



National Audit Office

## **THE NUCLEAR DECOMMISSIONING AUTHORITY** Taking forward decommissioning

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL | HC 238 Session 2007-2008 | 30 January 2008





# SUMMARY

**1** A growing proportion of the UK's civil public sector nuclear facilities have reached, or are nearing, the end of their operational life. By December 2007, 14 facilities had already shut down and were in the process of being decommissioned, which includes cleaning-up the sites.<sup>1</sup> Parts of Sellafield – the UK's largest civil nuclear site – were also being decommissioned and cleaned-up. Current plans envisage that most of these sites will be cleared over a 100-year period. The current best estimate puts the undiscounted future costs of decommissioning sites at around £61 billion at 2007 prices.

**2** The Nuclear Decommissioning Authority (the Authority) was established on 1 April 2005 to ensure the safe and efficient clean-up of the UK's first generation of civil public sector nuclear facilities. It owns a varied and ageing portfolio of 19 sites.<sup>2</sup> The sites include: Magnox nuclear power stations; research sites, including Dounreay; and the fuel handling, recycling and production facilities at Sellafield. The Authority is a non-departmental public body sponsored by the Department for Business, Enterprise and Regulatory Reform (the Department), which approves its strategy,

<sup>1</sup> In this report we use the term decommissioning in a broad sense to cover the range of activities required to take a facility which has ceased operating to its end state.

<sup>2</sup> The Authority has full ownership of 18 sites and has a lease agreement with the United Kingdom Atomic Energy Authority for that part of the Harwell site which was designated to it under the Energy Act 2004 and requires decommissioning and clean-up.

plans and budget. The Authority also reports to the Scottish Ministers who agree its strategy and plans for Scottish sites, and thus the Department and the Scottish Government are involved in the Authority's governance.

**3** The Authority discharges its responsibilities for decommissioning through management and operation contracts with licensed operators at each site. These site licensees manage sites, including preparing site plans, performing and sub-contracting work. The site licensees are, in turn, owned by parent bodies. The relationship between the Authority and the parent body is governed by a parent body agreement. At December 2007 the parent bodies comprised: the United Kingdom Atomic Energy Authority, a non-departmental public body; British Nuclear Group Limited (part of British Nuclear Fuels Limited, a company wholly owned by government); Reactor Sites Management Company Ltd, part of the private company EnergySolutions; and Westinghouse Electric Company, part of the Toshiba Group.

**4** The UK Government set out, in broad terms, the structure for taking forward decommissioning in the 2002 White Paper *Managing the Nuclear Legacy* Cm 5552. The structure is intended to allow the Authority to put the right to be the parent body out to competition whilst retaining the skills and or knowledge of staff within the site licensees. This avoids the need to license a new operator after each competition. The Government believes competition will stimulate innovation and bring strengthened management to the decommissioning process. The first of these competitions, to become the parent body for the Low Level Waste Repository near Drigg, is expected to be concluded by the end of February 2008 subject to Government approval. The competition to become the parent body for the Sellafield group of sites<sup>3</sup> is underway and due to be concluded by the end of 2008. The contracts are expected to run for an initial period of five years, extendable for a total of 12 further years over three periods, subject to performance.

**5** The Energy Act 2004 imposed a duty on the Authority to safeguard the environment; maintain health and safety; and preserve nuclear security. The Act left the statutory responsibilities of site operators, and their relationship with health, safety, security and environmental protection regulators, unchanged. Ultimate legal responsibility for determining how to comply with regulatory requirements remains with the site licensees. As such there are limits on the extent to which the Authority or the parent body can

influence how the site licensee delivers the work paid for by the Authority. **Figure 1 overleaf** summarises the relationship between the different parties.

**6** The Authority's income comes from a mix of grant-in-aid from the Department (expected to be £1,420 million in 2007-08) and revenue generated from commercial activities (budgeted to be £1,370 million in 2007-08), including power generation and fuel processing, that are centred on four of its sites. In 2006-07, the Authority spent around £690 million on project work at decommissioning sites, of which 40 per cent was spent at Sellafield (see paragraphs 1.13 and 3.2).

**7** This report examines the Authority's performance in using its contracts to take forward the decommissioning of sites since April 2005, and the lessons it can learn for contracting as it takes forward its competitions. The Authority's management of the competition process will be considered in future reports.

## Overall conclusions and assessment of value for money

**8** The nature and scale of the decommissioning task inherited by the Authority was highly uncertain. Many of the Authority's sites had not been designed with decommissioning in mind, and record-keeping – particularly in the early days of nuclear development – had not always been sufficiently detailed to inform decommissioning several decades later. Since its creation, the Authority has invested significant effort in determining the scale of the task it faces in decommissioning the UK's first generation of civil nuclear facilities. The Authority has produced, for the first time in the UK, a unified strategy for decommissioning the UK's legacy nuclear sites.

**9** The Department and Authority envisaged that better definition of the decommissioning task would see estimates of remaining lifetime costs grow in the short-term, but stabilise by 2008 and fall thereafter. The most recent iterations of the Authority's plans have continued to produce large increases in estimates, including the cost of the work programme over the next five years which might have been expected to have stabilised by now. The continuing instability in these costings reduces their value during the parent body competitions, making it difficult for the Authority to judge the cost and price element of bidders' proposals.

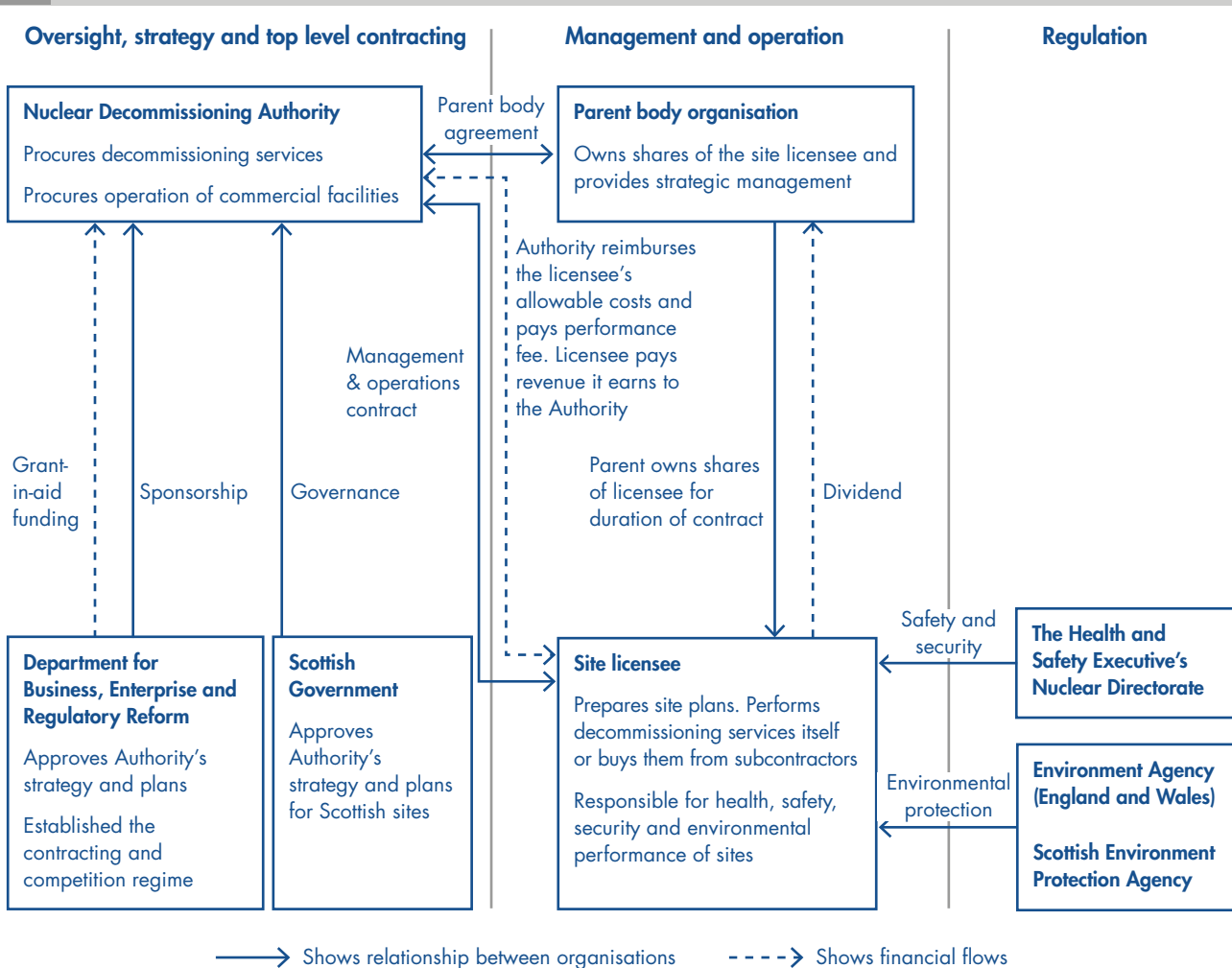
<sup>3</sup> The parent body will own the shares in the site licensee for Sellafield, Capenhurst, Calder Hall and Windscale.

**10** Significant resources have been allocated to the decommissioning programme. But the progress made by the Authority in decommissioning non-operational Magnox and research sites has been hampered by emerging pressures on its financial position. Due to the need to fulfil additional urgent expenditure commitments, particularly at Sellafield, and the uncertainty of commercial income from its ageing and unreliable facilities, the Authority has had to make changes at short notice to some sites' funding levels for the last quarter of 2006-07 and for 2007-08 to meet its priorities within budget. These changes have created significant uncertainty for both site licensees, in planning and delivering their long-term decommissioning programmes, and their

contractors, and have led to additional costs for the taxpayer which lessen the value for money derived from the decommissioning programme.

**11** The Authority's use of cost reimbursement management and operation contracts with site operators has been a sensible approach to adopt whilst establishing its role as a purchaser of decommissioning services. But these contracts require reliance on detailed short-term annual work programmes, which change frequently and make it difficult for the Authority to maintain a sufficiently testing incentive regime. In our view, in their current form, the contracts are unlikely to encourage sites to deliver long-term value for money as they do

**1** The key responsibilities of the main organisations which oversee, manage and regulate the decommissioning of civil public sector nuclear sites



Source: National Audit Office

**NOTE**

The diagram does not show the relationship at December 2007 between the Department and two of the parent bodies. The Department sponsors the United Kingdom Atomic Energy Authority, which is the parent body and site licensee for Dounreay and the other research sites. The Department owns British Nuclear Fuels Limited which includes the parent body for the Sellafield site licensee. British Nuclear Fuels Limited is not competing to remain the parent body of Sellafield.



not provide strong incentives to contractors to control lifetime costs through, for example, innovation and efficiency improvements. Other forms of contract, better adapted to the circumstances of particular sites and work streams, and the long-term nature of the work, need to be adopted if the potential value for money benefits of competitive contracting for decommissioning work are to be fully realised. The Authority has indicated its intention to move towards more testing contract forms where this is appropriate. It will need to have a clear view of how to achieve this if it is to use the competition process effectively to deliver benefit for the taxpayer.

## Our main findings

**i** The Authority has developed a comprehensive and consistent framework for drawing up decommissioning plans, known as lifetime plans, at site level. The quality of the plans has improved over a number of iterations particularly in setting out what needs to be done and, in broad terms, how it might be done and when (see paragraphs 2.2 and 2.3).

**ii** The Authority's 2007 estimate of the undiscounted future costs of sites over their remaining lifetime (£73 billion<sup>4</sup>) was almost £17 billion (30 per cent) higher than the estimate made by the Department in 2003.<sup>5</sup> Between 2005 and 2007 lifetime costs increased by some 18 per cent (£11.7 billion), after adjusting for inflation and the Authority's expenditure at its sites since it was established in 2005. In part, this increase reflects a more complete assessment of the range of work that needs to be taken forward, including the action necessary to address hazard at some of the legacy facilities at Sellafield. Our analysis of the plans also indicates, however, that cost estimates on work expected to be undertaken in the near to medium-term, which might be expected to have stabilised by now, have risen significantly over successive iterations. Between 2005 and 2007, the estimate of likely costs for the first five year period covered by those plans in a consistent manner<sup>6</sup> – April 2008 to March 2013 – rose by 41 per cent (see paragraphs 2.4 to 2.8 and Figure 8 on page 18).

**iii** In deriving cost estimates from the site licensees, the Authority has obtained most of its assurance about the validity of budgets by specifying the costing procedures sites should adopt and reviewing compliance with those

procedures. The Authority's staff, including its engineers, review project budgets included by sites in lifetime plans. The degree of scrutiny has been limited, however, as the Authority does not, for example, routinely employ its own professional cost advisers to review estimates. The Authority has previously recognised the need to strengthen the scrutiny of costs and is intending to commission a validation of the costs being submitted by sites in the lifetime plans to be finalised in 2008 (see paragraphs 2.9 to 2.11 and Figure 9 on page 20).

**iv** The Authority reports annually on performance at each of its sites by providing data on the value and cost of work completed against budget and assessing progress against key milestones and deliverables, for example expressed in terms of the demolition of buildings on site. These measures do not convey clearly to the lay reader how far decommissioning has progressed down the path from waste characterisation, through retrieval and containment, to hazard removal and eventual site clearance. The Authority has set itself a target for 2007-08 to develop, for all potentially mobile radioactive wastes, a hazard baseline that will cover the amount of waste, its activity, location, condition and the percentage of waste that is passively safe.<sup>7</sup> If robust hazard baselines can be developed, it is possible that these might provide one basis for reporting progress on decommissioning. At present, in the absence of appropriate measures of progress, the focus of external parties monitoring the Authority's performance is likely to be skewed towards levels of spend rather than its outputs and outcomes (see paragraphs 3.3 to 3.5 and Figure 10 on page 22).

**v** It is still too early to judge the impact of the contracting regime on health, safety, security and environmental performance. Since 2000-01, there has been a general reduction in the number of reported nuclear safety events at the sites now falling within the Authority's responsibility. Site by site performance against a wider series of metrics developed by the Authority was reported, for the first time, in its 2006-07 Health, Safety, Security and Environmental Report. The Authority can expand the range of metrics it uses and reports on so it can, for example, assess the overall environmental impact of its sites (see paragraphs 3.7 to 3.8 and Figure 11 on page 23).

4 This figure, at 2007 prices, comprises £61 billion for decommissioning (mentioned at paragraph 1) and around £12 billion to cover the cost of running the remaining operational facilities to the end of their commercial life, but does not reflect the anticipated revenue from these sites.

5 Estimated cost had increased partly as a result of inflationary pressures (which have added approximately £2 billion per annum, the equivalent of £8 billion over the period 2003 to 2007), and even though resources have been spent on operating and decommissioning sites during the intervening period.

6 Although all three plans covered 2007-08, the basis for treating the costs of contingency for that year varied.

7 Waste which is passively safe includes: waste which is in a form which is chemically and physically stable and is stored in a manner that minimises the need for safety mechanisms, maintenance, monitoring and human intervention.

8 The Authority's Draft Business Plan for 2008-11 was put out to public consultation.

**vi** The Authority has not had sufficient flexibility in its budget to cope with the level of volatility and uncertainty it has faced with its commercial income, and urgent expenditure commitments, in particular at Sellafield. As a result, a pattern of “start and stop” on some non-operational Magnox and research sites has incurred extra costs for the taxpayer. In November 2007 the Authority consulted on its plan to increasingly focus its decommissioning resources over the next three years on the high hazard facilities at Sellafield and Dounreay. The speed with which the Authority can move resources between sites depends on factors such as: the potential socio-economic impact on those areas around smaller research and Magnox sites; having funds to cover transition costs such as redundancy; and the ability of Sellafield and Dounreay to make effective use of new money (see paragraphs 3.11 to 3.17 and Figure 12 on page 25).

**vii** The Authority has lacked an established mechanism, developed and applied in consultation with stakeholders, for deciding priorities against different resource assumptions. As at Autumn 2007, the Authority was in the early stages of developing a framework to demonstrate the overall value of decommissioning work, for example, on levels of hazard, environmental performance and its socio-economic impact on local communities. It plans to use this framework in comparing different decommissioning scenarios (see paragraphs 3.5 and 3.23 to 3.24).

**viii** The Authority has had to strike a balance between encouraging sites to take forward decommissioning in a cost effective way and not cutting across site licensees’ legal responsibility for all site activities. The appointment of new parent bodies, drawn from the private sector, is creating a new set of relationships to manage. The Authority, the Health and Safety Executive’s Nuclear Directorate, the site licensees and existing parent bodies, have sought to clarify the roles of the different parties but this framework remains relatively new and untested. The effectiveness of this framework in helping the Authority take forward the decommissioning task will rely heavily on the ability of all parties to work in partnership towards common shared goals, with incentives in place that reflect those goals, and management teams with the skills to work constructively with their partners (paragraphs 4.3 to 4.5).

**ix** The use of a common cost reimbursable management and operation contract across all sites has provided a stable framework upon which the Authority and its sites have been able to establish consistent industry-wide planning and contract control procedures. The use of these contracts has, however, meant that increases in site licensees’ costs are borne by the taxpayer.

And because of the difficulties of using short-term incentive regimes noted at paragraph 11, the contracts are not well suited to the delivery of decommissioning activities that generally run to longer timescales. There is scope for the Authority to make greater use of fixed cost, or longer-term target cost plus fee arrangements to cover support services and those decommissioning activities, such as demolition or deplanting of non-radioactive buildings, that do not entail substantial risk or uncertainty and, in doing so, deliver better value for money. The Authority is considering, through the competition process, how it can use more commercial payment and reward mechanisms, including the use of multi-year performance incentives (see paragraphs 4.6 to 4.29).

## Recommendations

- i** The Authority should develop its current contract incentives by:
  - incorporating elements of fixed price, or longer-term target cost plus fee, for work streams or sites where analysis of risks – including awareness of experience abroad – indicates that work scope and cost are sufficiently well defined;
  - reviewing intellectual property provisions to maximise the Authority’s share of the benefits of innovation while providing sufficient incentive for site licensees and their parent bodies; and
  - moving to multi-year performance milestones aligned with project timetables where financial flexibility permits.
- ii** The Authority should strengthen its capacity to scrutinise the cost estimates put forward in the lifetime plans submitted by sites. The Authority has recognised the need to strengthen its scrutiny of costs and is intending to commission a validation of sites’ 2008 plans.
- iii** The Authority should determine the reasons for the continuing increases in cost estimates submitted by sites, particularly on those elements of work which by now should have been reliably costed. The analysis could break down cost increases into those driven by: changes in the Authority’s policy or guidance; better understanding of work required to achieve regulatory compliance; changes in the volume or characterisation of waste; and changes in the strategy, costs or scope of the work proposed by the site licensee. The Authority should seek to quantify uncertainties associated with the lifetime cost estimates that it intends to publish, and then present a cost range within which the final figure is likely to fall.

- iv** In the absence of stable cost baselines the Authority must consider how:
- it will compare the likely cost outcomes of bidders' proposals against each other and against the probable cost under the current incumbents;
  - it can subsequently lock successful parent bodies, and their site licensees, into price and incentive regimes which will provide the taxpayer with good value, once work scope has been adequately defined but where the successful bidder may already have been appointed.
- v** The Authority should evaluate the risks from more commercial management of its sites following competitions and ensure that its contract management staff are equipped to mitigate those risks.
- vi** The Authority should develop clear and transparent measures of the progress being made against the objective of decommissioning sites and present these in public documents in a way which is comprehensible to the layman. Its current work on developing a hazard baseline could provide a possible means of developing such measures. It should also continue to develop, by working with the regulators, the metrics its uses to monitor and report on the health, safety, security and environmental performance of its sites.
- vii** The Authority should require site licensees to prepare lifetime plans on the basis of the most realistic available funding assumptions and reject plans that exceed those limits unless the sites are able to demonstrate to the Authority they are the minimum necessary to meet their obligations.
- viii** The Authority should require lifetime plans to be prepared in a form which enables sites to assess the impact of differing funding assumptions for the near term. Sites would then be well-placed to provide the Authority with the information it needs to assess priorities should funding levels change.
- ix** The Authority should work with parent bodies, site licensees and regulators to develop a shared and documented understanding of their roles and responsibilities given the complexity of the contracting regime and the need to agree, prioritise and meet regulatory requirements as they arise.
- x** At the end of 2007 the Department transferred responsibility for governance of the Authority to its Shareholder Executive, which is responsible for improving the way Government manages public sector businesses. The Department should ensure these new arrangements enable it to be fully aware of developing financial and other major issues affecting the decommissioning programme and enable it to assess key risks to the Authority's programme.
- xi** The Department, working with HM Treasury and the Authority, should ensure that decisions on the use of funding flexibilities available to the Authority are made promptly in response to unanticipated changes in commercial income or commitments, to minimise their adverse impact on the value for money of the decommissioning programme and the confidence of the supply chain.
- xii** The Department should ensure that the targets which will underpin the 2008-11 Departmental Service Objective – to manage energy liabilities effectively and efficiently – provide incentives for the Authority to bear down upon and control lifetime costs.