for money, affordability, technical maturity, and the protection of health, safety and the environment
- promoting timely characterisation and segregation of waste, which underpins effective waste management from the outset

- where appropriate, provide leadership by encouraging greater integration across the estate and supply chain, in particular by seeking opportunities to share treatment facilities, interim storage assets, capabilities and learning
- supporting and promoting the use of robust decision-making processes to identify the best options for waste management
- enabling the availability of sustainable, robust infrastructure for continued operations, hazard reduction and decommissioning

## Preparing for implementation

Our Radioactive Waste Strategy, published in September 2019, contained a commitment to create an IWM Programme. Building on the success of the national LLW programme, the IWM Programme will drive changes in behaviour and culture, to allow waste producers to manage their waste flexibly and effectively, as well as to develop proportionate waste management solutions.

# The Integrated Waste Management Programme

We're developing a programme of work to integrate our waste management activities across the NDA group from waste generation to disposal.

Our vision is to develop a 'world-leading waste management programme' that delivers safe, sustainable, timely and cost-effective management of all radioactive waste in the UK.

Our aim is for the IWM Programme to open up new opportunities that enable the whole of the nuclear industry to manage its radioactive waste in a more sustainable and integrated way – according to its hazard rather than traditional waste classification.

Working in collaboration with industry and the supply chain, we're looking to reduce the costs of decommissioning, avoiding unnecessary use of resources such as waste packaging conditioning and storage to make our sites safer, sooner. Working together, we will create a common approach to radioactive waste management, share good practice and learning from experience – from within the UK and internationally.

This is a major change in the way we work, and its success relies upon initial investment in new infrastructure, technology and skills. This all enables build of future people capability and we aim to create a dynamic and flexible workforce serving the UK.

As well as providing opportunities for increased efficiency and enhanced delivery against our mission, we believe the IWM Programme will have a positive impact on the UK supply chain- providing global export opportunities for the industry.



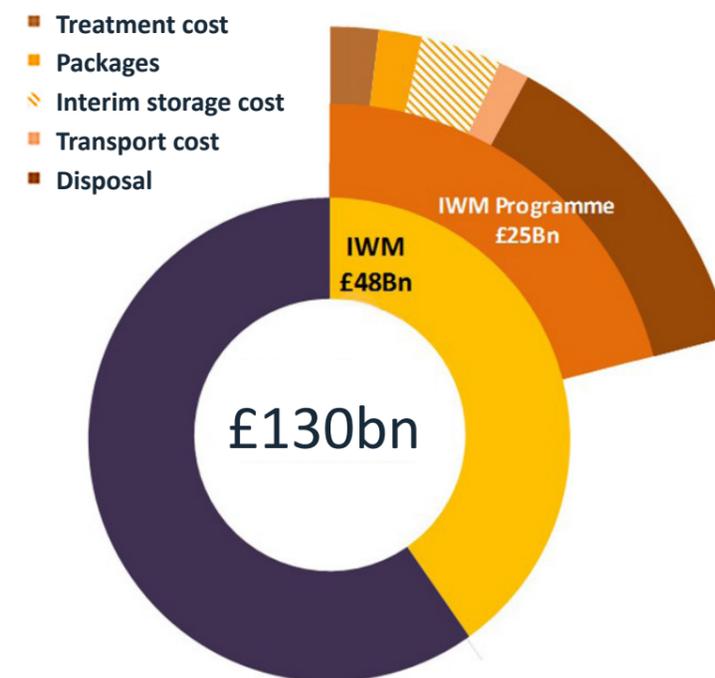
Given waste management makes up £48bn of the £130bn nuclear sector provision, the IWM Programme plays a crucial part in helping to achieve the commitments laid out in the Nuclear Sector Deal, such as 20% reduction in the costs of waste management and decommissioning.

The IWM Programme accounts for £25bn of the total nuclear provision of £130bn. We've already identified the opportunity for savings of around £2.3bn. This may be through a range of new waste treatment facilities, packaging and disposal routes.

The IWM Programme adopts a system approach and comprises a broad spectrum of activities that bring value to the wider group. Work programmes already under way include a scenario modelling tool, and initiating new ways of treating waste. The size and scale of programme activities are varied and will extend to large scale infrastructure projects.

By adopting an integrated approach to waste management, we can identify what capabilities will be required to deliver it. The integrated waste management programme will operate across the waste management lifecycle.

It will bring together all NDA waste producers and waste management companies into a combined and truly integrated programme, supported by the supply chain, to deliver more effective waste management.



## An integrated approach to waste management will:

- ensure waste is managed in a more integrated, cross-group way
- remove barriers and engender value-based decision making
- deliver a change in capability and culture across the NDA group

# Five key themes of the IWM Programme



## Rapid, safe and cost-effective waste management

We recognise the need to support the acceleration of decommissioning programmes and will focus on enabling earlier risk and hazard reduction. We will establish ways to deploy waste solutions faster, using innovative approaches and more robust waste-tracking data to underpin throughput and productivity. Our initial analysis has set out the potential for significant efficiencies. Our ambition is to target over £2 billion of savings - and we have set ourselves a near-term target of £50 million.



## People capability for the future

We will invest in the future through our people, establishing a professional development framework which recognises the role of those who work in the field of waste. We have many decades of experience in waste management and disposal, and want our people to be proud of their work. Building our profile internationally will assist in attracting future talent and growing an expert workforce for the future.



## Provide infrastructure

We can provide stronger solutions for our group when we operate across the estate. We see group-wide needs when we take a holistic view across the businesses and we have the leadership group to prioritise and resource the needs. We can deliver optimal solutions- rethinking our technology approaches and introducing new treatments to expand our route options. We will develop and implement storage and packaging strategies. We will work with the transport division to set out our needs and identify solutions.



## Culture of integrated waste management

A change is needed – a shared group-wide culture that puts waste hierarchy and a risk- informed approach at the centre of our thinking. An essential step is a common understanding of radioactive and non-radioactive waste management, best practice and learning from experience. Culture change is all about people, our thought processes, behaviours and how we translate this into action. We will work with our waste producers and waste management organisations to embed a common culture, addressing how we think and how we act.



## Sustainability, environment and supply chain activities

We must apply new thinking to avoid using unnecessary resources for packaging, conditioning and storage. We will initiate research to understand what alternatives are appropriate. Gathering relevant data to understand how we can compare carbon data will be key to begin our journey. We will develop approaches to embed sustainability in decision-making, using our NDA value framework as a common tool across the group. We will work with the supply chain to establish how we can promote global export opportunities and support sustainable activities.





Working together to safely manage the wastes we produce and store

As custodians of some of the world's most iconic nuclear facilities and sites, Dounreay Site Restoration Ltd, Magnox Ltd and Sellafield Ltd are responsible for creating, storing and managing the country's radioactive waste on behalf of the NDA.

Decommissioning facilities and cleaning up the sites is a long-term focus for all three companies. Safe, secure and sustainable waste management is at the heart of this.

An integrated and co-ordinated approach to waste management is essential for the sites, the environment and the tax payer.

Working together across the NDA group means that waste-informed decisions can be taken. These will consider the whole lifecycle, with the support of the right characterisation at the right time to inform decision making.

This approach builds on the highly-skilled work the companies have done to manage the wastes they create in the most appropriate way, and it builds on the collaboration that has already taken place, to identify fit-for-purpose treatment and storage solutions, learning from each other's successes.

In line with NDA's radioactive waste management strategy, all three companies, are guided by the principles of the waste hierarchy – recognising that disposal is the least favoured option where alternative solutions exist.

Working together in this way will drive efficiencies and help deliver a consistent approach to waste management, where the inventory is front and centre, where there is a strong focus on the cost of waste management, and where site specialisms can be developed to deliver not just for that facility, but for the whole industry. Embedding a strong waste culture to underpin this approach is fundamental.

It's an approach that will deliver opportunities for the workforce and for the supply chain at each site. And it's an approach that makes sense.

### Sellafield Ltd

As the country's most complex nuclear site, Sellafield stores, manages and treats all forms of radioactive, hazardous and non-hazardous waste.

Over time its mission has changed and adapted – from early plutonium production, to commercial power generation and fuel reprocessing.

As reprocessing comes to an end, its focus is now firmly on the management of the waste that is created on site or stored on site. This is long-term, specialist waste management work, which will grow and develop as the mission changes and decommissioning the legacy facilities progresses. It's no small task and it's a long term mission, but it's one that's already being delivered. This is achieved by working with the supply chain and partners within the NDA group

As part of the IWM Programme, Sellafield will continue to explore new treatment and storage options reflecting the waste hierarchy, such as the thermal treatment of waste. Adopting an integrated approach to waste management will enable informed decisions based on the country's radioactive waste inventory.

### Dounreay

Dounreay is Scotland's largest decommissioning project and is widely recognised as one of the most complex nuclear closure programmes in the world.

The decommissioning and remediation of the former research site, which pioneered Britain's fast reactor programme, is generating a significant number of challenging wastes from three unique reactors, fuel handling and reprocessing plants, research laboratories and legacy facilities. Decommissioning is well-advanced with a focus in recent years on culture change with projects treating waste as the main product of the programme.

A waste-informed decommissioning approach has been adopted, with material generated, treated, stored and disposed in a full range of facilities at the Caithness site as well as existing offsite treatment and recycling routes. This includes access to low level waste final disposal vaults constructed adjacent to the site.

Dounreay is delivering a 'microcosm' of the challenges that will be faced across the NDA group in future years, managing and optimising the generation, treatment, storage and disposal of the full range of decommissioning wastes, taking a leading role in pioneering approaches, learning lessons and helping to inform future projects elsewhere.

This approach is the result of open engagement with the supply chain and wider industry to bring together the best expertise to inform plans. A National Waste Programme peer review in 2017 acted as a focal point in highlighting best practice alongside areas where the team has been able to further improve. The IWM Programme will ensure that the best waste management and treatment options are being considered for use at the site.

### Magnox Ltd

Magnox is responsible for decommissioning its 12 nuclear sites across the UK and managing all associated wastes. This includes storing, on an interim basis, intermediate level waste and disposing of low level and non-radiological hazardous waste safely and compliantly.

The NDA has announced an intention to change its strategy for decommissioning the Magnox sites from blanket deferral to site-specific strategies that take into account the unique features of each site. This provides an opportunity to bring forward the treatment and disposal of additional waste streams that had previously been deferred, including asbestos, metal, graphite and concrete.

Activities being driven by the IWM Programme will help make informed decisions on appropriate waste management solutions to optimise the ongoing approach to decommissioning.

The IWM Programme is designed to look at waste issues in the whole, rather than separated into 'streams', and to work on developments such as fit-for-purpose decommissioning waste packages that would bring financial and environmental benefits to Magnox, other site license companies and the supply chain.

Activities driven by the IWM Programme could add significant value to Magnox, by opening up new waste routes which potentially avoid the need for building additional stores on its sites for decommissioning wastes. It could also provide efficiencies through effective use of expertise, capability and supply chain capacity.



## Optimising the role of disposal organisations

Achieving the benefits of an integrated approach requires collaboration across the NDA group as well as external stakeholders.

The NDA has two subsidiary companies, RWM and LLWR Ltd, which specialise in waste disposal. Their work directly underpins decommissioning on NDA sites and other UK organisations that produce radioactive wastes.

The aspiration is to see a wider range of both treatment options and disposal routes developed, supporting more efficient delivery of the decommissioning mission.

Disposal is the endpoint but decisions made even before waste arises, and throughout the whole lifecycle, are vital to ensure all treatment, packaging and storage decisions reflect the best and most effective practices.

Waste arising from decommissioning is extremely diverse, ranging from lightly contaminated metal or rubble that can be safely recycled, to highly radioactive materials that require layers of shielding plus the protection, over many thousands of years, provided by a repository located deep underground.

If waste is assessed according to risk rather than strict radiological classification, decision-making on the eventual disposal routes can be more flexible from the outset. Prior to disposal, a greater range of treatment, packaging and storage alternatives can also be considered, in line with the Waste Hierarchy that prioritises environmental sustainability.

A risk-informed approach allows for more pragmatic, proportionate solutions to be identified from initial characterisation onwards. This also requires integrated planning by all organisations involved in waste management, from producers to providers of disposal services, suppliers and regulators.

The IWM Programme will lead to greater availability of options ensuring only waste requiring a GDF will be consigned to the facility.

### The benefits

The benefits of the IWM Programme and closer collaboration include:

- working with waste producers early in the waste lifecycle and characterising at the right time will allow us to form decisions on the waste routes required and to plan accordingly from the outset
- improved co-ordination of transport planning
- availability of the right infrastructure to support waste treatment and processing
- standardisation of approaches to waste treatment and packaging, delivering cost reductions
- a range of waste routes open and available in the timescale that they are required, including on-site and off-site waste management opportunities
- shared learning and experience, enhancing efficiencies across the NDA group and other UK waste producers or suppliers
- future activities mapped out with greater confidence, enabling improved supply chain planning and involvement



The UK's main facility for the disposal of Low Level Waste (LLW) is managed by LLWR Ltd. Its engineered vaults receive and treat LLW from across the UK. By volume alone, LLW accounts for the vast bulk of radioactive waste.

LLWR also leads the National Waste Programme (NWP), a sub-programme of the IWM Programme that drives collaboration between partners in the nuclear and defence sectors, power generators, medical and nuclear services companies.

Its waste management services are open to all UK producers of radioactive waste, covering treatment, logistics and disposal technologies.

This enables greater deployment of sustainable options such as metal recycling, compaction, combustion and specialised landfill. These services have successfully opened up new treatment and disposal routes, diverting large volumes of LLW from automatic consignment to the repository and extending its life by many years.



In the UK, planning and delivery of a deep Geological Disposal Facility (GDF) is the responsibility of Radioactive Waste Management Ltd (RWM), working on behalf of the government.

The process to identify a suitable site in England or Wales is currently under way, focused on a voluntary approach and informed discussions with communities who may be interested in hosting a GDF.

RWM also works with producers of radioactive waste to identify optimal packaging methods, ensuring suitability for permanent disposal. Its scientists and engineers provide expertise on waste disposability criteria and on the collation of associated waste records required as part of the facility's long-term safety case.



## An industry approach

With the potential to bring about global export opportunities, greater taxpayer savings and reduce environmental impacts, the supply chain is a vital aspect of the IWM Programme.

The drive to reduce the cost of decommissioning brings the need for new ideas and innovation, as set out in the Nuclear Sector Deal. Working closely with the industry and the supply chain will be crucial in achieving this. In meeting the cost reduction challenge, there will be significant opportunities for the sector to stand together to support growth across the country.

In a cohesive, integrated and co-ordinated approach, our supply chain focus will bring mutual benefits across the whole waste management sector and wider decommissioning industry; from more opportunities to collaborate, to simpler processes and greater shared learning.

The four key themes our supply chain work will consider are:

### **Innovation**

Seeking innovation is at the heart of our IWM Programme. We're developing procurement strategies that will initially involve metal treatments and evolve to our other priority areas of asbestos and characterisation. We are preparing an innovation partnership approach aimed at developing an innovative product, service or initiative which will then be adopted and used as part of the integrated waste management programme of activities.

### **Category Management**

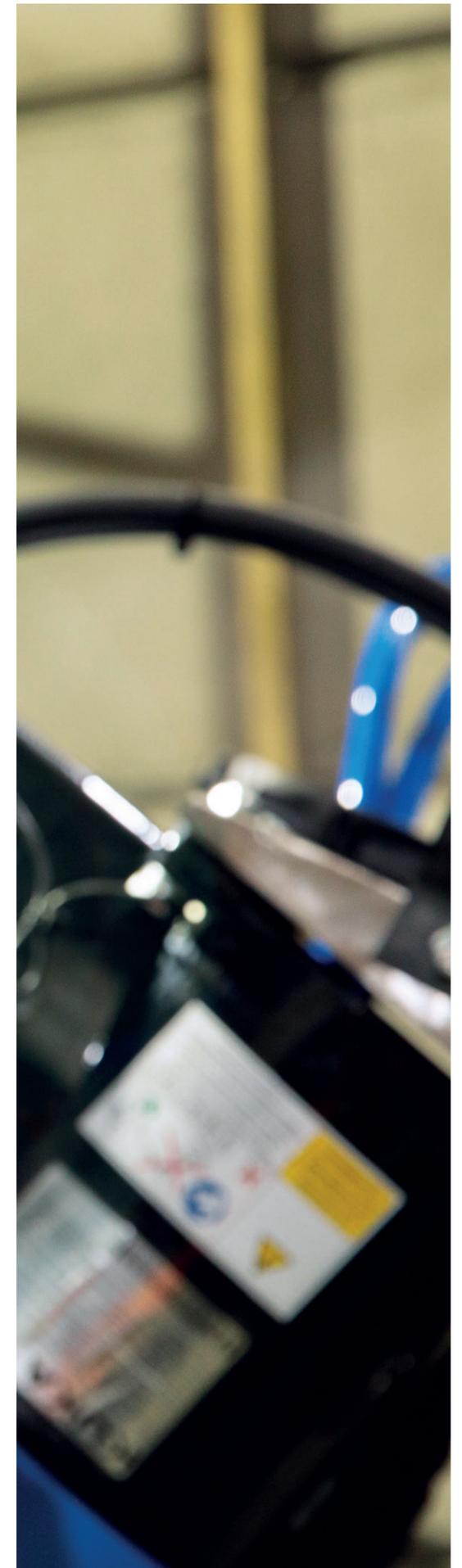
We want to work with the supply chain to set out a group-wide approach to our waste needs. We recognise that we can streamline our demands and set a standardised approach to packaging and containers. Improved waste forecasting will also bring about benefits for the supply chain and we have already developed a model to support this.

### **Optimising our waste supplier relationships**

We're keen to optimise our waste management supplier relationships. Our suppliers are embedded throughout the waste lifecycle, from diversion through to disposal. We will map out our interactions and work with these relationships to see how we can add more value and work together to develop solutions to deliver the challenges laid out within the UK government's nuclear sector deal.

### **Sustainability of supply chain activities**

We will develop an internationally-recognised programme which will give our suppliers visibility on a global stage. New ways of working, new treatment approaches and pioneering innovations will put us together on an international platform of best class. We will support the development of a UK pipeline for export of services and capability with our suppliers to enable a robust and sustainable future





## Working with our stakeholders



Building and maintaining the trust of our stakeholders will remain a priority for us, particularly as we drive forward a collaborative, life-cycle approach to managing waste across the NDA group.



Working closely with our regulators, communities, supply chain partners and trade unions has helped us achieve many significant milestones across the NDA group. Listening to their views, ideas and concerns better informs our plans.

Seeking ways to work differently, more creatively and more collaboratively will be our approach to adopting integrated waste management and disposal. Effective dialogue will be crucial to the success of the IWM Programme, building support, confidence and trust among all our stakeholders.

Through the IWM Programme, we will work collaboratively with our businesses, industry and the supply chain to open

up new opportunities and demonstrate better value for the taxpayer. This will involve activity such as looking at the potential for shared treatment facilities, common packaging strategies, waste treatment routes and the opportunity for near surface disposal as an option for some lower-hazard or shorter-lived ILW.

This is our foundation year and we are at the start of our IWM journey. We're really excited and we're keen to make it a truly integrated industry approach, so we can all play a part in making our legacy sites safer, sooner.

We are committed to providing confidence to all our stakeholders that their views and input will be considered and valued as part of this engagement,

and in helping to both drive direction, and to influence progress in delivering the objectives we have set ourselves within the IWM Programme.

As we continue to face the challenges brought on by the COVID-19 pandemic, we will harness the most effective communication tools and consultation techniques available. We will do our best to use existing effective and valuable dialogue methods where and when it is safe to do so such as site stakeholder groups meetings. Where necessary, we will establish new platforms for more focused dialogue and to engage with a broad range of stakeholders.



# IWM Roadmap

## 2020

Our immediate activity is on establishing a programme that focuses on industry wide priorities to reduce hazards at our sites. Building the processes and tools that set up the IWM Programme for success, initiating workstreams in a prioritised way.

In line with our One NDA approach, we will collaborate with all of our businesses so that we can drive forward projects and programmes that will really make a difference now and in the future. We will also engage across the sector to seek solutions to challenges we have faced collectively for a long time, such as, characterisation, inventory, packaging, piloting innovation and connecting our decision making across the group.

Immediate focus areas will be creation of the integrated baseline for the programme, progressing key infrastructure projects such as thermal treatment and near surface disposal as well as scope for priority focus areas such as packaging, asbestos and culture change.

## 2025

Having established the programme, we will focus on embedding a significant change to our waste management culture, so that waste is seen as a quality product across the group, managed in a risk informed way.

There will be standard sets of cost-effective packages in place, along with standard designs for encapsulation plants across the group. We will have work ongoing to ensure we achieve our sustainability targets, including zero avoidable waste to landfill.

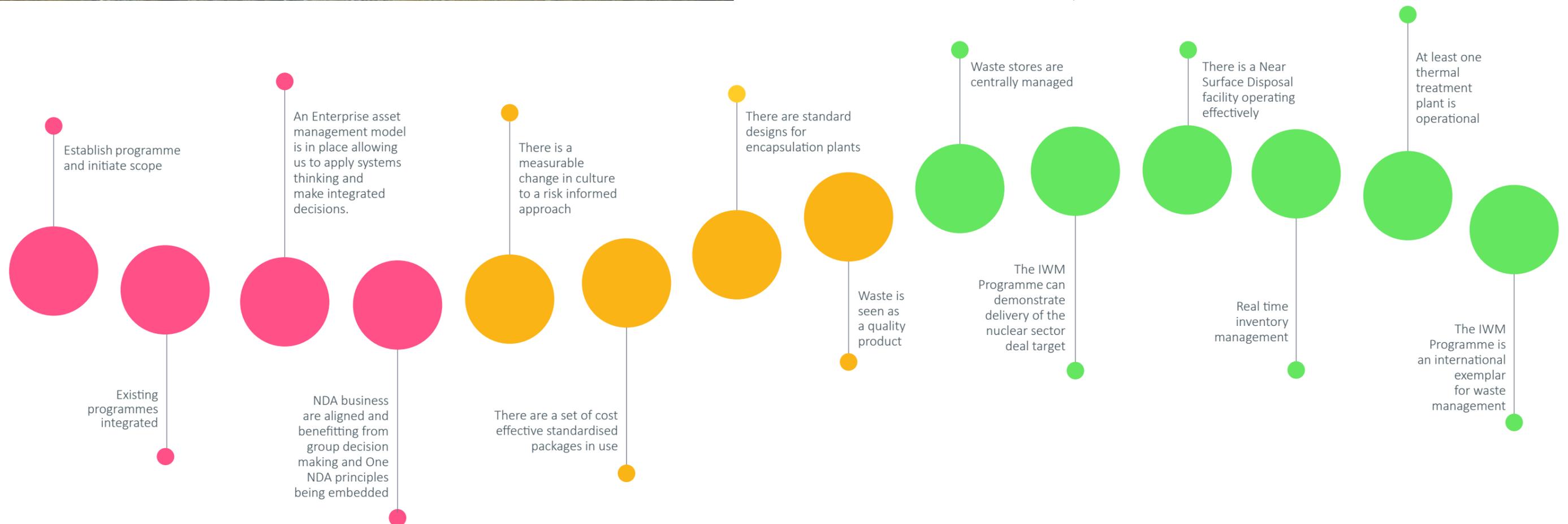
Multiple routes will be available through the supply chain for ILW and problematic waste, and a strategy will be in place for the management of uranic residues.

Research projects will be underway with international partners and there will be a simplified waste management structure established within the NDA group ensuring we are able to work effectively with the supply chain to deliver innovative waste solutions.

## 2035

On behalf of the NDA group, we will be working at the forefront of technology, heralded as an international exemplar for radioactive waste management and delivering solutions both inside and outside of the group.

The UK will be exporting radioactive waste services. Innovation uptake will be the norm as the IWM Programme reaches its endpoint having delivered the change in waste management behaviours and culture, realising the benefits of the One NDA approach and achieving the targets for efficiency in the nuclear sector deal.





© Nuclear Decommissioning Authority 2020. Some images appear courtesy of site licence companies and other organisations featured. Every effort is taken to ensure the accuracy of material or images produced or used by the NDA. However, the NDA cannot guarantee that the images shown will always be current, accurate or complete and does not warrant or endorse the accuracy or completeness of the images.