



National Audit Office



The decommissioning of the AGR nuclear power stations

Department for Business, Energy & Industrial Strategy

REPORT

**by the Comptroller
and Auditor General**

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Key facts

7

number of Advanced Gas-cooled Reactor (AGR) stations in the UK

2028

closure date of the last AGR station when electricity generation ceases and decommissioning begins

£23.5bn

EDF Energy's (EDFE's) 2021 estimate of the total undiscounted decommissioning liabilities of the seven AGR stations plus the Pressurised Water Reactor (PWR) at Sizewell B¹

- £14.8 billion** value of assets at March 2021 held by the Nuclear Liabilities Fund (the Fund) to help meet the decommissioning costs of the seven AGR stations and the PWR at Sizewell B. In July 2020, government injected £5.1 billion into the Fund. Assessment of the Fund's sufficiency is complex: the aim is that target returns from investments over decades will meet the liabilities.
- £3.1 billion – £8.0 billion** EDFE's total estimated range of costs for defueling the AGR stations – the first stage of the decommissioning process – under different scenarios. The costs of defueling form part of the decommissioning liability.
- £1 billion** the Department for Business, Energy & Industrial Strategy's estimate of the savings that could be achieved during the defueling of the AGR stations following its negotiations with EDFE.
- £100 million** potential upside and downside incentivisation (gain/loss) available to EDFE for defueling and transfer of AGR stations to Magnox Ltd.

Note

¹ All financial data in this report is in real terms at 2020-21 prices unless otherwise stated. On this page the estimates for defueling costs and the value of the potential incentives available to EDFE were made in 2021-22 and have not been converted into 2020-21 prices.

Summary

Introduction

1 The UK has eight second generation nuclear power stations accounting for around 16% of total UK electricity generation in 2020. Seven of the eight stations are Advanced Gas-cooled Reactor (AGR) stations, the design of which built on that of the first generation of now closed Magnox reactors.¹ Under current plans, all of the AGR stations will have stopped generating electricity by 2028. EDF Energy (EDFE) bought the stations in 2009 following the sale of British Energy, which had operated the stations since its privatisation in 1996. At the time of the sale, the taxpayer held an interest in 36% of the shares in British Energy.

2 In 1996, the government established the Nuclear Liabilities Fund (the Fund) to meet the costs of decommissioning the AGR and Pressurised Water Reactor (PWR) stations. The UK government has provided a guarantee to underwrite the Fund in the event that its assets are insufficient to meet the total costs of decommissioning. EDFE's latest estimate of the cost of decommissioning the AGR and PWR stations, at March 2021, was £23.5 billion.² At that time, the Fund's assets were valued at £14.8 billion. Assessment of the Fund's sufficiency is complex: the aim is that target returns from investments will over decades meet the liabilities. In 2020, government made a contribution of £5.1 billion in recognition of the impact on the Fund of an increase of over £2 billion in the estimated cost of decommissioning combined with continued low returns from investments in the National Loans Fund.

3 The arrangements for decommissioning the stations have been governed by a series of agreements between, variously, the Fund, the Department for Business, Energy & Industrial Strategy (the Department) and the station owners, which were originally drawn up in 2005 when British Energy was restructured. The agreements cover, for example, the government guarantee of decommissioning costs, the arrangements for reimbursing costs, and a reserve option for the Secretary of State to take these stations back into the public sector.

¹ The UK's only other active nuclear power station is a Pressurised Water Reactor (PWR) at Sizewell B, which is not a focus of this report.

² Costs quoted in this report are presented at March 2021 values unless stated otherwise. The estimated cost of decommissioning the stations is presented in undiscounted terms in this report in order to aid comparability with previously published estimates.

4 A review of the arrangements in 2015 by government's Shareholder Executive identified opportunities for improvement, including introducing commercial incentives for EDFE to decommission the stations efficiently. In late 2017, the Department entered into negotiations with EDFE to revise the agreements for the AGR stations, which it finalised in June 2021. Under the revised agreements EDFE will continue, upon closure of the stations, to defuel each of the stations as previously planned. The Department has, however, agreed financial incentives to encourage EDFE to accelerate defueling and transfer of the stations, with the opportunity to gain or lose up to £100 million in nominal terms depending upon its performance. Once defueling is completed, the Department will take the stations back into public ownership. Ownership of the stations will be transferred one by one to the Nuclear Decommissioning Authority (NDA), for its subsidiary Magnox Ltd to complete the decommissioning process by dismantling the reactors and taking down buildings. The Department estimates the new agreements could save the taxpayer up to £1 billion compared with the previous agreements as a result of accelerated defueling and that there will be further benefits from the NDA taking over these stations.

5 This report examines whether the outcome of the Department's negotiations with EDFE, and subsequent preparations for defueling and deconstruction, are likely to lead to better value for money when decommissioning the AGR fleet. The report covers the:

- background to decommissioning the AGR stations, how decommissioning is funded and the prospects for further calls on taxpayers' money to cover the long-term costs (Part One);
- commercial agreements which underpin how decommissioning will be delivered including the Department's rationale for renegotiating the agreements and whether it met its negotiating objectives (Part Two);
- arrangements to remove fuel from the AGR stations (Part Three); and
- progress with planning for the eventual transfer and decommissioning of the AGR stations to NDA and Magnox Ltd (Part Four).

Key findings

Meeting the cost of decommissioning

6 Meeting the costs of decommissioning may over time require more support from the taxpayer. At the end of March 2021, the Fund held assets of £14.8 billion, compared with forecast liabilities of £23.5 billion. The Fund trustees expect the investments to grow over the long term and to eventually cover the costs of decommissioning. This view is based on the long timescales over which the liabilities are expected to be incurred, for example the expectation that assets will grow when the stations are in a period of extended care and maintenance at which point the level of drawdowns from the Fund are expected to be low. Following the £5.1 billion injection in 2020, however, the Fund's recently published accounts for 2020-21 highlighted a new request to the Department for an injection of a further £5.6 billion due primarily to an increase in corporation tax rates to be paid by the Fund. The liabilities have almost doubled in real terms since 2004-05. If recent returns from the Fund's investments, which are mainly held in the National Loans Fund, and the historic upward trend of nuclear liability estimates are sustained, there remains a risk that the taxpayer will have to make further contributions in the future (paragraphs 1.7 to 1.16).

The renegotiated agreements

7 In 2015, the Shareholder Executive highlighted concerns about the ability of the existing funding arrangements to incentivise efficient decommissioning of the AGR fleet. Prompted by concerns within government about the likelihood of the Fund being able to cover the rising costs of decommissioning, the Department commissioned the then Shareholder Executive to carry out a strategic review of the governance, commercial and delivery arrangements for decommissioning. Under the original funding agreement, EDFE would be paid for all the decommissioning costs incurred that fell under the terms of the funding agreement. The review found that there was no financial incentive for EDFE to carry out decommissioning work efficiently. There were limited powers for the government to reject plans on the grounds of cost-effectiveness. There was also a lack of clarity on how EDFE should allocate costs between ongoing operations and decommissioning, such as the purchase of equipment that could be used for both station operations and defueling, or the costs of using its own specialists to work on decommissioning tasks (paragraphs 2.5 to 2.8).

8 The revised agreements provide EDFE with improved clarity about its role and a commercial incentive to improve defueling performance, although the approach to implementing the incentive will need to be kept under review. The Department's main objectives were to provide EDFE with financial incentives to minimise the cost of decommissioning, focused on the defueling stage, and to provide clarity on EDFE's role and the recovery of qualifying costs in decommissioning to enable it to plan ahead. The new agreements are clear that the stations will transfer to the NDA once the fuel has been safely removed and have introduced financial incentives for EDFE to earn up to £100 million, or incur penalties up to £100 million; £86 million of this incentive is intended to encourage safe, accelerated defueling.³ EDFE agreed that a proportion of the incentive should be targeted at improving site-by-site performance. This action could improve the impact of the incentive across the sites. The success of the financial incentive regime will depend on the ability of the Department to set sufficiently stretching but realistic target costs against which the EDFE incentive will be measured and applied (paragraphs 2.9 to 2.14, 2.22 and 2.23).

9 The Department considers that exercising the option to transfer the entire fleet of stations enabled it to achieve its negotiating objectives, but the NDA will not fully know the condition of assets it is taking over until they are transferred. The Department believes that a transfer to the NDA will deliver greater efficiencies by making use of the specialist expertise already gained during work on the Magnox fleet, since three of the seven AGR stations are co-located with Magnox stations. The original agreements allowed the Secretary of State to exercise the transfer option station by station. In the statement of negotiating principles agreed with EDFE in July 2019, however, the Department indicated its intention to exercise its option to transfer the entire fleet of AGR stations. The decision removed an important uncertainty for EDFE and allowed negotiations to proceed. While the Department analysed the relative benefits of exercising the option over all the stations now, rather than doing so on a station-by-station basis, it did so after the statement of negotiating principles had been agreed with EDFE. The Department has taken an irrevocable decision to transfer the stations, but the NDA will not know the exact details of what will transfer nor have a full understanding of the associated costs and liabilities until closer to the expected transfer (paragraphs 2.15 to 2.20 and 4.6).

³ Values in this paragraph are presented in nominal terms.

Risks from the defueling of the AGR stations

10 The cost of defueling the AGR fleet is likely to be highly dependent on the rate at which the stations can be safely defueled. EDFE estimated in 2021-22 that the cost of defueling the AGR fleet could be between £3.1 billion and £8.0 billion depending on the scenario.⁴ As soon as EDFE declares a station closed to electricity production all the costs of the station are borne by the Fund. EDFE estimated that the fixed costs to manage and maintain a station that is not generating electricity but still holds fuel are around £140 million per station per year, compared with around £25 million to £35 million per station per year once the fuel has been removed. The costs to be borne by the Fund are therefore very dependent on how soon defueling begins once a station ceases electricity generation, and how quickly fuel can be removed. Accelerated defueling will test the capacity of EDFE to remove the fuel, and then the NDA to transport and store the fuel safely at Sellafield. A bottleneck at any point in this process could have repercussions across the defueling programme. Early, unexpected closure of a station, meanwhile, could mean that fuel remains on site, with defueling plans not ready, safety cases yet to be approved by the Office for Nuclear Regulation and therefore the parties not ready to begin accelerated defueling. For example, the recent unexpected early closure of Dungeness B, because of a fault in the reactor core, may lead to additional calls on the Fund of an estimated £0.5 billion to £1.0 billion (paragraphs 3.2 to 3.4 and 3.13 to 3.17).

11 The Department, EDFE and the NDA have established joint arrangements to plan and oversee the accelerated defueling phase, but the scale of the task poses a big challenge. In 2015, the Department, EDFE and the NDA established the AGR Operating Programme (AGROP) and Defueling Steering Panel to provide management and oversight of the defueling of the AGR fleet. These have enabled the parties over the past six years to come together to develop plans for accelerated defueling. A mid-programme health review of AGROP representatives from the Fund, EDFE and the NDA concluded in December 2020 that the management arrangements were appropriate and mature enough to deliver the preparation phase with good evidence of cross-industry experience being used. The joint arrangements, in our view, look to be a sensible development but will be significantly tested once defueling accelerates and the parties operate under the revised agreements, with new financial incentives for EDFE (paragraphs 3.5 to 3.12).

⁴ Values in this paragraph are presented in nominal terms.

Risks from the transfer of the AGR stations to NDA

12 The new agreements set out the principles for what will be transferred to NDA and Magnox Ltd to support decommissioning, but some important details of precisely what will be transferred, when, and how are still to be agreed. The revised Option Agreement sets out that EDFE will transfer all land, assets and contracts required by Magnox Ltd to commence deconstruction on the sites. The way in which EDFE, NDA and Magnox Ltd will work together to plan for transfer of the stations is set out in a Memorandum of Understanding. The Department had originally intended this to be a legally binding agreement but it was not possible to agree terms between EDFE and NDA. Unlike the preparations for defueling, which started soon after the 2015 review by the Shareholder Executive, the preparations for transfer did not start in earnest until June 2021 when the new agreements were signed by the Secretary of State. Under current plans the first station could transfer as early as 2026. The Department, NDA and EDFE consider this provides sufficient time to prepare, but there is a history of such plans and preparations taking longer than expected. Our 2017 report on the NDA's Magnox contract outlined delays that arose when management and operations of those stations were transferred to a private contractor. The parties to the AGR transfer will need to manage similar risks when developing and executing their plans.⁵ Some issues are likely to become pressing long before transfer, for example:

- the workforce on AGR stations will very soon want to know what the transfer to Magnox Ltd will mean for them. On-site EDFE teams have deep knowledge of their stations and are likely to have expertise important for the post-transfer decommissioning;
- Magnox Ltd will need to build its own capacity to take on management of the stations. By the mid-2030s, when it is currently planned that the AGR stations will be fully transferred, the number of sites being decommissioned by Magnox Ltd will have expanded from 12 to 19;
- NDA had little information about the stations until the agreements were signed. With improved access to information Magnox Ltd will need to draw up plans for becoming the site licensee at each individual station and get approval from the Office for Nuclear Regulation. It can take up to two years to develop management arrangements and secure approval;
- EDFE and Magnox Ltd will need to reach agreement on how contracts with the suppliers for each station should be handled in the period leading up to transfer; and
- there is currently a lack of certainty about the exact land boundary and facilities the NDA and Magnox Ltd will receive to support decommissioning. The details need to be decided early in order to support planning and avoid protracted negotiations arising between the parties, particularly where sites may have value for other uses (paragraphs 2.19 to 2.20 and 4.2 to 4.5).

⁵ Comptroller and Auditor General, *The Nuclear Decommissioning Authority's Magnox Contract*, Session 2017-2019, HC 408, National Audit Office, October 2017.

13 The long-term benefits of taking the AGR stations back into public ownership will depend on the ability of Magnox Ltd to deliver efficiencies from combining the AGR stations with its existing portfolio of nuclear stations. There is potential for Magnox Ltd to realise some of these efficiencies from deconstruction work in the years immediately after transfer of the stations. NDA's ability to deliver efficiencies from the combined Magnox and AGR stations will depend on cooperative working between EDFE and Magnox Ltd and the quality of the plans developed in the years prior to transfer. Looking further ahead to the 2030s and beyond, the current decommissioning strategy drawn up by EDFE envisages putting the reactor buildings into a period of care and maintenance lasting some decades to allow radioactivity levels to decay before deconstruction of the main reactor buildings. However, since 2021 the NDA has adopted what it terms a rolling decommissioning strategy for its Magnox stations. This approach, it believes, could allow reactors to be decommissioned sooner. Stakeholders we spoke to with technical expertise and knowledge of the AGR stations expressed differing views on the applicability of a rolling strategy to the AGR fleet (paragraphs 4.6 to 4.11).

Overseeing the future performance of the decommissioning programme

14 The Department has an important role to play in overseeing the programme but as yet there are no arrangements in place to provide assurance on how well it discharges its responsibilities. The dispersed responsibility for different elements of the programme creates risks for the taxpayer as value for money will depend on how the system performs as a whole, not just the performance of the individual parties. The new agreements include arrangements for EDFE and the NDA to resolve disputes, with input from the Department where necessary. EDFE has established a set of milestones and key performance indicators. The Department is, however, having to fulfil a variety of roles: it is a signatory to the agreements; it has an important role in ensuring the agreements work in the interests of the taxpayer; it is the sponsoring department of the NDA; it is involved in the Fund's corporate governance; and it has existing relationships with EDFE in relation to new nuclear projects. The Department's success in discharging these responsibilities will have an important influence on the success of the decommissioning programme. The centre of government has yet to put in place arrangements by which it can assure itself that the Department is fulfilling these roles and the decommissioning programme is performing effectively. There are no plans yet, for example, to include the programme in the Government Major Projects Portfolio (GMPP) (paragraphs 2.26 to 2.28 and Figure 7).

Conclusion on value for money

15 The renegotiated commercial and delivery agreements, signed in June 2021, provide improved clarity about the future of the AGR stations. By providing EDFE with a financial incentive to complete defueling of the stations efficiently, the revised funding agreement offers the prospect of securing better value for money. But the defueling programme carries substantial risks which, if poorly managed, could result in costs increasing significantly. Success will depend on how effectively EDFE and the NDA Group work together. In terms of preparing to transfer the stations, the Department is reliant on there being continuing goodwill between EDFE and the NDA to resolve potential differences. If it is to achieve value for money from the new agreements, the Department will need a clear view of how the programme is performing as a whole and will need to act quickly and decisively should problems emerge, given the large sums of taxpayers' money still at stake.

16 Initial ambitions that the existence of the Fund would help eliminate taxpayers' exposure are being tested, with rapid increases in the estimates of decommissioning costs outstripping investment returns. The history of the AGR fleet provides lessons for other long-term programmes carrying significant end-of-life liabilities, including new nuclear energy programmes.

Recommendations

17 The value for money to be delivered from the new decommissioning agreements will depend on the ability of EDFE and the NDA Group to work together effectively, alongside the other stakeholders including the Fund and the nuclear regulator. Our recommendations are made with this purpose in mind.

- a** EDFE has developed key performance indicators and milestones against which it will report progress with decommissioning. **The Department should also develop measures against which it can monitor broader aspects of the performance of the programme for decommissioning the AGR stations.** Measures should include, for example the:
- adequacy of estimates to defuel and decommission the AGR stations and the implications for the likely demands upon the Fund;
 - extent to which the actions of the various parties align in the interest of delivering safe and cost-effective decommissioning; and
 - extent to which the savings envisaged in the business case are indeed being delivered.

- b** Given the impact that early closure of a station can have on the costs incurred by the Fund, **the Department should, with EDFE, review the risks of early closure at each of the AGR stations to ensure appropriate contingency planning is in place.**
 - c** **The Department should ensure that the NDA and Magnox Ltd have a clear plan for delivering value for money in the period post-transfer,** taking advantage of any efficiencies to be realised from the combined AGR and Magnox fleets. The Department should agree performance metrics based on the plans and hold NDA and Magnox Ltd to account for delivery.
 - d** **The Department should consider what changes to the oversight and funding arrangements will be needed as the NDA begins to take responsibility for stations.** For example, whether it will remain sensible for decommissioning of the AGR and Magnox stations to be funded via different mechanisms. At present, AGR decommissioning is funded from the Fund, and the decommissioning of Magnox Ltd's stations is funded from the NDA's grant from the Department.
 - e** **The Department, working with HM Treasury, should put in place appropriate arrangements to assure the taxpayer that it is discharging its oversight role effectively and that the decommissioning programme is performing well.** It should consider, for example, in consultation with HM Treasury, whether the decommissioning programme should be added to the Government Major Projects Portfolio (GMPP), and thereby receive additional challenge and scrutiny within government. It should report publicly on the performance of the programme.
- 18** The complex history of the AGR stations demonstrates the challenge of making adequate provision for end-of-life liabilities during the operating life of these facilities.
- f** **The Department and HM Treasury should draw upon the lessons from the AGR arrangements when informing strategies for funding the decommissioning of new nuclear stations.** This should include consideration of how the taxpayer's position can be protected for the longer term, bearing in mind that estimates of decommissioning liabilities have had a tendency to increase the closer they get to maturing.