

# Nuclear Decommissioning Authority

UK Decommissioning Strategy

**Round-table: Innovative  
engineering solutions in the  
history of nuclear industry as a  
prerequisite of sustainable  
development**

Atomexpo 2017

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# Nuclear Decommissioning Authority

- Background to the NDA
- Strategy
- Our sites, challenges & achievements

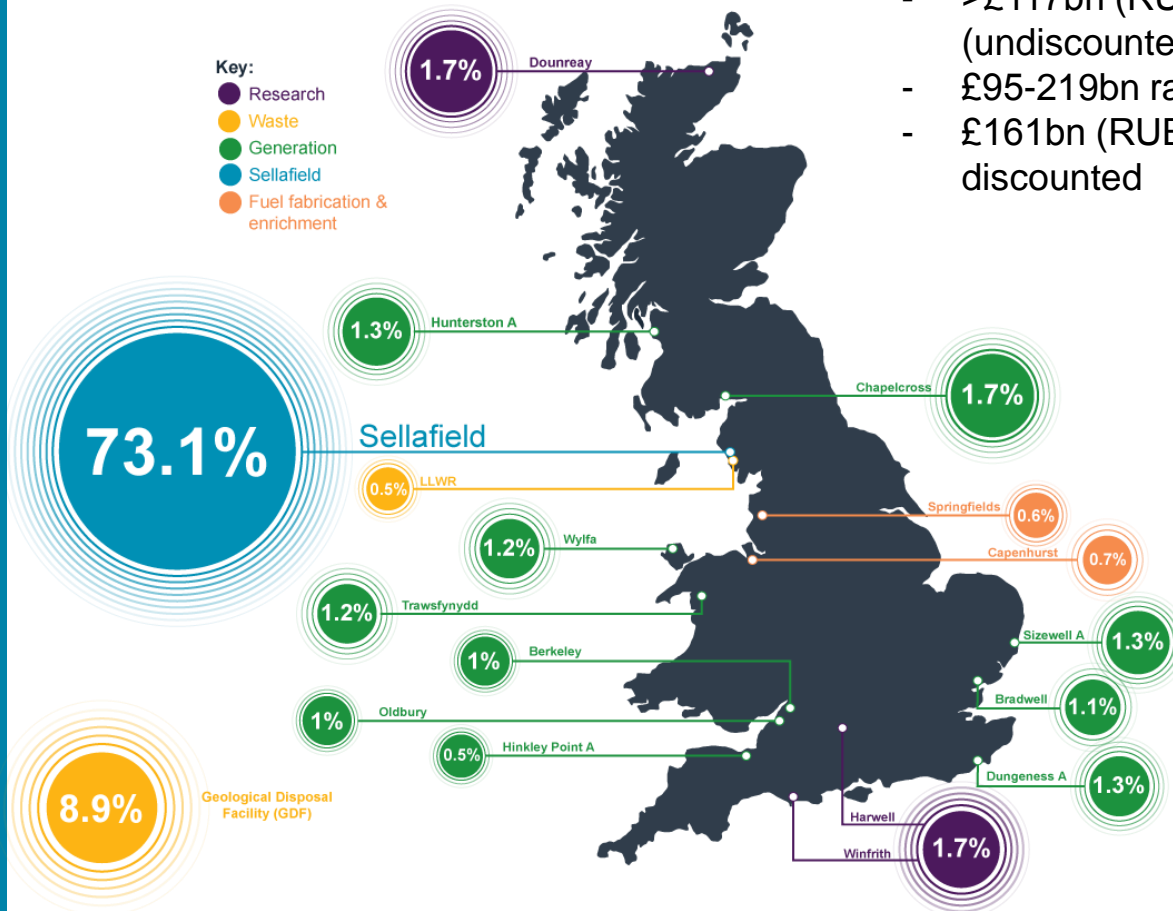


Chapelcross Cooling Towers

# Sites & Liabilities

- Total 120+ year liability:

- >£117bn (RUB8,500bn) (undiscounted)
- £95-219bn range
- £161bn (RUB11,700bn) discounted



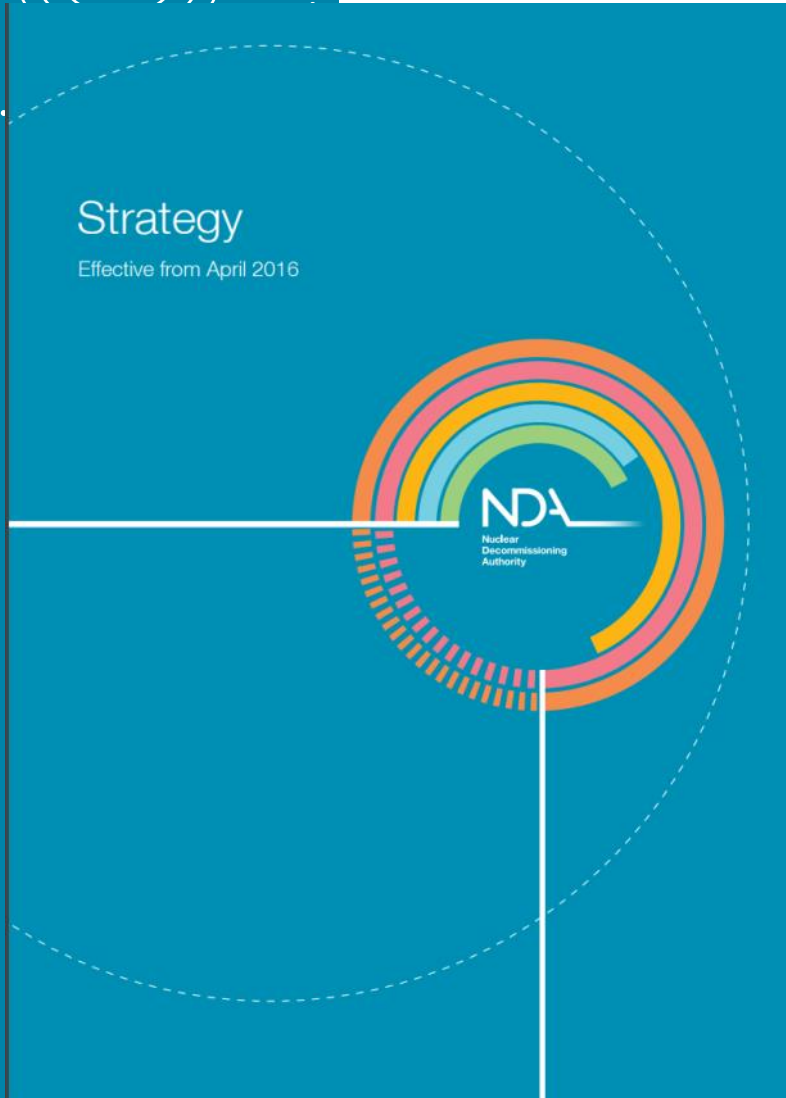


# Strategy Themes and Topics

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# Strategy Themes and Topics



- Strategy produced every 5 years
- Signed off by Ministers
- Site decommissioning & remediation
- Spent fuels
- Nuclear materials
- Integrated waste management
- Critical enablers

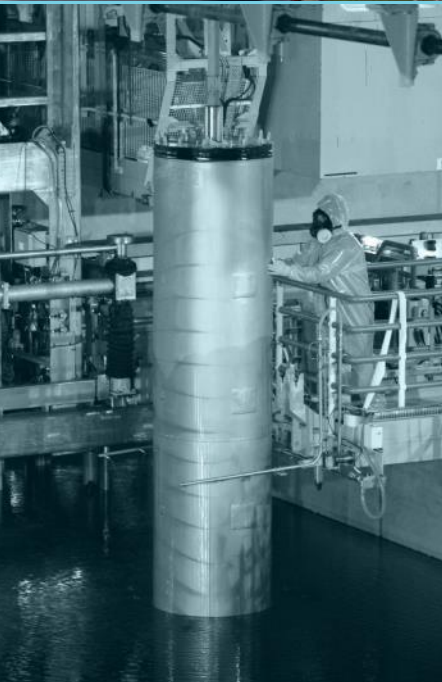
# Site Decommissioning and Remediation

- ***Objective: To decommission and remediate our designated sites, and release them for other uses***
- Key programmes:
  - Proportional Regulatory controls and a desire for similar approach to in-situ management
  - Need for understanding of the broader factors that influence spend
    - e.g. it's not just all about hazard
  - Need for understanding of end state near term affordability vs long term cost trade off
  - Introduction of interim states to describe the journey
  - Availability of disposal routes (e.g. geological disposal) affects the strategy
  - ALARP
  - Underpinning R&D
  - Prompt decommissioning of high hazard facilities
  - Deferred decommissioning of Magnox reactors



# Spent Fuels

- **Objective: To ensure safe, secure and cost-effective lifecycle management of spent fuels**
- Reprocessing brought to a timely conclusion
  - 2018 THORP – all overseas and UK contracts
    - 4,428 tHM overseas origin LWR
    - 5,020 tHM UK origin AGR
  - 2020 Magnox –
    - 55,145 tHM UK, Italy, Japan
- Long-term storage of remaining spent fuel & vitrified HLW, pending disposal
- Return of vitrified HLW to overseas customers
- Consolidate “Exotic” materials from Dounreay to Sellafield for future management



# Nuclear Materials



Plutonium containers



- **Objective: To ensure safe, secure and cost-effective lifecycle management of our nuclear materials**
- Pu arisen from reprocessing operations of UK and overseas fuel since 1950s:
  - Undertaken at Sellafield and Dounreay
  - ~114 tHM UK, ~20 tHM overseas at end of reprocessing
- Dounreay Pu stocks being consolidated at Sellafield:
  - New store at Sellafield
  - Old material to be repackaged
- Pu disposition options development:
  - Short term – safe & secure storage
  - Medium term - re-use options being considered (inc. MOX)
  - Long term - Disposal
  - Underpinning R&D
  - Pu position papers available on website
- Considering U management options
  - ~48,800 t uranics (21,500 t UF<sub>6</sub> tails; 26,000 t MDU, 1,350 t other)
  - Safe & secure storage
  - Deconversion of tails hex at Capenhurst
  - Long term options being considered



# Integrated Waste Management

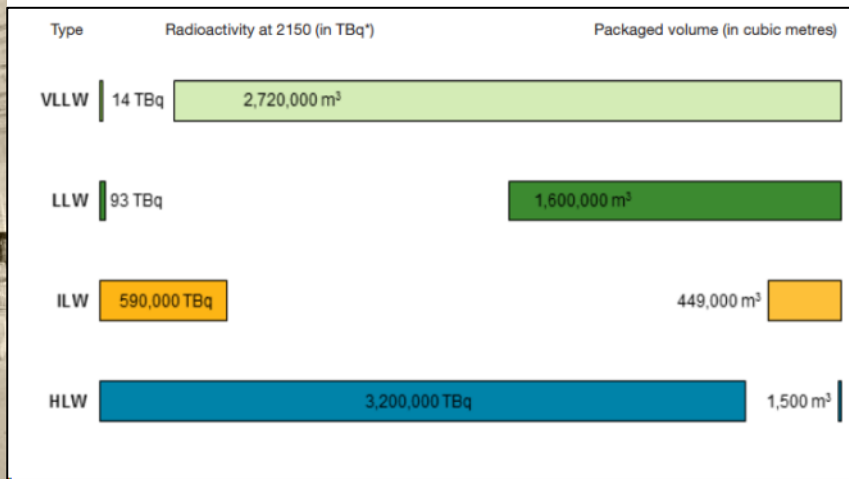
## Waste Management Hierarchy



## Radioactive Waste Management



- **Objective: To ensure that wastes are managed in a manner that protects people and the environment, now and in the future, and in ways that comply with government policies and provide value for money**
- Application of waste management hierarchy:
  - VLLW to industrial landfill
  - LLW to near-surface national facility
  - ILW, vitrified HLW, spent fuel – geological disposal
  - Overseas vitrified HLW returned
- In addition covers liquid & gaseous discharges, plus non-radioactive waste (e.g. asbestos)
- Considering options
  - A new near-surface facility for LLW and short-lived ILW
  - “Intermediate depth” disposal for reactor wastes



Packaged waste volumes (2150)



# Critical Enablers

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- R&D
- People (including skills and capability)
- Supply Chain development
- Socio economics
- Public and Stakeholder engagement
- Health, Safety, Security, Environment and Quality
- Asset Management
- Contracting
- Information Governance (Information and Knowledge Management)
- Transport & Logistics
- Revenue Optimization
- International Relations
- Land and Property Management

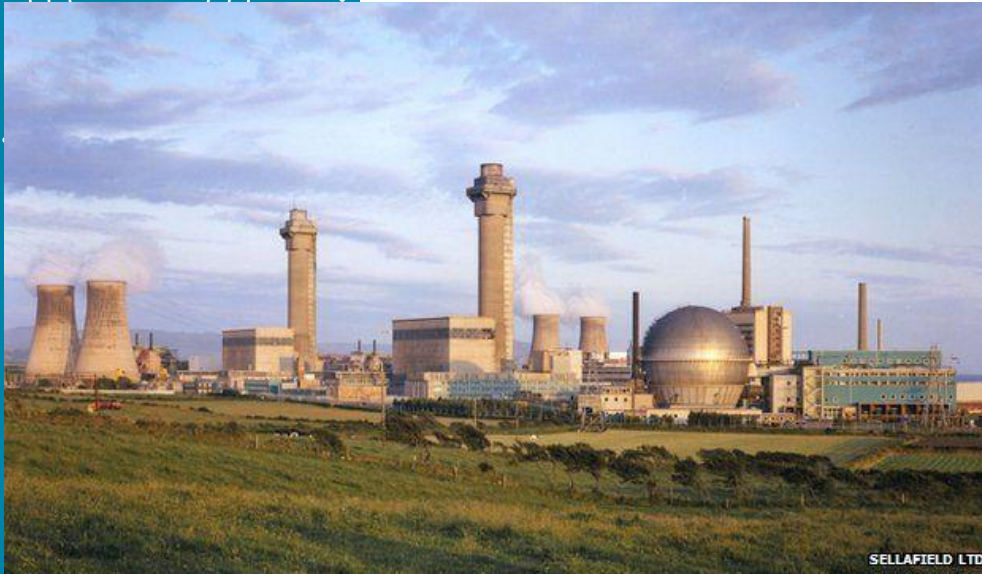
# Sellafield



Sellafield Ltd



# Sellafield skyline change



SELLAFIELD LTD



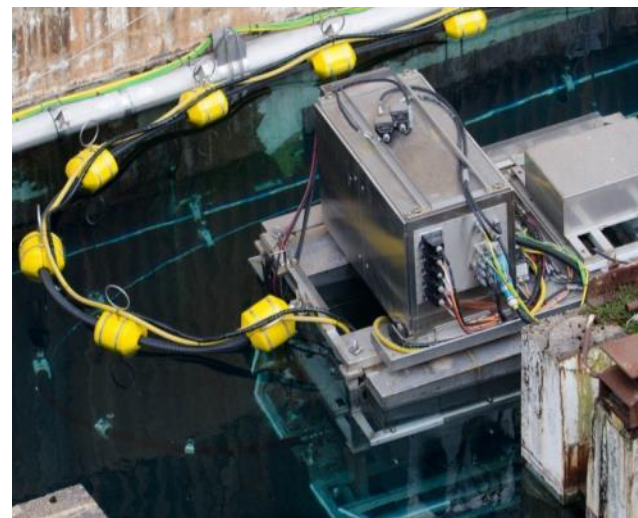
Calder Hall cooling towers demolished 2007

Windscale Advanced Gas-Cooled Reactor decommissioned



# Sellafield Progress – Legacy Ponds & Silos

**Pile Fuel Cladding Silo:** installation of steel doors to allow access to retrieve the waste: James Fisher Nuclear, Shepley Engineers, Bechtel, Cavendish, BMT



**First Generation Magnox Storage Pond:** First sludge retrievals completed from the pond Nuvia, Amec, Hertel & Cavendish



**Magnox Swarf Storage Silo:** a breakthrough in the management of ILW storage is set to accelerate progress and save hundreds of millions of pounds



**Pile Fuel Storage Pond:** bulk stocks of fuel removed = hazard cut by 70%

# Dounreay



# Dounreay – achievements

- Dounreay contract firmly embedded and delivering change
- 2 LLW vaults of 6 completed
  - 175,000m<sup>3</sup> total capacity
- Dounreay Fast Reactor (DFR):
  - Pond drained and decontaminated ready for demolition.
  - 57 t NaK destruction
  - New equipment installed to remove breeder fuel
- Prototype Fast Reactor (PFR)
  - 1500 t Na removed and disposed
- Materials test reactor decommissioning complete by 2018
- Shaft & Silo
  - 65m deep x 4.6m d
  - Waste retrieval starts 2024

New Low Level Waste Facility



Shaft & Silo



PFR clean-up



NaK destruction



Demolition work





**Berkeley in operation**



**Berkeley decommissioning**



**Bradwell Safestore - before cladding**



**Bradwell Safestore - cladding complete**



# Magnox achievements



Chaplecross Asbestos strip



Harwell building demolitions



C&M



- **Magnox stations**

11 sites

1956 Calder Hall opens

Dec. 2015 Wylfa closes

1,100 TWh generated

- **All Magnox former generating sites are in transition through the following phases:**

**Defuelling** – removal of fuel from reactor and transported to Sellafield for reprocessing – all apart from Wylfa

**Care and Maintenance (C&M) preparations** – removal of hazards such as sludges/ resins/ asbestos

**C&M** – reactor buildings & ILW store are left in a safe state until Final Site Clearance – many decades

**Final Site Clearance** – Provision of a GDF will enable final decommissioning of the sites to take place

- **Winfrith**

- 7 of 9 research reactors decommissioned

- **Harwell**

- 11 of 14 research reactor decommissioned

- (Many other research university and industrial research reactors decommissioned – 1 remaining)

# The NDA Estate - LLWR

- Low Level Waste Repository near Drigg has operated since 1959
- LLW is disposed of in engineered concrete vaults
- Key emphasis on recycling and reusing material to reduce the volumes being disposed of at LLWR
- VLLW to specially licenced landfill
- Application of Waste Management Hierarchy:
  - 2009 – 95% of LLW disposed of / 5% diverted
  - 2016 – 10% of LLW disposed of / 90% diverted
  - 100 year lifetime (including Nuclear New Build)



## Waste Management Hierarchy





<https://www.gov.uk/government/organisations/radioactive-waste-management>

# NDA Supply Chain Event 2017

Event City, Manchester - 2 November 2017

<http://www.decommsupplyevent.co.uk/>



*Further  
announcements  
soon*





# Links

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- <https://www.gov.uk/government/organisations/nuclear-decommissioning-authority>
- <https://www.linkedin.com/company-beta/70264/>
- <https://nda.blog.gov.uk/>
- <https://twitter.com/ndagovuk>
- <https://www.youtube.com/user/ndagovuk>
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