



National Audit Office

Report

by the Comptroller
and Auditor General

The Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority: progress with reducing risk at Sellafield

Key facts

£3.3bn

Total expenditure of the Nuclear Decommissioning Authority (NDA) in 2017-18, including £1.2 billion in revenue

61%

Of the NDA's spend in 2017-18 was spent at Sellafield

£0.15

Amount of every pound spent by the NDA in 2017-18 was on major projects at Sellafield

17	nuclear sites that the NDA is responsible for operating, decommissioning and cleaning up under the Energy Act 2004
8	of the 10 most hazardous facilities on the NDA estate are at Sellafield
£121 billion	estimated undiscounted total cost of the NDA's clean-up mission up to 2120, of which Sellafield accounts for £91 billion
70%	reduction in radioactive content in the pile fuel storage pond after Sellafield Limited completed the removal of nuclear fuel from the pond in March 2016
14	major projects at Sellafield with expected lifetime costs of more than £100 million each or that are novel or contentious
£6 billion	total expected spend on major projects currently in design or under construction at Sellafield
£483 million	Sellafield Limited's spend on major projects in 2017-18
£586 million	the sunk costs of three major projects cancelled at Sellafield since 2012 after the NDA says it found more cost-effective strategies

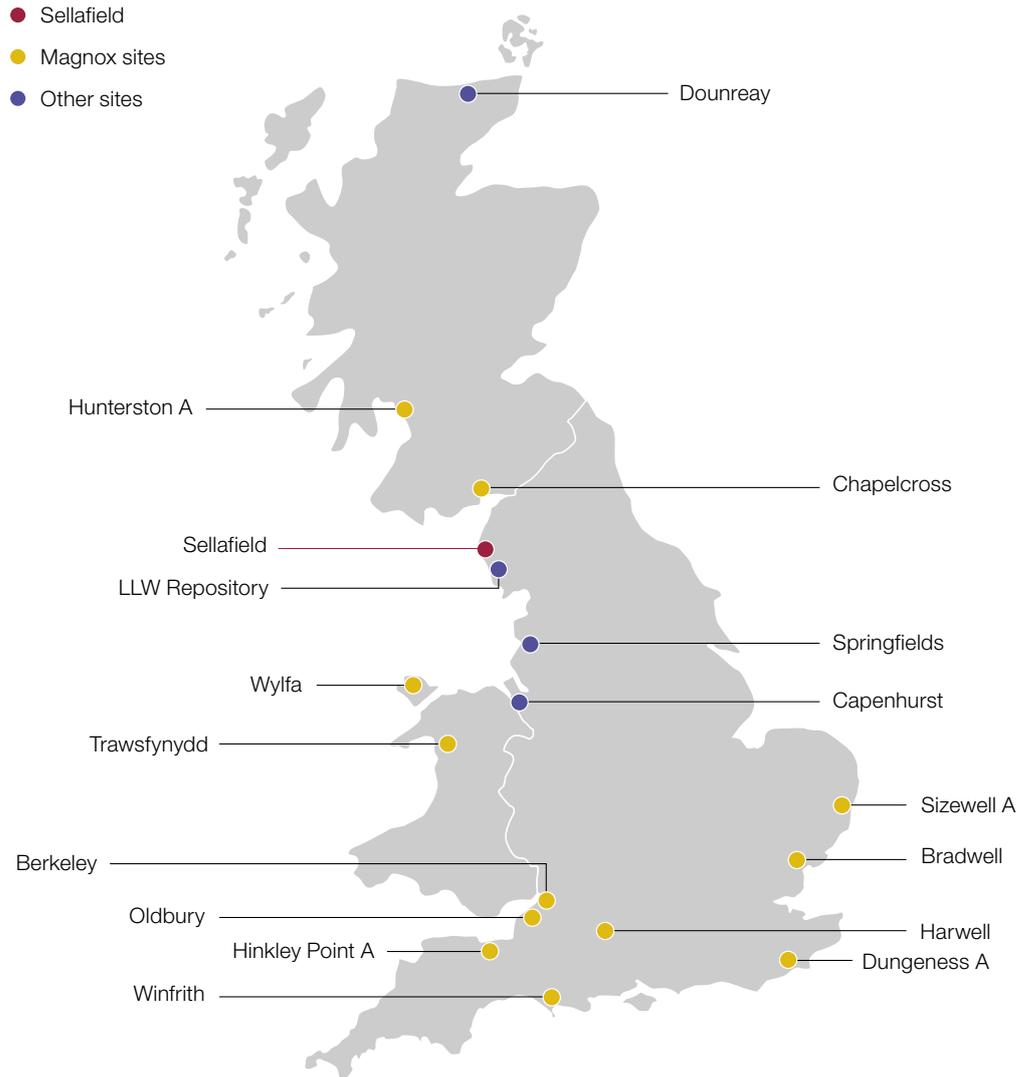
Note

1 All 2017-18 expenditure data are pre-audit figures.

Figure 1

The Nuclear Decommissioning Authority’s estate of 17 sites

The Nuclear Decommissioning Authority is responsible for the operation, decommissioning and clean-up of 17 nuclear reactor and research sites



Note

1 There are 12 Magnox sites, of which 10 are power plants and two are research sites (Winfrith and Harwell). The other sites include: Sellafield; LLW Repository, which treats and disposes low-level radioactive waste; Dounreay is a nuclear site that is being decommissioned; Springfields produces nuclear fuel; and Capenhurst manages and stores nuclear materials.

Source: National Audit Office analysis of the Nuclear Decommissioning Authority’s data

Summary

1 In 2005, the Nuclear Decommissioning Authority (NDA) was established as a non-departmental public body under the Energy Act 2004. The NDA is responsible for operating, decommissioning and cleaning up 17 nuclear reactor and research sites in the UK (**Figure 1** on page 5). It is sponsored by the Department for Business, Energy & Industrial Strategy (the Department). UK Government Investments (UKGI) oversees the NDA's governance and performance on behalf of the Department. The safety and environmental risks associated with the NDA estate are regulated by the Office for Nuclear Regulation (ONR), the Environment Agency, the Scottish Environment Protection Agency and Natural Resources Wales. The NDA sets an estate-wide strategy, allocates budgets and monitors performance across all 17 sites. Site licence companies (SLCs) carry out the work on each site according to lifetime plans agreed by the NDA.

2 The NDA's work includes reprocessing spent fuel from old nuclear reactors, managing and storing nuclear materials, removing and managing contaminated waste, and decontaminating and dismantling legacy facilities. The NDA estimates that this work will be completed by 2120, at a cost of £121 billion, but these estimates remain highly uncertain. Sellafield is the largest and most hazardous nuclear site on the NDA estate, accounting for 75% of the long-term cost estimate. Sellafield accounted for 61% of the NDA's total spend of £3.3 billion in 2017-18.

3 Sellafield also provides important services to the UK nuclear industry such as reprocessing spent fuel from nuclear facilities currently in operation, and storage facilities. The long-term cost estimate for Sellafield covers the expected cost of these services, as well the cost of decommissioning and cleaning up these and other facilities that deal with legacy waste and contaminated materials. The NDA expects the Sellafield site to remain operational until 2120.

4 Sellafield's most hazardous facilities include four legacy ponds and silos that hold large quantities of nuclear materials, and the stores that house most of the UK's plutonium inventory. Sellafield Limited, the SLC that manages the day-to-day work on the site, has put in place five long-term programmes to deal with these hazards. These programmes will take decades to complete, as they require the construction of new plants and the development of bespoke technologies to retrieve and handle waste. For example, the Magnox swarf storage silo, operational since 1964, contains waste sludge from legacy nuclear operations that is both radioactive and corrosive. The facility is expected to pose a significant hazard until 2050.

5 In January 2015, the NDA announced the termination of its contract with the private sector consortium that managed Sellafield Limited, a decision approved by the then Department of Energy & Climate Change and HM Treasury. As of April 2016, Sellafield Limited became a wholly owned subsidiary of the NDA.

6 We have previously reported on the NDA's progress with reducing risk and hazard on the Sellafield site. Overall, we found that the NDA had struggled to understand the full extent of the work necessary to clean up its most hazardous facilities. This contributed to the estimated lifetime cost of the NDA's clean-up mission increasing by 120% (in real terms) between 2004-05 and 2014-15. More specifically:

- in 2012, we found that the NDA's portfolio of 14 major projects at Sellafield was not providing good value for money, with significant lifetime cost increases and delays;
- in 2013, we concluded that the NDA's assurance of reported efficiency savings at Sellafield was moderate;
- in 2015, we reported that costs and delays of major projects at Sellafield had escalated further; and
- in 2017, we reported on the NDA's failed procurement and management of its contract to decommission 12 Magnox sites (see Figure 1).

This report

7 This report builds on our previous findings, and examines:

- the NDA's role, its governance, and the complex challenges it faces in delivering its long-term mission (Part One);
- progress with reducing high hazard and risk at Sellafield, and limitations to faster progress (Part Two);
- the NDA and Sellafield Limited's plans to ensure sustainable progress at Sellafield (Part Three).

8 Our audit approach is set out in Appendix One and our methods are set out in Appendix Two.

Key findings

Progress at Sellafield

9 Since 2015-16, the NDA's estimate of the total future costs of decommissioning activity has stabilised after rising for 10 years, although this estimate remains inherently highly uncertain. Change in the nuclear provision estimate is one measure of the NDA's understanding of its future liabilities and whether it is making progress. Since 2015, the NDA's estimate of the provision has stabilised at around £121 billion after more than doubling (even after adjusting for inflation) between 2004-05 and 2014-15. The NDA considers that the estimate increased during this time because it had developed a better understanding of the scale and nature of the risks and challenges on the site. The range around the estimate remains unavoidably large, but the central estimate has stabilised, which is a step forward (paragraphs 1.18 to 1.21 and Figures 9, 10 and 11).

10 Since 2015-16, the NDA has made progress in meeting significant milestones in reducing high hazards in its legacy ponds and silos. For example, one legacy pond has been emptied of 70% of its radioactive content since March 2016. The NDA has made progress on the pile fuel cladding silo programme, which means it now expects this to be emptied by 2030, six years earlier than it expected in 2015. However, an analysis of annual performance indicators shows that all four legacy pond and silo programmes have delivered less work than the NDA expected in at least three years since 2011-12. The NDA told us that annual delays in the schedule do not necessarily amount to long-term delays. We discuss this further in paragraph 14 below (paragraphs 2.9, 2.10, 2.26 to 2.28 and Figures 13 and 19).

11 Since 2015-16, the NDA has reduced the expected delays in delivering most of its major projects. There are 14 major projects at Sellafield (those with a lifetime cost exceeding £100 million). Many of these are necessary to progress risk reduction in the highest hazard facilities. In 2015, the NDA expected the nine major projects that were under construction or recently completed to finish a total of 439 months later than planned at the design stage (representing a 93% delay). In 2018, the NDA expects the nine major projects that are under construction to complete 165 months later than planned (a 31% delay). An analysis of annual performance against project schedules shows that in 2017-18 most projects delivered their schedule of work. This continues an improving trend that started in 2014-15 (paragraphs 2.18 to 2.22, 2.24, 2.28 and Figures 15, 18 and 19).

12 The NDA expects its major projects to cost more than originally estimated, but to a lesser extent than in 2015. In 2015, the NDA expected the nine projects that were under construction or recently completed to cost 60% more than had been budgeted at the design stage. The NDA, in 2018, expects its portfolio of major projects at comparable stages to cost 29% more than budgeted (£913 million over budget). Annual performance against project budgets shows an overall positive trend, starting in 2014-15. The major projects we examined were delivered on or close to budget in 2017-18 (paragraphs 2.24, 2.28 and Figures 16, 18 and 19).

13 The NDA and Sellafield Limited attribute the improved performance of major projects since 2015 to a number of factors, but they could do more to understand which of these have been most effective. Both the NDA and Sellafield Limited have told us that the new management model has supported better performance by replacing the ‘fee-earning pressure’ of the previous model with a focus on progress towards reducing high hazard and risk. A more integrated approach to risk assessment with the ONR has also helped. Sellafield Limited has introduced measures to improve its delivery of major projects including increasing capability, introducing better project controls, and managing risk and contingency. But the NDA and Sellafield Limited could do more to understand how each of these factors has contributed to improvements in project performance (paragraphs 2.44 to 2.46).

Limitations to performance evaluation

14 Evaluating overall performance at Sellafield is difficult due to a range of factors, but the NDA and central government could do more to understand and explain progress. The complexity, uncertainty and scale of the task, and the bespoke nature of many of the required solutions, mean it is inherently difficult to measure and benchmark the NDA’s progress. These challenges notwithstanding, we found several ways in which the NDA could have done more to clarify progress at Sellafield, and which central government has not sufficiently pursued:

- Reconciling annual performance metrics with long-term milestones is challenging. For example, the pile fuel cladding silo programme has delivered less work than planned in five of the past seven years, yet the NDA expects to reach key milestones for the programme earlier than planned (paragraphs 2.26 to 2.28).
- The NDA set the long-term performance plan for Sellafield in 2014, before the new management model came into effect in April 2016. The assumptions, incentives and risk appetite underlying the performance plan significantly changed during that time. The NDA is reflecting recent progress on the site by updating parts of the baseline through a process called ‘change control’. However, it has no plans to review the entire baseline until 2020, when all reprocessing activity at Sellafield comes to an end (paragraphs 2.38 and 2.39).
- It is difficult to determine whether improved performance is attributable to better planning – through more realistic budgets and schedules – or better delivery. We previously reported that the NDA’s cost and schedule estimates were too optimistic. Correcting this optimism bias in planning will improve measured performance even if there are no improvements in project delivery. The NDA could be clearer about which improvements are most effective, and at what stages of the project lifecycle they occur (paragraph 2.39).

- The NDA has cancelled three projects since 2012 because it says it has found a better, more cost-effective way of making progress at Sellafield. These cancellations have involved significant sunk costs and lost time. For example, for two of these cancelled projects, the NDA identified a more cost-effective strategy that would lead to cost reductions of between £500 million and £600 million and enable waste retrieval to start sooner. However, before their cancellation, the two projects forecast combined cost increases of £2.1 billion and a delay to their expected completion dates of 113 months. The NDA could be clearer in presenting the full sunk costs of any change in strategy, the lessons learned from the problems with the previous approach, and how it intends to evaluate the effectiveness of the new strategy. This would enable the Department and Parliament to assess the overall effectiveness of a change in strategy (paragraph 2.23 and Figure 17).

We have seen no evidence that stakeholders in central government, including HM Treasury, UKGI and the Department, have challenged the NDA to address these issues or, more generally, produced an overall assessment of the NDA's performance since 2015. We also found no clear or shared understanding of what constitutes value for money in nuclear decommissioning and, in particular, how the balance is struck between near-term affordability constraints and long-term value-for-money considerations. This creates challenges for Parliament to understand the basis on which funding and prioritisation decisions have been taken (paragraphs 1.16 and 2.36).

15 Gaps remain in the NDA's assurance of major projects. The NDA's assurance activity is extensive, but its effectiveness is limited because it relies on the assurance systems of Sellafield Limited, which are still immature and under-resourced. The NDA also relies too much on single-point assurance reviews, such as those carried out by the government's Infrastructure and Project Authority (IPA) or using the IPA's approach. These provide 'strategic', high-level assurance at particular points in the project lifecycle. Although a new subcommittee of the NDA Board reviews progress with major projects and programmes to reduce high hazard, the NDA Board does not regularly scrutinise progress on major projects (paragraphs 2.40 to 2.43).

16 The NDA has weakened its assurance of efficiency savings at Sellafield, even though these are central to assessing progress following the change of management model. Under the previous management model, the NDA assured reported efficiency savings because the fees paid to the consortium managing the Sellafield site were based on achieving a minimum level of efficiency savings. After the new management model came into effect in 2016, the NDA changed its approach to assuring efficiency savings. It now looks at the actual cost of the work delivered at Sellafield and whether it is carried out to schedule, compares this to planned delivery, and considers any difference to be efficiency savings. The NDA is aware that this can include non-repeatable savings and 'windfalls' such as a reduction in business rates, which reduce costs but do not reflect more efficient ways of working. Moreover, the NDA and Sellafield Limited do not assure the efficiency savings that Sellafield Limited reports. UKGI and HM Treasury have not challenged or tested these reported efficiency savings, even though they are the main way of measuring the benefits of the new management model and a contributing factor to achieving value for money at Sellafield (paragraphs 3.16 to 3.20 and Figure 23).

Future progress and challenges

17 The NDA and central government agree that making faster progress with reducing high hazard at Sellafield is not constrained by funding. In line with government policy, HM Treasury does not limit the funding available to the NDA to reduce risks deemed 'intolerable' by the ONR. In the 2015 Spending Review, HM Treasury allowed the NDA access to reserve funds to manage volatility associated with fluctuating income from commercial operations; or for new work on high hazard required by changes in safety regulations; or to progress work at Sellafield if all existing flexibilities have been exhausted. However, HM Treasury made clear that access to the reserve is conditional on the NDA and the Department first meeting any additional funding pressures by prioritising spending within their own budgets. The NDA has not sought additional funding from the Treasury Reserve, although in 2015-16 it requested additional funding from the Department when income from reprocessing fell below forecast. For all other NDA expenditure, the government weighs risk reduction and other potential benefits (such as a lower lifetime cost of the NDA's work) against short-term affordability, although the government is not transparent about how it makes these choices (paragraphs 1.13 to 1.16, 2.47, and Figure 6).

18 The NDA says faster progress with reducing high hazard at Sellafield is constrained by other factors, but it has not tested these sufficiently. These non-financial constraints include: the physical limitations of the site; management capacity for decision-making; transport links to and from Sellafield; and workforce productivity. The NDA and Sellafield Limited cannot show what work they have undertaken to test and understand these perceived constraints. An assessment of these constraints could fundamentally affect the strategic decisions the NDA takes on prioritising work and the progress of activity at Sellafield (paragraph 2.48).

19 The NDA has made slow progress with demonstrating how its current work leads to progress against its long-term mission. This would enable it to make better strategic decisions about which activities to prioritise and fund, and to provide a clearer account of the progress it has made and value it has delivered. This is vital for providing assurance to Parliament, and would be particularly valuable during any periods of enhanced scrutiny, such as is currently the case following the failure of the Magnox contract (paragraph 1.22).

20 We identified two further factors that pose risks to the NDA's mission and which undermine accountability:

- **The governance and assurance system around the NDA is not optimised.** The NDA's engagement with central government, including HM Treasury, the Department and UKGI, is complex. The Committee of Public Accounts raised concerns about the effectiveness of central government oversight of the NDA in its February 2018 report on the failure of the Magnox contract. It is understandable that central government would want to enhance its scrutiny of the NDA following the Magnox contract failure, but it is not clear that each of the governance layers is adding value in terms of oversight, assurance or holding the NDA to account for performance.
- **There is a lack of clarity and agreement about the NDA's role.** We found that stakeholders' perceptions of the role of the NDA differ, and this lack of clarity has increased following the decision to bring Sellafield into the NDA as a wholly owned subsidiary in April 2016. Officials at Sellafield Limited told us this has become more of an issue since the failure of the Magnox contract. The NDA has become more involved in influencing operational decision-making at Sellafield, and going beyond its strategic role.

We repeatedly heard anecdotal but concerning indications that confusion about roles, lengthy assurance processes, and delays in sanctioning decisions have affected staff morale, retention and focus at Sellafield. With the shift from a private sector management model, retaining a motivated senior leadership team at Sellafield Limited has become even more important to sustaining progress (paragraphs 1.4 to 1.11 and 2.49).

Conclusion

21 Since our last report in 2015, work to reduce risk and high hazard at Sellafield has taken an encouraging turn for the better. In recent years, Sellafield Limited has met significant milestones in retrieving hazardous waste from its legacy ponds and silos. While delays and cost overruns are still evident for major projects at Sellafield, the NDA has made progress with reducing these since we last reported. However, the Department, UKGI, the NDA and Sellafield Limited have more work to do to measure, evaluate and communicate progress more effectively.

22 To sustain progress in the near term, the NDA and central government will need to clarify the NDA's role and to find the right balance between scrutinising decisions and enabling the leadership at Sellafield to exercise its legal duties, professional expertise and maintain motivation. To inform its longer-term strategy, the NDA must review the constraints that it says prevent further and faster progress with reducing high hazard at Sellafield.

Recommendations

On the role and governance of the NDA, the Department should

- a** carry out a tailored review of the NDA, including its role, function and governance arrangements, in line with Cabinet Office guidelines, taking into account – where appropriate – recent and ongoing reviews of the NDA. The Department should use the findings of the Committee of Public Accounts' February 2018 report, alongside those of the independent inquiry into the failed Magnox contract, to:
 - clarify the respective roles and responsibilities of the NDA and Sellafield Limited (and the other site licence companies); and
 - streamline the governance and oversight of the NDA to clarify the roles and value added by each body, and ensure the right capabilities, management information systems and approvals processes are in place to support, challenge and assess the NDA's performance.

On performance reporting and assurance

- b** the NDA should review whether the current lifetime plan for Sellafield remains good enough to monitor performance and assess efficiencies after the change to the Sellafield management model;
- c** the NDA should review and strengthen its assurance arrangements, including its assurance of efficiency savings reported by Sellafield Limited, with a focus on capability in both the NDA and Sellafield Limited to discharge assurance functions effectively; and
- d** the Department should ensure that NDA's management information provides both programme and project-level data to enable it to evaluate its performance in the medium term (three to five years). This information for each layer from Sellafield Limited to the Department should be clearly linked to the responsibilities of each layer and avoid duplication.

To help sustain improvements at Sellafield, the NDA should, with the support of Sellafield Limited

- e** invest in understanding the drivers of project improvements at Sellafield to ascertain which have been most effective and replicable; and
- f** test the perceived constraints to faster and further progress at Sellafield and use these findings to inform or revise its strategy for decommissioning Sellafield.

To support a more transparent approach to reporting on progress and decision-making, the NDA should

- g** complete its work on mission reporting to enable it to give a transparent account of its progress on areas of the work that are more certain; and
- h** work with Sellafield Limited and HM Treasury to evaluate and report the full costs associated with changes it has made to strategies and projects it has deferred, making clear how short- and long-term costs have been taken into account.