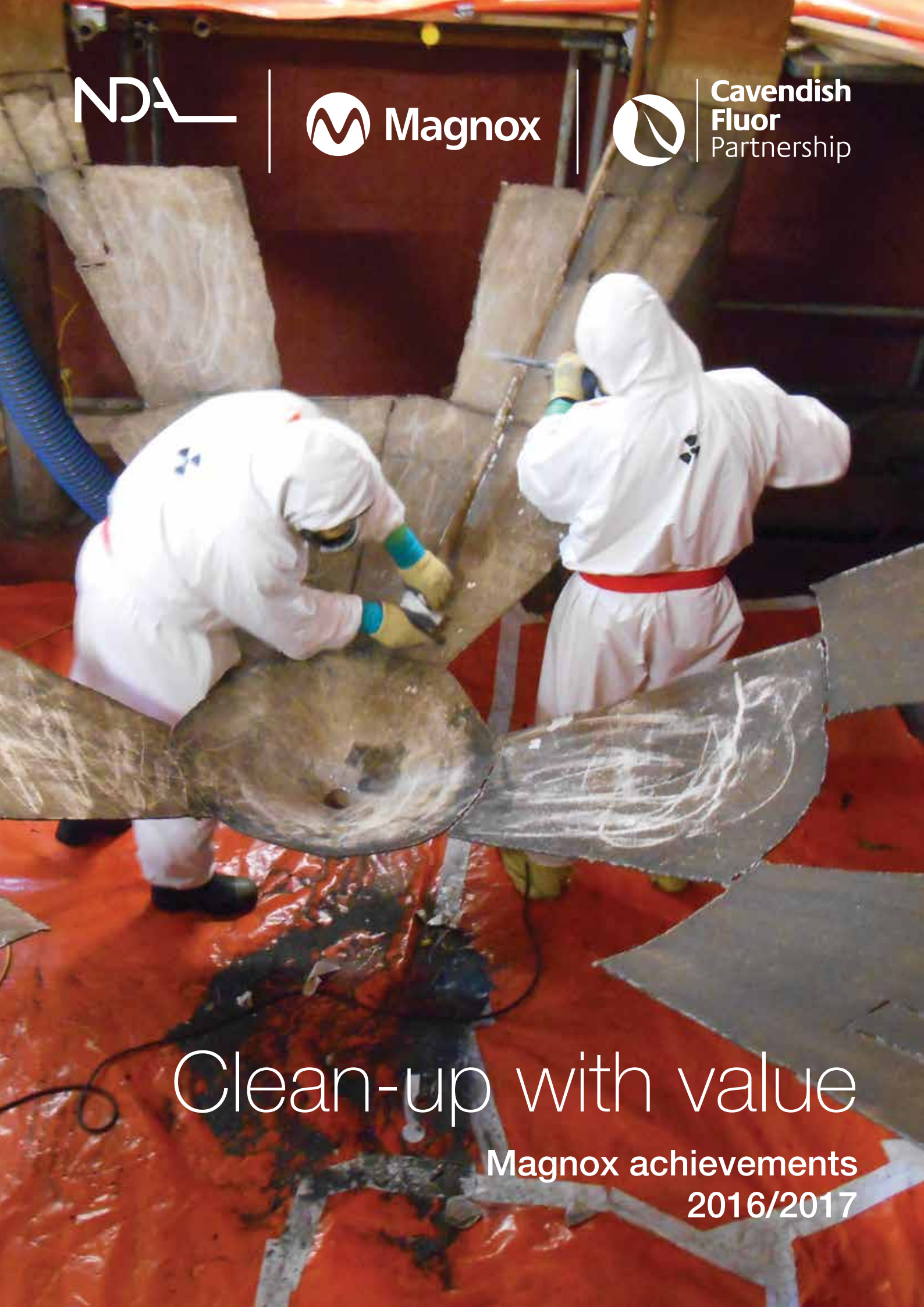


NDA

Magnox



Cavendish
Fluor
Partnership



Clean-up with value

Magnox achievements
2016/2017

Introduction to our achievements

The last two years have seen enormous change at Magnox as we have reshaped the business to deliver better value, and the hard work is now paying off. This short review of our achievements in 2016/17 highlights some significant steps forward in safely decommissioning the sites in our care.

A key feature of the last 12 months has been embedding and building on the programmes approach, which focuses on capitalising on sharing the learning across sites to minimise our delivery costs. We are rapidly approaching site closure at Bradwell, and the lessons learned in

accelerating that site will ensure we can repeat its successes elsewhere.

Decommissioning the Magnox estate safely and securely is a task which we carry out responsibly, with proper regard for the environment and the communities in which we operate. I'm very proud that we've managed to make continued progress while also making substantial savings for the taxpayer.

This brochure can only show some of the challenges which have been overcome to meet our decommissioning milestones but I want to give full credit to the Magnox workforce, whose passion and determination to succeed has taken us to this point and will take us beyond.

Kenny Douglas, Managing Director



Bradwell



Bradwell Site successfully disposed of all its fuel element debris (FED) waste. This is an important step towards the site's planned closure.

Innovative techniques were used including dissolving the material in acid and exploring new options for disposal of the waste. The result is a reduction in hazards on site and shortening the FED treatment project by more than a year.

The site's dissolution plant treated 65 tonnes of FED by dissolving the waste in an acid, separating the radioactive materials and reducing the volume of solid waste by more than 90 per cent.

Through careful monitoring, more than half of the FED at Bradwell was reclassified as 'suitable for disposal as low level waste (LLW)' in a collaboration between Magnox, the Nuclear Decommissioning Authority, regulators, the Low Level Waste Repository (LLWR) and a specialist contractor.

More than 140 tonnes of FED has now been sent as LLW for treatment and eventual disposal at the LLWR, saving around two years of dissolution operations and £29 million for the UK taxpayer.

Bradwell Site successfully demolished its ponds complex, which was used during electricity generation to cool and store spent nuclear fuel underwater after it was taken out of the reactors.

Conventional demolition methods were used to take down the redundant buildings, after 10,000m² of walls and floors were decontaminated.

The remaining ponds buildings will now be enclosed in weatherproof cladding ready for care and maintenance.

“Decommissioning the Magnox estate safely and securely is a task which we carry out responsibly, with proper regard for the environment and the communities in which we operate.”

Kenny Douglas, Managing Director



2,900 drums

Nearly 2,900 drums of FED were retrieved from highly contaminated waste vaults

972m²

972m² of vault surfaces have been decontaminated – equivalent to five tennis courts

2.5km of pipework

More than 2.5km of pipework was removed and more than 120 tonnes of metal waste was recovered and disposed of



**COMPLETED
AHEAD OF
SCHEDULE**



Oldbury

All low level waste pond skips have been removed and transferred for temporary storage at Oldbury Site.

The skips will remain in storage while the potential of co-disposal with other waste is evaluated. More than 100 skips were removed in challenging radiological conditions to allow decommissioning to continue in the pond.

The redundant fuel skips were once used for storing fuel elements after they had been inside the reactor, during generation.

Prior to their removal, 52,000 fuel elements were extracted from the skips, leading to 286 flask dispatches. All of this work was completed four months ahead of schedule.

The team will now focus on removing larger pieces of equipment and filters from the pond.

52,000
52,000 fuel elements were extracted from the skips, leading to 286 flask dispatches to Sellafield

Wylfa Site continued to focus on removing its highest hazard with a concerted effort during 2016/17 to progress the defuelling programme.

Generation ceased at the end of 2015 and, as the last Magnox site with spent fuel, defuelling both reactors safely is a key priority.

The site faced many challenges, including three major pile cap equipment failures which took thousands of man hours to understand and resolve.

Despite this, the site came out of 2016/17 nearly 35 per cent defuelled, and with the total number of fuel elements to be removed from both reactors at 64,618.

8,744 fuel elements removed from reactor one

103 fuel flasks filled and shipped for reprocessing

8,048 fuel elements removed from reactor two

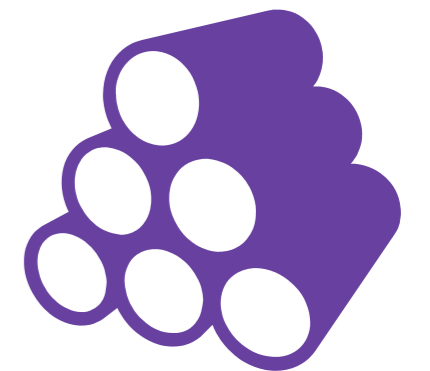


Wylfa

Wylfa Site's effluent discharge line project achieved a major milestone when it was delivered five months ahead of target.

A new twin-walled polyethylene pipe has been installed to discharge effluent 250 metres offshore, enabling the cooling water system to be shut down. It has also minimised the site's impact on the environment, with 70 per cent of the redundant pipeline being recycled.

Decommissioning was carefully managed to maximise clean, reclaimable scrap resulting in just 30 per cent of the redundant pipeline being consigned as waste.



70 per cent
of the redundant pipeline being recycled

Dungeness A

Dungeness A Site has pioneered the use of divers to make significant progress in decontaminating and deplanting its two cooling ponds.

The divers are undertaking a range of activities, including decontaminating pond surfaces and size-reducing equipment and skips previously used to store used fuel. This innovation has allowed the activities to progress more safely, quickly and cost-effectively.

This new method is now changing the way pond decommissioning will be undertaken in future at a number of Magnox sites.

51 skips

have been reduced in size while still underwater

15 tonnes

of pond equipment has been removed from each pond



270 separate dives

undertaken to decommission the ponds

Hinkley Point A



The successful removal of a pipebridge at Hinkley Point A Site saw the site safely deal with a high hazard.

The pipebridge was built in the 1970s to support efforts to clean-up the ponds after an operational incident.

At about 10m high and 70m long, the pipebridge had been open to the elements and had become corroded, posing a significant safety risk.

As a result a huge scaffold structure was erected to enable its removal.

Over 11km
of scaffolding poles to enable safe removal of the pipebridge

Sizewell A



A major environmental hazard has been safely removed from Sizewell A Site.

The polychlorinated biphenyl contaminated oil, once part of coolant fluid used in electrical apparatus during electricity generation, presented a risk to the environment and was one of the greatest hazards left on site.

Removal of this zero tolerance pollutant takes away the need for additional reporting to the Environment Agency, as well as the risk of ground contamination in the area.

Zero tolerance pollutant removed from site

Harwell



Harwell Site's liquid effluent treatment plant has undergone a dramatic transformation.

The office and welfare accommodation has been demolished. The pump houses have been removed and the medium-level treatment plant has been decontaminated and demolished. The work has cleared much of the infrastructure that has been in operation for 60 years.



The construction of the intermediate level waste (ILW) store is underway at Harwell Site.

With foundations and base slab finished, 25 shield walls, each 0.5m thick, will be constructed from concrete.

Once complete the store will be 72m long, 30m wide and 14m high and will house a 55-tonne overhead crane, and have the capacity to safely store 484 boxes of ILW waste.

1,000m³ of concrete used to construct base slab



50 shipments of very low level waste and metal sent for recycling

Berkeley

350 tonnes of fuel element debris originally held in vault two

more than

61 tonnes

now removed



The team at Berkeley Site has continued to fill ductile cast iron containers with intermediate level waste from the site's vaults.

Through operational experience better levelling and packaging techniques have been developed that could reduce the number of containers sent for disposal by 20, saving £2.9 million for the UK taxpayer over the project's lifetime.

Hunterston A



Hunterston A Site hit two major waste milestones, moving the site forward on its critical path to care and maintenance.

The first active drum of waste from the wet intermediate level waste retrieval plant (WILREP) was retrieved, encapsulated and transported to the intermediate level waste store, followed by the 500th package from the solid active waste bunker retrieval (SAWBR) project.

These milestones are a big step forward in being able to safely treat and store waste at Hunterston A Site.

Three out of five waste vaults now empty

Chapelcross



The team at Chapelcross Site has continued to strip all sixteen, 100-foot-tall heat exchangers of external steelwork.

A massive 468 tonnes of metal, about the weight of 78 African elephants, has been sent for recycling through local metal merchants.

A giant crane dominated the skyline this year as part of the project. The crane weighed 12 tonnes and was the largest on site since construction began in the late 1950s.

Chapelcross Site delivered a major milestone with the manufacture and factory trial of its zeolite skip retrieval equipment.

The project will remove all 50 zeolite skips currently stored in a site pond - placing each one into a shielded overpack, drilling and draining the free liquid and then transferring the skip into a 6m³ concrete box.

The box will then be filled with grout and capped with a concrete lid, prior to long-term storage.

The skips were used to reduce caesium levels in the pond during generation.



Progress has been made to completely isolate Winfrith Site's steam generating heavy water reactor (SGHWR) from all of the plant and equipment that once allowed it to operate.

Innovative techniques were developed to remove the reactor's steam risers and feeders, including the use of diamond wire saws deployed semi-remotely to cope with radiation hotspots.

During operations, steam risers and feeders helped to distribute water through the reactor to produce steam and recirculated the condensed water.

Work can now begin on preparing to remove the reactor core, demolition of the SGHWR complex and eventually returning the site to heathland.

1.5km
of risers and
feeders, weighing
17.2 tonnes,
removed

Winfrith



Demolition of the external active sludge tank (EAST) has been completed at Winfrith Site.

The EAST was originally created to hold sludges from SGHWR before they were processed.

Prior to demolition, significant preparatory work was carried out including the decontamination of the EAST ancillary buildings and removal of all services.

**More than
2,600 tonnes**
of concrete and
asphalt removed and
recycled



Trawsfynydd Site's skyline has changed dramatically with the demolition of the stores complex, associated workshops and three-storey administration block.

A 'dust buster' was used during the work to dampen and suppress the dust to minimise environmental impact. A daily convoy of skips removed the demolished materials for recycling off site, with the concrete and brick remaining on site for reuse.

1,200 tonnes of material sent off site including:

- 500 tonnes of steel
- 400 tonnes of general waste
- 90 tonnes of asbestos
- 33 tonnes of plasterboard

6,000 tonnes of crushed concrete

34,245 man-hours worked

Fuel element debris (FED) is being retrieved from the north vault at Trawsfynydd Site for the first time in the site's history.

The breakthrough was made following the removal of a concrete plug weighing two tonnes – about the same as an Indian rhinoceros.

The achievement follows more than five years of meticulous preparation.

2,511 tonnes of FED waste retrieved so far



Almost 22,000 employee training sessions were delivered across the company in a continued drive to support individual development.

To address skills shortages, more graduates have been sponsored by Magnox through the Nuclear Decommissioning Authority's programme.

And Magnox introduced a new Project Delivery Process and Working Charter, underlining the need to work collaboratively together to deliver success.

The Charter recognises that supportive behaviours are as important as technical expertise in helping to make improvements, which will better equip us in enacting our mission to close the sites.

A year of strong business performance

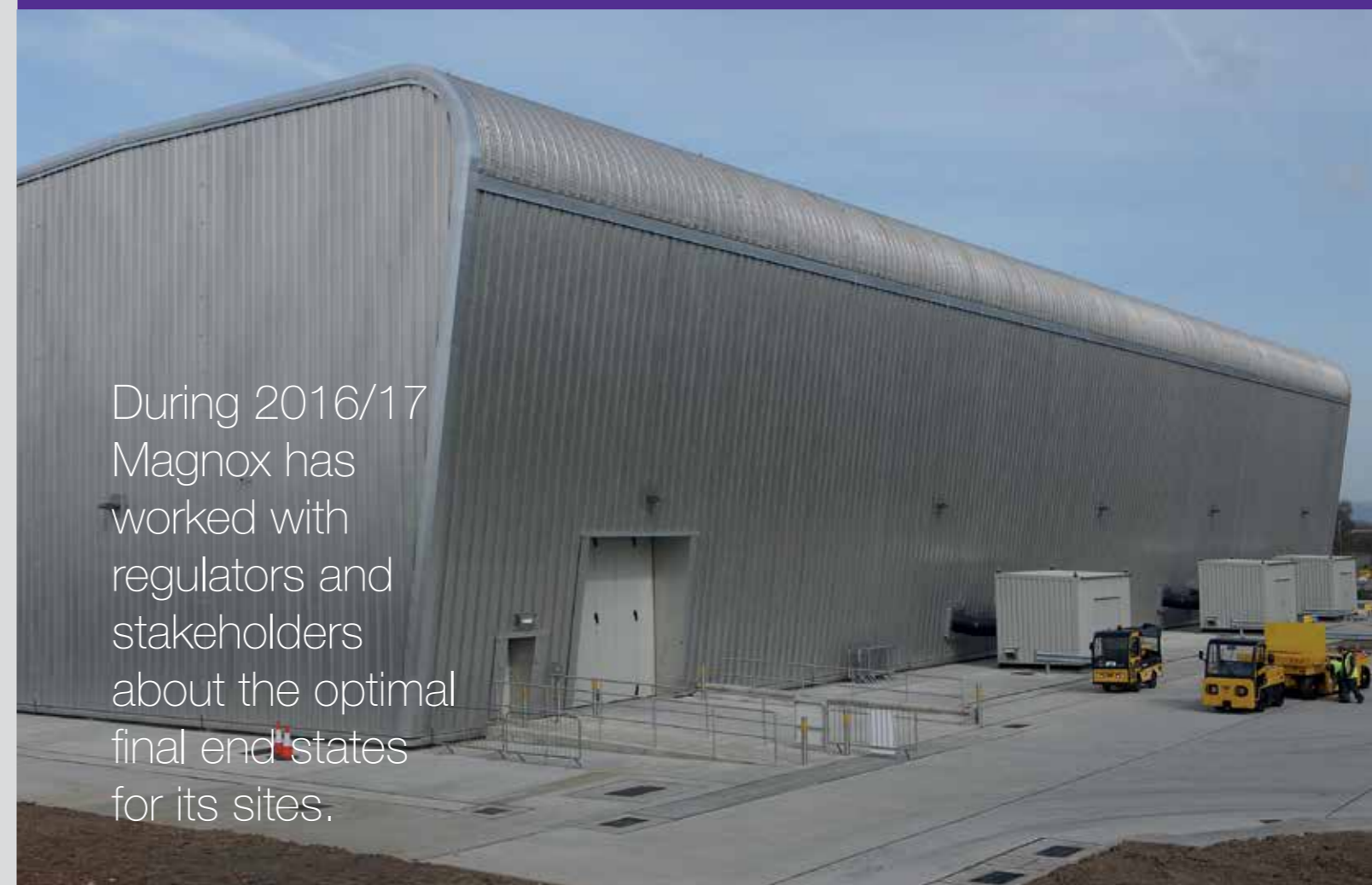


The Nuclear Decommissioning Authority and the UK taxpayer invested £502.6 million in cleaning-up Magnox sites during 2016/17, delivering innovation to maximise decommissioning delivery.

Of this, £265 million was spent in the supply chain, with 29 per cent channelled through small and medium-sized enterprises.

A total of £113.7 million was spent on decommissioning; £134.3 million on waste management and £83.9 million on asset management; with other spend allocated to electricity generation at Maentwrog, defuelling and enablers.

Organisational restructuring of the business was delivered creating savings in excess of £90 million



During 2016/17 Magnox has worked with regulators and stakeholders about the optimal final end states for its sites.

We have led an industry trial of new regulatory guidance, considering options including the in-situ disposal of existing radioactively contaminated structures and some radioactive wastes - typically these structures and wastes have radioactivity levels similar to very low level waste.

During the year Magnox was recognised as being at the forefront of the nuclear industry in having updated safety case processes appropriate for decommissioning work.

The outcome of a project to transform our documentation, allowing decommissioning and risk reduction to be delivered more quickly, is a £60 million saving, while still ensuring that safety remains the top priority.

More than **500 tonnes** of asbestos removed from Magnox sites – enough to fill 40 double decker buses

Following a campaign to optimise accommodation and switch-off unnecessary plant, Magnox saved:

- 1,570,000kWh of electricity – enough to power 500 homes every day for a year
- 1,620,000kWh of gas – enough to heat 100 homes every day for a year

Almost 1,000 tonnes of metallic low level waste (LLW)

successfully recycled, resulting in significant cost savings

Almost half of Magnox's LLW sent to suitably permitted landfill

Corporate



Retrieval, packaging and management of waste has featured highly in 2016/17.

The move to consolidate the interim storage of intermediate level waste (ILW) in regional stores means the need to construct a store at every site has been avoided.

This has generated safety and environmental benefits, as well as around £15 million in build, operation and maintenance costs per store.

During the year planning applications were approved to move ILW to Bradwell and Berkeley Sites, making use of existing facilities. And the

introduction of a new waste package, the 6m³ concrete box which is a more cost-effective, but safe and secure packaging solution, has completed Magnox's waste strategy developments.

Working in partnership with the Low Level Waste Repository Limited (LLWR) and a key commercial radioactive waste treatment company, Magnox also opened up a new disposal route for some fuel element debris, saving space within its stores.

Nearly 7,000m³ of low level and very LLW dealt with – the same as three Olympic-sized swimming pools

Over 90 per cent of all waste diverted away from LLWR

Magnox socio-economic scheme Funding awarded 2016-2017

£724,279
142 organisations



Supporting communities

Magnox is committed to providing and enabling socio-economic support for the communities in which it operates. Administered by Magnox on behalf of the Nuclear Decommissioning Authority, the Magnox socio-economic scheme helps initiatives that improve education and skills provision or support local employment, social infrastructure or economic diversification.

Funding awarded by region



Scotland:	£32,121	South East:	£205,544
Wales:	£453,603	South:	£10,048
South West:	£22,963		

Every £1 invested by the Magnox socio-economic scheme has secured £9 from other sources.

Funding objectives

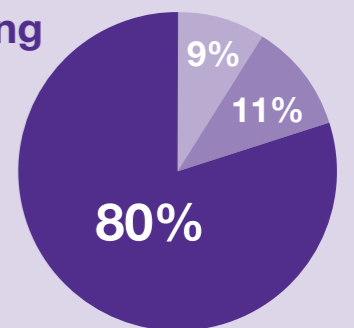
Magnox socio-economic scheme funding is available on three levels to help achieve its aims:

- AIM 1**
Mitigating the socio-economic impact of decommissioning over £10,000
- AIM 2**
Helping to build sustainable communities up to £10,000
- AIM 3**
Being a good neighbour up to £1,000

% of funding awarded

by funding aim

- £576,721
- £83,068
- £64,490



The Magnox socio-economic scheme has secured £6,712,762 match funding and supported



