



National Audit Office

Report

by the Comptroller
and Auditor General

The Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority: progress with reducing risk at Sellafield

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National Audit Office

The Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority: progress with reducing risk at Sellafield

Report by the Comptroller and Auditor General

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Sir Amyas Morse KCB
Comptroller and Auditor General
National Audit Office

15 June 2018

This report examines the Nuclear Decommissioning Authority's progress with reducing risk and hazard at its largest and most hazardous site, Sellafield.

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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

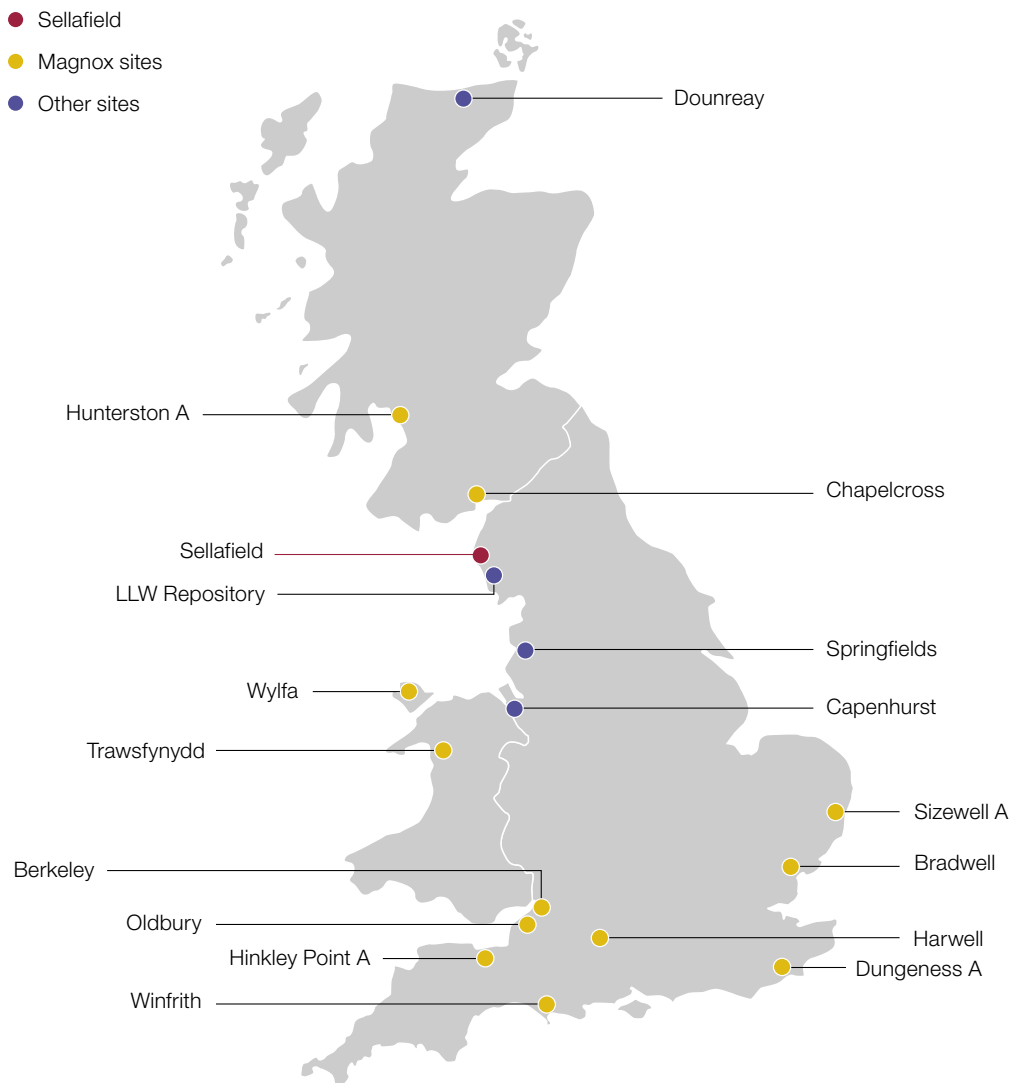
Note

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.

Part One

The NDA's role, governance and performance

1.1 This part of the report:

- explains the Nuclear Decommissioning Authority's (NDA's) role, operating environment and capability;
- sets out the governance structure around the NDA and associated accountabilities;
- explains the NDA's strategy and approach to value for money;
- provides an overview of the NDA's funding and expenditure; and
- sets out the changes in the estimated lifetime cost of the NDA's mission and how the NDA communicates progress against that mission.

The NDA's role, operating environment and capability

1.2 In 2005, the NDA was established as a non-departmental public body under the Energy Act 2004. It is responsible for operating, decommissioning and cleaning up 17 nuclear sites, of which 14 are in England and Wales and three are in Scotland. The NDA's decommissioning work will end when it releases the sites for other uses. On current plans, it expects that this will take approximately 100 years to complete. The main activities required to deliver the NDA's mission are set out in **Figure 2** overleaf.

1.3 The NDA's primary role is strategic, rather than operational: it sets an estate-wide strategy that takes into account government policies and regulatory requirements, allocates budgets and monitors performance across the estate. The work on the 17 sites is carried out (or subcontracted) by site licence companies (SLCs). The NDA manages SLCs through a variety of management models, and contractual and commercial arrangements. It requires SLCs to develop and maintain lifetime plans that set out the scope of work to be delivered, the schedule for delivery and estimated costs. The NDA also manages a complex stakeholder environment which includes central government departments and bodies, regulators, SLCs and an extensive private sector supply chain. See **Figure 3** on pages 18 and 19 for more details on the NDA's operating environment.

Figure 2

Summary of the Nuclear Decommissioning Authority's (NDA's) key areas of responsibility

Waste management	The NDA's priority is to deal with waste in ageing storage facilities by placing it into safer conditions. Its progress with disposing of higher activity waste is dependent on finding a suitable site for long-term underground storage (the geological disposal facility).
Managing nuclear materials	The NDA manages large stocks of civil uranium and plutonium owned by the NDA, the Ministry of Defence (MoD), EDF Energy and overseas utilities. Government must decide whether to continue to store this material, reuse it as fuel, sell it to a third party, or prepare it for long-term disposal.
Reprocessing spent fuels	Spent fuel from old nuclear reactors is reprocessed by separating it into uranium and plutonium and waste by-products. Most reprocessing occurs in two plants located at Sellafield. The NDA expects to finish this work by 2020. It will also receive and store fuel at Sellafield from EDF's advanced gas-cooled reactor stations until they close around the mid-2030s.
Decommissioning	Involves the decontamination and dismantling of legacy facilities and the removal of waste.
Other activities	<ul style="list-style-type: none"> ● Research and development; ● Oversight of EDF Energy's decommissioning plans; ● Interim storage of fuels on behalf of the MoD; and ● Managing non-standard fuels, commonly referred to as 'exotics', which include fuel inherited from earlier nuclear industry activities.

Source: National Audit Office analysis of the Nuclear Decommissioning Authority's strategy 2016–2020

1.4 We have found that stakeholders' perceptions of the NDA's role differs, are often unclear, and that there is a perceived overlap with other stakeholders, such as UK Government Investments (UKGI) (paragraph 1.10). The NDA has been under more intense scrutiny following its failed contract to decommission 12 Magnox nuclear reactors in 2017.¹ Officials at Sellafield Limited told us that this scrutiny has led the NDA to, at times, go beyond its strategic remit of setting expected outcomes and assuring performance, to becoming more involved in influencing operational decisions.

¹ Comptroller and Auditor General, Department for Business, Energy & Industrial Strategy, *The Nuclear Decommissioning Authority's Magnox contract*, Session 2017–2019, HC 408, National Audit Office, October 2017.

1.5 Following the failure of the Magnox contract, the NDA has strengthened the capacity and capability of its executive team. A new chief executive was appointed in March 2017, and he has recruited a commercial director, general counsel and director for nuclear operations. Four of the NDA Board's non-executive directors have agreed to a six-month extension of their tenure, up to summer 2018.

Governance of the NDA and accountabilities

1.6 The NDA's Framework Document 2013 sets out the governance framework within which the NDA operates. In summary, the NDA is subject to three overarching governance structures:

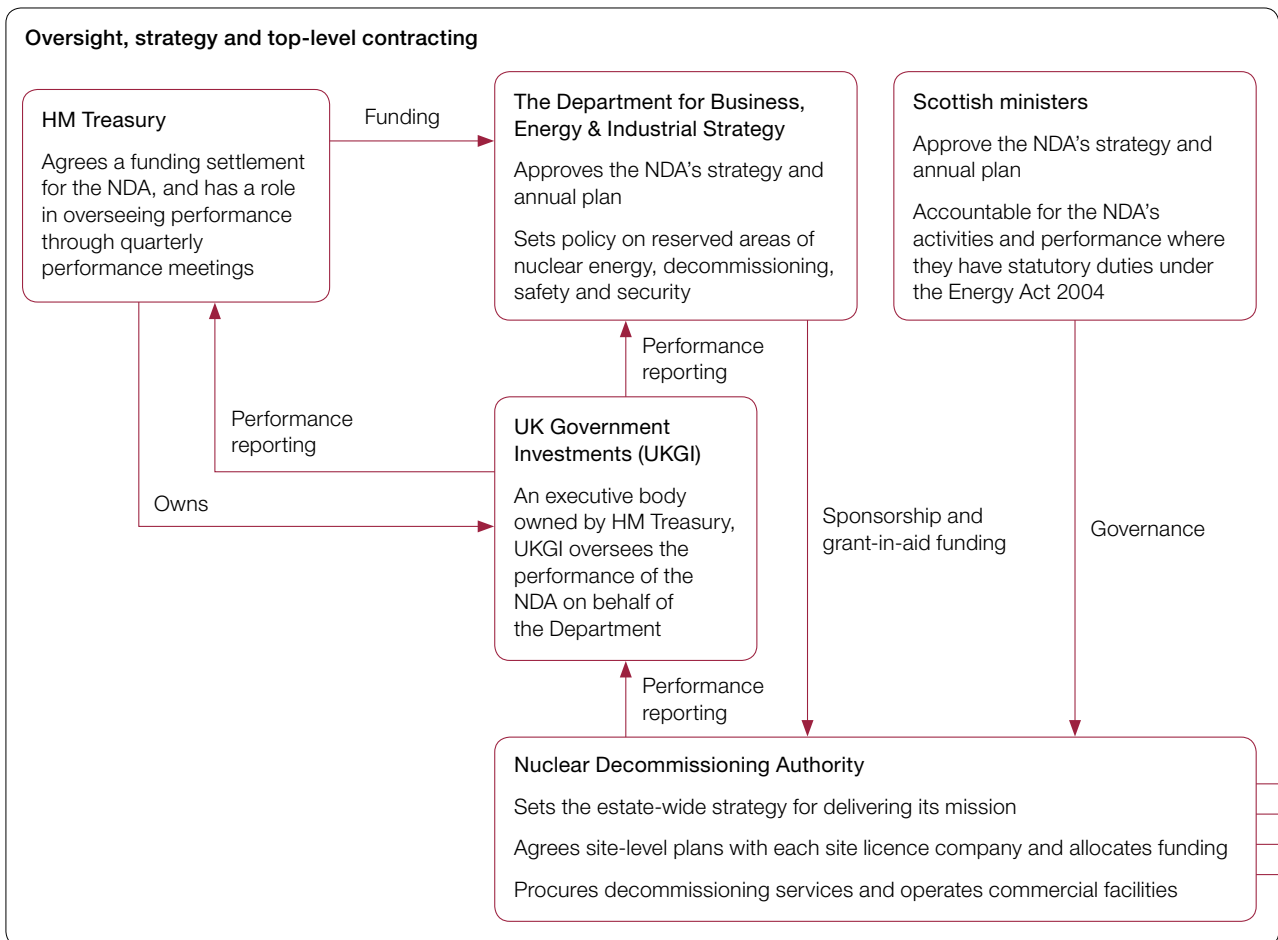
- Regulatory governance: under the Energy Act, the NDA, through its SLCs, must meet the regulatory requirements set out by the Office for Nuclear Regulation (ONR), the Environment Agency, the Scottish Environment Protection Agency and Natural Resources Wales.
- Governance to support accountability to the Scottish Parliament: Scottish ministers are accountable to the Scottish Parliament for the activities and performance of the NDA where they have statutory duties and responsibilities under the Energy Act 2004.
- Governance to support UK Parliamentary accountability, the focus of this section.

1.7 The accountability framework for the NDA is set out in **Figure 4** on page 20. The Department for Business, Energy & Industrial Strategy (the Department) is responsible for setting nuclear policy, including nuclear safeguarding and security policy. Along with HM Treasury, it approves business cases submitted by the NDA where the project will cost more than £100 million, is deemed to require more intense scrutiny by HM Treasury, or where a significant change to, or cancellation of, an approved plan or project is required. UKGI, a government company owned by HM Treasury and set up as the government's specialists in corporate governance and corporate finance, oversees the NDA on behalf of the Department. The Department inherited this governance structure from the former Department of Energy & Climate Change following machinery of government changes in 2016.

Figure 3

The Nuclear Decommissioning Authority's (NDA's) operating environment

The NDA manages a complex stakeholder environment



Notes

- 1 Parent Body Organisation (PBO) arrangements for the Magnox sites are only in place until 2019. The NDA and government have not yet announced what arrangements will replace the outgoing PBO.
- 2 In April 2016, the NDA cancelled its parent body agreement with Nuclear Management Partners and brought Sellafield Limited back into its direct control as a subsidiary.
- 3 Performance reporting includes quarterly performance meetings, and quarterly governance meetings. These are attended by the NDA, UKGI, the Department and HM Treasury.

Source: National Audit Office analysis of published documents

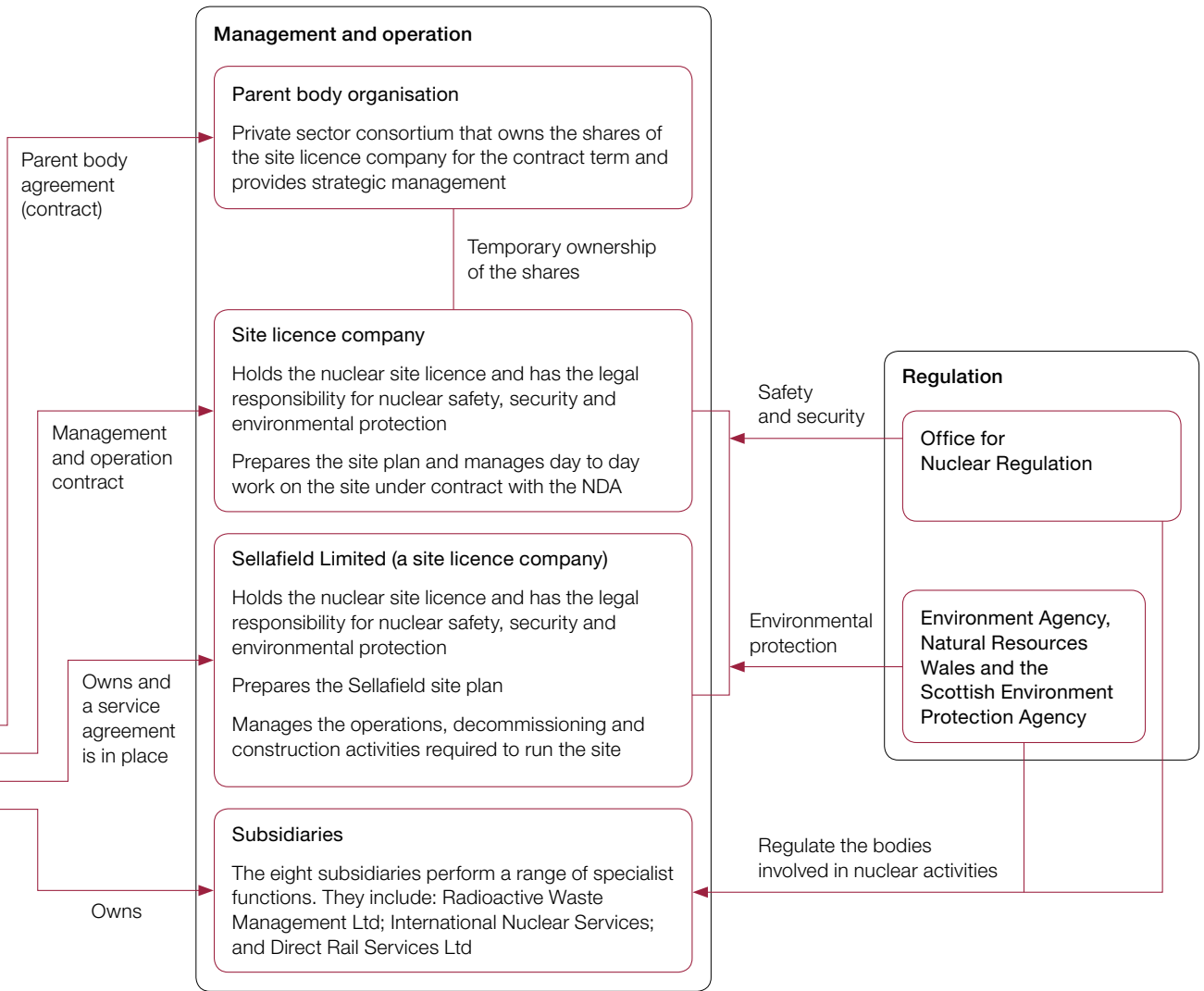
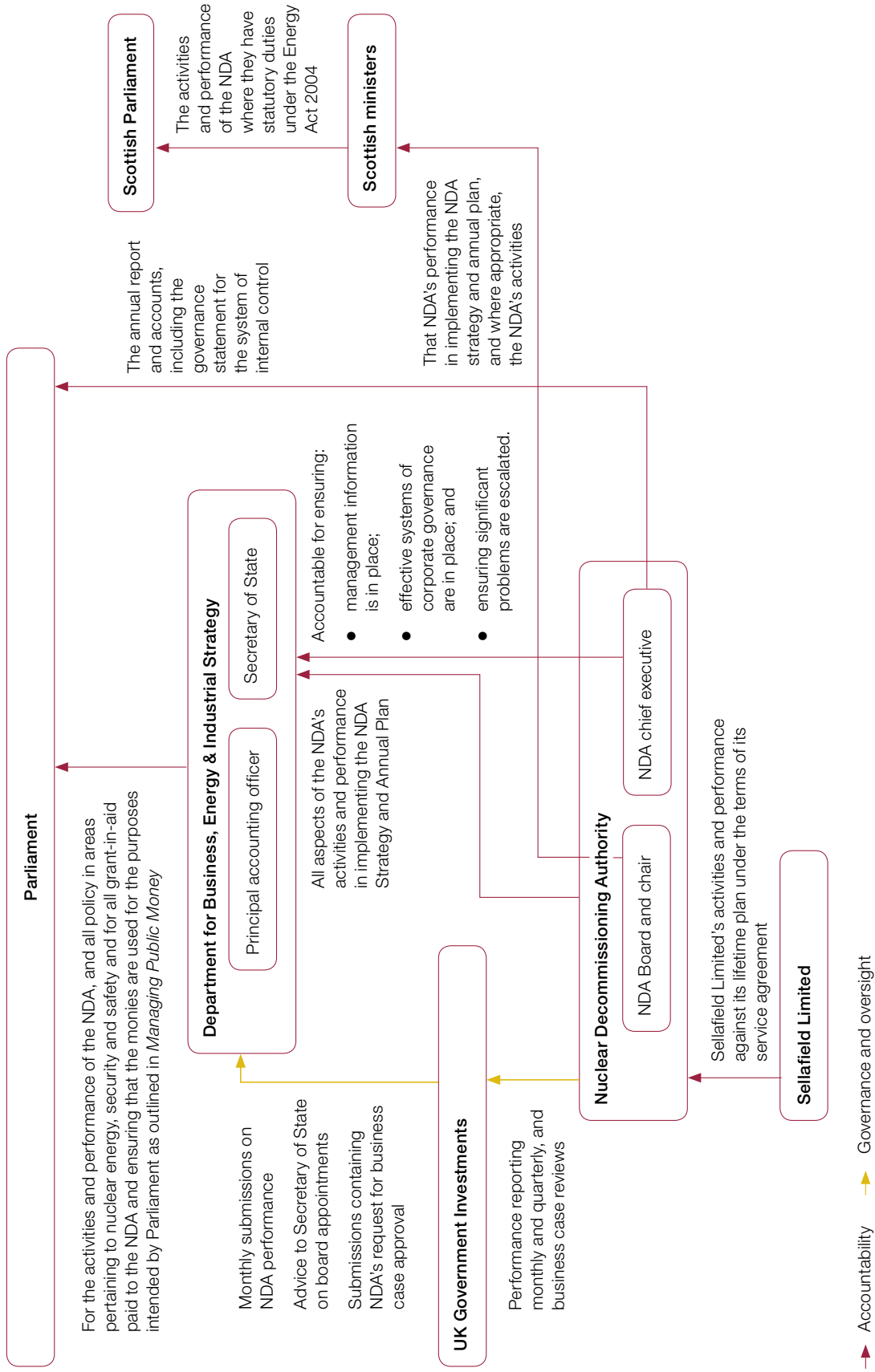


Figure 4
The Nuclear Decommissioning Authority's accountability structure
Accountability, governance and oversight of the Nuclear Decommissioning Authority



Source: National Audit Office analysis of the Nuclear Decommissioning Authority's 2013 Framework Document

1.8 UKGI is the main point of day-to-day contact between the government and the NDA. Regarding its role, UKGI said it:

- monitors the NDA's performance and key risks against agreed targets, and reports these to the Department on a monthly basis. UKGI told us it does not, however oversee the progress of individual major projects;
- provides challenge and support to the NDA in developing business cases. UKGI told us it does not carry out assurance of NDA business cases but instead provides a 'sense check';
- helps the NDA 'navigate the system' of central government's approval of business cases;
- promotes compliance with the principles of good governance and advises the Secretary of State for Business, Energy & Industrial Strategy on the appointments of non-executive directors to the NDA Board, in conjunction with Scottish ministers;
- advises the Secretary of State on a strategic level on whether the NDA is delivering value for money; has an appropriate budget and performance targets; and whether the responsibilities and duties of the departmental accounting officer are discharged; and
- is represented on the NDA Board through a non-executive director.

1.9 In response to the NDA's failed Magnox contract, the Committee of Public Accounts found in February 2018 that the governance structure surrounding the NDA requires simplification and clarification to ensure roles, responsibilities and accountabilities are clear. It also warned against central government reacting to the failure of the Magnox contract by adding more layers of oversight, and urged the Department to strike a balance between effective oversight and ensuring the NDA can achieve its mission effectively.²

1.10 Our assessment is that the governance and accountability system is overly complex. The distinct role played, and value added, by each layer in the accountability and governance framework is not always clear. For example, there is a perceived overlap between the respective roles of the NDA and UKGI in managing central government stakeholders. While UKGI felt it was clear on its roles and responsibilities, these were not always clear to us and we did not find a consistent understanding among other stakeholders.

² HC Committee of Public Accounts, *The Nuclear Decommissioning Authority's Magnox contract*, Twenty-First Report of Session 2017–2019, HC 461, February 2018.

1.11 Stakeholders have told us that the boards of Sellafield Limited and the NDA are working effectively together, but that there is a tension in that the NDA remains accountable for overall progress at Sellafield, while Sellafield Limited is responsible for delivering work safely and securely as the nuclear site licence holder. The service agreement between Sellafield Limited and the NDA states that in the event of a dispute, the matter will be escalated for resolution between the NDA's chief executive and the chairman of Sellafield Limited.

The NDA's strategy and approach to value for money

1.12 The NDA must ensure that its estate-wide strategy reflects government policies, fulfils regulatory requirements and meets its obligations under the Energy Act 2004.³ In setting its strategy, the NDA has to contend with a high degree of uncertainty and complexity associated with decommissioning legacy facilities, poor record management and ageing facilities that fall short of modern standards. **Figure 5** sets out other factors that influence the NDA's strategic decision-making.

1.13 Considerations of risk and hazards across the estate underpin the NDA's strategy and decisions about which activities to prioritise.⁴ The NDA has developed an indicator of hazard to enable it to rank facilities across the estate by the level of threat they pose. Of the top 10 most hazardous facilities across the entire NDA estate, eight are at Sellafield and two are at Dounreay. We discuss these in more detail in Part Two.

1.14 The NDA prioritises work on reducing what it and the ONR deem to be 'intolerable risks'. This means that other considerations, such as funding, should not act as constraints. Where risk is regarded as 'tolerable' or 'broadly acceptable', the NDA's decisions about the pace of work to reduce this risk are influenced by a wider range of factors. **Figure 6** on page 24 explains the NDA's approach to prioritising its activities.

1.15 Subject to agreement from central government, the NDA may decide to defer or speed up decommissioning, depending on a balance of considerations regarding safety, hazard reduction, affordability and lifetime costs. **Figure 7** on page 24 sets out an example of where the NDA is considering alternatives to its current strategy for deferred decommissioning after reassessing the risks and hazards on the Magnox sites. To adopt this strategy, the NDA will have to consult and agree it with the ONR, and gain the approval of HM Treasury and the Secretary of State for Business, Energy & Industrial Strategy.

³ Legal responsibility for determining how to comply with regulatory requirements rests with site licence companies.

⁴ The NDA defines hazard as the potential for harm due to the inherent nature of something (such as reactive material), and risk as the chance that "something will be adversely affected by the hazard".

Figure 5

Factors affecting the Nuclear Decommissioning Authority's strategic decisions

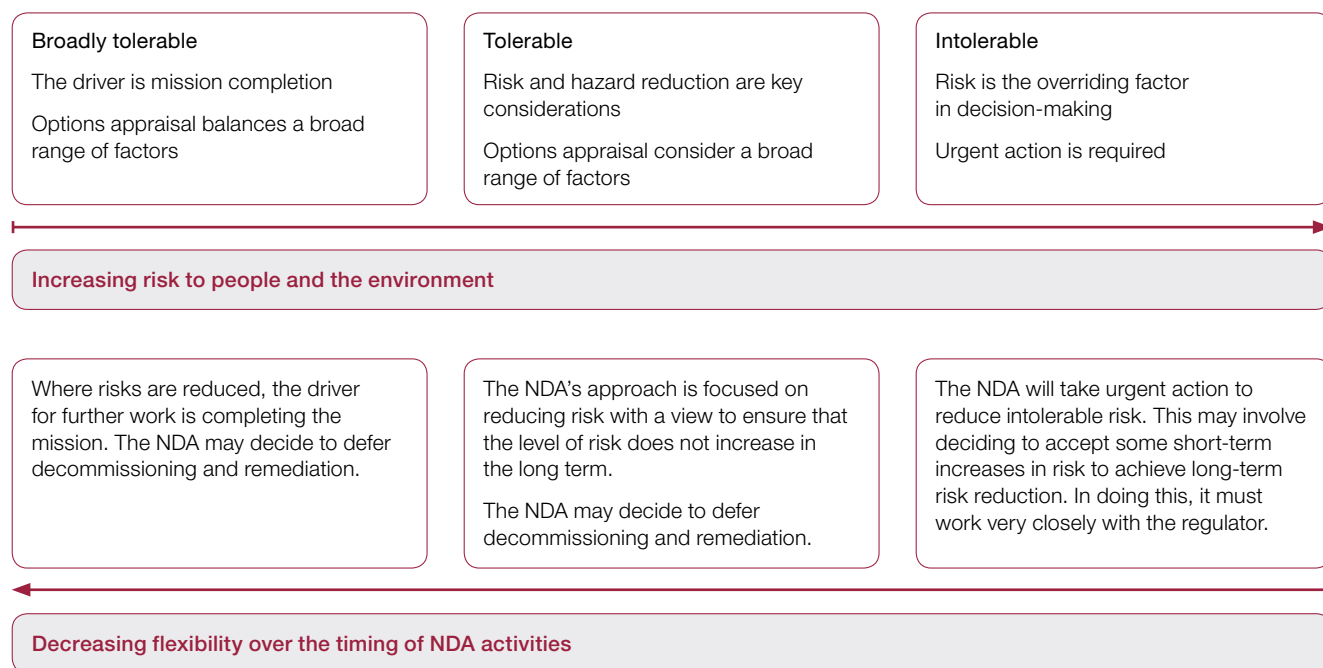
Factor	Stakeholder	Example of effect on NDA strategic decisions
Policy uncertainty	The Department for Business, Energy & Industrial Strategy (the Department)	The NDA needs a long-term repository for spent fuel and high activity waste to progress its decommissioning plans. However, the Department's plans to identify a suitable location have been repeatedly delayed.
Ensuring health, safety and security	Office for Nuclear Regulation (ONR)	The NDA's licensees (site licence companies) must submit a safety case to the ONR before undertaking any activity to implement the NDA's strategy. The ONR assesses safety cases before granting permission to carry out the activities.
Environment	Environment Agency	The NDA must consider the environmental impact of waste management activities.
Affordability and government funding	HM Treasury	HM Treasury sets spending limits for the NDA (each year over the spending review period). The NDA has to prioritise work on the most hazardous sites, which can mean delaying work on facilities that do not pose an immediate risk.
Value for money	The Department, HM Treasury and Parliament	The NDA needs to assure the Department, HM Treasury and Parliament that it is safeguarding public funds and ensuring propriety, regularity and value for money. For example, the NDA needs to consider whether and when spending more in the near term could reduce lifetime costs and improve value for money overall.
Socio-economic considerations	Energy Act 2004	The NDA's responsibility for considering the impact of decommissioning on the relevant local economies and employment may be in tension with faster decommissioning.
Stakeholder confidence	Central government, Parliament	The recent failure of the NDA's Magnox contract has led to a period of intensified scrutiny by central government which has slowed down procurements and funding approvals.

Source: National Audit Office analysis

Figure 6

The Nuclear Decommissioning Authority's (NDA's) approach to prioritising risk across the estate

The three categories of risk and the Nuclear Decommissioning Authority's response



Source: National Audit Office analysis of the Nuclear Decommissioning Authority's Strategy 2016–2020

Figure 7

The Nuclear Decommissioning Authority (NDA's) strategy for decommissioning the Magnox reactors

The NDA's current strategy for the 10 Magnox reactors is to defer dismantling them until 2071. Under this strategy, the NDA would maintain the reactors until decommissioning starts. On the NDA's current plan, actual decommissioning will take place between 2071 and 2107 at an estimated cost of £10.4 billion. It believes deferring decommissioning will:

- give time for radioactive decay, making the subsequent clean-up operation easier and cheaper;
- avoid the need for interim storage of waste from the reactors; and
- delay expenditure to improve the cost-benefit ratio as future discounting reduces costs.

In 2016, the NDA began re-examining the timing of the proposed decommissioning activity of the Magnox reactors. It found that the benefits of delaying decommissioning may have been overestimated and considered the impact of starting the work sooner. The proposed new strategy does not identify a difference in costs, but highlights the benefits of reducing risks much earlier than anticipated. The NDA expects to submit a business case to government to support a revision of its strategy in 2018.

Source: National Audit Office analysis of the Nuclear Decommissioning Authority's documents

1.16 Under the Energy Act 2004 the NDA has a duty to secure value for money, subject to meeting its safety, security and environmental duties. However, we found that there was no clear and shared understanding between the NDA, HM Treasury, UKGI and the Department of what constitutes value for money in the context of nuclear decommissioning.

- UKGI and the Department consider that value for money is achieved when decommissioning objectives are met in a way that is safe, secure and cost-efficient for the short *and* long term (emphasis added). But in the context of the 2015 Spending Review discussions about NDA funding, value for money was defined as '*long-term* cost implication (in effect, an approximation of the impact on the nuclear provision)'. This latter interpretation highlights the tension between (short-term) affordability and (long-term) cost minimisation. HM Treasury's focus on short-term affordability means it considers work that the NDA defers from one spending period to another to be a cost saving. It does this despite acknowledging that deferrals incur 'hotel costs' – the costs associated with maintaining a facility or hazard until work is completed to reduce its risk. HM Treasury does not require the NDA to analyse or present the 'hotel costs' associated with deferral of activity, despite these being a major component of long-term costs.
- The NDA considers that value for money at Sellafield is achieved if it is able to deliver its work to the schedule and cost estimated in its 2014 performance plan. But to consider alternative long-term strategies, the NDA and Sellafield Limited need to understand the various possible sources of value from their activities. Sellafield Limited has identified four 'value streams': managing spent fuel, decommissioning facilities and remediating contaminated land, managing special nuclear materials, and retrieving waste. But the NDA and Sellafield Limited have not yet agreed on how to measure these sources of value.

This lack of clarity and transparency about what constitutes value for money, and how long-term costs are weighed against short-term affordability makes it difficult for Parliament to understand why decisions about funding and prioritising work have been taken, and whether the NDA is safeguarding public funds.

Expenditure and funding arrangements

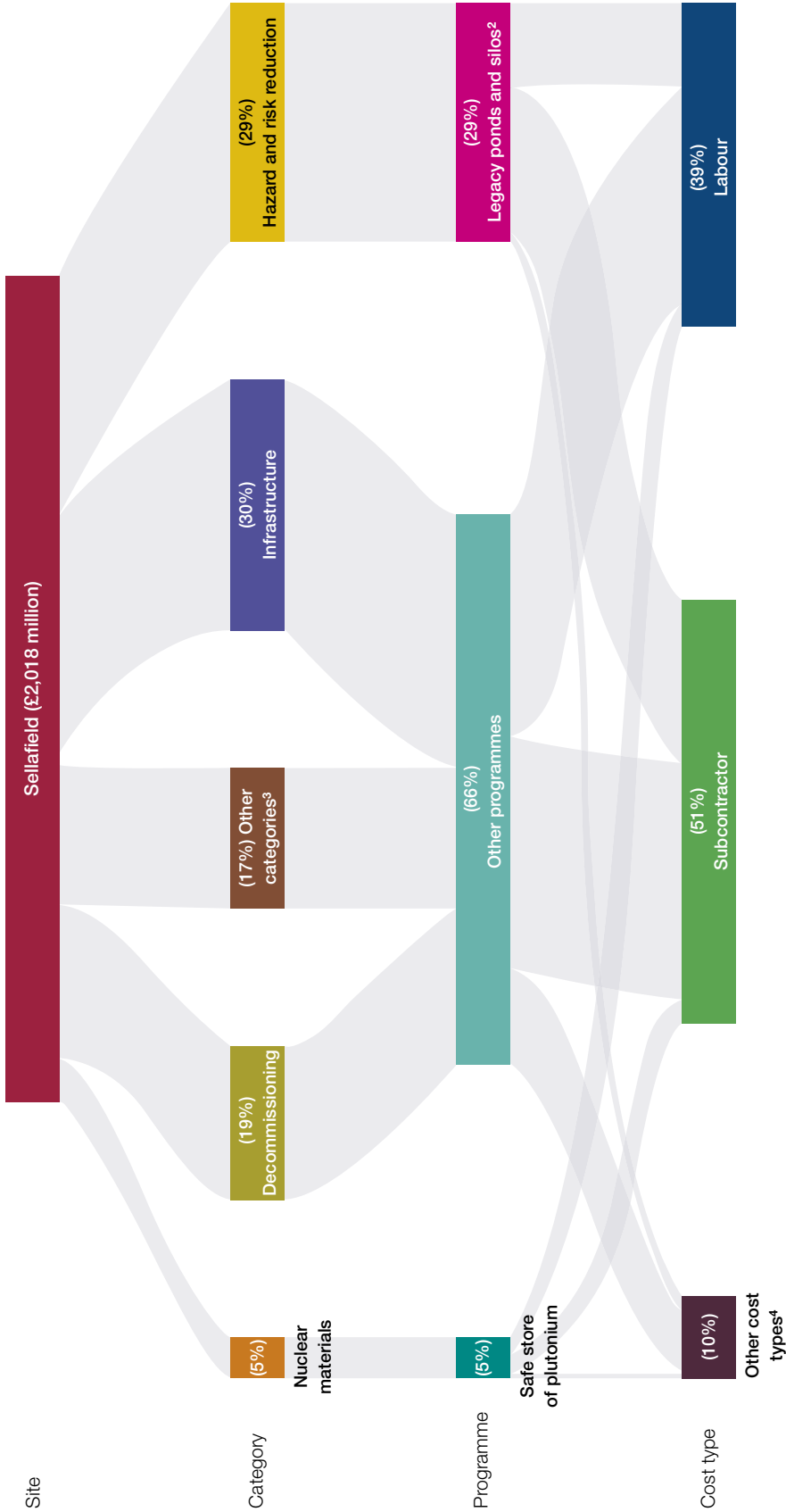
1.17 The NDA spent a total of £3,324 million in 2017-18 and it generated £1,180 million from its commercial activities, which reduces taxpayers' net funding of the NDA.⁵ In 2017-18, Sellafield Limited spent £2,018 million (61% of total NDA spend). It spent 29% of this on hazard and risk reduction, and 19% on decommissioning. Subcontractors deliver the great majority of the work. For every £1 spent at Sellafield in 2017-18, £0.51 was spent on subcontractors. This was broadly similar to the share in 2016-17 (**Figure 8** overleaf).

⁵ In 2017-18, the NDA received a grant-in-aid of £3,488 million from the Department to fund its cash outflow for the year.

Figure 8

The Nuclear Decommissioning Authority (NDA's) expenditure at Sellafield in 2017-18

The majority of Sellafield's spend on reducing high hazard and risk goes to subcontractors who carry out the work



Notes

- 1 All 2017-18 figures are pre-audit figures.
- 2 Legacy ponds and silos include: Magnox swarf storage silos (15%); pile fuel cladding silo (7%); first generation Magnox storage pond (5%); and pile fuel storage pond (1%).
- 3 Other categories include: end states; functions; spent fuel management; and waste management.
- 4 Other cost types include spend on: equipment; materials; and various other minor cost types.
- 5 We discuss the five major programmes to reduce high hazard at Sellafield from paragraph 2.6 onwards.

Source: National Audit Office analysis of Nuclear Decommissioning Authority's expenditure data

Lifetime costs and progress in decommissioning the NDA estate

1.18 Accounting standards require the NDA to recognise its ‘nuclear provision’ – an estimate of all future costs of decommissioning to which it is unavoidably committed. The NDA calculates the estate-wide provision based on the desired end-state for each site on the estate, the decommissioning plans of each SLC and a series of assumptions (such as the changing nature of hazardous material over time). The provision is revised annually to reflect work that has been completed and changes to site plans or assumptions. The cost of decommissioning and cleaning up Sellafield is the largest component of the NDA provision, accounting for approximately 75% of the total estimate (**Figure 9** overleaf).

1.19 These estimates are highly uncertain because they anticipate costs over 100 years into the future and rely on uncertain assumptions about the nature of the clean-up task, the physical and chemical state of materials over time and the nature and cost of technological solutions. The undiscounted provisions for the NDA estate and Sellafield range from £99 billion to £225 billion and from £78 billion to £167 billion respectively (2017-18 prices). Nonetheless, movements in the nuclear provision can give some indication of the NDA’s understanding of its future liability and its progress in reducing it by completing planned work.

1.20 The NDA’s undiscounted provision more than doubled (even after adjusting for inflation) between 2004-05 and 2014-15.⁶ As the NDA revised the Sellafield provision each year, the cost of new work added to the Sellafield lifetime plan was greater than or equal to the cost of work Sellafield had delivered in the same year. As a result, the provision continued to increase. In 2015, we reported that the NDA attributed these increases to its better understanding of the scale and nature of the risks on the site, and uncertainties still involved in the decommissioning projects and programmes, and a more realistic assessment of the efficiencies it can achieve within the plan.⁷

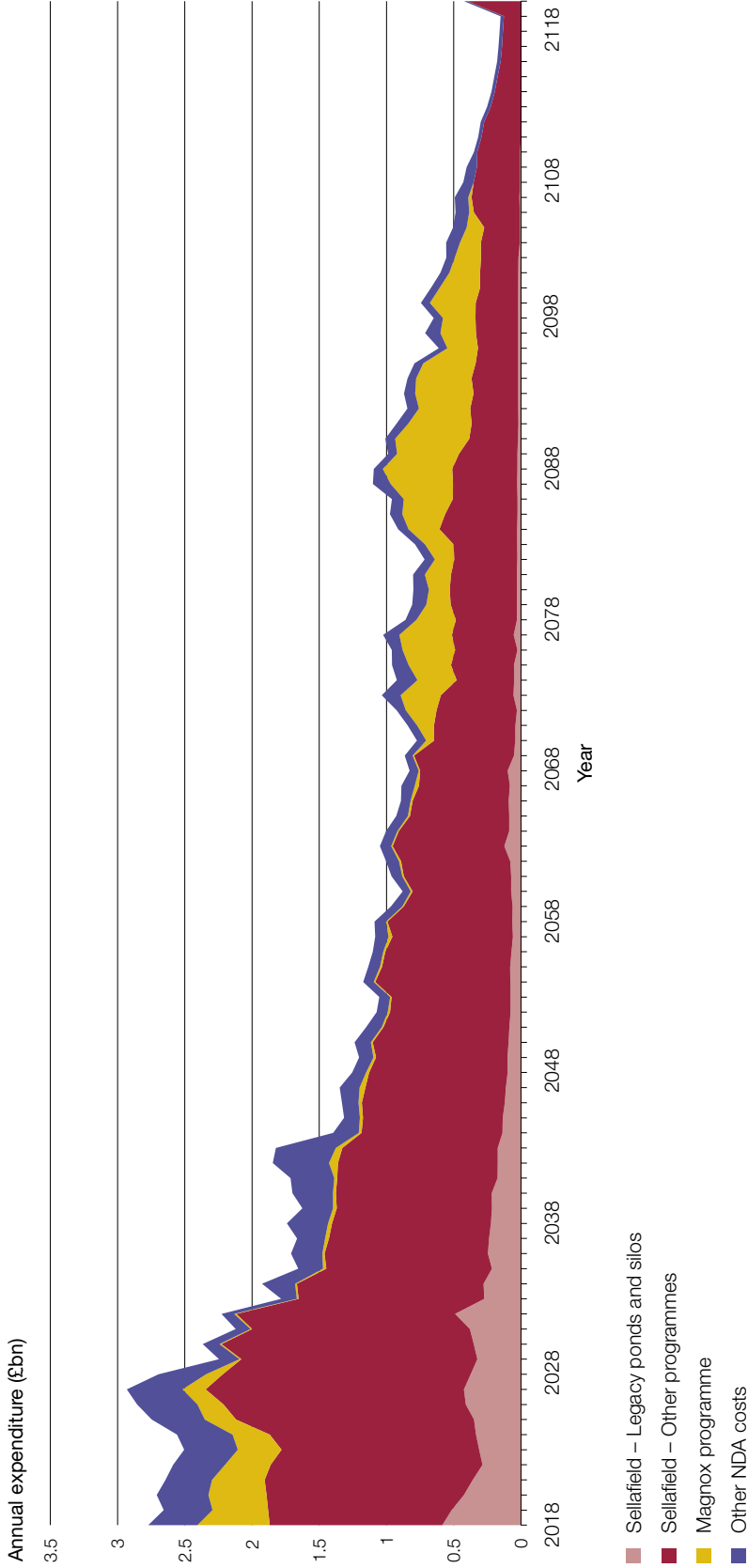
1.21 Since 2014-15, the NDA’s undiscounted provision has stabilised at around £121 billion and the Sellafield provision at around £91 billion, as the NDA’s understanding of the scope and cost of work has improved (**Figure 10** on page 29). However, new work is still being identified and, in 2017-18, Sellafield added work worth £1.7 billion to its provision (**Figure 11** on page 30). Recent increases to the provision have offset the reductions that followed the NDA completing work: since 2015-16, the NDA has delivered work worth £6.0 billion, but estimates that the work left to do has increased by £6.0 billion. The range around the estimate remains unavoidably large because of the long-term horizon and the uncertainty about any work planned beyond 10 years.

⁶ The discounted provision has more than tripled since 2015, increasing from £73 billion in 2015 to £234 billion, due to changes in HM Treasury’s discount rates.

⁷ Comptroller and Auditor General, Nuclear Decommissioning Authority, *Progress on the Sellafield site: an update*, National Audit Office, 2015.

Figure 9 The long-term cost estimate for cleaning up the Nuclear Decommissioning Authority (NDA) estate (the nuclear provision)

Sellafield's expenditure is the largest component of the NDA's nuclear provision

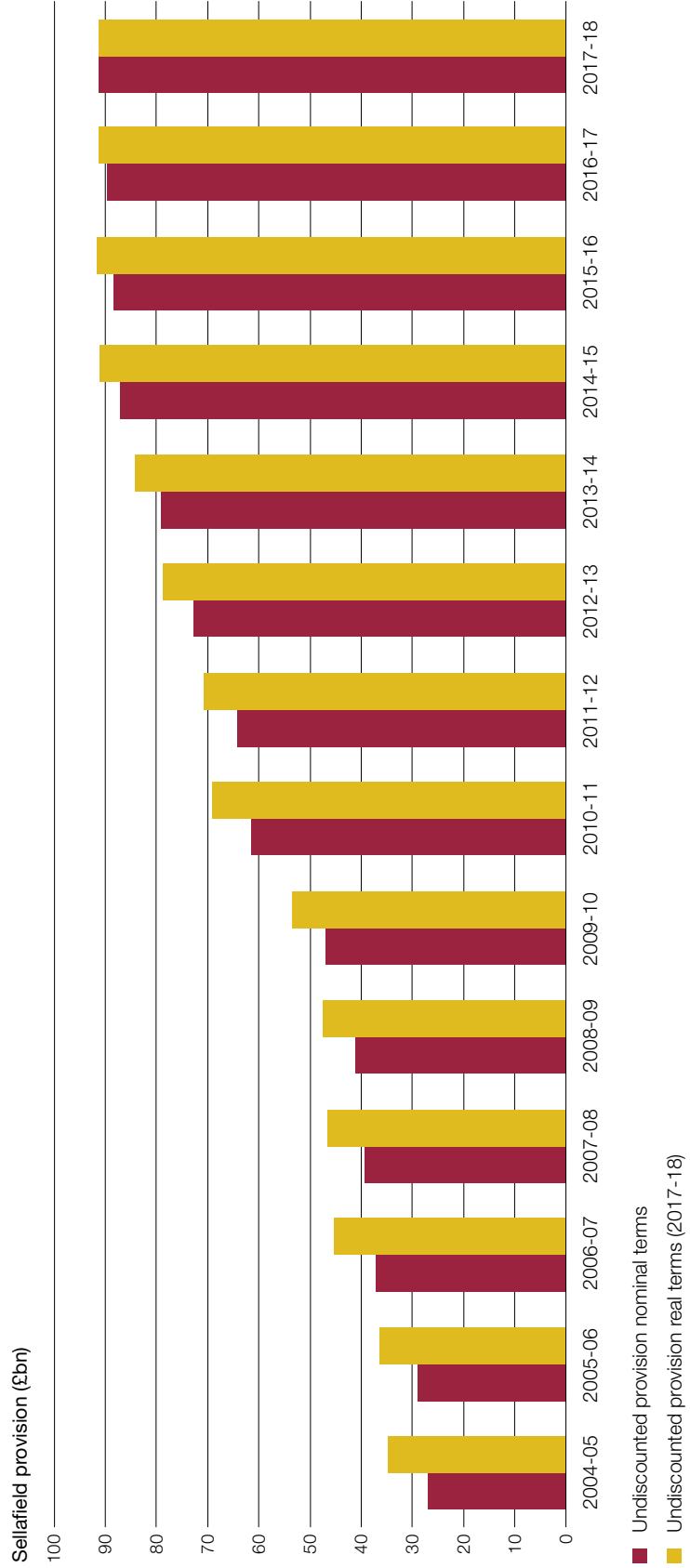


Notes

- 1 Other NDA costs include expenditure for sites such as the low-level waste repository, the Dounreay site, and the geological disposal facility.
- 2 'Sellafield - Other programmes' includes expenditure on reprocessing fuel; managing plutonium; managing waste; and functions and infrastructure.
- 3 Undiscounted figures are in 2017-18 prices.

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

Figure 10
Trends in the Sellafield provision
Since 2015-16, the provision has levelled out in real terms

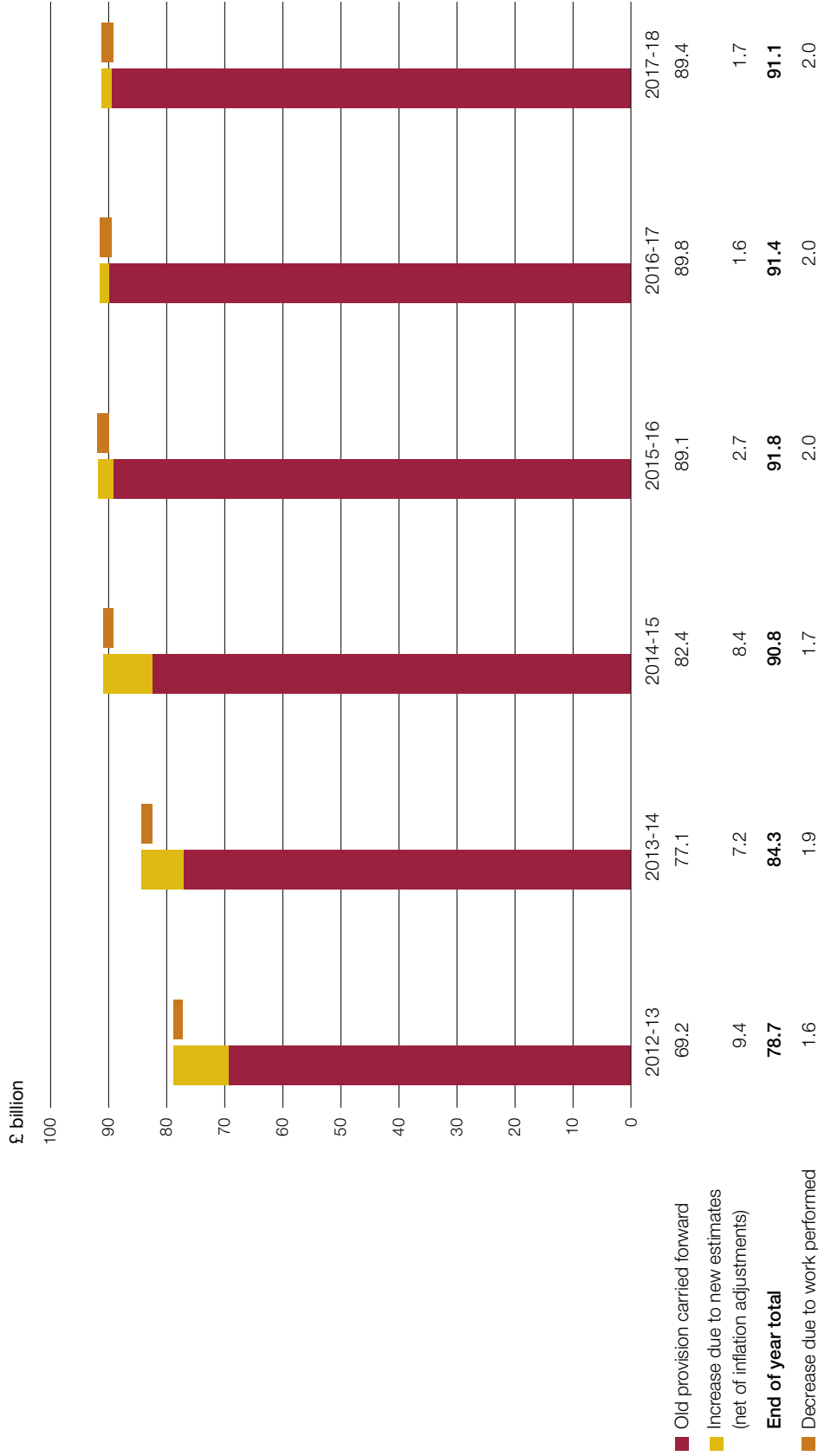


Note

1 Real terms figures are converted using Gross Domestic Product (GDP) deflators to 2017-18 prices.

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

Figure 11
 Movement in the Sellafield undiscounted provision between 2012-13 and 2017-18
 Increases in the provision have offset reductions due to work carried out on decommissioning



Notes

- 1 All figures are converted to real terms using Gross Domestic Product (GDP) deflators to convert to 2017-18 prices.
- 2 Increases to the provision are due to new work being discovered and the NDA's inflation adjustments. The NDA inflates the provision using its own inflation rate, which reflects price increases within the nuclear sector. Our analysis inflates the provision at GDP deflators, and we add the difference between inflation rates into annual increases (the yellow category).
- 3 The total may not add up due to rounding.

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

Communicating progress with delivering the mission

1.22 After the Committee of Public Accounts' evidence session in 2015, the former chief executive of the NDA wrote to the chair of the Committee. He acknowledged that, in light of the uncertainty and long-term nature of its work, the NDA would seek ways to demonstrate its progress in areas of its mission that were more certain. This would enable it to provide a clearer and more transparent account of its progress, allowing more effective scrutiny and accountability. The NDA has since started a programme of work to support this, but progress has been slow.

Part Two

Progress at Sellafield

2.1 Of the Nuclear Decommissioning Authority's (NDA's) 17 sites, Sellafield is the largest and most hazardous. This is because of a legacy of neglected contaminated buildings, untreated waste and ageing facilities. Of the site's 1,400 buildings, 240 are operating nuclear facilities or are legacy buildings that contain radioactive materials. Some are deteriorating or fall short of modern standards and therefore pose a significant risk to people and the environment. The majority of radioactive material in the UK is stored at Sellafield, partly as a deliberate outcome of the government's policy to consolidate radioactive material. See **Figure 12** for a map of the Sellafield site.

2.2 The NDA estimates that remediation activity on the Sellafield site will be completed by 2120. Its plan involves: reprocessing spent fuel from old nuclear reactors; retrieving and packaging waste from existing storage facilities at Sellafield; treating highly radioactive waste; transferring waste to the low-level waste repository and the planned geological disposal facility; demolishing most buildings; and clearing the final site.

2.3 As the site licence company (SLC), Sellafield Limited is responsible for managing day-to-day work to reduce hazard and risk on the site. It does this primarily through delivering major projects and programmes. Sellafield Limited also manages activities that generate commercial income for the NDA.

2.4 The NDA is accountable to central government for overall performance at Sellafield. Its role involves: setting out the requirements of the Sellafield plan in line with the NDA's strategy; approving business cases for funding projects with lifetime costs exceeding £50 million (with subsequent approval by central government for projects of more than £100 million or deemed contentious by HM Treasury); monitoring performance; and intervening as required to address underperformance.

2.5 This part of the report examines:

- progress in reducing the highest hazards and risks, focusing on five key programmes and 14 major projects;
- progress with commercial operations at Sellafield;
- how the NDA assures and reports on progress at Sellafield; and
- the drivers of, and constraints on, faster progress at Sellafield.

Figure 12

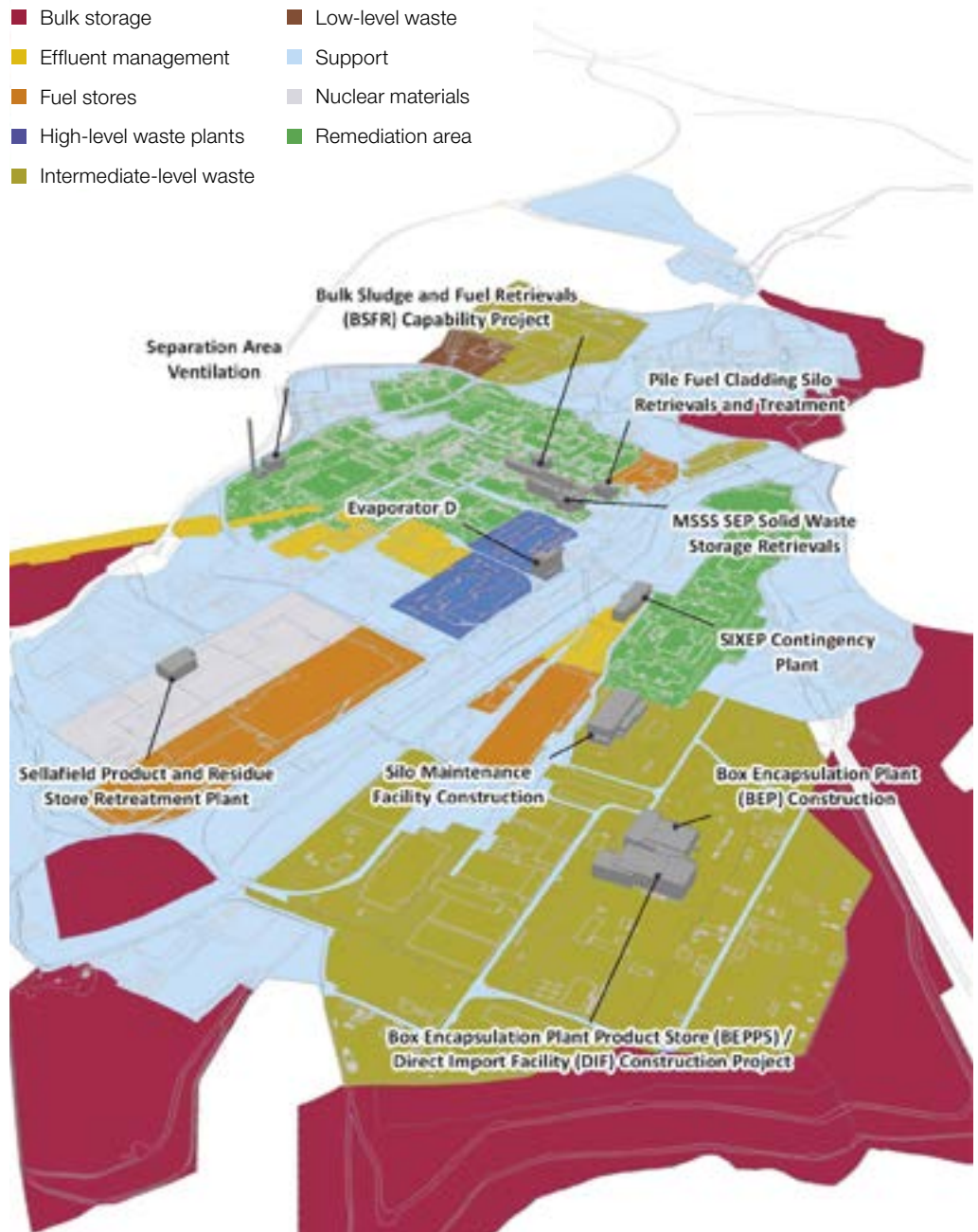
The Sellafield site and its major projects

Sellafield is a large and complex site, and a number of major projects are currently being delivered

Site Development Zones

Zone name

- | | |
|----------------------------|---------------------|
| ■ Bulk storage | ■ Low-level waste |
| ■ Effluent management | ■ Support |
| ■ Fuel stores | ■ Nuclear materials |
| ■ High-level waste plants | ■ Remediation area |
| ■ Intermediate-level waste | |



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Note

1 The map does not include all facilities at the Sellafield site for national security reasons.

Source: Sellafield Mapping Unit

Progress with reducing hazard and risk at Sellafield

2.6 The top 10 highest hazards at Sellafield are the four legacy ponds and silos, the plutonium stock, plutonium management facilities, and facilities that deal with the by-products of waste treatment activities. Sellafield Limited has a series of programmes in place to deal with these, with expected completion dates still decades into the future. For a programme to proceed, it often requires the successful completion of one or more major projects, so progress must be assessed at both programme and project level. There is also a high degree of uncertainty about the nature and scale of the problems to be addressed; progress can reveal new problems, which in turn push back the expected completion date. As a result, measuring progress with reducing high hazard and risk at Sellafield is challenging.

2.7 To assess progress on the highest hazards and risks we have:

- for key programmes, tracked how planned milestones, and expected completion dates have changed since 2011;
- for major projects, examined changes in expected completion dates and total cost, and estimated the costs of those which have been cancelled; and
- for key programmes and major projects, also evaluated whether they are delivering their annual schedule of work within the budgeted cost.

Progress with key programmes

2.8 Eight of the NDA's ten highest hazard facilities are located at Sellafield.⁸ Four of them comprise two legacy ponds and two silos that were built in the 1950s and 1960s. These are deteriorating but still contain large amounts of spent fuels and radioactive waste materials. The second and the fifth are the product finishing and storage facilities that deal with plutonium products and residues on the site. In line with regulatory requirements and government policy, the NDA's strategy prioritises managing and safely storing plutonium, and decommissioning the legacy ponds and silos by starting retrieval operations as quickly as possible to reduce the associated risk.

Progress with legacy ponds and silos

2.9 The NDA's estimated completion dates for the four legacy ponds and silos programmes were extended significantly between 2007 and 2010 and again in 2011. In 2015, we reported that, in its latest performance plan set in 2014, the NDA made little change to its forecast completion dates for the two pond programmes, but pushed back its expected completion dates for the two silos programmes by 10 years and 14 years. The NDA and Sellafield Limited currently estimate that one silo programme will be completed six years earlier than expected in 2015. It has maintained its forecast completion dates for the remaining three.

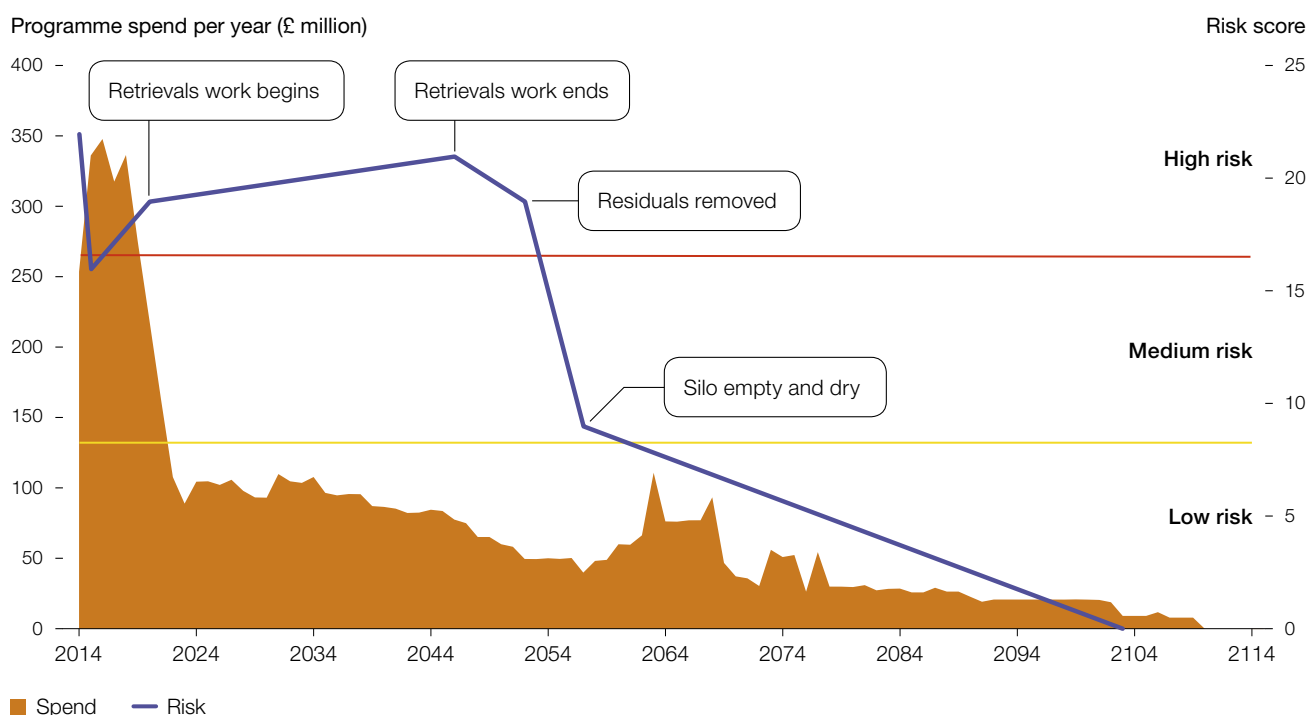
⁸ The other two facilities are located at the Dounreay site.

2.10 Since we last reported, the NDA and Sellafield Limited has met significant milestones in reducing high hazard in its legacy ponds and silos (**Figure 13** on pages 35 to 38); paragraphs 2.25 to 2.28 discuss year-on-year progress.

Figure 13

Progress with reducing high hazard in legacy ponds and silos

a) Magnox swarf storage silo is projected to be a low-risk programme by 2061



Recent milestones achieved

This programme aims to install three machines to retrieve radioactive waste mechanically from the silo, all of which have been under construction since the late 1990s. In 2016-17, Sellafield Limited installed the first one. It has also reported that radioactive liquors are being removed from the silo faster than scheduled.

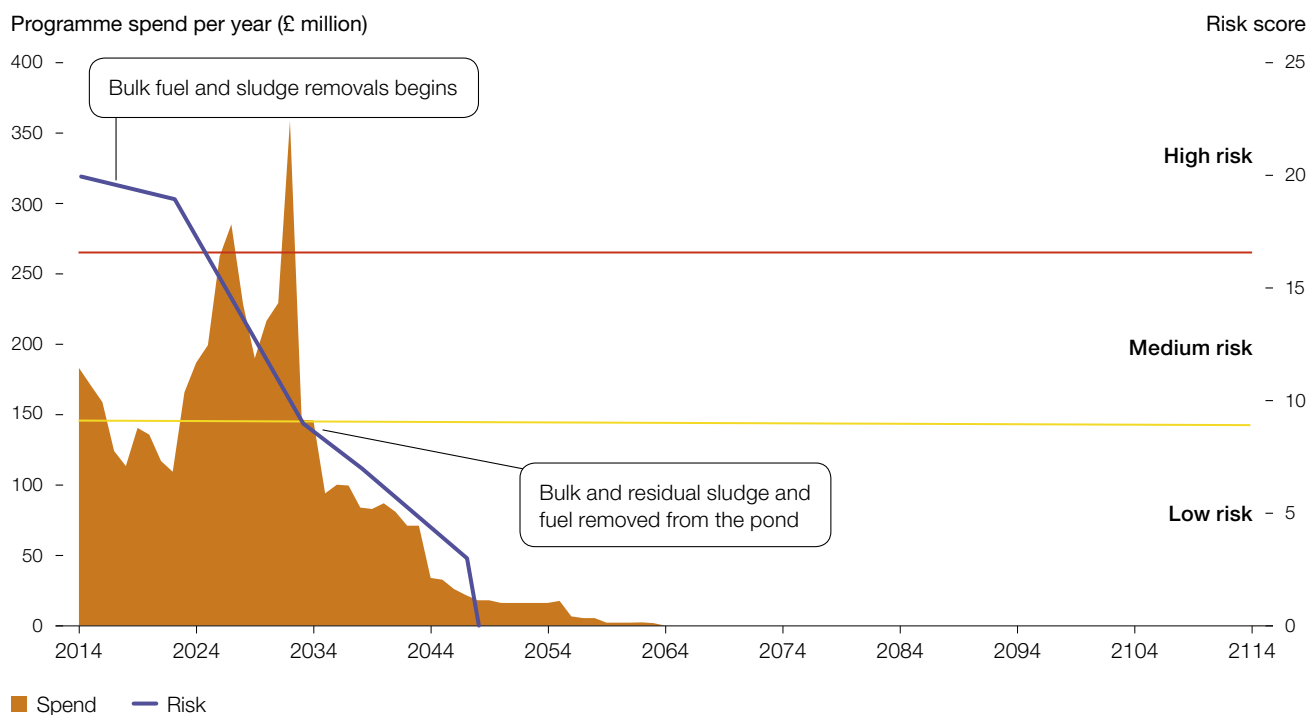
The business case was approved in September 2015. The programme is forecast to cost £7.1 billion from 2014-15 onwards.

Milestone	2011 performance plan	2014 performance plan	September 2015	Latest forecast date (February 2018)	Risk and hazard level
Beginning of miscellaneous waste retrievals	July 2017	December 2019	January 2021	June to September 2019	Very high
Beginning of full inventory retrievals	July 2017	2026	2022	2022	Very high
End of full inventory retrievals	2036	2050	2046	2046	High
Post-operational clean-up operations completed	2041	2055	2061	2057 to 2061	Low
Demolition complete	2087	2101	2107	2103 to 2107	Zero

Figure 13 continued

Progress with reducing high hazard in legacy ponds and silos

b) First generation Magnox storage pond is projected to be a low-risk programme by 2033



Recent milestones achieved

Sellafield Limited has resumed retrieving spent fuel for the first time in decades. In December 2016, it installed the bulk sludge retrieval equipment that will be used to remove radioactive sludge and transfer it to more modern facilities.

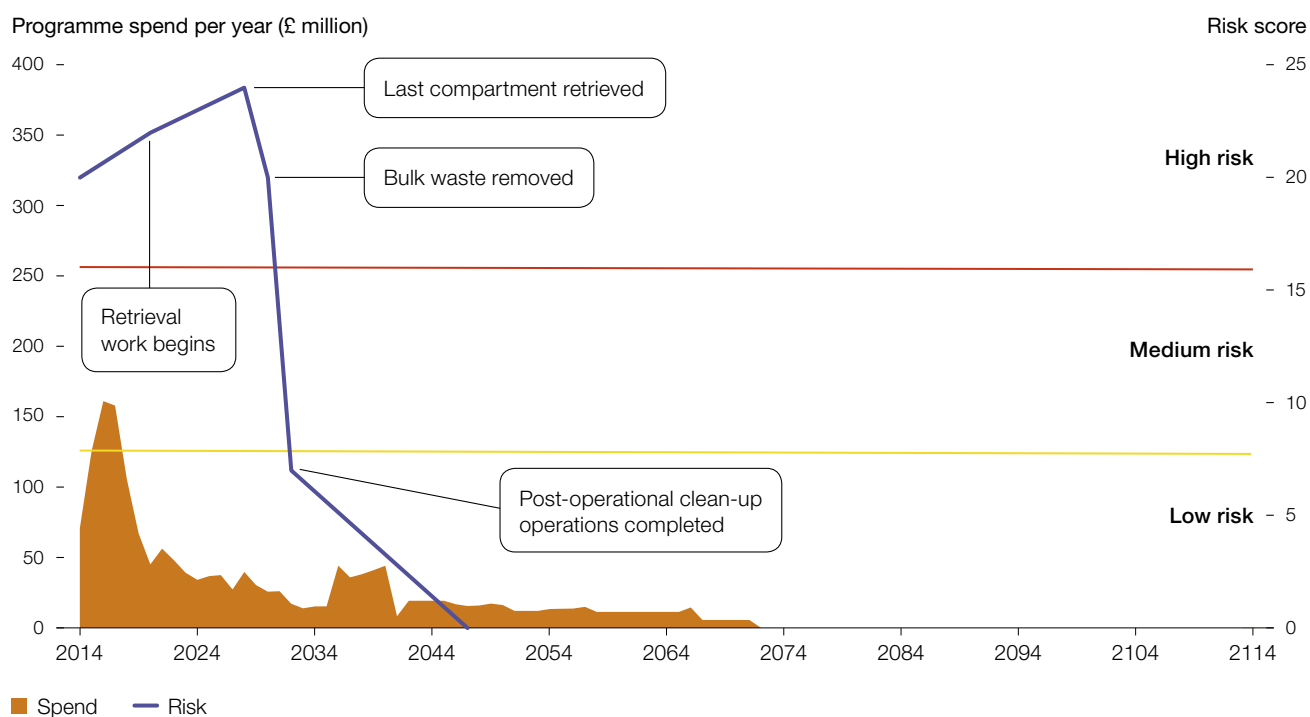
The business case was approved in December 2014. The programme is forecast to cost £4.9 billion from 2014-15 onwards.

Milestone	2011 performance plan	2014 performance plan	September 2015	Latest forecast date (February 2018)	Risk and hazard level
Beginning of bulk sludge removal	February 2015	April 2016	Achieved: March 2015	Achieved: March 2015	Very high
Beginning of bulk fuel removals	November 2015	April 2016	April 2016	Achieved: April 2016	Very high
Bulk inventory removed from the pond	2034	2033	2033	2033	Low
Demolition complete	2050	2048	2048	2037 to 2040	Zero

Figure 13 continued

Progress with reducing high hazard in legacy ponds and silos

c) Pile fuel cladding silo is projected to be a low-risk programme by 2032



Recent milestones achieved

Sellafield Limited has installed six reinforced doors to the side of the silo to access waste. It expects retrievals to start in 2020, two years earlier than planned in 2015, at a reduced lifetime cost of £250 million.

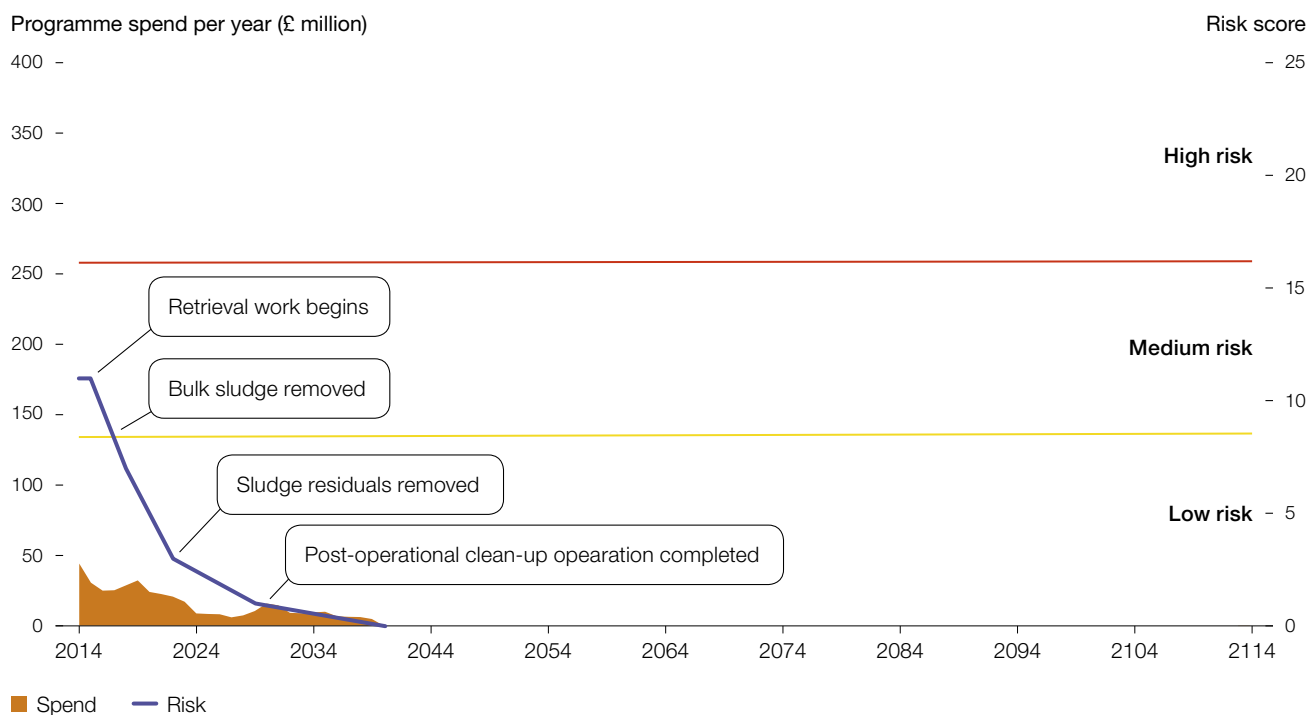
The business case was approved in March 2016. The programme is forecast to cost £1.8 billion from 2014-15 onwards.

Milestone	2011 performance plan	2014 performance plan	September 2015	Latest forecast date (February 2018)	Risk and hazard level
Beginning of bulk retrievals	August 2017	April 2023	November 2022	2019 to 2020	Very high
Bulk retrievals complete	August 2023	March 2033	September 2036	2030	High
Post-operational clean-up operations completed	2025	2035	2038	2032	Low
Demolition complete	2039	2049	2049	2047	Zero

Figure 13 continued

Progress with reducing high hazard in legacy ponds and silos

d) Pile fuel storage pond has recently become a low-risk facility



Recent milestones achieved

Retrievals of bulk stock of nuclear fuel started in 2012. Sellafield Limited reported in March 2016 that retrievals had been completed, leading to a 70% cut in the pond’s radioactive content.

The business case was approved in April 2014. The programme is forecast to cost £409 million from 2014-15 onwards.

Milestone	2011 performance plan	2014 performance plan	September 2015	Latest forecast date (February 2018)	Risk and hazard level
Beginning of sludge removal	2012	2015	July 2016	Achieved: December 2016	Medium
Start of bulk fuel removal	2012	Achieved 2012	Achieved 2012	Achieved: 2012	Medium
Bulk fuel removal complete	January 2015	August 2017	March 2017	Achieved: March 2016	Low
Complete dewatering	March 2029	March 2029	March 2029	March 2029	Low
Demolition complete	2041	2040	2040	2040	Zero

Notes

- In the graphs, the NDA’s assessment of risk is not related to the programme spend per year.
- The NDA’s assessment of future risk levels presented here is not a precise evaluation, but an indicative measure of how planned interventions affect risk. These estimates reflect the opinion of a small number of experts and are not fully underpinned by quantitative measurements. To define risk levels, the NDA uses a matrix that scores the probability of an event occurring, with the consequences should it occur. A risk assessment of ‘very low’ corresponds to an unlikely event occurring with negligible consequences; ‘very high’ corresponds to a very likely occurrence with critical consequences.
- The analysis combines data from September 2016 (risk), March 2018 (spend) and various years (milestones).
- The milestones highlighted in bold are when the NDA expects the risk associated with a facility to be downgraded to the ‘low’ risk category.

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

Progress with managing plutonium

2.11 The UK has the largest inventory of civil plutonium in the world – around 40% of the global total. Most of this plutonium is currently stored at Sellafield in facilities that are regarded as the NDA's second and fifth highest hazards. The NDA's reprocessing activity continues to generate plutonium from spent fuel. However, the NDA expects all reprocessing activity at Sellafield to stop by the end of 2020, meaning it will not add further to the inventory of plutonium (Part Three).

2.12 The Department for Business, Energy & Industrial Strategy (the Department) is currently considering options for what to do with the plutonium inventory in the long term. Options include reusing it as fuel for power generation in new nuclear reactors, or immobilising the material before disposing of it in the geological disposal facility once that is constructed (currently estimated to be between 2043 and 2048). Both options are long term and will take decades to implement.

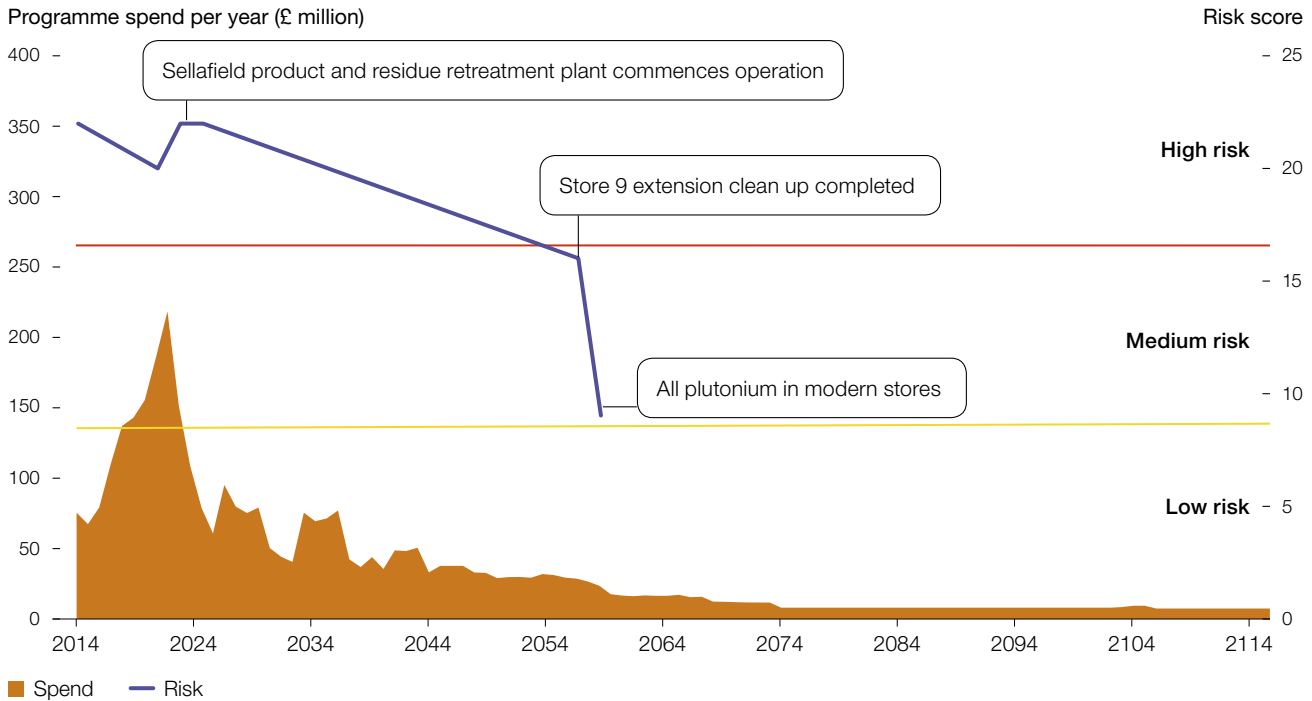
2.13 Irrespective of which option is chosen for managing the plutonium inventory in the long term, the NDA must, in the interim, ensure that it is stored safely and securely. Sellafield Limited is carrying out its safe storage of plutonium programme, which involves work to store plutonium until 2120. The programme includes emptying plutonium from older facilities to more modern stores and repackaging containers not currently suitable for long-term storage. The NDA estimates that this will cost £3.5 billion (from 2017-18 onwards) and continue until 2120, when Sellafield is expected to close. **Figure 14** overleaf sets out key milestones for this programme, and how those have moved over time.

2.14 In 2010, the NDA opened the Sellafield product and residues store (SPRS), a modern facility to store plutonium canisters more safely and securely. It has been transferring plutonium canisters into the store since 2012, and reports that it is approximately 30% full. Two more stores are likely to be built to house the entire stock. The NDA estimates they will cost £200 million more than initially budgeted to complete. The NDA monitors progress by checking how many canisters Sellafield Limited is moving against an annual target agreed between them.

2.15 However, some of the existing canisters are unsuitable for storage in SPRS, and need to be repackaged. The NDA expects to do this through a new project, the Sellafield product and residue store retreatment plant (SRP). In future, some canisters that have already been transferred into modern storage will have to be repackaged through the SRP facility to ensure they do not degrade. SRP is currently in the design phase, with the NDA originally estimating that it would cost £470 million and that it would be ready by 2023. The NDA told us that, as of June 2018, it is continuing to develop the design specifications, and that it expects that the likely project cost estimate is now between £1 billion and £1.5 billion. The NDA is expecting a two-year delay on the project so far, and says that further delays are likely. This means the NDA has had to explore contingency arrangements for repackaging some canisters within this two-year period.

Figure 14
Progress with reducing high hazard associated with the safe storage of plutonium

Safe store of plutonium is projected to be a low-risk programme by 2070



Recent milestones achieved

In 2010, the NDA opened the Sellafield product and residues store (SPRS), which is now approximately 30% full. The programme is expected to cost £3.5 billion from 2017-18 onwards.

Milestone	2011 performance plan	2014 performance plan	September 2015 or last business case	Latest forecast date (February 2018)	Risk and hazard level
Sellafield product and residue store (SRP) retreatment plant commissioning	-	April 2022	March 2025	December 2025	Very high
Product finishing and storage – complete operations	March 2031	March 2031	March 2031	March 2031	Very high
Store 9 extension – clean up operations completed	-	March 2058	March 2058	March 2058	High
– complete decommissioning	March 2072	March 2070	March 2070	March 2070	Low
Product finishing and storage – complete decommissioning	March 2077	March 2077	March 2077	March 2077	Zero

Notes

- In the graph, the NDA's assessment of risk is not related to the programme spend per year.
- The NDA's assessment of future risk levels presented here is not a precise evaluation, but an indicative measure of how planned interventions affect risk. These estimates reflect the opinion of a small number of experts and are not fully underpinned by quantitative measurements. To define risk levels, the NDA uses a matrix that scores the probability of an event occurring, with the consequences should it occur. A risk assessment of 'very low' corresponds to an unlikely event occurring with negligible consequences; 'very high' corresponds to a very likely occurrence with critical consequences.
- The analysis combines data from September 2016 (risk), March 2018 (spend) and various years (milestones).
- The milestones highlighted in bold are when the NDA expects the risk associated with a facility to be downgraded to the 'low' risk category.

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

2.16 A proportion of the plutonium canisters at Sellafield are decaying faster than the NDA anticipated. A leak from any package would lead to an 'intolerable' risk as defined by the Office for Nuclear Regulation (ONR). The NDA has therefore decided to place the canisters more at risk in extra layers of packaging until SRP is operational. It has not yet submitted a new business case to support these contingency arrangements.

2.17 The NDA currently estimates that the lifetime cost of the programme to manage plutonium will cost £3.5 billion, but told us that this does not include all the costs associated with the expected cost increase for the SRP project, contingency arrangements associated with the delay in SRP, or the increase in cost of building two new stores to house plutonium canisters. The NDA told us it expects that, once these estimates are refined, they will increase the programme cost by between £0.5 billion and £1 billion.

Progress with major projects

2.18 The NDA currently reports to the Department on the progress of 14 'major projects' at Sellafield. These are projects with expected lifetime costs of more than £100 million and that require closer scrutiny and approval by the Department and HM Treasury. These projects are key to making progress with reducing the high hazard facilities discussed above. They involve providing equipment, buildings or systems to remove, move, treat, and package and store waste. Other major projects relate to operating the site and reprocessing spent nuclear fuels.

2.19 In 2015, we reported on the performance of the 14 major projects at that time.⁹ While the number of major projects that the NDA monitors has remained the same, the individual projects have changed due to cancellations, completions and new major projects starting up. Of the projects we reported on in 2015:

- six are still being delivered (three moved from the design phase and are now under construction);
- two have been completed, including Evaporator D. Following a history of poor performance, this project was completed more than three years late and cost £749 million, significantly higher than the £397 million it was estimated to cost when it began; and
- three projects have been cancelled (see Figure 17 on pages 46 and 47).

The NDA has added six new major projects to the list, bringing the total number to 14 in 2018. We list these projects in Appendix Three.

2.20 The NDA estimates that the lifetime costs of the 14 current major projects is £6 billion, of which £3.3 billion had been spent by 31 January 2018. In 2017-18, the NDA spent £483 million on major projects, which accounted for 24% of expenditure on the Sellafield site, and 15% of the NDA's overall expenditure. Nine projects are under construction or recently completed, and five are at the early concept or design phases (Appendix Three).

⁹ In 2015, our report included one additional project, the highly active liquor storage tanks. However, this was cancelled in 2012 while still at the design stage. We have excluded it from this analysis.

2.21 The NDA tracks the progress of major projects by monitoring expected total cost and completion dates against project plans approved by the Department and HM Treasury. We have analysed how the NDA's most recent estimate differs from the original project plan for the nine projects currently under construction or recently completed. In terms of performance against schedule, six projects have accumulated a total delay of 186 months, one is on schedule, and two are ahead of schedule, by a total of 21 months (**Figure 15**).¹⁰ In terms of performance against budget, six projects are expected to complete over budget for a combined £1.1 billion, and three are expected to cost a combined £142 million less than when the projects began (**Figure 16** on page 44).

2.22 Looking at the five projects that were already under construction when we reported in 2015 and that remain under construction in 2018, we found that the NDA has managed to reduce the cumulative delay by 42 months, relative to a total of 336 months to deliver all five. However, these projects are now expected to cost £149 million more than estimated in 2015.

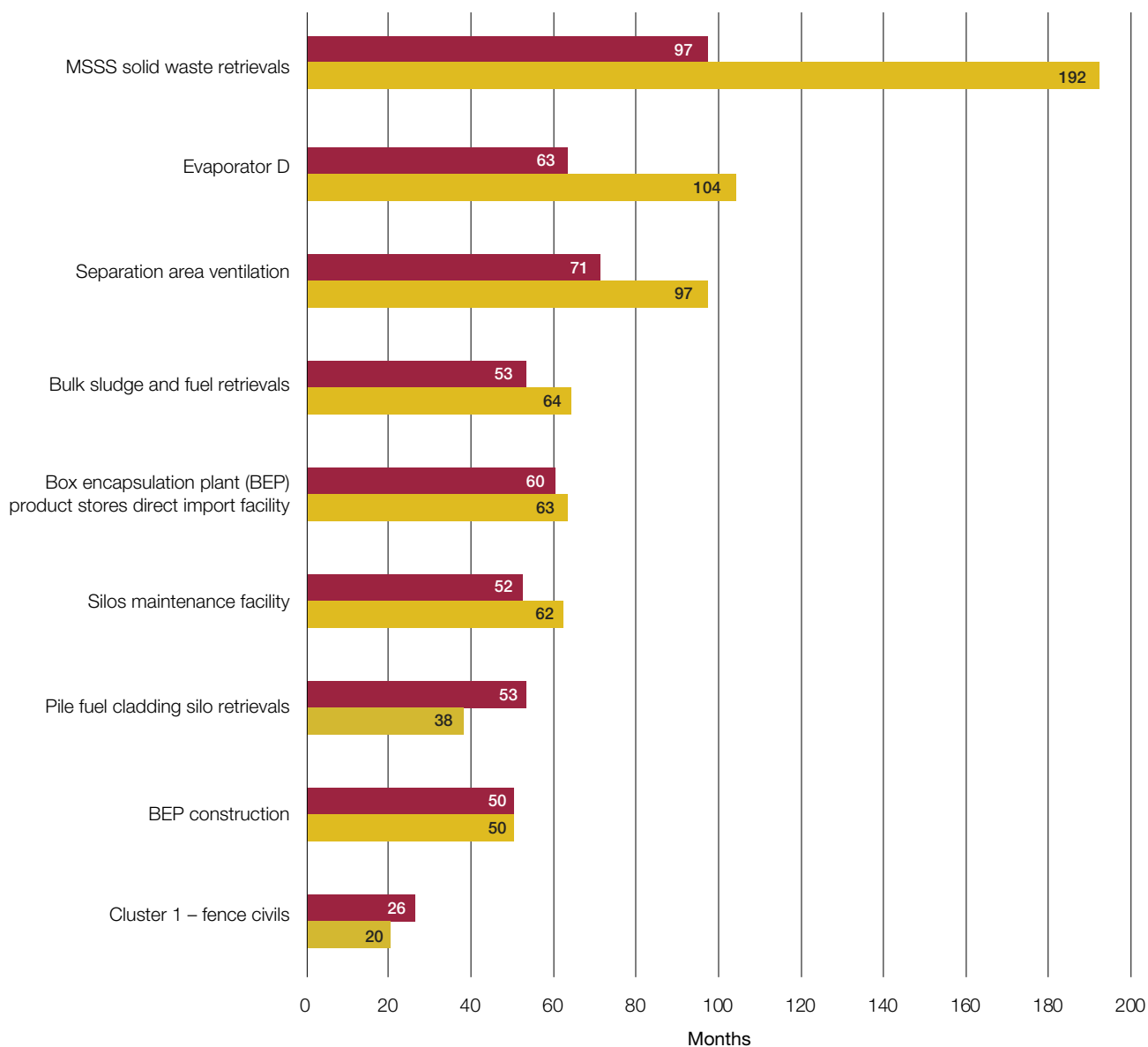
2.23 The NDA regularly reviews the need for its projects. These reviews may identify an alternative course of action that could allow faster progress or is more cost-effective. Sometimes, this means cancelling an ongoing project. The NDA says it has cancelled three projects since 2012 because it identified more cost-effective strategies for carrying out the work (**Figure 17** on pages 46 and 47). Our audit shows that, before cancelling these projects, the NDA had incurred sunk costs of £586 million. This includes the silo direct encapsulation plant (SDP) which the ONR was critical of and advised the NDA to consider alternatives. The NDA does not track the money it has spent on projects it has cancelled before they are completed. It reports only the costs incurred since the last request for funding. The NDA could be clearer about how it intends to evaluate whether the change in strategy was more effective once the project has been delivered.

¹⁰ Pile fuel cladding silo (15 months early) and fence civils (six months early).

Figure 15

Major project performance: schedule forecasts

Six major projects have a total delay of 186 months. One is on schedule and two are being delivered earlier than planned



- Original schedule
- Schedule as at December 2017

Notes

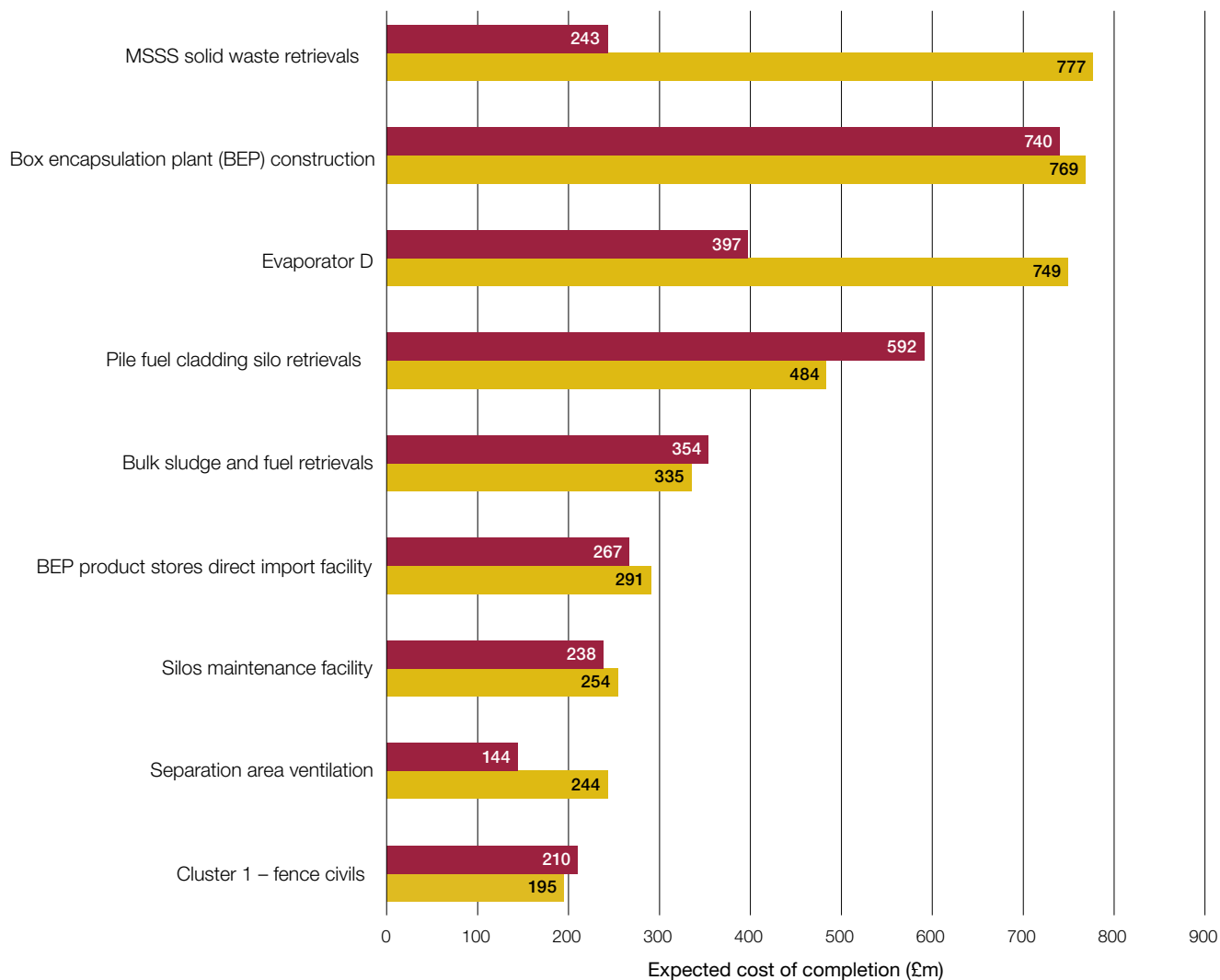
- 1 The full project name for MSSS solid waste retrievals is Magnox swarf storage silo solid waste retrievals.
- 2 The NDA told us it is currently reviewing BEP product stores direct import facility project. This will likely have an impact on the schedule presented here (see Figure 16).

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

Figure 16

Major project performance: cost forecasts

Six major projects are expected to complete over budget at a combined cost of £1.1 billion; however, three major projects are expected to complete at a reduced total cost of £149 million



- Original cost
- Cost as at January 2018

Notes

- 1 The full project name for MSSS solid waste retrievals is Magnox swarf storage silo solid waste retrievals.
- 2 The NDA told us that, as at June 2018, it expects the completion cost of the BEP product stores direct import facility to increase from £291 million to between £350 million and £400 million due to difficulties Sellafield Limited have encountered during construction.

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

2.24 We also assessed major project performance by comparing aggregate information on the NDA's portfolio of major projects under construction or recently completed as these portfolios stood in 2015 and in 2018 (**Figure 18** on page 48).¹¹ The NDA's portfolio of projects in 2018 is larger, with expected lifetime costs considerably higher (46%). The NDA expects the 2018 portfolio costs to overrun, but to a lesser extent than it did for the 2015 portfolio (29% over budget in 2018 compared with 60% in 2015). Delays to completion dates are also lower in the 2018 portfolio: in 2018, projects are expected to take 31% longer than originally planned, compared with 93% for the 2015 portfolio.

Year-on-year performance of programmes and major projects

2.25 As well tracking estimated completion dates and lifetime costs of programmes and major projects, the NDA measures annual performance using two indicators:

- cost performance index (CPI) measures the ratio between the budgeted cost of work performed and the actual cost of work performed – a CPI lower than 1 means the project cost more than expected that year (meaning it is over budget);
- schedule performance index (SPI) measures the ratio between the budgeted cost of work performed and the budgeted cost of work scheduled – an SPI lower than 1 means the project has delivered less than expected that year.

2.26 Looking first at the four legacy ponds and silos programmes, these have performed better on CPI compared to the position in 2015. However, in terms of SPI, three of them have delivered less work than planned in at least five years since 2011-12, including the pile fuel cladding silo.

2.27 This notwithstanding, the NDA says the pile fuel cladding silo programme is ahead of schedule, and it has not put back the scheduled completion dates of the other programmes. The NDA contends that annual delays do not necessarily result in cumulative delays to programme completion because “long-term plans include risks and opportunities” that can be responsible for, or allow a response to, annual fluctuations in performance.

¹¹ Between 2015 and 2018, four projects in the 2015 portfolio have been completed and are therefore no longer on the list of major projects. The NDA has added four new projects to its list. Five projects overlap the two periods.

Figure 17

Major projects cancelled since 2012

	Project initiation	Estimated delivery at initiation	Estimated cost at initiation (£m)	Last cost estimate (£m)	Last estimated delivery date
Silos direct encapsulation plant (SDP)	2010	November 2018	560–669	2,689	June 2026
Box transfer facility (BTF)	December 2011 (design gate)	November 2018	148	196	September 2020
Highly active liquor storage tanks	2007	March 2013	83	474	March 2018
Ponds solid treatment plant technical underpinning project	2010	March 2015	29	–	–

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

2.28 Figure 19 on pages 50 and 51 summarises CPI and SPI performance across Sellafield's five high-hazard programmes and 10 major projects. For the programmes, we find that, on average, they have been delivered broadly on budget since 2011-12 (top left quadrant of Figure 19). In terms of SPI, on average the programmes delivered less work than planned each year until 2015-16 but have been on track since (bottom left quadrant of Figure 19). At the project level, performance against CPI in 2013-14 was particularly uneven, but has improved since (top right quadrant) and in terms of SPI has improved since 2014-15 (bottom right quadrant of Figure 19).

Progress with commercial fuel reprocessing operations

2.29 Alongside its decommissioning activity, Sellafield Limited carries out commercial operations that mainly involve reprocessing and storing spent fuel. In 2017-18, commercial activities at Sellafield generated an income of £902 million for the NDA, up 5.3% from 2016-17.¹² We have previously reported that Sellafield Limited's performance has varied from year to year. This is mainly due to the fragility and age of the reprocessing plants, which lead to frequent outages.¹³ In 2017-18, the NDA missed its output targets for two of the three plants involved in reprocessing.

¹² In 2016-17, commercial activities at Sellafield generated an income of £857 million.

¹³ HC Committee of Public Accounts, *Progress at Sellafield*, Forty-third Report of Session 2013-14, HC 708, February 2014.

Date cancelled	Spend by cancellation (£m)	Reason for cancellation
October 2015	477	Both the silos direct encapsulation plant (SDP) and the box transfer facility (BTF) were projects intended to support waste retrievals from the Magnox swarf storage silo (MSSS), the highest hazard facility on the NDA estate. In 2015, HM Treasury and the Department of Energy & Climate Change approved the NDA's proposed change of strategy for removing waste from the silo. The NDA had showed that the new strategy would reduce expected costs by between £500 million and £600 million and allow retrieval activity to start sooner. This new strategy meant that the NDA no longer required SDP. It says it had been pursuing SDP because this was the only technically mature option available to it, and had continued with it while work on a better strategy was taking place in parallel. Before cancelling the project, SDP's expected lifetime costs had spiralled from £560 million to £2.7 billion and its delivery date was pushed back by eight years. Sellafield Limited spent £477 million on designing and building the outer shell of the SDP facility before the NDA's decision to cancel the project. A further implication is that the BTF, originally envisaged as part of the same waste stream, was no longer required and effectively cancelled. The NDA is looking for alternative uses for the facility. Combined, the two projects were expected to cost £2.1 billion over budget and complete 113 months late.
April 2015	66	
May 2012	43	This project aimed to replace tanks used to collect highly radioactive liquors as some were showing signs of corrosion. As the NDA has decided to end reprocessing activity at Sellafield by 2020, the Office for Nuclear Regulation agreed to allow Sellafield Limited to use two tanks, previously kept empty to provide reserve capacity, in place of building new tanks.
March 2017	17	This study was conducted to understand the technologies required for the treatment of solid wastes retrieved from the first generation Magnox storage pond. After reviewing options, the study concluded that existing facilities, or others already under construction, would meet the requirements.

2.30 By the end of 2018, Sellafield Limited will stop reprocessing activity at its Thermal Oxides Reprocessing Plant after it has completed all of its current contracts. This will reduce the NDA's annual income, but the storage of reprocessed and spent fuel will continue to generate income for some years after that. Sellafield Limited will also bring to an end reprocessing activity in its Magnox Reprocessing Plant in 2020 once all the fuel from Magnox power stations has been processed. Part Three sets out how Sellafield Limited is planning to respond to the end of reprocessing activity. This currently accounts for around 25% of its total work outside of its work to reduce high hazard on the site – what Sellafield calls its 'variable scope'.

Reporting and assuring progress

2.31 The NDA monitors the 'desired outcomes' to be achieved at Sellafield. These include: making demonstrable physical progress with legacy ponds and silos; improvements in commercial operations; efficiency through reduced costs and increased value; and ensuring the safety and security of the site. The NDA receives performance information from Sellafield Limited on a regular basis, and provides this as part of monthly and quarterly performance reports to the NDA Board and the Department (through UK Government Investments (UKGI)) and HM Treasury. Since our 2015 report, the NDA has also published an overview of the performance of major projects as part of its annual report and accounts.

Figure 18

Major project performance: portfolio assessment

The Nuclear Decommissioning Authority has reduced delays to its major projects: in 2018, projects are expected to take 31% longer than planned compared with 93% in 2015

Project name	2015 ¹	2018 ¹	
Local sludge treatment plant	Completed (2012) ²	<i>Not present</i>	
Buffer sludge packaging plant	Completed (2014)	<i>Not present</i>	
Encapsulated product store	Completed (2014)	<i>Not present</i>	
Box transfer facility	Construction	<i>Not present (cancelled in 2015)</i>	
Separation area ventilation	Construction	Completed (2017)	
Evaporator D	Construction	Completed (2017)	
Magnox swarf storage silos retrievals	Construction	Construction	
Bulk sludge and fuel retrievals	Construction	Construction	
Silos maintenance facility	Construction	Construction	
Box encapsulation plant	<i>Not present (project at design stage)</i>	Construction	
Box encapsulation plant product stores direct import facility	<i>Not present (project at design stage)</i>	Construction	
Pile fuel cladding silo retrievals	<i>Not present (project at design stage)</i>	Construction	
Fence civils	<i>Not present</i>	Construction	
Combined estimates of	2015	2018	
Cost at design gate	1,758	3,185	(£ million)
Cost at reporting date ³	2,814	4,098	(£ million)
Forecast cost overrun at completion	1,056 (60%)	913 (29%)	(£ million)
Schedule at design gate	474	525	(months)
Schedule at reporting date	913	690	(months)
Forecast delay at completion	439 (93%)	165 (31%)	(months)
Schedule completed at reporting date	553 (61%)	492 (71%)	(months)

Notes

- 1 The projects considered in each of the 2015 and 2018 portfolios are in **bold** text.
- 2 Year the project was completed. Projects remain in the portfolio after being completed so that they can be monitored during their early life.
- 3 The reporting date shows the NDA's best estimates for completion date and cost at completion when we reported in 2015 and as of February 2018.
- 4 The NDA told us that, as at June 2018, it expects the completion cost of the BEP product stores direct import facility to increase from £291 million to between £350 million and £400 million due to difficulties Sellafield Limited have encountered during construction. The figures above do not include this increase.

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

2.32 We examined whether routine reporting through monthly and quarterly reviews gives a clear and consistent view of major project performance. The NDA's reporting to UKGI and HM Treasury is extensive and complies with an agreed template between all parties. However, where projects, programmes or operational targets are reported to be underperforming, the NDA does not sufficiently explain how it plans to rectify performance, by when, and what impact this will have on the rest of the portfolio.

2.33 The NDA monitors the annual performance of Sellafield Limited's management using a number of criteria aligned to Sellafield's long-term site plan. The NDA says that this ensures that management's attention is focused on making progress where it matters the most. The key targets cover a series of management deliverables that the NDA and Sellafield Limited consider critical to the mission, and reflect the urgency and importance of some projects. For example, they include significant milestones for the major projects and legacy ponds and silo programmes; health and safety records; and quantities of spent fuel reprocessed.

2.34 In 2016-17, Sellafield Limited:

- achieved 77 out of 101 points (76%);
- missed two milestones: one for installing a new boiler and one for demolishing a disused ventilation stack. It also scored poorly on several criteria related to project delivery; and
- achieved an 'excellent' result in 20 out of 34 criteria, including major decommissioning operations.

2.35 In 2017-18, Sellafield Limited:

- achieved 72 out of 92 points (78%);
- missed three milestones: one related to an administrative review of pay; one related to quantities of reprocessed waste; and one related to the Magnox swarf storage silo programme (Sellafield Limited is expected to transfer between 25 and 50 cubic metres of materials, but by the end of the year had transferred none); and
- achieved an excellent result in 22 out of 31 criteria, including full points in five out of six project delivery criteria.

2.36 Given the long timescales of the mission at Sellafield, we were concerned to have found no evidence that UKGI, HM Treasury or the Department have reviewed progress over the medium term (three to five years), or pressed the NDA to explain apparent contradictions in its performance monitoring (as set out above).

2.37 Finally, the NDA also monitors estimated efficiency savings at Sellafield, which we discuss in Part Three.

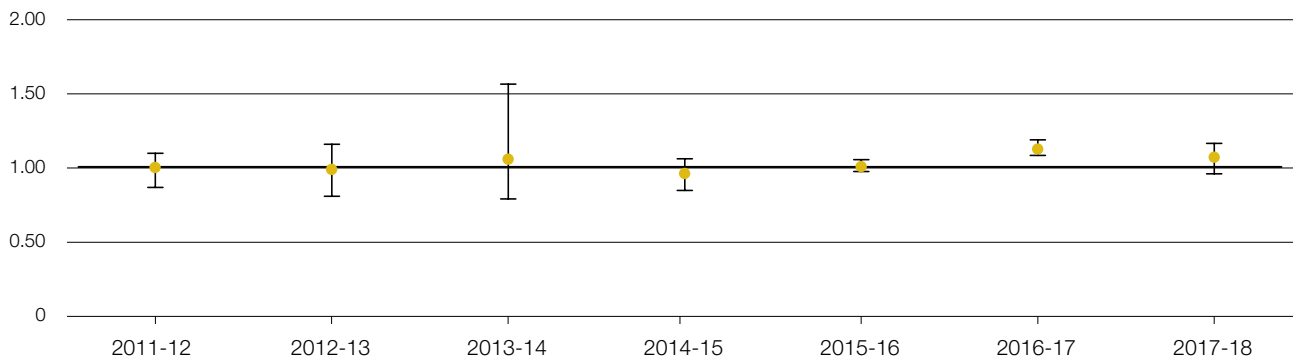
Figure 19

Year-on-year performance on cost and schedule for programmes to reduce high hazard and risk and major projects

Programmes to reduce high hazard and risk

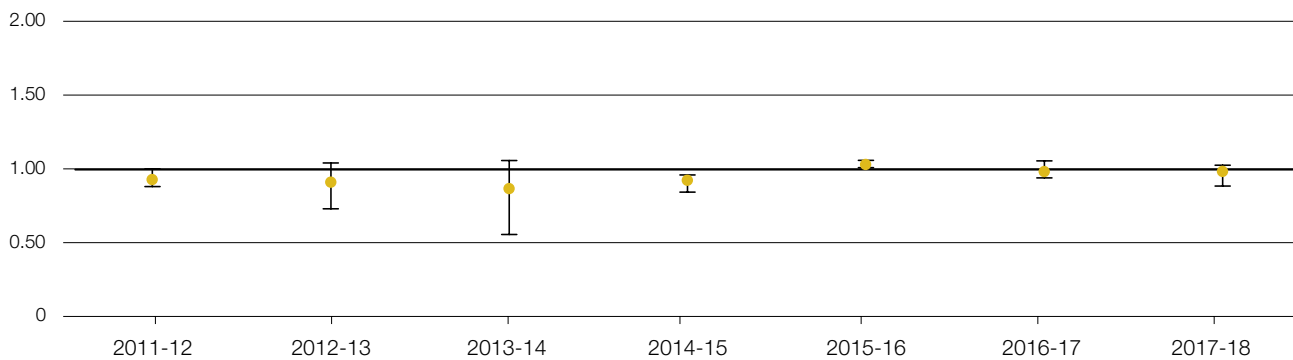
Programmes are more consistently delivered on or below budget

Cost performance (CPI)



Most programmes delivered less work than planned each year until 2015-16

Schedule performance (SPI)



Minimum to maximum range ● Average value
 Above 1: Good performance Below 1: Poor performance

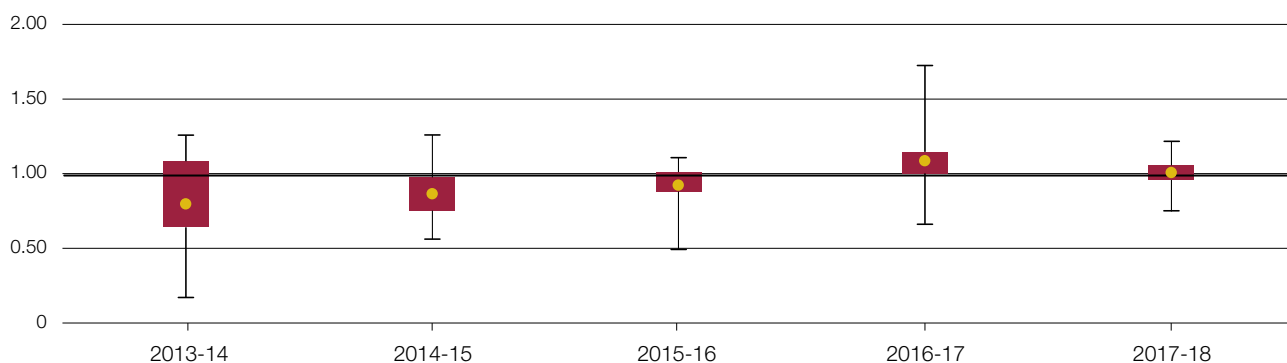
Figure 19 *continued*

Year-on-year performance on cost and schedule for programmes to reduce high hazard and risk and major projects

Major projects

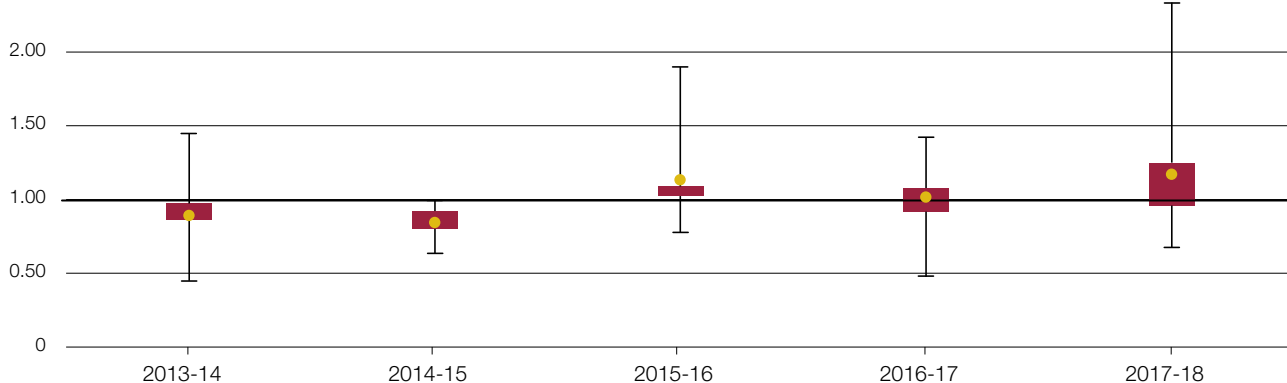
In 2017-18, the 10 projects we analysed delivered very close to their budgeted cost

Cost performance (CPI)



On average, major projects are delivering the scheduled amount of work, and often even more but there is wide disparity across projects

Schedule performance (SPI)



■ First quartile to third quartile range I Minimum to maximum range ● Average value

Above 1: Good performance Below 1: Poor performance

Notes

- 1 The indices show the relationship between the budgeted cost of work performed and the actual cost of work performed (cost performance index or CPI) and the budgeted cost of work performed and the budgeted cost of work scheduled (schedule performance index or SPI).
- 2 An SPI of 1 would show that the NDA had delivered all the work scheduled in that period. A CPI of 1 would show that the work performed had cost what it was budgeted to cost. A score of less than 1 indicates poorer performance than planned, and a score of more than 1 indicates better performance than planned.
- 3 Projects included in the analysis: box encapsulation plant; box encapsulation plant product store direct import facility; bulk sludge and fuel retrievals; Evaporator D; MSSS solid waste retrievals; pile fuel cladding silo early retrievals; Sellafield product and residue store retreatment plant; separation area ventilation; silo maintenance facility; SIXEP contingency plant.
- 4 The average values are unweighted for size or schedule of the programme or project.

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

Limitations to measuring performance

2.38 Sellafield Limited and the NDA track how major projects are performing against cost and schedule compared with the baseline set in 2014 under the previous management model. Each year, Sellafield Limited introduces a series of change controls that update part of the 2014 baseline, and every year it produces a detailed plan of work for the next three years.

2.39 The NDA says it has no plans to revise the 2014 baseline until 2020 when its reprocessing activities at Sellafield are due to end. Our concerns about the continued viability of measuring performance against this baseline include:

- the baseline was set under the previous management model, and the parent body organisation (PBO) was involved in setting it. As the PBO's fees depended on delivering work against the baseline, it was in its interest to negotiate larger budgets and longer schedules. Sellafield Limited told us that it conducted the technical work underpinning the baseline, and that the PBO had only a limited say in setting up the baseline;
- the baseline was defined with an assumption that Sellafield Limited would take a low-risk approach to its work. The NDA and Sellafield Limited have told us that this appetite for risk has shifted since the change in management model. This has meant that project managers have incentives to find savings that they would have not otherwise been able to. The NDA says that it includes changes in underlying assumptions by updating parts of the baseline;
- in 2014-15, our financial audit of the NDA's accounts found that the NDA changed its approach to assuring cost estimates halfway through the process of setting the baseline. This was because the initial assurance process identified issues that were too systemic to be addressed on an individual, detailed basis; and
- in 2012, we reported that Sellafield Limited suffered from widespread optimism bias.¹⁴ If Sellafield Limited has corrected for this in the 2014 baseline, as we would expect, it is possible that improvements in its performance against cost and schedule reflect these corrections, rather than improvements in project delivery.

¹⁴ Comptroller and Auditor General, Nuclear Decommissioning Authority, *Managing risk reduction at Sellafield*, Session 2012-13, HC 630, National Audit Office, November 2012.

Strengthening assurance

2.40 The NDA's assurance of major project performance has been subject to several changes since we last reported. In 2016, the Department's accounting officer asked the NDA to submit "four or five" large or high-risk projects to enhanced assurance measures through reviews by the Infrastructure and Projects Authority (IPA).¹⁵ Eight IPA reviews have taken place so far, two of which have looked at major projects. The remainder have assured progress with other aspects of the NDA's work, including ongoing procurements. The Department's accounting officer also asked the NDA to establish a new sub-committee to its Board to review progress with major projects.

2.41 We examined the NDA's current arrangements to assure progress at Sellafield. The NDA does not assure the performance information that Sellafield Limited reports. Instead, its assurance of the performance of major projects and programmes relies on a combination of Sellafield Limited's assurance functions and on 'strategic reviews' led jointly with the IPA or in line with IPA-style reviews. The NDA told us that its Sellafield owners representative team maintains information on operations at Sellafield that enables it to provide challenge and advice to Sellafield Limited.

2.42 While the NDA's assurance is extensive and has some good elements in place, its effectiveness in supporting better management and mitigating risk in projects is limited by:

- the relative immaturity of Sellafield Limited's new assurance systems;
- limited capacity in the assurance teams of both Sellafield Limited and the NDA; and
- an overreliance on assurance through IPA or IPA-style reviews, which provide only a 'point in time' view of a project over a very short period and are limited in their ability to detect inherent or systemic issues with major project delivery.

It also unclear how these layers of assurance fit together, and what value each layer adds.

¹⁵ The Infrastructure and Projects Authority is the government's centre of expertise for infrastructure and major projects. It was established in 2016 after a merger of Infrastructure UK and the Major Projects Authority.

2.43 The NDA Board reviews performance reports for the NDA estate and considers funding requests for major projects. The NDA chairman and a non-executive director also attend the NDA's new subcommittee that reviews project and programme performance. We examined NDA Board minutes and judge that there is scope for further scrutiny of the progress of programmes and major projects as a portfolio. We noted multiple instances where the NDA Board did not discuss progress with major projects and programmes either in full or in part. There was also no indication that the Board discussed any issues with major project and programme performance on a regular basis.

Faster hazard and risk reduction

The drivers of improved performance

2.44 Sellafield Limited attributes its recent ability to improve performance to a number of factors. Of these, it says the NDA's new management model has been significant, and this has shifted the focus from 'fee earning' to delivering the NDA's mission on the site (discussed in Part Three). Sellafield Limited also says that its relationship with the regulator and key stakeholders has improved and is better coordinated. This is due mainly to the working group known as the 'G6', which was established in 2014. This group brings together six key stakeholders: the Department, the NDA, Sellafield Limited, the Environment Agency, UKGI and the ONR. The group discusses effective approaches to reducing hazard, the balance of risk in the short term and removing barriers to more progress.

2.45 Sellafield Limited told us that it has pursued a series of measures to support improvements in project delivery since 2011-12. These include:

- improving its preparation of business cases and their assurance;
- strengthening project fundamentals, including increasing support to project managers through peer-to-peer support and coaching and enhanced project controls, risk and contingency management;
- developing the capability of Sellafield Limited's staff and the supply chain; and
- benchmarking and shared learning activities.

2.46 Sellafield Limited and the NDA could do more to evaluate the impact of these contributory factors. Currently, they have little information on which have been most effective in supporting improved project delivery. They expect that further improvements in major project delivery will be made by acquiring private sector programme and project partners (Part Three).

The constraints on improved performance

2.47 In line with government policy and regulations set out by the ONR, the NDA must prioritise work to de-risk the facilities that pose 'intolerable' risks. To enable the NDA to do this, HM Treasury says it has not constrained the amount of funding available for this work. In the 2015 Spending Review, HM Treasury allowed the NDA "access to the reserve to manage volatility" associated with fluctuating income from commercial operations; new regulations that may require further or new work on high hazards across the NDA estate; or to progress work at Sellafield if all existing flexibilities have been exhausted. 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 never resorted to requesting this additional funding, as it says that progress with reducing high hazard and risk is not constrained by funding. In 2015-16, the NDA sought additional funding from the Department after income from commercial operations fell short of what it had forecast for that year.¹⁶

2.48 The NDA and Sellafield Limited say that the following factors limit the pace of de-risking activity:

- Task complexity: Retrieving materials from legacy ponds and silos, and managing the plutonium inventory, can require bespoke technological solutions that take time to develop. There are also numerous interdependencies across the portfolio, so that delays in one work stream can delay progress on others and there is a limit to management's decision-making capability in a complex environment;
- Physical constraints: The Sellafield site is congested and includes several restricted areas that take time to access due to security considerations. This means that relatively simple tasks like installing a crane require significant planning. The NDA also says that poor transport links to and from the site limit access and the number of contractors that it is possible to have on site.
- Low productivity of the workforce: Old employment contracts and shift patterns, and a strong focus on process and safety on the site limit faster progress.

We have not seen any evidence that Sellafield Limited and the NDA have sufficiently tested the limitations they say constrain faster progress with reducing hazard and risk. There is therefore a risk that these assumptions are overestimated and negatively affect the NDA's perceptions and decisions about what work can progress faster and how.

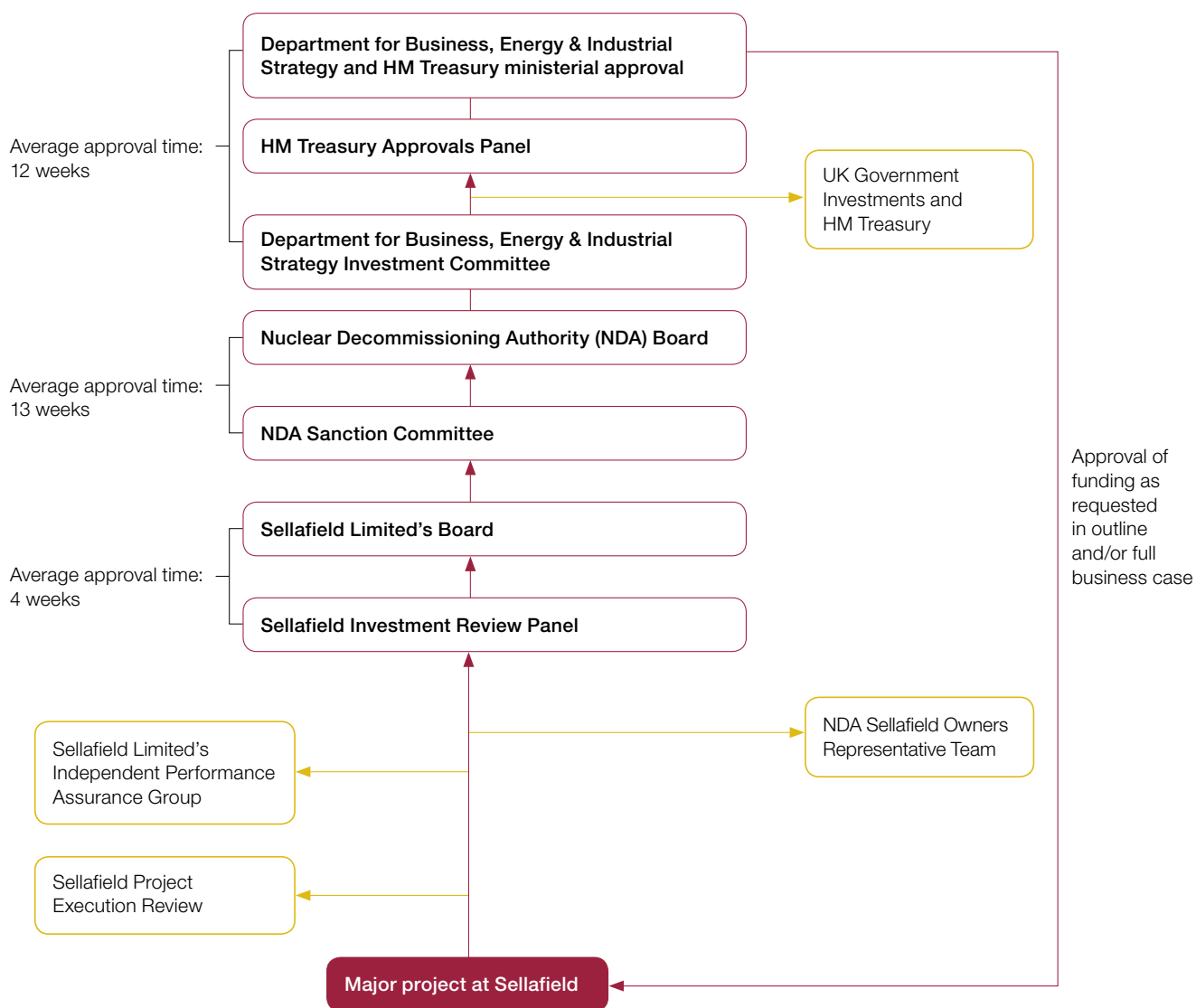
¹⁶ At the time, the NDA's sponsoring department was the Department of Energy & Climate Change.

2.49 Finally, the failure of the Magnox contract has led to a period of stronger scrutiny of the NDA by central government. While this may be an appropriate response from central government, Sellafield Limited told us that it has resulted in slower progress on major projects and affected staff morale and talent retention. Retaining a motivated senior leadership team at Sellafield Limited is widely regarded as important to overall progress, particularly after the change to the management mode in April 2016. Our analysis shows that the time between Sellafield Limited submitting its original business case and ministerial sign off has ranged between 15 weeks and 33 weeks, with an average of 28.5 weeks (**Figure 20**). But our analysis has not indicated a material difference in the time to gain funding approvals before and after the Magnox contract failure.

Figure 20

Approval route for the funding of major projects at Sellafield

Funding approvals for five major projects took an average of 28.5 weeks



- Approvals body
- Assurance and/or oversight
- ➔ Route for approval
- ➔ Assurance and/or oversight

Note

1 Approval times include time to revise, edit and challenge business cases. They can be rejected at any stage.

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

Part Three

Ensuring sustainable progress at Sellafield

3.1 This part of the report examines:

- the Nuclear Decommissioning Authority's (NDA's) progress with embedding the new management model for Sellafield Limited, which came into effect in April 2016;
- Sellafield Limited's plans to transform work on the site, as reprocessing comes to an end;
- progress with securing private sector partners to support improvements in delivering major projects; and
- the NDA's assurance of progress at Sellafield after 2016.

A new management model for Sellafield Limited

3.2 In its February 2014 report, the Committee of Public Accounts concluded that the NDA's management arrangements for Sellafield were not demonstrating value for money.¹⁷ At the time, Sellafield Limited was managed by a private sector consortium, Nuclear Management Partners (NMP). In November 2014, the NDA produced a business case to change the management model of Sellafield Limited. The change aimed to meet the following objectives:

- that Sellafield Limited meets its legal requirements for safety, security and environmental protection;
- to make demonstrable progress in retrieving hazardous waste from legacy ponds and silos, where the majority of high hazard is located on the site;
- to improve operations and make sustained progress with decommissioning; and
- to increase efficiency, with a target of £1.4 billion in efficiency savings by 2029.

¹⁷ HC Committee of Public Accounts, *Progress at Sellafield*, Forty-third Report of Session 2013-14, HC 708, February 2014.

3.3 In January 2015, ministers at the then Department of Energy & Climate Change and HM Treasury approved the NDA's recommendation to terminate its contract with NMP.¹⁸ In April 2016, Sellafield Limited became a direct subsidiary owned by the NDA. The NDA believes that the new management model will deliver the intended improvements by:

- better-aligned incentives between the NDA and Sellafield Limited, focused on achieving the mission rather than earning fees;
- bringing in private sector partners to address capability and capacity gaps; and
- transferring risk to the private sector only when the risk has been specified and incentivised properly.

3.4 The NDA and Sellafield Limited have managed the transition to the new management model effectively. Early signs are encouraging: both the NDA and Sellafield boards and executives have reported improved working relationships that focus on reducing high hazard and risk at Sellafield without 'fee-earning pressure'. Both NDA and Sellafield Limited executives and the Office for Nuclear Regulation (ONR) told us this has incentivised and supported improvements in delivering major projects.

3.5 A report by the NDA's internal audit function in 2017 found that many of the proposed benefits of the change in the management model could not be quantified or easily tracked. The NDA has identified indicators of better working relationships, such as less formal correspondence and information requests between the NDA and Sellafield Limited, fewer staff required to manage the relationship, and fewer internal change controls submitted by Sellafield Limited. However, the NDA has not attributed efficiency savings to specific factors. The report concluded that "it is likely that a number of these would lead to an enhanced and more efficient delivery environment". We discuss how efficiency savings are measured and assured from paragraph 3.16.

Transforming Sellafield

3.6 The transition to the new management model at Sellafield is taking place at a time when the NDA's work is changing. In 2012, the NDA announced the end of all reprocessing activity on the site by 2020.¹⁹ This will bring to an end around 25% of the current activity on the Sellafield site and allow a shift towards more retrievals, treatment and storage of waste, and decommissioning.

¹⁸ In 2016, the Department of Energy & Climate Change merged with the Department for Business, Innovation & Skills to establish the Department for Business, Energy & Industrial Strategy.

¹⁹ Spent fuel from old nuclear reactors is reprocessed by separating it into uranium and plutonium and other types of waste.

3.7 To sustain the improvements on the site envisaged in the management model change, and in anticipation of the end of reprocessing, Sellafield Limited has announced a plan to transform itself into a “high performance organisation”. Through transformation, it aims to:

- accelerate high hazard reduction by 25%;
- achieve efficiency savings of £1.4 billion by 2020 (nine years sooner than the objectives for the management model change) and deliver a further £1 billion to £1.4 billion of cost reductions by 2029; and
- create the resilience to cope with funding changes of up to £100 million in any financial year by 2020.

3.8 So far, Sellafield Limited has made some progress in articulating its plan to transform Sellafield into seven thematic areas, including improvements in leadership, the supply chain, and adopting innovations and new technologies. But it has been slow to set out its plans in a set of programme requirements with associated objectives and monitoring plans. This has in turn affected its ability to effectively communicate the outcomes it wants to achieve and limits:

- Sellafield Limited’s ability to prioritise its activities, optimise the way it allocates people to work and recognise and manage risk;
- the ability of the governance system, within Sellafield Limited and between it and the NDA, to anticipate, scrutinise and take significant decisions as transformation progresses; and
- the reporting and monitoring of progress by Sellafield Limited to its Board, the NDA and wider stakeholders in government.

UK Government Investments (UKGI) and the Department have asked the NDA and Sellafield Limited to present clear milestones and metrics for tracking progress against the objectives of transformation at Sellafield. UKGI has reported that the NDA’s progress to date has been slow.

3.9 As reprocessing comes to an end, Sellafield Limited expects that 3,000 roles will cease to exist. After taking into account the normal levels of staff turnover, it aims to redeploy 2,000 staff to other areas of activity on the site, but this requires a programme of reskilling and retraining as part of the culture change that its transformation plan is designed to achieve. While it has reported some successes, including reformed terms and conditions for new starters, Sellafield Limited has encountered challenges to other areas of its proposed reforms to the workforce and organisational culture. In 2017, there were six days of strikes on the site – the first since August 2015 – and two days of strikes in early 2018.

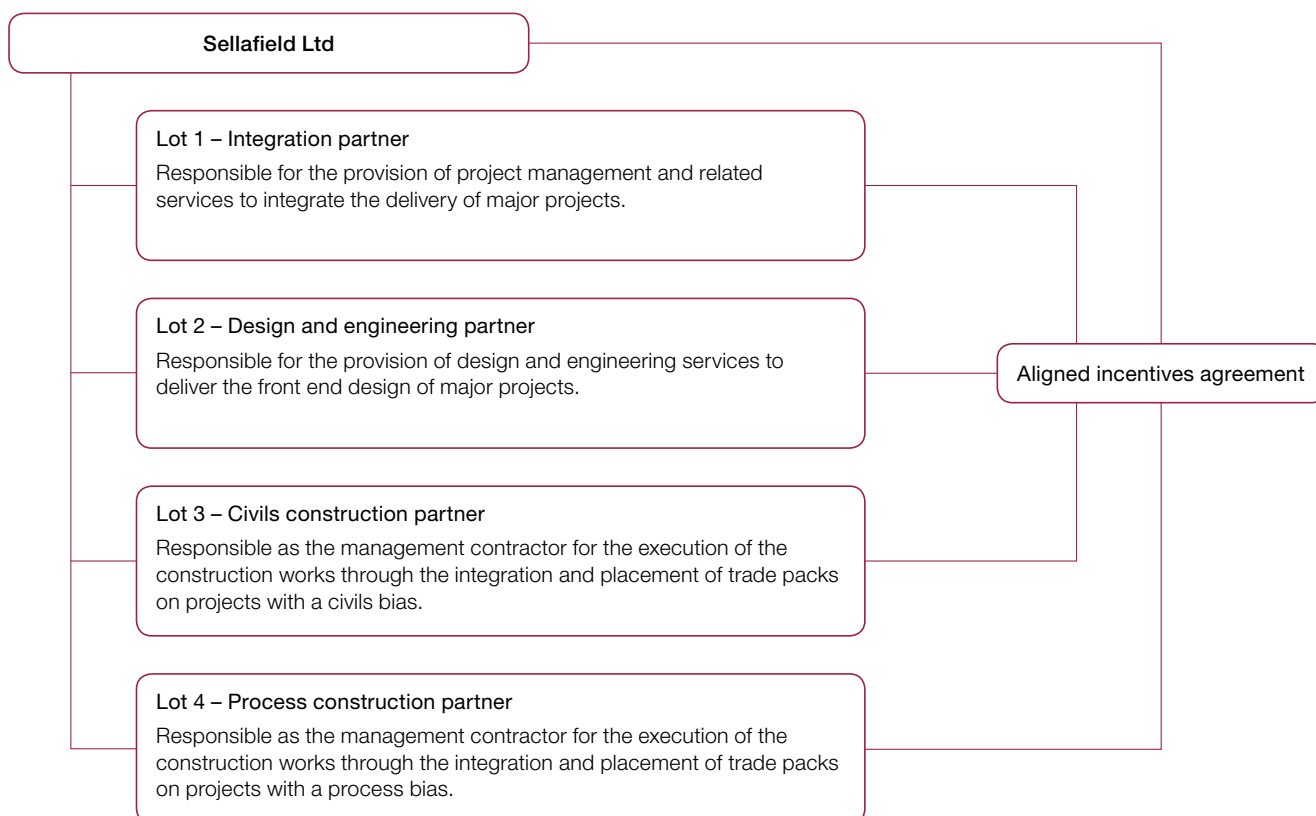
Sustaining improvements in major project delivery

3.10 Under the previous model, a private sector consortium acting as the parent body organisation was expected to provide business leadership to Sellafield Limited. Under the new management model, the NDA recognised the continued need for private sector input, and Sellafield Limited has decided to bring in private sector partners to support the delivery of major projects. Sellafield Limited has since started a complex procurement to acquire four programme and project partners (PPP) to support its major projects over a 20-year period. Sellafield Limited envisages that this contracting structure will provide greater certainty about its ability to deliver against credible cost and schedule projections, resulting in faster reduction of hazards and improved value for money (**Figure 21**).

Figure 21

Sellafield Limited’s contractual construct for programme and project partners

Sellafield Limited is procuring four programme and project partners



Note

1 The aligned incentive agreement is a contractual approach that rewards the joint achievement of long-term objectives and requires a collaborative approach from the four contract partners to do so.

3.11 The Department and HM Treasury approved the outline business case for PPP in April 2017. The commercial strategy was not assessed or approved by the Major Projects Review Group (MPRG) before the start of procurement.²⁰ The MPRG is expected to review the contract in the autumn of 2018 before the contract is awarded. HM Treasury and the Department must approve the full business case for PPP before Sellafield Limited awards the contract to the winning bidders. According to Sellafield Limited's procurement plan, it expects to award the contract in the first quarter of 2019. Stakeholders in government and the NDA will need to ensure that all assurance and approval activity can be completed within this timeframe.

3.12 The PPP procurement is taking place against the backdrop of the NDA's failed Magnox contract. For the PPP procurement, Sellafield Limited, rather than the NDA, is the contracting authority, although the NDA remains accountable overall for the outcome of the procurement. Sellafield Limited has engaged external parties to assure the procurement, including continuous reviews by legal advisers. The Infrastructure and Projects Authority has also reviewed specific aspects of the procurement four times, awarding Amber/Red (October 2016); Amber/Green (December 2016); Green/Amber (July 2017); and Amber/Green (February 2018) ratings.

3.13 Central government has set up an oversight panel to scrutinise progress at key stages of the procurement. The panel provides assurance to the Secretary of State for Business, Energy & Industrial Strategy that best practice is being followed and that lessons from the failed Magnox contract have been learned. To date, the panel has met four times to provide challenge to Sellafield Limited and the NDA as they progress through key stages of the procurement.

3.14 The procurement – and the management of the contract after it is awarded – bear significant risk. These risks, Sellafield Limited's plans to mitigate them, and any remaining risks are set out in **Figure 22**.

Monitoring progress since the model change

3.15 As set out in Part Two, the NDA monitors and assures the progress that Sellafield Limited makes on the site against the site plan and within its annual funding limit. Under the new management model, the NDA and Sellafield Limited agree a number of criteria that score annual performance in 10 categories, including commercial operations, decommissioning and project delivery. These are reported on monthly and a formal review of Sellafield Limited's performance against these criteria takes place quarterly. Sellafield Limited's performance against these criteria contributes to the remuneration of its executives. It is also included in reports on the NDA's estate-wide performance, which are sent to the Department through UKGI on a monthly and quarterly basis.

²⁰ The Major Projects Review Group is jointly run by HM Treasury and the Infrastructure and Projects Authority. It convenes to review the highest-profile projects in government (typically, those costing more than £1 billion) and advise ministers on funding decisions.

Figure 22

Key risks in the procurement and management of the Programme and Project Partners (PPP) contract

Sellafield Limited and the Nuclear Decommissioning Authority will have to manage a number of risks

Risk	Mitigation by Sellafield Limited	Remaining risk
Sellafield Limited makes errors similar to those made by the Nuclear Decommissioning Authority (NDA) during the Magnox contract procurement	<p>Sellafield Limited has:</p> <ul style="list-style-type: none"> with the NDA, conducted a 'lessons learned' exercise, shared with government; commissioned legal assurance from an adviser with experience in European procurement regulations; appointed a legal team to review the evaluation process; and developed an integrated assurance plan for PPP; and attended the government's oversight panel which scrutinises progress with the procurement. 	Losing bidders may challenge the outcome of the evaluation.
Sellafield Limited's future requirements change over the 20-year contract	Sellafield Limited has reviewed the grounds for material variation and lessons learned from the Magnox contract.	A legal challenge on the grounds of material variation to any contract award due to the uncertainty around the condition of parts of the Sellafield site where the scope of work may changes over time.
The financial health of one or more of the bidders declines during procurement, which may reduce competitiveness if they withdraw	Sellafield Limited is carrying out financial health checks on qualified bidders.	The financial health of successful bidders could decline before the contract is awarded or during the 20-year contract.
Sellafield Limited receives a legal challenge on one or more of the 'lots' after it announces its preferred bidders	The NDA and Sellafield Limited have partially mitigated this risk. They have agreed a joint approach to some potential scenarios resulting from receiving a legal challenge to one or more 'lots'.	Sellafield Limited receives a legal challenge after announcing its preferred bidders.
Sellafield Limited's does not have the capability to sufficiently manage the contract after it is awarded	<p>Sellafield Limited has built up its 'intelligent client' function to allow it to drive the cultural and behavioural change in Sellafield Limited and to drive the performance of the new PPP contractors.</p> <p>Sellafield Limited has filled the 116 roles it expected to require, mainly through internal redeployments and some external hires.</p>	The commercial capabilities of four incoming contractors could be greater than Sellafield Limited's intelligent client capability, risking Sellafield Limited's ability to sufficiently challenge and manage contractors.
Sellafield Limited's contractual structure, based on contractors' mutual profit and loss, does not work in practice	Sellafield Limited has strengthened its intelligent client role and tested its aligned incentive agreement against collusion and gaming to ensure collaboration.	<p>The aligned incentive agreement fails if one or more of the contractors continually underperforms.</p> <p>Contractors collude against Sellafield Limited.</p>
Timing of the contract award	Sellafield Limited has said it has included contingency in the timetable to allow for slippage, and has planned mitigations for delays up to March 2019 in the contract award.	<p>Approvals for the full business case and announcement of the preferred bidder are later than Sellafield Limited has planned.</p> <p>The pressure to approve the full business case and announce preferred bidders puts undue pressure on the NDA to quickly assure and approve key decisions.</p>

3.16 As part of its case for change, the NDA set out that the new management model would result in efficiency savings of £1.4 billion at Sellafield by 2029. Efficiency savings are those achieved through management action to:

- reduce the number of inputs, such as workforce or funding, while maintaining the same value of outputs; or
- create more value in outputs for the same level of inputs.

3.17 In its 2013 report, the Committee of Public Accounts expressed concern that efficiency savings are often overstated across government.²¹ In 2013, we judged that the NDA's system to assure efficiency savings provided moderate assurance.²² At the time, NMP's fees were based on achieving a minimum level of efficiency savings at Sellafield. The NDA's transition to the new management model at Sellafield in 2016 removed the fee-based incentive to achieve efficiency savings.

3.18 Sellafield Limited has committed to delivering the promised £1.4 billion in efficiency savings by 2020, and a further £1 billion to 1.4 billion in savings by 2029. Since 2015-16, Sellafield Limited has reported a total of £474 million of efficiency savings: £182 million in 2016-17 and £292 million in 2017-18. It estimates that it is on track to achieve the efficiency savings targets of £1.4 billion by 2020. Only some of the savings identified are recurring, such as reducing staff numbers, while others are one-off cost savings. The latter include unpaid fees to contractors due to missed targets.

3.19 The NDA's assurance of efficiency savings reported by Sellafield Limited is weaker after the change to the new management model. Sellafield Limited does not audit or assure the efficiency savings it reports, and nor does the NDA. The NDA has said the removal of a fee-based contract means it is no longer necessary to actively assure these reported efficiency savings. Instead, it says it compares the scope and cost of work delivered against its plan, and regards the difference as an efficiency saving. It cannot attribute all of these savings to management action. We found that the NDA refers to efficiency savings and cost reductions interchangeably, making monitoring progress against this objective more challenging. The difference in the NDA's approach to assuring savings before and after the change in the management model are presented in **Figure 23**. Moreover, neither UKGI nor HM Treasury assure or challenge the efficiency savings reported by the NDA to determine whether they genuinely result from efficiencies.

21 HC Committee of Public Accounts, *Nuclear Decommissioning Authority, Managing Risk at Sellafield*, Twenty-fourth Report of Session 2012-13, HC 746, February 2013.

22 Comptroller and Auditor General, *Nuclear Decommissioning Authority, Assurance of reported savings at Sellafield*, Session 2013-14, HC 778, National Audit Office, October 2013.

3.20 Sellafield Limited and the NDA do not know what specific changes explain the efficiency savings reported, and acknowledge that a proportion cannot be attributed to management action. An example of an efficiency saving prompted through management action is reducing the number of staff on a project while delivering the same or better outcomes. Insufficient assurance of reported efficiency savings and a lack of understanding of their make-up limits the ability of:

- the NDA to fully and transparently account for the public funds that it manages;
- Sellafield Limited to learn what management actions, initiatives or approaches have resulted in genuine efficiency savings and learn these lessons; and
- both the NDA and Sellafield Limited to ensure and sustain stakeholders' confidence that reported efficiency savings are genuine.

Figure 23

The Nuclear Decommissioning Authority's approach to assuring reported efficiency savings

The Nuclear Decommissioning Authority has changed the way it assures efficiency savings

	Under Nuclear Management Partners (up to April 2016)	Under the new subsidiary model (after April 2016)
Calculate efficiency savings by comparing the cost of work carried out with the estimated cost of that work in the baseline	Yes	Yes
Adjustment to remove savings not attributable to management actions	Yes	No
Requirement to report progress on specific initiatives to reduce costs ¹	Yes	No
Site-wide measurement and reporting of efficiency ²	Yes	Yes

Notes

- 1 Information of project-by-project cost reduction can help Sellafield Limited and the NDA to understand and, where necessary, challenge Sellafield Limited's attribution of the savings to practices, methods or initiatives.
- 2 Reporting site-wide measurement and reporting of efficiency savings mitigates the risk of efficiency savings being claimed by reallocating costs between cost categories or areas of Sellafield.

Source: National Audit Office analysis

Appendix One

Our audit approach

Figure 24

Our audit approach

The objective of government

The Nuclear Decommissioning Authority (NDA) was established in 2005 to lead the decommissioning of the UK's nuclear facilities at 17 sites. This includes decommissioning and reducing the high hazard and risk at Sellafield, the NDA's largest and most hazardous site. The NDA mission will come to an end when it releases the sites for other uses.

How this will be achieved

The NDA sets an estate-wide strategy that reflects government policies and regulatory requirements. It discharges its role through site licence companies, including Sellafield Limited. It took over Sellafield Limited as a direct subsidiary in 2016 after previous management arrangements underperformed. At Sellafield, the NDA oversees Sellafield Limited's commercial activities, management of plutonium, progress with reducing high hazard in legacy ponds and silos, and progress with major project delivery – key enablers to overall risk reduction on the site.

Our study

Our study examines: roles and governance structures; whether the NDA is making progress with reducing high hazard and risk at Sellafield; whether the NDA and Sellafield Limited's plans for ensuring sustainable progress are likely to deliver their intended benefits; and whether the governance and assurance arrangements of the new management model at Sellafield and of the NDA are fit for purpose.

Our evaluative criteria

The NDA is making progress with delivering major projects since we last reported, and there is evidence of progress with reducing hazard in legacy ponds and silos and its management of plutonium.

The NDA's plans to sustain progress through actions to improve delivery of major projects; through the change in the management model and through transformation are likely to yield sustainable improvements.

The roles of the NDA, SLCs and central government are clear, and governance and assurance arrangements are well understood and support sustainable improvement at Sellafield.

Our evidence
(see Appendix Two for details)

- We evaluated NDA management reports.
- We interviewed the NDA's and Sellafield's officials.
- We analysed the NDA's cost, budget and schedule data at programme and project level.
- We compared performance in the past three years against performance we reported in 2012 and 2015.

- We interviewed officials at the NDA, Sellafield, UK Government Investments (UKGI), the Department for Business, Energy & Industrial Strategy (the Department) and HM Treasury.
- We reviewed documents from the NDA and Sellafield Limited on their recent actions to support improvements to project delivery.
- We reviewed the NDA's methodology for setting up the baseline and evaluating projects' performance.

- We interviewed officials at the NDA, Sellafield, UKGI, the Department, HM Treasury and the Office for Nuclear Regulation.
- We reviewed the NDA's and Sellafield's reports and planning documents.
- We reviewed documents from the Department, UKGI and HM Treasury.
- We reviewed NDA Board minutes.

Our conclusions

See paragraphs 21 and 22.

Appendix Two

Our evidence base

- 1 We have reached our independent conclusions on the Nuclear Decommissioning Authority's (NDA's) progress with reducing Sellafield's highest hazards and whether the new management model at Sellafield is progressing to plan following our analysis of evidence collected between January 2017 and May 2018.
- 2 Our audit approach is outlined in Appendix One.
- 3 We reviewed the NDA's role, governance and performance in Part One.
 - We reviewed documents produced by the NDA; Sellafield Limited; the Department for Business, Energy & Industrial Strategy (the Department); UK Government Investments (UKGI); HM Treasury; and the Office for Nuclear Regulation (ONR).
 - We conducted more than 70 interviews with officials from the NDA; Sellafield Limited; the Department; UKGI; HM Treasury; and the ONR. We discussed whether each stakeholder was clear about: the role of each stakeholder; the current governance arrangements, and whether these arrangements were fit for purpose.
 - We interviewed nuclear sector experts.
 - We analysed the NDA's provision, including a detailed analysis of the Sellafield provision. We examined movements in the provision to understand the reason for recent trends.
 - We analysed the NDA and Sellafield Limited's data on expenditure.
- 4 We evaluated whether the NDA and Sellafield Limited are making progress with reducing Sellafield's high hazard and risks in Part Two.
 - We analysed management reports; internal and external programme and project reviews; internal audit reports; and expert reviews.
 - We examined the NDA's estate cost data covering seven financial years (from 2011-12 to 2017-18) to recalculate cost performance indices and schedule performance indices for projects and programmes.

- We analysed performance information for the legacy ponds and silos programmes and major projects. This included: risk of each project over time; annual and lifetime budgets and schedules; annual and lifetime value generated and progress towards their schedule; and how estimated completion dates and cost at completion have changed.
- We reviewed information on fuel reprocessing and on the plutonium management strategy.
- We reviewed the process that Sellafield Limited used to define and update its baseline to understand the limitations to ascertain performance against cost and schedule indices.

5 In Part Three, we evaluated the NDA's progress with embedding the new management model for Sellafield Limited; Sellafield Limited's plans to transform the way it works on the site; progress with securing private sector partners to support improvements in delivering major projects; and the NDA's assurance of progress at Sellafield after 2016.

- We conducted more than 70 interviews with staff from the NDA; the Department; UKGI; HM Treasury; and the ONR.
- We reviewed the NDA's and Sellafield Limited's documents that set out the plan and objectives for the change of management model.
- We reviewed Sellafield Limited's documents to evaluate whether the transformation programme was clearly planned and whether it is being monitored appropriately.
- To understand the risk associated with procuring four strategic partners, we evaluated Sellafield Limited's planning documents and internal and external reviews. We also interviewed Sellafield Limited and NDA staff and consulted widely with our community of contracting experts.
- We analysed the approval timeline of five major projects recently approved to examine what, if any, impact the failure of the Magnox contract and the increased scrutiny that followed had on approval times.
- We examined the role each stakeholder plays during the approval and during the assurance process, and evaluated whether these were clearly identified and appropriate for their skills.

Appendix Three

The NDA's major projects

Figure 25
Sellafield's major projects since 2012

Major project	2012	2015	2018	Estimated delivery at Feb 2018
Evaporator D	✓	✓	✓	December 2017
Separation area ventilation	✓	✓	✓	September 2016
Silos maintenance facility	✓	✓	✓	December 2018
Bulk sludge and fuel retrievals	✓	✓	✓	August 2019
MSSS solid waste retrievals	✓	✓	✓	March 2023
Box encapsulation plant (BEP) construction	✓	✓	✓	February 2022
Box encapsulation plant product stores direct import facility	✓	✓	✓	February 2020
Pile fuel cladding silo early retrievals	✓	✓	✓	November 2019
Silos direct encapsulation plant	✓	✓		Project cancelled in September 2015
Box transfer facility	✓	✓		Project cancelled in September 2015
Encapsulated product store	✓	✓		Delivered 2014
Buffer sludge packaging plant	✓	✓		Delivered 2014
Local sludge treatment plant	✓	✓		Delivered 2012
Ponds solid treatment plant technical underpinning project	✓	✓		Cancelled March 2017
Future provision of analytical services			✓	March 2028
Electrical supply – new construction			✓	March 2028
Cluster 1 – fence civils:			✓	April 2018
Site ion exchange (SIXEP) contingency plant			✓	December 2024
Sellafield product and residue store retreatment plant (SRP)			✓	December 2026
Technology cluster – site security architecture upgrade (SSAU)			✓	July 2020

Notes

- 1 HC Committee of Public Accounts, *Nuclear Decommissioning Authority: Managing Risk at Sellafield*, Twenty-fourth Report of Session 2012-13, HC 746, February 2013.
- 2 HC Committee of Public Accounts, *Progress at Sellafield*, Forty-third Report of Session 2013-14, HC 708, February 2014.

Source: National Audit Office analysis

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