



National Audit Office

Report

by the Comptroller
and Auditor General

Nuclear Decommissioning Authority

Progress on the Sellafield site: an update

MARCH 2015

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Part One

Introduction

Managing the Sellafield site

1.1 Sellafield is the UK's largest and most hazardous nuclear site. It includes two operational nuclear fuel reprocessing plants, and waste treatment and storage plants as well as legacy storage ponds and silos for nuclear waste material from the UK's first generation of nuclear plants. The Nuclear Decommissioning Authority (the Authority) owns Sellafield and 16 other UK licensed civil nuclear sites. The Authority is an arm's-length body, sponsored by the Department of Energy & Climate Change.

1.2 The Sellafield site is hazardous because of the historic build-up of contaminated buildings and untreated waste on the site and the age of its facilities. Since nuclear operations began in the 1940s, successive operators did not give sufficient thought to decommissioning or retrieving and disposing of radioactive waste. There are around 240 buildings on the site that are operating nuclear facilities or buildings containing radioactive materials. Some are deteriorating or fall short of modern standards and pose significant risks to people and the environment. The Authority's estimate of the lifetime cost of decommissioning and cleaning up the site has been increasing year-on-year.

1.3 In 2005, following the restructuring of the UK nuclear industry and the creation of the Nuclear Decommissioning Authority, the Authority implemented a 'parent body organisation' model for the operation of its nuclear sites. Under this model the site licence companies manage the sites under management and operations contracts with the Authority. The Authority sets strategic objectives for the sites and the site licence companies develop, implement and maintain a plan to meet those objectives. The main rationale for this model was to have private sector owners of the site licence companies, to provide leadership and enhance the companies' competencies and capabilities. The Authority selects the parent body organisations for the sites through competitive tenders.

1.4 Under this model, in November 2008 the Authority appointed Nuclear Management Partners Limited, a private sector consortium of AECOM (formerly URS), AMEC Foster Wheeler and AREVA, as ‘parent body’ owner of Sellafield Limited, the licensed operator of the site.¹ The Authority reimburses Sellafield Limited for its expenditure on the site and pays base and performance fees to Sellafield, who may pass them to Nuclear Management Partners as dividends. The Authority regains ownership of Sellafield Limited when the agreement ends, but the agreement also includes a clause allowing early ‘termination for convenience’.

1.5 In September 2013 the Authority continued its agreement with Nuclear Management Partners into the second 5-year period of the 17-year agreement. In January 2015, after a strategic review of the delivery model at Sellafield, the Authority announced its decision to terminate its contract with Nuclear Management Partners and implement a new delivery model.

Background to this update

1.6 We have produced two reports on progress with nuclear decommissioning at Sellafield. The first, published in November 2012, examined how the Authority manages risk at Sellafield, focusing on performance on the largest projects.² The second, published in October 2013 was in response to a recommendation by the Committee of Public Accounts (the Committee), and examined how the Authority gains assurance about the level of reported efficiency savings.³ The Committee has also published two reports, in February 2013 and in February 2014, when it reported on progress on the site and the Authority’s decision to continue the agreement with Nuclear Management Partners into a second term.^{4,5}

1.7 This update explains developments in the management of the site at the end of the current Parliament. The update presents data the Authority published, or that it gave to us, and summarises the Authority’s documents and explanations of progress. We have checked the consistency of the data to sources, where possible, but we have not audited the Authority’s underlying records. The update addresses:

- progress on the Sellafield site and its major programmes and projects and Sellafield Limited’s capability and capacity (Part Two); and
- the Authority’s review of the delivery model, and its plans for transition to a new model (Part Three).

¹ The Sellafield site includes three licensed sites: Sellafield, Windscale and Calder Hall.

² Comptroller and Auditor General, *Managing risk reduction at Sellafield*, Session 2012-13, HC 630, National Audit Office, November 2012.

³ Comptroller and Auditor General, *Assurance of reported savings at Sellafield*, Session 2013-14, HC 778, National Audit Office, October 2013.

⁴ HC Committee of Public Accounts, *Nuclear Decommissioning Authority: Managing risk at Sellafield*, Twenty-fourth Report of Session 2012-13, HC 746, February 2013.

⁵ HC Committee of Public Accounts, *Progress at Sellafield*, Forty-third Report of Session 2013-14, HC 708, February 2014.

Part Two

Performance at Sellafield

2.1 Decommissioning and cleaning up Sellafield will involve completing current commercial operations and decommissioning and demolishing the buildings on site. The highest hazard facilities on the site are the four legacy ponds and silos. The Nuclear Decommissioning Authority's (the Authority's) strategy prioritises making clear progress on these programmes. In this part we address progress at site level, on the legacy ponds and silos programmes, and on the largest projects on the site, many of which are within the legacy ponds and silos programmes.

Overall progress on the site

2.2 The Authority aims to clear the Sellafield site by 2120. This requires completion of:

- fuel reprocessing operations on the site;
- retrieval and packaging of waste from existing storage facilities;
- transfer of waste to the Low Level Waste Repository and the proposed geological disposal facility;
- vitrification of high-level radioactive waste;⁶
- transfer of high and intermediate level waste into safe containers and storage; and
- final site clearance.

The Authority's detailed work schedule for the site provides for decommissioning and clean-up work to be complete by 2135 but the Authority expects to be able to complete decommissioning by 2120.

6 Vitrification is the process of turning waste into glass.

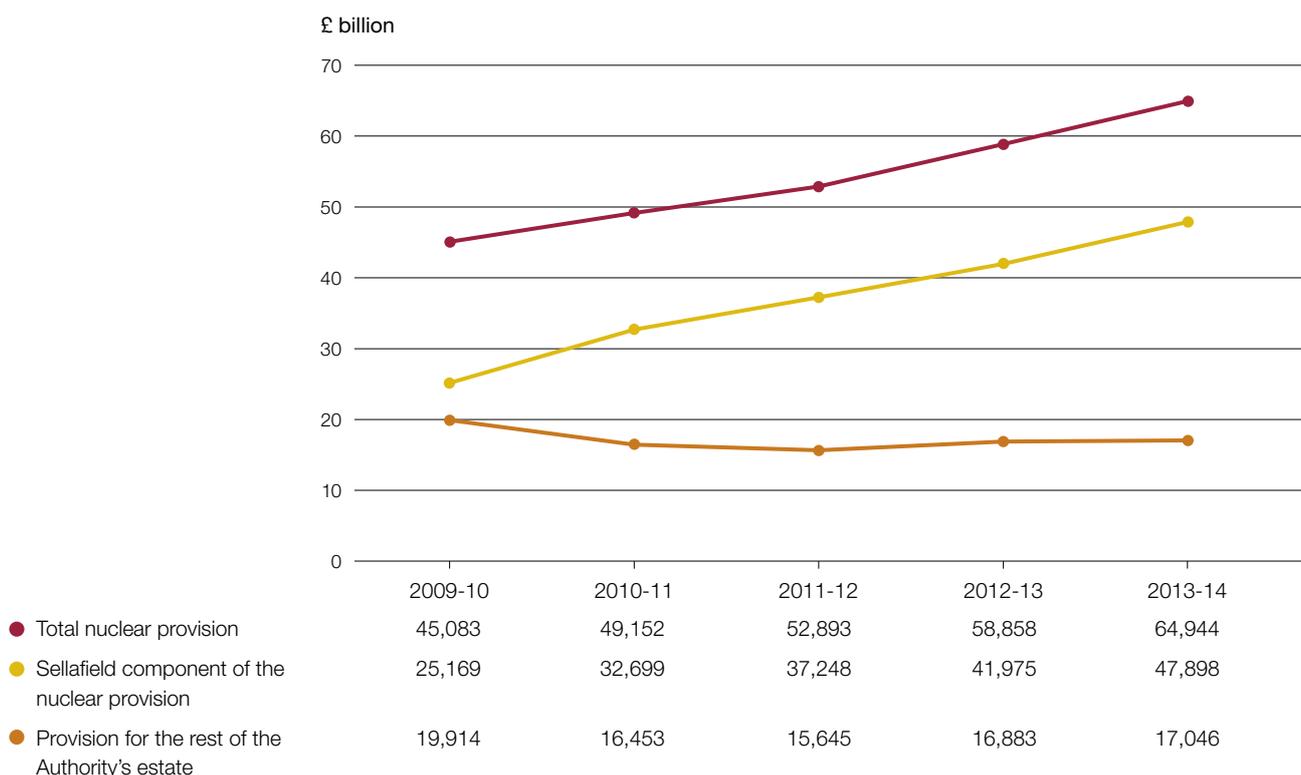
Lifetime cost of decommissioning the site

2.3 The Authority's estimate of the lifetime cost of decommissioning at Sellafield has been increasing sharply in recent years. The Authority presents its estimate as a provision in its annual accounts. As at 31 March 2014, the Authority estimated the Sellafield provision at nearly £48 billion after discounting future cash flows. This is around 74% of the Authority's total nuclear provision of nearly £65 billion and an increase of nearly £6 billion (14%) since March 2013. The estimated provision for the rest of the Authority's estate has remained relatively stable (**Figure 1**).

Figure 1

The provision for decommissioning and clean-up of the Sellafield site¹

The provision for decommissioning the Sellafield site has increased year on year, while the provision for the rest of the Authority's estate has remained stable



Note

¹ The discount rates the Authority has applied to the nuclear provision are slightly different in some years but reflect HM Treasury guidance at the time.

Source: Nuclear Decommissioning Authority's Annual Report and Accounts, 2009-10 to 2013-14

2.4 Between 2010-11 and 2013-14 the nuclear provision for Sellafield has increased by more than £15 billion. More than £12 billion of this is from increases in estimates of the cost of work required to complete decommissioning and clean up across the site. The rest is from other changes including the approach to discounting and inflation, and reductions in the estimate of the provision because of work done in-year. Between 2012-13 and 2013-14, cost estimates increased by more than £6 billion, driven by increases in some major project costs and the removal of previously assumed efficiencies that had been built into the performance plan but which the Authority subsequently deemed to be unachievable. **Figure 2** shows the breakdown of increases in the provision for Sellafield between 2010-11 and 2013-14.

2.5 The Authority considers that the increase in its lifetime cost estimates is mainly because it now has a better understanding of the scale and nature of the risks and challenges on the site. In particular, it reflects an improving understanding of the challenges, potential technical solutions and uncertainties still involved in the decommissioning projects and programmes to retrieve, package and store high risk, hazardous materials. It also reflects a more realistic assessment of the level of efficiencies achievable within the plan. We discuss these projects and programmes in more detail later in this part.

2.6 The Authority bases its management judgement of the overall nuclear provision on the lifetime plans for the sites across its estate. The Authority had intended that its Board would approve a new lifetime plan for Sellafield in April 2014. However, this did not happen until December 2014. This delay was due to Sellafield Limited delivering its proposed plan late and the Authority's Board deciding in July 2014 that it was unacceptable.

2.7 As at February 2015, the Authority's estimate of the discounted nuclear provision for the Authority's estate was around £70 billion, of which £53 billion relates to Sellafield (an increase of £5 billion from 2013-14). We have not yet audited these figures. We are reviewing the Authority's assurance over the 2014 performance plan as part of our audit of the Authority's financial statements for the year 2014-15, so that the Comptroller and Auditor General can reach an opinion on whether the financial statements, including the latest estimate for the nuclear provision, are true and fair.

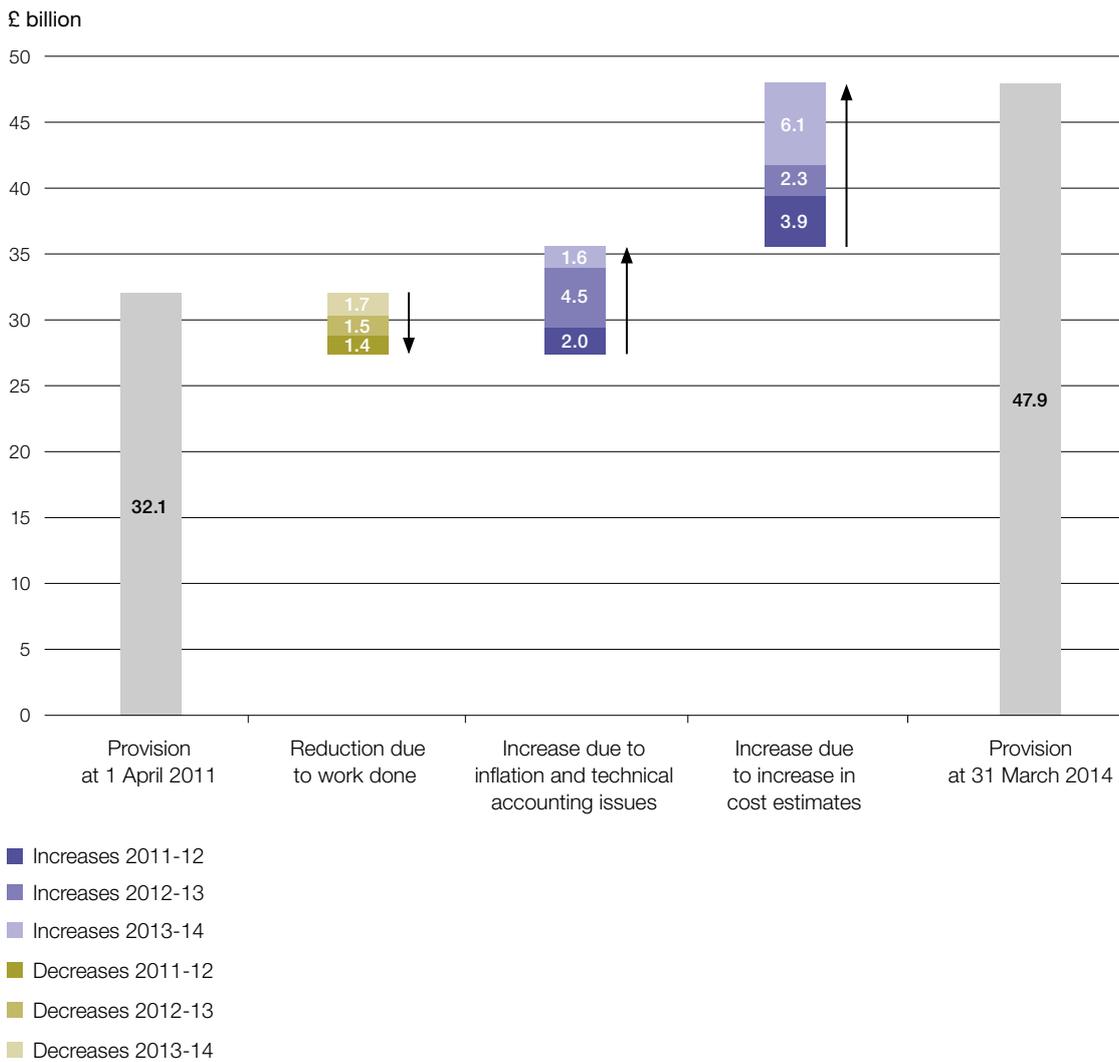
Year-on-year site level performance

2.8 Since the May 2011 performance plan, work on the site has cost more and taken longer than planned (**Figure 3** on page 10). The Authority and Sellafield Limited routinely monitor performance on cost and schedule against the performance plan for the site. It monitors performance at an aggregate level, based on detailed data for the projects within the 23 programmes on site. Cost and schedule performance against the plan deteriorated slightly between 2012-13 and 2013-14. During 2014-15 performance has improved, with in-year costs being slightly less than planned, and progress against schedule being closer to, though still behind, plan.

Figure 2

Breakdown of increases in the size of the provision for Sellafield

The majority of the increases in the provision for Sellafield has been for increases in the costs of the work



Source: Nuclear Decommissioning Authority *Annual Reports and Accounts 2011-12 to 2013-14*

Figure 3

Cost and schedule performance indices across the site

Work on the site has cost more and taken longer than planned

| | 2011-12 | 2012-13 | 2013-14 |
|----------------------------------|---------|---------|---------|
| Cost performance index (CPI) | 0.99 | 0.96 | 0.95 |
| Schedule performance index (SPI) | 0.94 | 0.93 | 0.91 |

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 Authority 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 Figures for 2012-13 and 2013-14 show the cumulative position from implementation of the 2011 performance plan.

Source: National Audit Office analysis of Authority information

Performance with ongoing commercial fuel reprocessing operations

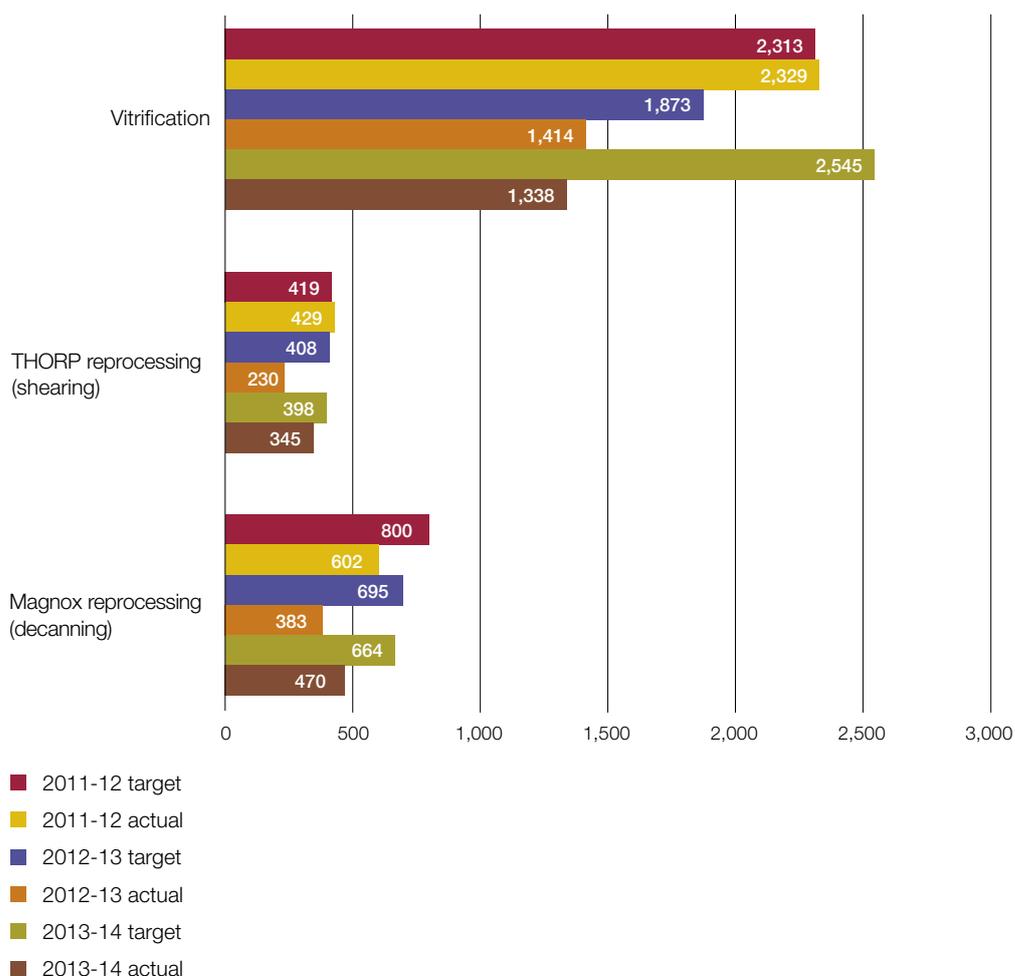
2.9 As well as decommissioning activity, Sellafield Limited also carries out commercial operations, mainly fuel reprocessing. The Committee of Public Accounts (the Committee) highlighted in its February 2014 report that Sellafield Limited had rarely achieved its output targets for its reprocessing operations. It noted the Authority's explanation that the varying performance from year to year reflected the stretching targets it had set and the inherent fragility of the old reprocessing plants. In 2013-14, Sellafield Limited improved its performance on two of its reprocessing operations but achieved just over half of its target for highly active liquor vitrification. The Authority forecasts that in 2014-15, Sellafield Limited will exceed its vitrification target, and improve its performance on the previous year. However, due to outages at the vitrification plant, the target for 2014-15 was set much lower (**Figure 4**).

Progress in decommissioning the legacy ponds and silos

2.10 Estimated completion dates for the four legacy ponds and silos programmes were extended significantly between 2007 and 2010 and brought forward again when the Authority agreed the 2011 performance plan. In its latest lifetime plan, Sellafield Limited has made little change to its estimated forecast completion dates for the two pond programmes which are in the construction phase. Sellafield Limited has put back its expected completion dates for the two silos programmes, by 10 and 14 years respectively. These programmes are in the planning and design phase and Sellafield Limited has re-evaluated its estimates of the time it will take to retrieve waste (**Figure 5** on page 12).

Figure 4
Sellafield Limited's operations

Sellafield Limited has fallen short of most of its operational targets in recent years



Note

1 Units are tonnes equivalent of nuclear fuel being processed.

Source: National Audit Office analysis of Authority information

2.11 The revisions to the completion dates for the legacy ponds and silos in the 2014 performance plan reflect slower progress than expected over recent years and Sellafield Limited's improved understanding of the challenges that may be involved. Sellafield Limited has not met the planned schedules in the May 2011 performance plan for any of the four legacy ponds and silos programmes. It has fallen behind schedule the most on the pile fuel cladding silo programme and made best progress on the pile fuel storage pond, where progress is just behind schedule. It has delivered the work at lower than the budgeted cost for two of the programmes but exceeded it for the other two (**Figure 6** overleaf).

Figure 5

Forecast completion dates for the legacy ponds and silos programmes

Expected completion date for two programmes have been put back by 10 and 14 years

| Programme | Lifetime plan 2007 | Contract baseline plan 2010 | Performance plan 2011 | Performance plan 2014 |
|--|--------------------|-----------------------------|-----------------------|-----------------------|
| Programmes in the construction phase | | | | |
| First generation magnox storage pond: completion of retrievals | 2015 | 2043 | 2034 | 2033 |
| Pile fuel storage pond: all intermediate-level waste removed and treated | 2021 | 2042 | 2024 | 2024 |
| Programmes in the planning and design | | | | |
| Pile fuel cladding silo: bulk retrievals complete | 2016 | 2026 | 2023 | 2033 |
| Magnox swarf storage silo: residual retrievals complete | 2029 | 2045 | 2036 | 2050 |

Source: Nuclear Decommissioning Authority

Figure 6

Cost and schedule performance indices for the legacy ponds and silos programmes

None of the programmes has delivered all of their scheduled work and two have exceeded their budgeted costs

| Programme | Performance index | 2011-12 | 2012-13 | 2013-14 |
|--|-------------------|---------|---------|---------|
| Programmes in the construction phase | | | | |
| First generation magnox storage pond | CPI | 0.87 | 0.93 | 0.88 |
| | SPI | 0.92 | 0.97 | 0.93 |
| Pile fuel storage pond | CPI | 1.06 | 1.16 | 1.31 |
| | SPI | 1.00 | 1.04 | 0.97 |
| Programmes in the planning and design phase | | | | |
| Pile fuel cladding silo | CPI | 0.98 | 0.81 | 0.81 |
| | SPI | 0.88 | 0.73 | 0.65 |
| Magnox swarf storage silo | CPI | 1.10 | 1.06 | 1.05 |
| | SPI | 0.91 | 0.90 | 0.95 |

Notes

- 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).
- An SPI of 1 would show that the Authority 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.
- Figures for 2012-13 and 2013-14 show the cumulative position from implementation of the 2011 performance plan.

Source: Nuclear Decommissioning Authority

Progress on the most high-value, high-risk projects

2.12 We reported in 2012 that Sellafield Limited had made poor progress on its portfolio of 14 major projects. Many projects fall within the legacy ponds and silos programmes, providing bespoke equipment, buildings and systems to remove, treat, package, move and store waste. Some relate to the operation of the site and reprocessing spent nuclear fuels. We reported delays and cost overruns on projects in planning and design, where schedules and costs may be particularly uncertain because of the uncertainties of the volume and nature of the waste and the technical solutions needed to manage the decommissioning. We also reported poor progress on projects in the construction phase. The Authority has provided updated cost and schedule data for the projects that we reviewed (Appendix One). Two of the original projects in planning and design have since been cancelled or incorporated into other projects. Three of the major projects in construction have been completed, with little further cost escalation or delay since 2013, and two projects have moved from planning and design into construction. One further major project has entered the planning and design phase. Therefore, of the original fourteen projects, nine remain active, with three in planning and design and six in construction.

Estimated completion dates of the nine remaining major projects

2.13 Sellafield Limited has put back considerably most of the nine remaining major projects since they were initiated, putting back the completion dates further since September 2013. In aggregate, Sellafield Limited has put back the estimated completion dates for the three projects still in planning and design by 143 months since they were initiated. Eighty six months of this change in estimated duration has occurred since September 2013. The vast majority of the changes relate to two complex retrieval and treatment plants: pile fuel cladding silo and silos direct encapsulation plant.

2.14 Sellafield Limited has put back the estimated completion dates for the six projects now in the construction phase in aggregate by 271 months since they passed their design gate (the date the project design is approved to begin construction). 100 months of this change has occurred since September 2013. Since September 2013 the increase in duration is largely attributable to the magnox swarf storage silos retrieval project and the box transfer facility, both of which have been deferred to align with the revised silos direct encapsulation plant availability.

2.15 The estimated completion dates for two further projects – the box encapsulation plant product store direct import facility, which is in planning and design, and the silos maintenance facility, which is in construction – were extended by 12 months between September 2013 and December 2014. This was due to under-estimation of the scale of the challenge and the need to align the projects with the magnox swarf storage silo programme.

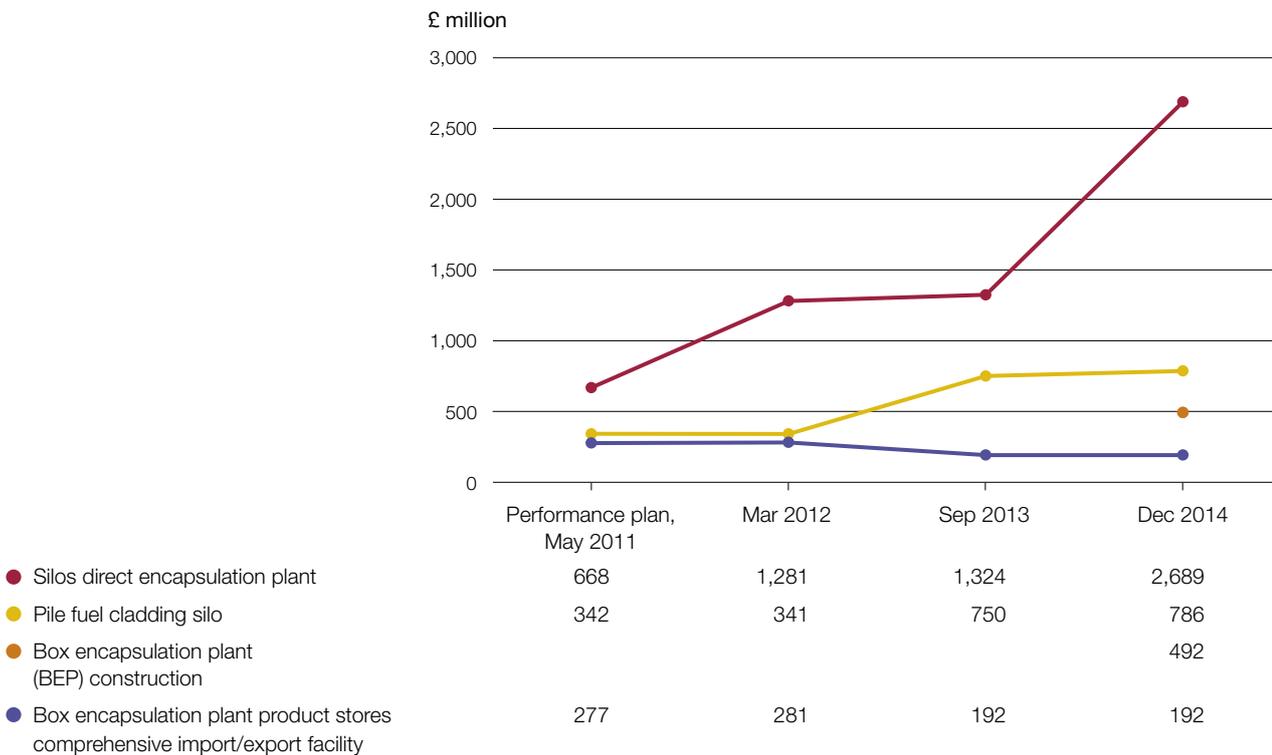
Estimated costs of the remaining major projects

2.16 Since September 2013 the estimated costs for most of the original remaining major projects have been stable, for projects in both the planning and design and construction phases (**Figure 7 and Figure 8**). However there has been a substantial increase of £1.4 billion in the lifetime cost for the silos direct encapsulation plant, a complex treatment plant in the planning and design phase.⁷ This has resulted in the total lifetime costs of the remaining nine major projects increasing to around £7 billion. In addition, one new project – the box encapsulation plant project – has gone into the design phase. This project has been accelerated in order to accept waste from the magnox swarf storage silo ahead of the availability of the silos direct encapsulation plant. The Authority estimates that this project will cost around £492 million.

Figure 7

Estimated costs for major projects in the design and planning phase

Estimated lifetime cost of the silos direct encapsulation plant doubled in December 2014, while other projects' estimated costs have not increased significantly



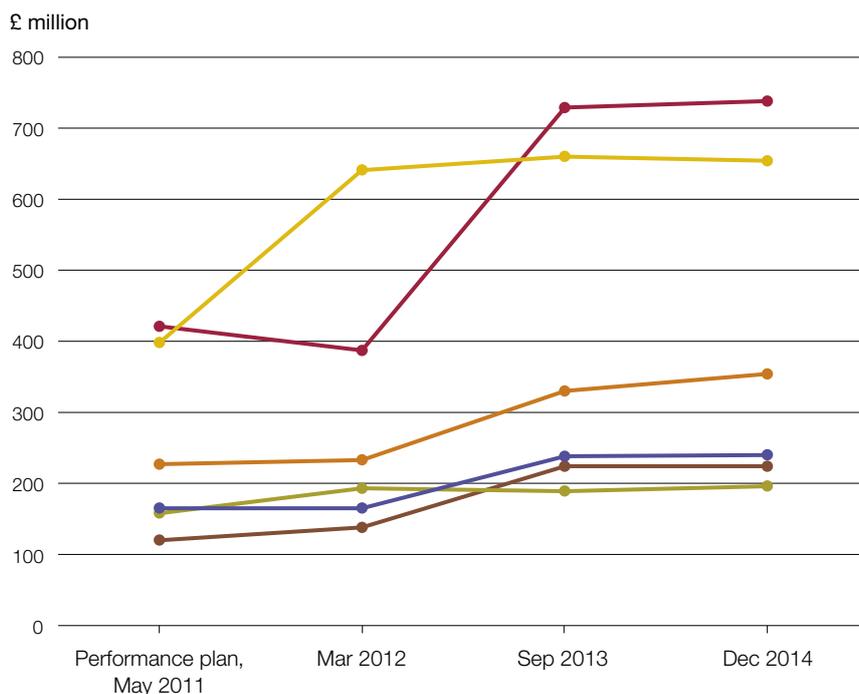
Source: National Audit Office analysis of the Authority's information

⁷ The Authority estimates time and cost ranges for projects. In this report we have used the Authority's mid-point estimate for the estimated costs of major projects. After a quantification of risks, the Authority considers there to be a 50-50 chance that costs will come in below this mid-point estimate.

Figure 8

Estimated costs for the major projects in the construction phase

Following earlier increases in the estimated costs for major projects in the construction phase their costs have now stabilised



- Magnox swarf storage silos retrievals
- Evaporator D
- Bulk sludge and fuel retrievals
- Silos maintenance facility
- Box transfer facility
- Separation area ventilation

| | | | |
|-----|-----|-----|-----|
| 421 | 387 | 729 | 738 |
| 398 | 641 | 660 | 654 |
| 227 | 233 | 330 | 354 |
| 165 | 165 | 238 | 240 |
| 158 | 193 | 189 | 196 |
| 120 | 138 | 224 | 224 |

Source: National Audit Office analysis of the Authority's information

2.17 The estimated cost of the silos direct encapsulation plant has doubled from £1.3 billion in September 2013 to £2.7 billion in December 2014 (Figure 7). In 2012 we reported that this is the third attempt to design a plant to receive, treat and immobilise the waste from the magnox swarf storage silo. At that time Sellafield Limited was planning to re-compete the project. Since awarding the contract Sellafield Limited has confirmed its cost estimate with greater certainty, but has moved its expected completion date back from August 2020 to June 2026. This project has accounted for the majority of the overall extension to completion dates for major projects.

2.18 The magnox swarf storage silos retrievals project and the pile fuel cladding silo project, which accounted for a significant proportion of the increase in estimated costs from March 2012 to September 2013, have not shown further significant increases in their estimated costs to December 2014 (Figure 7 and Figure 8). The Authority expects further clarification of costs and schedules on the pile fuel cladding silo project – in due course.

- **Magnox swarf storage silos retrievals project**

The project is to construct equipment and systems to safely remove radioactive waste from the storage silo. It is to commission its first machine in 2017, when the Authority expects there to be an opportunity to reduce the risk of the overall programme. The end date for the delivery of the final machine is linked to the silos direct encapsulation plant project and so the project's final completion date has been put back from 2023 to 2025 (Appendix One).

- **Pile fuel cladding silo project**

The project is at the design stage for integrated systems for retrieval of the waste from this silo, and is being re-planned. The Authority expects the revised plan to reduce the uncertainties in the proposed approach and result in a more robust cost and delivery schedule.

Progress with improving the capability and capacity of Sellafield Limited

The use of staff from Nuclear Management Partners

2.19 As the parent body organisation, Nuclear Management Partners has provided executives and secondees on a 'reachback' basis to Sellafield Limited to improve its capability and capacity, with the costs reimbursed by the Authority.⁸ We reported in 2012 that the Authority had reviewed Sellafield Limited's use of executives and reachback. The Committee concluded in its 2013 report that Nuclear Management Partners had not provided the leadership critical for success at Sellafield, and that the Authority should monitor, and challenge where appropriate, the use made of Nuclear Management Partners' executives and experts and the terms on which they are employed.

⁸ 'Reachback' refers to Sellafield Limited's use of staff from Nuclear Management Partners' companies at Sellafield.

2.20 The Authority committed to continue to monitor and challenge the appointment of Nuclear Management Partners' executives and experts and these costs have fallen. The Authority estimates that the cost of seconded executives, including salary, tax, expenses and incentives, has reduced to £6.4 million in 2014-15 from a peak of £11 million in 2011-12. There were 14 full-time equivalents in executive positions between 2012-13 and 2014-15, reduced from 17 in 2011-12 and 19 in 2010-11. The Authority estimates that the cost of reachback – including salary, plus overhead plus reasonable expenses – will have reduced to less than £10.8 million in 2014-15, from a peak of £25.1 million in 2012-13. The number of full-time equivalents is forecast to reduce to 40 in 2014-15 from 92 in 2012-13.

Procurement, contracting and project management

2.21 In January 2013 the Committee expressed concern that taxpayers were bearing the financial risks of delays and cost increases, as all but one of the major projects at the site involved a cost reimbursement contract between Sellafield Limited and its subcontractors. The Committee recommended that the Authority should determine how and when it will have achieved sufficient certainty to expect Sellafield Limited to transfer risk down the supply chain on individual projects and then to reconsider its contracting approach for the site as a whole. The Authority reports that it is still aiming to complete its intended review of procurement and contracting across the Sellafield programme by December 2015, to identify the scope for transfer of delivery risk to the private sector. It reports that it has taken a first step by identifying where work is sufficiently certain to support transfer of more delivery risk to the supply chain in its assurance of the 2014 performance plan.

2.22 In November 2013 Nuclear Management Partners confirmed to the Committee of Public Accounts that there was scope for improvement within Sellafield Limited in project management, business case preparation and cost estimation, procurement strategy, supply chain management, design capability and engineering. The Authority told the Committee it would monitor the performance of Sellafield Limited and Nuclear Management Partners against the updated 2014 lifetime plan and an 'excellence plan'. These plans set out Nuclear Management Partners' expectations for Sellafield Limited. The Authority also set specific measures and targets for 2014-15 in areas including performance on site, capability improvements and to maintain very good safety performance. Of 27 success criteria that the Authority set Sellafield Limited, the Authority is forecasting that Sellafield Limited's performance will be 'excellent' in 5, 'good' in 8 and 'adequate' in 13. One milestone – the appointment of a director in charge of security – was missed, but this post has now been filled.

Delivery of wider economic benefits

2.23 Sellafield Limited is due to finalise its new socio-economic strategy by the end of March 2015, in response to a recommendation from the Committee of Public Accounts, and has reported some increase in its use of apprentices and commitment to skills enhancement and its spending with small and medium-sized enterprises. In April and September 2014, the Authority and Sellafield Limited jointly published progress updates on their approach to developing skills and contributing to socio-economic development in and around Sellafield. In 2014 Sellafield Limited had increased its use of apprentices, trainees and graduates by nearly 40% since 2012; and in 2013-14 increased its direct spending with small and medium-sized enterprises to 7.6%, with total Sellafield supply-chain spending with small and medium-sized enterprises now being 19%.

Fee payments to Sellafield Limited

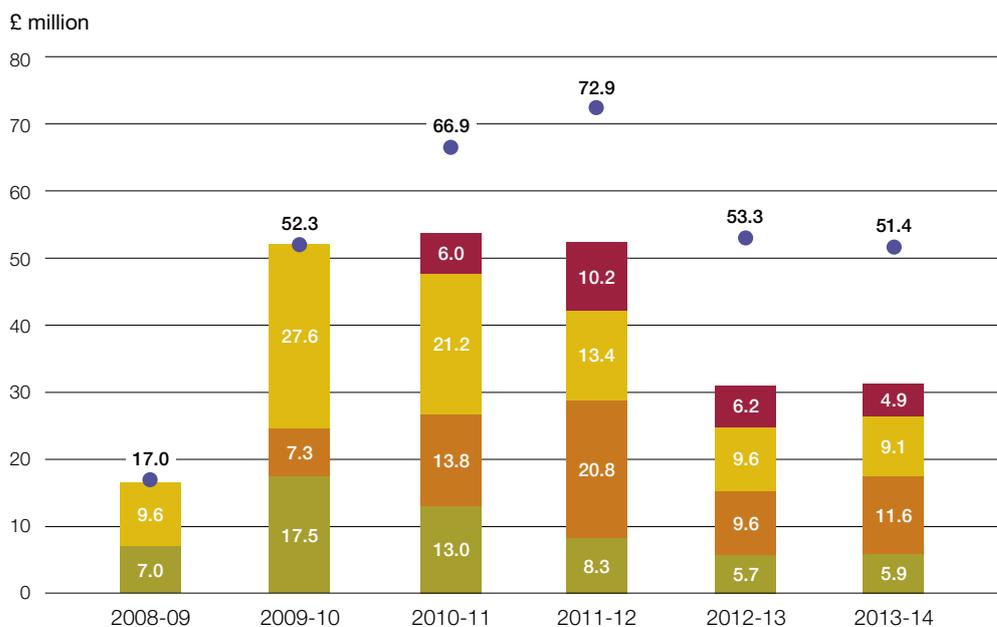
2.24 To the end of the first five-year term of the contract, the Authority has paid a total of £237 million in fees to Sellafield Limited for meeting its targets and objectives, from which Nuclear Management Partners receives payments as dividends. This is in line with the £230 million the Authority previously advised the Committee it could be (**Figure 9**). The Authority has not yet finalised the level of fees that Sellafield Limited will receive in 2014-15, against its assessment of maximum fees available for 2014-15 of around £53 million.

2.25 According to updated information provided to us by the Authority, which we have not audited, the Authority has now agreed that Sellafield Limited actually delivered efficiency savings of £715 million over the period 2008-09 to 2013-14.⁹ At the time of our October 2013 report, *Assurance of reported savings at Sellafield*, the Authority was forecasting that Sellafield Limited would achieve total efficiency savings between 2008-09 and 2013-14 of £691 million compared to a target of £699 million (in 2012 prices). Efficiency savings drive one of the main incentive based fee categories, alongside performance in meeting project milestones and identifying work that can be removed from the programme without affecting overall progress on the site. In October 2013 we reported, in response to a request for assurance from the Committee, that the Authority's systems for recording, scrutinising and challenging claimed site-wide savings at Sellafield provide moderate assurance of reported overall savings.

⁹ The original target for site-wide savings was £796 million over the period (2012 prices). During 2012-13, the Authority removed legacy ponds and silos from the efficiency fee mechanism as it sought to incentivise progress on the ground rather than cost efficiency. It is for this reason that the efficiency savings target was reduced.

Figure 9
Fees paid to Sellafield Limited

The Authority paid £31.5 million in fees to Sellafield Limited in 2013-14, a similar amount to 2012-13



- Other fees: for example, payments for identifying work that can be removed from the plan without affecting the achievement of objectives, and providing security on the site, less abatement.
- Performance based incentive fee: earned on achievement of specific project milestones. The Authority has withdrawn these incentives for the remainder of the contract period.
- Efficiency fee: earned for outperforming the contract baseline and achieving project and operational efficiency milestones.
- Base fee: a predetermined amount earned regardless of performance.
- The Authority's estimate of the maximum fee available.

Source: National Audit Office analysis of Authority information

Part Three

Revised delivery model for Sellafield

The Authority's review of delivery arrangements

3.1 In September 2013 the Nuclear Decommissioning Authority (the Authority) announced that it would continue the contract with Nuclear Management Partners into its second 5-year period. It acknowledged to the Committee of Public Accounts that performance had been worse than expected, and explained that with the Department's agreement it had extended the contract with Nuclear Management Partners because it considered this was the best option available at the time. The Authority told the Committee that in reaching this decision it had explored two alternatives: to re-let the contract; or to dispense with the parent body and operate with Sellafield Limited as a subsidiary of the Authority. In addition, the Authority stated that it could use the 'termination for convenience' clause in the contract at any time.

3.2 In its February 2014 report, the Committee concluded that "(t)he Authority has not demonstrated why, given the lack of risk transferred to (Nuclear Management Partners) this 'parent body' arrangement at Sellafield provides value for money". The Committee recommended that the Authority,

"should set out how it might transfer more of the delivery risk to contractors under its existing arrangements and how it will ensure that its alternative arrangements are viable to enable it to terminate the current contract should performance continue to prove unsatisfactory".

In its response to the Committee's recommendation, the Authority stated that it has "viable alternatives to the current contractor, contract and PBO model. These alternatives will be maintained and developed further during 2014".

3.3 In March 2014 the Authority began a strategic review of the delivery arrangements, because it recognised that the parent body organisation model, while beneficial in the early days, was no longer providing value for money at Sellafield. The stated objective of the review was to:

"identify the business model for the operation of Sellafield Limited that best secures the outcomes of safety, expedited remediation of the high-hazard facilities and value for money (including risk transfer)".

3.4 The Authority's review included:

- clarifying the success requirements;
- research and interviews with stakeholders to identify opportunities for improvement;
- developing hypotheses about the causes of poor performance; and
- reviewing delivery models used on major programmes in the public and private sectors and the nuclear and other sectors.

3.5 After assessing a long-list of ten delivery model options, the Authority reviewed in detail a short-list of three:

- **Option 1:** retaining the parent body organisation model with Nuclear Management Partners remaining as the parent body, but with steps taken to improve performance;
- **Option 2:** retaining the parent body organisation model, but holding a competition for a new parent body with a modified contract to help improve performance; and
- **Option 3:** a 'market-enhanced site licence company', with the Authority taking back ownership of Sellafield Limited from Nuclear Management Partners, and Sellafield Limited contracting with a strategic partner to bring in the required private sector expertise.

3.6 The Authority took steps to gain assurance about the quality of its strategic review. For example, it used a panel of industry experts to provide advice about the options being considered, and in December 2014, the Major Projects Authority carried out a Project Assessment Review of the process. The Major Projects Authority review found that the case for change had broad support and that the Authority had managed its stakeholders well. The Major Projects Authority also stated that additional assurance about the Authority's role in managing the transition could strengthen the process further. The Major Projects Authority and the Major Projects Review Group plan to review, in March 2015, the Authority's approach to invoking the 'termination for convenience' clause in its contract with Nuclear Management Partners, and the readiness of the Authority and Sellafield Limited to proceed with transition, with particular attention to the implementation plans, the risk strategy and the realisation of benefits.

The preferred delivery model

3.7 In November 2014, the Authority produced a business case recommending that its Board and the Department of Energy & Climate Change (the Department) approve a move to option 3, the market-enhanced site licence company. The business case showed the market-enhanced site licence company option outscored the other options on all evaluation criteria. In summary, the Authority assessed the main advantages of this option:

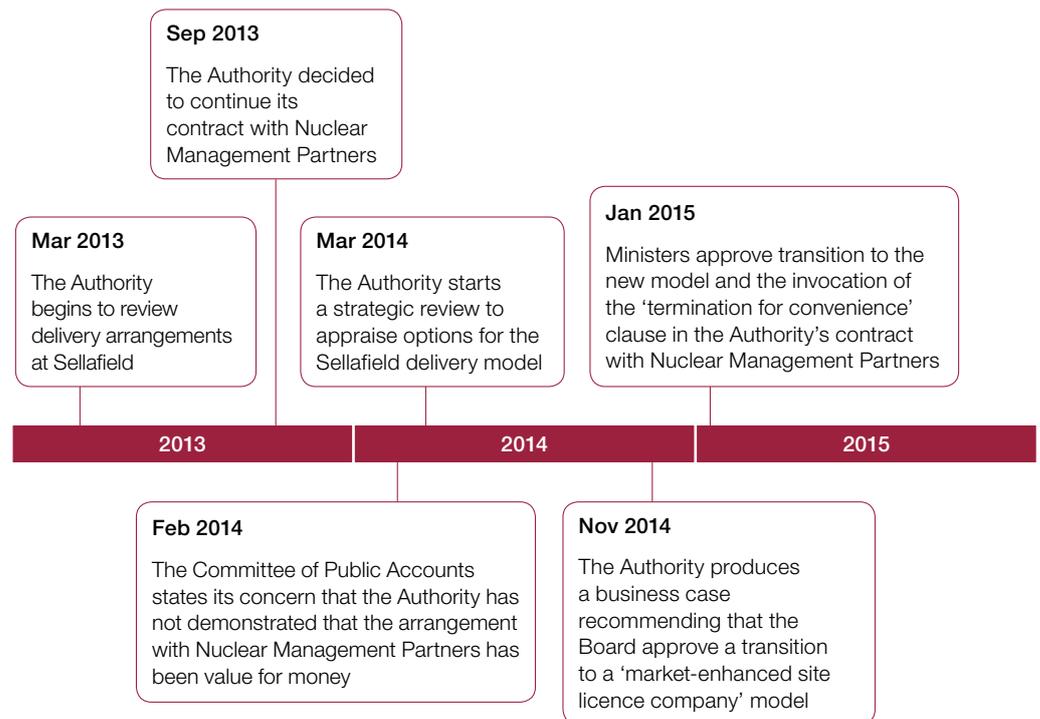
- Simplicity of relationships and accountabilities between the main parties.
- Improved ability to incentivise long-term outcomes in smaller-defined packages of work given inherent uncertainties on the site.
- Better alignment of objectives and incentives between the Authority and the leadership in Sellafield Limited.
- More enduring and motivating leadership within Sellafield Limited.
- Better access to the market for enhancing and developing capability.
- More opportunities to transfer delivery risk from Sellafield Limited to the market.

3.8 The Authority concluded that the market-enhanced site licence company could bring significant savings and benefits compared with the alternatives. The Authority's business case states that the appraisal was designed to compare the three options, not to provide a baseline against which to measure the costs and benefits of the new model. The main reasons for the higher forecast net benefits of the market-enhanced site licence company are reduced costs through lower payments to the private sector partner and the potential for greater efficiency savings. We have not audited the assumptions underpinning the Authority's analysis.

3.9 In January 2015, Ministers at the Department and HM Treasury and the Department's Accounting Officer approved the Authority's recommendation and the Authority decided to terminate its contract with Nuclear Management Partners. It will cost the Authority around £430,000 to break the contract with Nuclear Management Partners. **Figure 10** shows a timeline of events between the Authority's decision to continue its agreement with Nuclear Management Partners and the decision to terminate for convenience.

Figure 10

Timeline of events leading up to the Authority's decision to 'terminate for convenience' its contract with Nuclear Management Partners



Source: National Audit Office

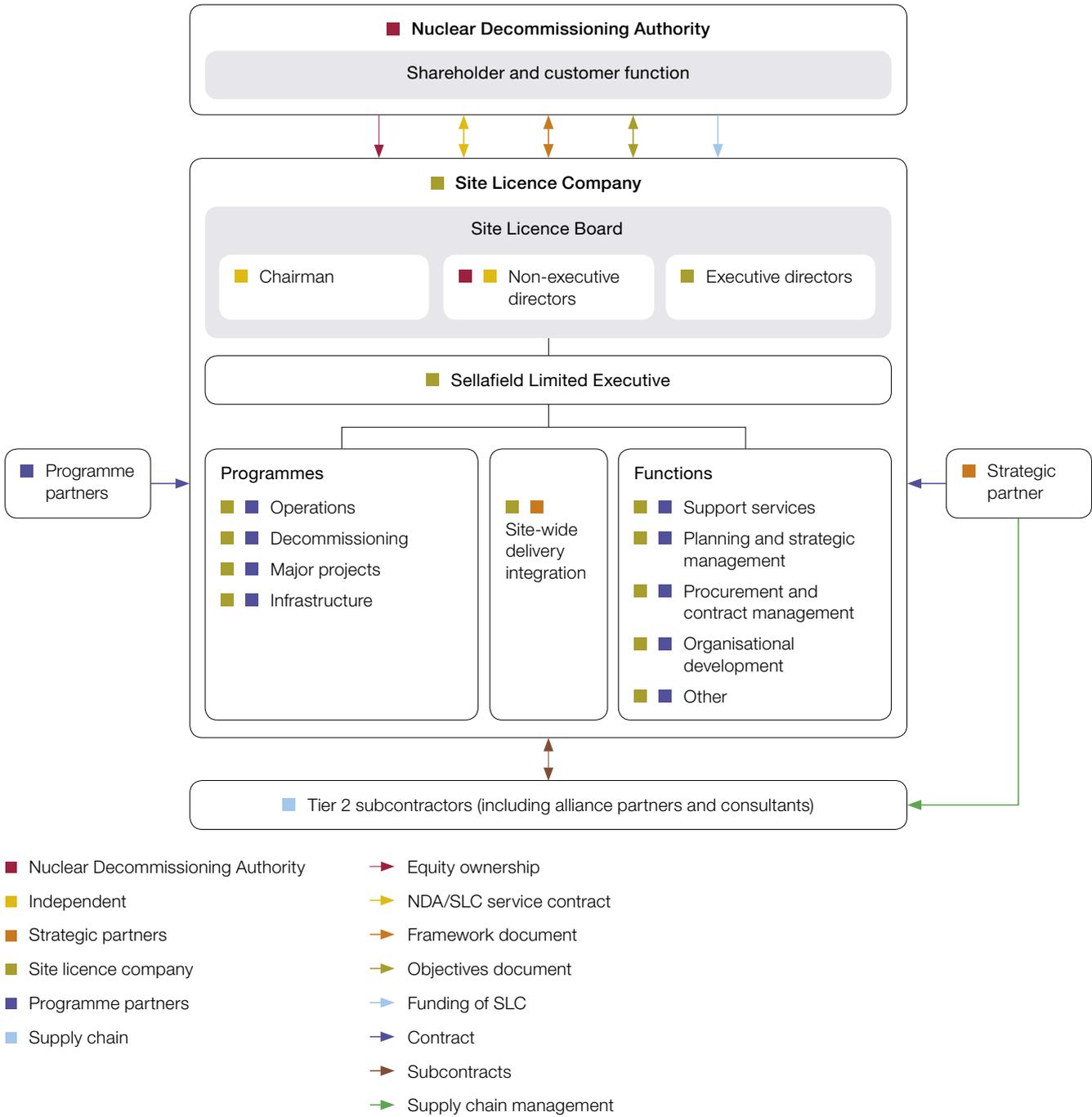
Transition to the new model

3.10 Under the Authority's revised model, Sellafield Limited will be assisted by private sector partners rather than being owned by a private consortium (**Figure 11** overleaf). The main features of the proposed model are:

- the Authority will take back ownership of Sellafield Limited as a subsidiary, and will act as strategic authority and owner;
- the Sellafield Limited Board will be chaired by an independent non-executive director, with support from three independent non-executive members. The Authority will provide two non-executive directors;
- up to four Sellafield Limited executive directors, including the chief executive officer, will also sit on the Board; and
- Sellafield Limited will recruit a strategic partner and potentially a number of programme partners from the private sector to provide it with additional expertise.

Figure 11
The proposed revised delivery model for Sellafield

Sellafield Limited will be assisted by a private sector strategic partner and programme partners



Source: Nuclear Decommissioning Authority

3.11 Under the market-enhanced site licence company, the Authority proposes that the strategic partner will support Sellafield Limited in three phases:

- the development of a revised site strategy, including identifying where there are gaps in Sellafield Limited's capability and breaking up the site into more manageable packages with better-defined scope;
- implementing the site strategy, including procuring programme partners to manage key projects and programmes; and
- supporting delivery of decommissioning and clean-up through management of contracts and integration of activities across the site.

3.12 The Authority envisages that payments to the strategic partner and the programme partners will be through a combination of cost-reimbursement, fees for delivery of key milestones, and a share of savings made against target costs. The Authority considers that the majority of potential fees for the strategic partner and programmes partners will be available in the final phase, upon delivery of savings and meeting milestones.

3.13 The market-enhanced site licence company model is similar to those that we have seen on, for example, the construction programme for the London 2012 Olympic and Paralympic Games and Crossrail. The Olympic Delivery Authority appointed a delivery partner to provide expert support and resource in managing the programme and to take control of overall management of construction activities. Crossrail Limited appointed a project delivery partner, to manage the contractors responsible for the construction of the Central Section Works and the interfaces with other parties such as Network Rail and London Underground. It also brought in a programme partner to provide overall programme and project management and control.

3.14 The Authority has appointed its Sellafield Programme Director as Senior Responsible Officer for the transition to the new model, and has set out an outline plan for the transition programme, which it expects to further develop with Sellafield Limited and Nuclear Management Partners. The Authority will firm up the plan by May 2015. The baseline plan for the main critical activities is to:

- confirm the senior management team for the transition period, including the chair and chief executive, and any ongoing requirements for secondees from Nuclear Management Partners by March 2015;
- serve the 'termination for convenience' notice to Nuclear Management Partners on 31 March 2015;
- finalise the transfer of shares in Sellafield from Nuclear Management Partners to the Authority on 31 March 2016;
- issue an Official Journal of the European Union (OJEU) notice for the procurement of a strategic partner for Sellafield Limited, with appointment expected in 2016; and
- appoint programme partners as required.

3.15 While the transition process is underway, the Authority expects that staff from Nuclear Management Partners will continue to lead and work on the site, to ensure maintenance, safety, security and delivery over the transition period. Following share transfer, Nuclear Management Partners' staff will progressively move out of their roles and be replaced by a new management team over a period of six months. As with previous years, the Authority expects there to be fees available to Sellafield Limited during the transition period and that these will be linked to performance on the site. However, the Authority is in the early stages of defining how Nuclear Management Partners will be incentivised and compensated during transition.

3.16 The Authority recognises that there are key risk areas associated with the transition to the new model:

- **Stakeholder responses to the proposed change in delivery model**

The Sellafield workforce is one of the key stakeholder groups and the Authority considers that, on the whole, they are likely to be supportive of the change.

- **The Authority's capability and capacity to implement the transition**

The Authority states that it will augment its capacity to manage the change with advisers; a senior, interim appointment to help manage the process; and use of project management capability within Sellafield Limited.

- **Securing suitable people to replace secondees from Nuclear Management Partners**

The Authority is confident in the capability of the current chair and managing director to start the process.

- **Obtaining and managing a strategic partner**

The Authority and Sellafield Limited are taking advice from the market about the availability of suitable companies and expect to apply lessons from other relevant best practice and the Authority's competitions, which it has overseen for other nuclear sites.

- **Realising the expected benefits of the transition**

The Authority expects to take steps to improve its capability as sponsor of Sellafield Limited to help realise the expected benefits. A related risk is that Sellafield Limited is unable to incentivise the strategic partner and programme partners in a way that provides the expected performance improvements. As mitigation, the Authority's contract management team will support Sellafield Limited with the procurement and contractual terms for the strategic partner, and the Authority and Sellafield Limited will seek the support of the strategic partner with the development of contractual incentives for programme partners.

Appendix One

Major projects updated costs and schedules

See **Figure 12** on pages 28 to 31.

Figure 12

Major projects updated costs and schedules

Planning and design

| Project | Description | Year project initiated | Years in planning/design stage | Estimated cost at initiation (£m) | Estimated cost in performance plan May 2011 (£m) | Estimated cost as at Mar 2012 (£m) | Estimated cost as at Sep 2013 (£m) | Estimated cost as at Dec 2014 (£m) | Variance against original upper estimate (£m) | Variance against upper estimate at initiation (%) | Variance against performance plan estimated cost (£m) | Planned delivery date when initiated | Planned delivery date in 2011 performance plan | Estimated delivery date as at Mar 2012 | Estimated delivery date as at Sep 2013 | Estimated delivery date as at Dec 2014 | Variance against delivery date when initiated (months) | Variance against delivery date in 2011 performance plan (months) | Variance against delivery date at Sep 2013 |
|---|--|------------------------|--------------------------------|-----------------------------------|--|------------------------------------|------------------------------------|------------------------------------|---|---|---|--------------------------------------|--|--|--|--|--|--|--|
| Pile fuel cladding silo | Design and build a new waste retrieval plant | 2005 | 7 | 150–495 | 342 | 341 | 750 | 786 | 291 | 59 | 444 | Oct 2019 | Aug 2017 | Aug 2017 | Jan 2023 | Apr 2023 | 42 | 68 | 3 |
| Box encapsulation plant product stores comprehensive import/export facility | Design and build a store with an import/export facility for containerised intermediate-level waste | 2006 | 6 | 108–119 | 277 | 281 | 192 | 192 | 73 | 61 | -85 | Jan 2019 | Oct 2017 | Oct 2017 | Oct 2018 | Nov 2019 | 10 | 25 | 13 |
| Highly active liquor storage tanks | Build replacement tanks to hold highly active liquid waste from reprocessing | 2007 | 5 | 83 | 474 | 474 | 474 | 474 | 0 | 0 | 0 | Mar 2013 | Mar 2018 | Cancelled | Cancelled | Cancelled | 0 | 0 | 0 |
| Silos direct encapsulation plant | Build a treatment plant to deal with hazardous legacy waste | 2010 | 2 | 560–669 | 668 | 1,281 | 1,324 | 2,689 | 2,020 | 302 | 2,021 | Nov 2018 | Jun 2017 | Oct 2017 | Aug 2020 | Jun 2026 | 91 | 108 | 70 |
| Ponds solid treatment plant technical underpinning project | Complete a series of studies to define solutions for the management of ponds | 2010 | 2 | 29 | 29 | 21 | 21 | 21 | -8 | -38 | -8 | Mar 2015 | Mar 2015 | Mar 2015 | Scope moved to other projects | Scope moved to other projects | 0 | 0 | 0 |
| Box encapsulation plant (BEP) construction | Construct a waste sorting and treatment plant for miscellaneous waste from a number of legacy facilities across the Sellafield site including the magnox swarf storage silos | 2014 | 1 | 492 | 0 | 0 | 0 | 492 | 0 | 0 | 0 | Dec 2019 | N/A | N/A | N/A | Dec 2019 | 0 | 0 | 0 |
| Total | | | | 1,422–1,887 | 1,790 | 2,398 | 2,761 | 4,654 | 2,376 | 132 | 2,372 | | | | | | 143 | 201 | 86 |

Figure 12 *continued*

Major projects updated costs and schedules

Construction

| Project | Description | Date passed design gate | Estimated cost at design gate (£m) | Estimated cost in performance plan May 2011 (£m) | Estimated cost as at Mar 2012 (£m) | Estimated cost as at Sep 2013 (£m) | Estimated cost as at Dec 2014 (£m) | Variance against design gate estimate (£m) | Variance against design gate estimate (%) | Variance against the performance plan estimated cost (£m) | Planned delivery date at design gate | Planned delivery date in 2011 performance plan | Estimated delivery date as at Mar 2012 | Estimated delivery date as at Sep 2013 | Estimated delivery date as at Dec 2014 | Variance against delivery date at design gate (months) | Variance against delivery date in 2011 performance plan (months) | Variance against delivery date at Sep 2013 |
|---------------------------------------|--|-------------------------|------------------------------------|--|------------------------------------|------------------------------------|------------------------------------|--|---|---|--------------------------------------|--|--|--|--|--|--|--|
| Local sludge treatment plant | Construct storage tanks to hold radioactive sludge and a building to house them with settling plant, utilities and ventilation equipment | May 2006 | 32 | 63 | 63 | 63 | 63 | 31 | 49 | 0 | Mar 2008 | Jan 2012 | Delivered Mar 2012 | Delivered Mar 2012 | Mar 2012 | 48 | 2 | 0 |
| Buffer sludge packaging plant | Construct storage capability for radio active sludge until it can be processed into a suitable waste reform for final disposal | Sep 2006 | 108 | 202 | 234 | 240 | 0 | 132 | 55 | 38 | Jun 2008 | Oct 2013 | Mar 2014 | Mar 2014 | Nov 2014 | 77 | 13 | 8 |
| Encapsulated product store | Construct new store for intermediate-level radioactive waste from reprocessing and future hazard reduction programmes | Oct 2006 | 94 | 103 | 103 | 105 | 105 | 11 | 10 | 2 | Sep 2010 | Aug 2012 | Nov 2012 | Apr 2014 | Apr 2014 | 43 | 20 | 0 |
| Magnox swarf storage silos retrievals | Construct equipment and systems that can safely remove radioactive waste from a storage silo | Mar 2007 | 243 | 421 | 387 | 729 | 738 | 495 | 68 | 317 | Apr 2015 | Jun 2023 | Jun 2023 | Jan 2023 | Nov 2025 | 127 | 29 | 34 |
| Separation area ventilation | Construct a 120 metre high chimney with associated plant room monitoring room and substation | Aug 2008 | 144 | 120 | 138 | 224 | 224 | 80 | 36 | 104 | Aug 2011 | Jan 2013 | Nov 2013 | Dec 2016 | Jan 2017 | 65 | 48 | 1 |
| Evaporator D | Construct a new evaporator to reduce the volume of highly active liquors (a by-product of reprocessing) | Apr 2009 | 397 | 398 | 641 | 641 | 654 | 257 | 40 | 256 | Jul 2014 | May 2014 | Dec 2015 | Mar 2016 | Apr 2016 | 21 | 23 | 2 |
| Box transfer facility | Construct a tunnel and associated mechanical devices to transport processed waste contained inside of 3m ³ boxes | Dec 2011 | 148 | 158 | 193 | 189 | 196 | 48 | 25 | 38 | Nov 2018 | Jan 2017 | Mar 2017 | Feb 2019 | Sep 2022 | 46 | 68 | 43 |
| Silos maintenance facility | Build a high contamination workshop to keep machines functional or permit their replacement during retrieval operations | Oct 2013 | 238 | 165 | 165 | 238 | 240 | 2 | 1 | 75 | Feb 2018 | May 2017 | Feb 2017 | Feb 2018 | Feb 2019 | 12 | 21 | 12 |
| Bulk sludge and fuel retrievals | Provide assets needed to support the export of ponds solids, wet bay solids and sludge | Apr 2014 | 354 | 227 | 233 | 330 | 354 | 0 | 0 | 127 | Sep 2018 | Mar 2016 | Nov 2016 | Jan 2018 | Sep 2018 | 0 | 30 | 8 |
| Total | | | 1,758 | 1,857 | 2,157 | 2,759 | 2,815 | 1,057 | 38 | 958 | | | | | | 439 | 254 | 108 |

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