

THE NEW RUSH FOR NUCLEAR

AN EXPENSIVE WHITE ELEPHANT



Contents

Key findings

UK new-build programme	2
New-build in Finland	2
New-build in the US	3

The Finnish nuclear programme

Construction cost and time	3
Finance	4
The customer	4
Analysis of the Finnish experience	4

The US Nuclear Power 2010 programme

The programme	5
Analysis of the programme	5

UK developments

Proposals for new-build	7
Subsidies and guarantees	7
Construction costs and time	8
Operating costs and reliability	8
Waste management and decommissioning	9

Endnotes	11
----------	----

Introduction

The UK Government and nuclear industry claim that a new generation of nuclear power stations can be built without any public subsidy. They point to Finland, where the first new reactor ordered in Europe since 1993 is being built, and to the US as proof of a re-emerging industry. This briefing shows that subsidies are likely to be an essential part of any new-build programme in the UK and it demonstrates that support can be expected via a number of market interventions. Furthermore, it explains how the Government has already enacted legislation and is developing further measures that could open the way for the taxpayer to pick up the bill for the liabilities of any private nuclear operator that should fail to provide proper funding for waste and decommissioning.

Utility companies appear to be less optimistic about the time schedule for nuclear new-build, suggesting that the first new nuclear plant might not be in operation until 2020 – too late to help meet either the predicted energy gap in 2016–2018 or help tackle climate change.

Key findings

UK new-build programme

- The UK Government has stated that new-build owners/operators will pick up 'the full share' of the costs of dealing with the waste produced by their plants – but this may, apparently, be limited to paying only for additional vaults needed in the proposed national repository. The Department for Business, Enterprise and Regulatory Reform (DBERR) has refused to confirm whether this full share will also include additional costs. These extra costs might include those relating to community compensation packages or keeping the repository open for longer to accommodate any new build waste.
- Prospective owners/operators of new nuclear plants have emphasised the need for some support for nuclear power in the electricity market, for example through a guaranteed carbon price (that is, a guaranteed payment for fossil-fuel carbon emissions saved by nuclear output).
- National Grid Transco has estimated that if all existing nuclear power stations were to be replaced, the cost of necessary reinforcement of the transmission network would be £1.4 billion – most of which would fall to National Grid Transco and hence to electricity consumers.
- Although the owners/operators of new nuclear power stations in the UK will be expected to have decommissioning plans, they will not have to provide surety up front for the costs of decommissioning. In contrast, the Energy Act 2004 allows for the Secretary of State for DBERR to make wind farms provide financial 'security' against decommissioning costs before construction begins.
- Prospective owner/operators are also pressing the Government to ensure there is access to existing nuclear sites for new build – how this would be achieved is not yet clear.
- Despite the experience of having to bail out British Energy (at a cost to taxpayers estimated at £5.3 billion), the Energy Act 2004, which established the Nuclear Decommissioning Authority (NDA), was specifically worded to give the Secretary of State the power to direct the NDA to take over financing the waste liabilities of private nuclear companies should they be unable to meet their obligations for new plants.
- In October 2006 the NDA was also charged with delivering the national repository for nuclear waste – a responsibility that could also entail handling any waste from new-build power stations. The NDA will be exert significant influence

over the subsidiary that will implement the repository project – possibly right up to the point construction starts, but how the repository is funded and how costs are allocated will be determined by the Government itself.

- Although decisions on investing in the construction of new-build nuclear plant are meant to lie firmly with the private sector, key issues around waste disposal and cost allocation will be determined by the Government.

New-build in Finland

- The reactor under construction at Olkiluoto, Finland is an Areva NP design – the Evolutionary or European Pressurised Water Reactor (EPR). Areva NP is jointly owned by the French company Areva (66%) and the German company Siemens (34%). The French Government currently owns 90% of Areva.
- The European Commissioner for Competition is investigating a complaint of illegal state aid to the Finnish project. A bank owned by the state of Bavaria leads the syndicate that provided 60% of the finance (£1.3 billion) at a sub-economic interest rate. In addition, two national export credit institutions are also involved: France's Coface, with a £407 million export credit guarantee covering Areva's supplies, and the Swedish Export Credit Corporation (SEK) with a guarantee of £73 million.
- Areva NP agreed a fixed-price contract to construct the plant at Olkiluoto. The schedule allowed for a 48-month period from the pouring of first concrete to the reactor's first operation. But by December 2006, after 18 months of construction, the plant was already 18 months behind schedule. At this time, the French Ministry of Industry admitted that the losses to Areva NP had reached £467 million on a contract reported to be fixed at £2 billion.
- In August 2007 it was reported that Areva NP was going to take an additional provision for Losses of between £334-£467 million on top of of the £467 million provision already made for losses. Compensation for delays has already reached the limit of £200 million payable for a delay of 18 months.
- The owner/operator, Teollisuuden Voima Oy (TVO), will not receive any compensation for further delays beyond those already incurred by September 2006. The plant is likely to be at least two years late and the owners will have to buy

The Finnish nuclear programme

electricity from the market for that period, potentially at high prices in order to meet their supply commitments.

New-build in the US

- The US Nuclear Power 2010 programme was launched in 2002. A total of up to £228 million in grants was expected to be made available, spread over at least three projects, as well as other subsidies and guarantees. However, by September 2007, no order for a new plant has yet been placed
- In addition, the US Energy Policy Act of 2005 offers three types of support for new-build:
 - 1) a provision for a limited number of new nuclear power plants to receive a £9/MWh production tax credit up to a limit of £62.5 million per 1,000MW capacity;
 - 2) a provision for federal loan guarantees covering up to 80% of the debt incurred financing the project; and
 - 3) a provision for up to £250 million in risk insurance for the first two plants and £125 million for plants three to six, to be paid if delays that are not the fault of the licensee slow the licensing of the plant.
- By 2007, it was clear that the loan guarantees provided for by the Energy Policy Act were not enough to reassure financiers. As a result of lobbying by the nuclear industry, the Office of Management and Budget allowed the Department of Energy discretion to guarantee 100 per cent of the debt incurred by each project. In addition, it has emerged that a provision in an Energy Bill passed by the US Senate provided for up to £25 billion in loan guarantees for new nuclear power plants.

The Olkiluoto-3 reactor in Finland is currently the only nuclear plant on order in Western Europe or North America and is the first to be ordered in Europe since 1993. It is the first plant of a new design, the EPR – a 1,600–1,700MW reactor developed by the Franco–German company Areva NP, which is 90% owned by the French government. The plant is being built for TVO, whose main shareholder, PVO (Pohjolan Voima Oy), is owned by the large electricity-user industries of Finland.

The new Finnish reactor is often portrayed as an exemplar of the capabilities of current designs. It is predicted to be cheaper to build and operate, as well as being safer than existing plants. It is also seen as demonstrating the feasibility of new nuclear reactors in liberalised electricity markets, something that many were sceptical of because they felt that plant owners would be unwilling to bear the full burden of the financial risk. Traditionally in non-liberalised markets the costs of building, operating and decommissioning new plants is borne by the taxpayer. In this light, it is important to examine the circumstances of the plant's purchase to see how far it can really be seen as a commercial decision made in a free market and without subsidies and guarantees.

Construction cost and time

The original arrangements

To reduce the economic risk to TVO, the vendor Areva NP offered the plant under turnkey terms on a fixed-price contract, with Areva NP taking total responsibility for equipment and buildings, construction of the entire plant up to and including commissioning (excluding excavation), licensability, construction schedule and performance. The overall project cost was estimated by TVO at around £2 billion.¹

The turnkey terms allowed for fines to be levied on the contractors if the plant was late. The schedule allowed for a 48-month period from the pouring of first concrete to the reactor's first operation.

The actual experience

The construction ran into serious delays: by December 2006, after only 18 months of construction, the plant was already 18 months behind schedule and Areva NP was suffering severe financial losses. This slippage was due to a range of failures, including welding quality, delays in completing detailed designs, and problems both with concrete and with the quality of some equipment.² What is more, it seems that none of

the parties involved (including the vendor, TVO or the safety regulator) had a clear enough understanding of the demands building a nuclear plant would place on them.

In December 2006, the French Ministry of Industry announced that Areva NP's losses had reached £467 million on a contract reported to be fixed at £2 billion. The turnkey contract should ensure that the escalating costs of construction will not be passed on to the customer, TVO, although the deal appeared to be under strain – Areva NP and TVO give different opinions on where the blame lay and who should pay compensation.³

Compensation for delays has already reached the limit of £200 million payable for a delay of 18 months. TVO will not receive any compensation for further delays beyond those already incurred by September 2006.

Further problems were disclosed in August 2007. Although these were not precisely quantified in terms of delays to completion or additional costs, the plant was now reported to be about two years behind schedule.⁴ It was reported that the delays were due partly to problems in meeting the requirement that the plant should be able to withstand an aircraft crashing into it and partly to the volume of documentation required having been underestimated by the vendor.⁵ One report stated that Areva NP was going to take an additional provision for further losses of between €500 – €700 million, on top of the £467 million provision already made for losses.⁶

Finance

The full details of the reactor's financing have not been published, but according to the European Renewable Energies Federation (EREF), a bank owned by the state of Bavaria leads the syndicate that has provided the majority of the finance. It has provided a loan of £1.3 billion, about 60% of the total cost, at an annual interest rate of 2.6%. Two national export credit institutions are also involved: France's Coface, with a £407 million export credit guarantee covering Areva's supplies, and the Swedish Export Credit Corporation (SEK) with a guarantee of £73 million. Such institutions normally use credit guarantees only to support projects in developing countries.

The customer

The buyer, TVO, is an organisation unique to Finland. TVO's largest shareholder, PVO, holds 60% of the shares and is a not-for-profit company owned by Finnish electricity-intensive industries. In 2005 PVO generated about 16% of Finland's electricity. PVO's shareholders are able to buy electricity at a cost in proportion to the size of their equity; but in return, they are obliged to pay fixed costs according to the same proportions – and variable costs in proportion to the volume of electricity they actually consume. PVO's involvement in the plant means that there is effectively a life-of-plant contract for the output of the reactor, with electricity prices set to cover fully all costs incurred. The other main shareholder in TVO is the largest Finnish electricity company, Fortum, with 25% of the shares. The majority of shares in Fortum are, in turn, owned by the Finnish Government.

Analysis of the Finnish experience

Turnkey contracts have been few and far between in the history of nuclear power and have generally resulted in huge losses to the vendor. Nuclear power plants are immensely complex to construct, requiring a great deal of on-site work and input from a large number of organisations. It is therefore difficult for any one company to have sufficient control over the process to be able to guarantee the price to the customer. However, turnkey contracts have been used in the past as loss leaders to convince utility companies that the vendors were so sure of their designs that they could be bought with confidence. Future contracts do not offer similar protection to the buyer.

If Olkiluoto-3 does 'showcase' the EPR technology, opening the way for further orders, the losses incurred by Areva NP might appear justifiable to its shareholders (that is, primarily the French Government). However, the construction process has been so dogged with difficulties that, far from convincing new buyers, it might put them off. Potential buyers of the EPR in India and China are reported to be perturbed by the problems.⁷ However, it seems highly unlikely that Areva NP could contemplate offering turnkey terms again until there is very clear evidence that the probability of cost and time overruns for an EPR is extremely low.

The unique nature of the project means it has been fully insulated from the market by the lifetime's output of the plant being contracted for at *whatever* cost is incurred. Nevertheless, TVO still faces risk. The plant is likely to be at least two years late and the owners of TVO (who are primarily also its customers) will have to buy electricity from the market for that period,

The US Nuclear Power 2010 programme

potentially at high prices. Once the reactor does come on-stream, if the cost of its electricity proves to be high, or at least higher than the wholesale market price in Finland, the owners will nevertheless be obliged to buy their electricity at that above-market rate – and for electricity-intensive industries, where energy can represent as much as half of total costs, this could have a catastrophic effect on competitiveness.

It remains to be seen whether the European Commission will find the finance arrangements for Olkiluoto-3 to have involved illegal or unfair state aid. However, it is bizarre that loans to a government-backed organisation in a prosperous Western European country should have to be backed by export credit guarantees from other governments, even at a cost of borrowing far below commercial rates.

In this light, the example of Olkiluoto-3 does not provide any evidence that nuclear new-build is feasible in a liberalised market without substantial public subsidies and guarantees.

Like the Olkiluoto-3 reactor, the US Nuclear Power 2010 programme has been held up by some in the UK nuclear industry as evidence of a potentially burgeoning market. The message is that US utility companies are ready to order nuclear plants – the implication also being that the private market will cover all costs. However, neither of these assertions seems to be true.

The programme

The Bush administration has made concerted efforts to stimulate nuclear new-build – including its Nuclear Power 2010 programme, launched in 2002, under which the US Department of Energy (USDOE) expected to launch cooperative projects with industry. However, to date no new nuclear plant has been ordered.

A total of up to £228 million in grants is expected to be available, to be spread over at least three projects. Two main organisations have emerged to take advantage of these subsidies and have signed agreements with USDOE. Nustart, launched in 2004, was the first utility grouping to express an interest. It is a consortium including eight US utility companies, the European utility EDF, which is majority owned by the French government, and the reactor manufacturers Westinghouse and General Electric.

The establishment of the Nuclear Power 2010 programme was consolidated by the Energy Policy Act 2005. The Act's most important nuclear-related provisions offer three types of support:

- First, a limited number of new nuclear power plants can receive a £9/MWh production tax credit up to a maximum of £62.5 million a year per 1000MW capacity.
- Second, there is a provision for federal loan guarantees covering up to 80% of the debt incurred by each project (but not the equity share).
- Third, there is a provision for up to £250 million in risk insurance for the first two plants and £125 million for plants three to six. This insurance is to be paid if delays that are not the fault of the licensee slow the licensing of the plant – for example, if operational experience elsewhere highlights problems that require additional safety measures the insurance will be payable on costs due to any resultant delay.

By 2007, it was clear that the loan guarantees offered were not enough to reassure financiers. In April 2007, the US Nuclear Energy Institute (NEI), the trade body for the nuclear industry, in a meeting with the US Government's Office of Management and

Budget (OMB), lobbied for 100% debt coverage with guarantees for up to 80% of the project cost. Subsequently, the Department of Energy proposed 90% debt coverage by loan guarantees up to a maximum of 80% of total project cost – but this still did not satisfy the nuclear industry, which wanted guarantees for 100% of the debt. In August 2007, the OMB appeared to allow the Department of Energy discretion to cover 100% of the debt.⁹ In addition, it emerged that an Energy Bill passed by the Senate makes provision for up to £25 billion in loan guarantees for new nuclear power plants.⁹ If we assume that a nuclear plant would cost £2 billion and that guarantees would apply up to the maximum 80% of project cost allowed, a limit of £25 billion would provide guarantees for at least 15 reactors. At this level of support, the original concept of ‘kick-starting’ the industry seems to be sliding into one of permanent subsidy.

Analysis of the programme

The publicly stated premise behind the Finnish and the US nuclear programmes was initially that new nuclear power plants would not in general need subsidies and guarantees. The assumption of the US Nuclear Power 2010 programme that subsidies and guarantees for three or so projects would be enough to kick-start ordering has been proved wrong, with support for new-build weaker than originally expected.

The provisions will have the effect of lowering the **price** of nuclear electricity to the customer without lowering its **cost** of generation (at least not for many years), in that some of the costs and risks will not be factored into the price charged to customers, but will instead be shifted onto the shoulders of the taxpayer. For example, the production tax credit will deprive the US Treasury of funds that must be made up from other sources. Whether the benefit flows through to customers or is retained by investors will vary with the economic regulatory approach used, but either way prices can be kept lower than would be the case if the credit did not exist. Similarly, the loan guarantees will assure lenders that they will be repaid no matter what happens at the power plant. Essentially, their risk is taken over by the Government. This lowers both the interest rate of the loans and the amount of more expensive equity capital that must be raised by the lenders – just as with the financing of the Olkiluoto-3 reactor in Finland.

Taken together and combined with other benefits recently conferred on the industry in the United States (such as the 20-year extension of the law limiting nuclear power plant exposure to liability for the costs of a serious accident), the benefits in the recent US law (offered by the Nuclear Power

2010 programme and the Energy Policy Act 2005) have substantially increased the likelihood of a new US nuclear power plant being ordered some time in the next few years. Indeed, the incentives are structured to provide maximum benefit to plants ordered before the end of 2008.

At a recent conference, a number of US electric utility CEOs made it clear that without the 2005 Congressional action there would have been no possibility of orders for new nuclear plants. Nevertheless they emphasised that even the extensive support now envisaged might not be sufficient to ensure orders.¹⁰

In conclusion, the US Nuclear Power 2010 programme is not by any means an example of industry fully funding a new nuclear programme, and it is surprising that the industry in the UK has risked raising this particular programme as an example of how a re-emerging industry can cover its own finances.

UK developments

Proposals for nuclear new-build

The Government's proposals and the assumptions behind them are to be found in the 2006 Energy Review¹¹ and in supporting documentation, especially a BERR cost-benefit analysis for nuclear power.¹² This analysis notes that there is scope for adding a relatively small amount of new nuclear capacity in the period to 2025 and in the lowest scenario this would result in the construction of 6GW of new capacity by 2025 to replace existing nuclear capacity, which by then will have been retired. This timing has already slipped by up to two years, however, because of the Government's failure to carry out proper consultation.

Utility companies initially were quite optimistic about time schedules, suggesting that new plant could be in operation by 2017, but now they are becoming more cautious, suggesting that the first new nuclear plant might not be in operation until 2020. However, given delays in the consultation process, under-resourcing of the main safety regulator, (the Nuclear Installations Inspectorate) and the difficulties of obtaining planning consent, this still seems optimistic.

Applications have been made to start the process of gaining regulatory approval for reactor designs.¹³ The whole process is expected to last four years, but due to a lack of nuclear inspectors it may take longer.¹⁴ Four designs have been submitted:¹⁵

1. the 1,700MW Areva EPR supported by EDF and five other European electricity-generating companies;
2. Westinghouse's 1,150MW AP-1000 pressurised water reactor design, supported by E.ON and other European utility companies;
3. GE/Hitachi's 1,520MW Economic Simplified Boiling Water Reactor (ESBWR), supported by four European utility companies;
4. and the 1,085MW ACR-1000, supplied by the Canadian company AECL.

The EPR and AP-1000 have received safety certification in at least one other jurisdiction; the ESBWR has not yet completed safety approval anywhere, and the ACR-1000 has no safety certification and is not currently being assessed in the US or in Europe.

The Government has claimed that no subsidies or guarantees will be given for new-build and representatives of the nuclear industry

have expressed their belief that nuclear power plants can be built without subsidy.¹⁶ However, even the most aggressive of UK utility companies advocating new nuclear build, EDF, has emphasised the need for some support, stating that plants could be built without subsidy 'provided that there was agreement on the funding of decommissioning and waste disposal, a clear licensing and consent road map, and a credible carbon price.'¹⁷ There are clearly questions over what constitutes Government subsidy and/or support – a crucial matter in a liberalised energy market.

Subsidies and guarantees

The support offered in Finland and the USA provides a good indicator of what cost elements companies wanting to build nuclear power plants in the UK are likely to seek from the Government.

The largest components of support in Finland and the US are the loan guarantees and market support. Without comprehensive guarantees for the loans that will dramatically reduce the cost of capital by shifting risk to taxpayers, it is highly likely new nuclear will not happen. Without price guarantees nuclear plants will be exposed to the uncertainties of the UK's wholesale electricity market. Provisions for insurance against delays, including those caused by regulatory changes, are also important.

Both the US and the Finnish programmes have been based on loan guarantees paid for by the public (in the Finnish case including the French and Swedish publics). In addition, in some US states, wholesale competition is being reined in and nuclear plants may be built under the traditional model in which they form part of a 'regulated rate base'. Under this arrangement, the company owning the plant would be guaranteed a fair rate of return on its investment whether the plant proved economic or not, dramatically reducing the investment risk. Publicly funded loan guarantees would appear to be essential if loans are to be offered at reasonable rates of interest – unless nuclear plants were to be completely removed from the market.

For the US programme, huge production tax credits are being offered that mean there is a high likelihood that costs will be covered. In Finland, the Olkiluoto-3 plant's output is covered by an effective life-of-plant power purchase agreement at full cost recovery terms. Such market guarantees, if applied in the UK, would be likely to violate EU state aid legislation. However, creative thinking might lead to another means, such as a high guaranteed carbon price, being used to provide support. Without some form of guarantee the likelihood of new-build will diminish.

Construction cost and time

The key to the Finnish order was the availability of a turnkey contract that seemed to place the risk of cost and time overruns on the vendor rather than the buyer. The UK would be a prestigious prize for any nuclear vendor but, given the country's poor record of building plants to time and cost, it seems highly unlikely that any vendor could take the risk of offering more than one unit on turnkey terms, and even then probably only if further firm orders were placed on terms less stringent to the vendor.

Operating costs and reliability

The Finnish nuclear industry has always had a good record of reliable operation, and the US industry has turned round its very poor reliability record over the past 15 years – making both industries relatively attractive partners for vendors and investors. However, while the UK nuclear industry has improved its performance since 1990, the reliability of its plants is probably worse than that of any other developed country. The reliability of French plants (all owned and operated by EDF) is no better than mediocre by international standards, so that even if EDF was involved in the operation of any new plants, this would not necessarily completely assuage the fear that operating costs would be too high for the fixed costs to be fully covered over the lifetime of the plants. No vendor would guarantee the operating cost of a plant it sold, so this risk would be hard to cover.

Grid connection

If a plant is either built on a new site or replaces a much smaller unit, there could be significant transmission reinforcement costs. National Grid Transco has estimated that if all existing nuclear power stations were to be replaced, the cost of reinforcement to the transmission network would be £1.4 billion – most of which would have to be covered by National Grid Transco and passed on to electricity consumers.¹⁸

Spinning reserve costs

New nuclear power plants, especially if the EPR design was chosen, would be the largest generating units in the UK's electricity system, with an output of up to 1,700MW. 'Spinning reserve' is the amount of plant that must be kept in readiness for operation in case of the failure of the largest unit then operating. In a recent review,¹⁹ energy consultants PB Power note that the current UK system is designed to cope with the failure of two 660MW units. This standard derives from the 1970s, when 660MW units were the largest on the UK system. PB Power points out that an EPR with an output

of 1,580MW would require an additional 260MW of spinning reserve at a cost of £1.30/MWh (if supplied by gas-fired plant) or £2.10/MWh (if supplied by coal-fired plant). The EPR design is now likely to have a rating of about 1700MW, implying that nearly 400MW of additional spinning reserve would be needed, so this cost may be an underestimate. Of the other potential designs, the AP-1000 and the ACR-1000 would not need additional spinning reserve, while the ESBWR (1,520MW) would require an additional reserve of about 200MW.

Waste management and decommissioning

The Nuclear Decommissioning Authority – the conduit for future subsidies?

Although nuclear new-build projects in the UK will be expected to include decommissioning plans, surety for the costs does not have to be provided up-front. In contrast, the Energy Act 2004 allows for the Secretary of State to direct (if necessary) that wind farm developers provide security for decommissioning costs before construction begins.

Yet the arrangements for nuclear decommissioning and waste disposal require special scrutiny because of the scope for massive costs to fall on future generations. This is particularly the case in the UK given the country's track record of failure to make adequate provisions for these costs, the consequences of which have seen the Government raid the public purse, for example, the £70 billion-plus for the Nuclear Decommissioning Authority (NDA)'s clean-up of 'legacy' wastes²⁰ and the projected payment of at least £5.3 billion for the bail-out of British Energy for reactor decommissioning and waste disposal. British Energy is currently estimated to be worth only £3.9 billion²¹, which means that even if the Government sold its entire interests in the company, there could be a huge shortfall that the taxpayer would have to pick up.

The Energy Act 2004 established the NDA, a non-departmental public body that is dependent on both government funding and monies from commercial (waste creating) activities for its income, for example from the operations of spent fuel reprocessing plants. This Act enables the Secretary of State to direct the NDA to take over the financing of nuclear waste liabilities from private nuclear companies should they be unable to meet their obligations.²²

As a result of the Government's desire to keep the option of being able to make provision for any future financial crisis such as that which affected British Energy, the Energy Act was deliberately worded so as to allow for the taxpayer, via the NDA, to pick up future liabilities:

'... using the NDA as a conduit or interface for any future British Energy-type crisis should not be prevented by this legislation.'²³

The NDA's new waste disposal remit – including new-build – and costs?

Which organisation (Government, the NDA or the subsidiary planned for develop the repository) will make the final decision on costs for disposal and allocation for repository funding is not known. The following – based on current information – indicates the Government will have significant powers in determining funding and costs allocation for waste disposal.

In October 2006, in its response to the report and recommendations of the Committee on Radioactive Waste Management (CoRWM), the Government announced that the NDA was to be given the remit of delivering the proposed national repository for nuclear waste. This responsibility would also entail handling waste from any new-build power plants.²⁴

The NDA has now established a Radioactive Waste Management Directorate – which will develop a subsidiary that will become a separate entity – possibly as late as when construction of the national repository commences. Until the time the company is formed and operates completely independently, the NDA will heavily influence the organisation's strategic objectives.

The Government has stated that any new-build owners/operators will pick up their 'full share' of the costs of dealing with waste.²⁵ In its consultation document on nuclear waste, the Department for Environment, Food and Rural Affairs (Defra) wrote:

'If new build waste were to be accommodated in the same facility as legacy waste, additional vaults would have to be provided and the design would need to be modified.'²⁶

Based on the above, it appears that any new-build operator could expect to pay only for extra vaults in the proposed national repository. This is predicted to cost at least £10 billion to deal with the UK's legacy waste.²⁷ The additional cost for spent fuel

disposal (for example, from ten new AP-1000 reactors) has been estimated at £2 billion.²⁸ There is no information available as to how, or even whether, private companies will be charged for the ongoing costs of dealing with new-build waste, such as the costs of site maintenance and other operations needed to keep the repository open for the decades required to dispose of the extra waste from new reactors. The Government has been asked to clarify its position on these matters, but has said that they will be dealt with if a decision is made to proceed with new-build.²⁹

It seems, however, that the Government will decide the allocation for new-build waste disposal costs in the repository. In a revealing response to a Freedom of Information request from Greenpeace on the meaning of 'full share', the NDA wrote:³⁰

'How the national repository will be funded and costs allocated, is a matter for the government to determine. The NDA does not hold the information requested and is not in a position to answer your questions.'

From reading the relevant materials, it would seem that over the following three to four decades,³¹ until work begins on the repository (and a separate company takes over the process), the Government will be able to exercise considerable control (via the NDA) over the repository's funding and cost allocation. Thus private nuclear operators could be in a situation whereby they will be negotiating over costs allocation for waste with the Government. This contrasts with decisions on investment in new-build, which are meant to rest firmly with the private sector – yet many financial aspects of waste disposal will be determined, it appears, directly by the Government. Negotiations might well take a different form if a private company ran the repository programme – for example, it would probably expect companies to pay a bond against new build waste to go into the repository.

The power of the Government to determine how the national repository will be funded and costs allocated, (coupled with its powers under the Energy Act) puts the Government in a position to have significant influence over the method, and perhaps even the amounts, the NDA/subsidiary will use to charge private sector operators for the waste costs of new-build reactors. Moreover, in the case of company bankruptcy, the Government could direct the NDA to pick up the full costs of waste disposal, including the costs of decommissioning as well as interim storage.

Government proposals on liabilities funds
The Future of Nuclear Power, DBERR's nuclear consultation

document, discusses the issue of how the industry will pay for its liabilities and expresses a preference for the option that ‘the owners/operators are required to make payments to a separate, independent fund or funds held by a body or bodies, such as a trust’. It is not known if the proposal would mean contributions to the fund are to be based on the company’s performance.³²

The Government’s preferred option seems quite different to the way in which British Energy’s provisions have been made raises serious questions. British Energy’s original Nuclear Decommissioning Fund (NDF) was run by trustees and was to receive predetermined contributions from British Energy. The contributions were to be reassessed every five years with the aim of ensuring that there were adequate assets to meet the firm’s decommissioning liabilities. Despite this safeguard, British Energy failed to make adequate provision to fund its liabilities. The DBERR was officially criticised by the National Audit Office,³³ and the Committee of Public Accounts over its continued failure to monitor British Energy’s liabilities funding.³⁴ The NDF’s successor, the Nuclear Liabilities Fund (NLF), was set up on totally the opposite basis to other decommissioning funds, which are designed to try to minimise their dependence on the company’s performance, so that adequate money will be there regardless of the fortunes of the business. In the case of the NLF, however, the funds will be adequate only if the company prospers.³⁵ The proposal that new-build liabilities – possibly not dependent on company performance – diverges from the approach that the Government has applied in its dealings with British Energy. If this is the case, then it would create two nuclear liability regimes in the UK.

Most importantly, in suggesting a trust to manage liabilities funds for future private nuclear operators, the Government is once again risking a British Energy-style funding crisis – because it still does not have cohesive monitoring powers over such funds. The continued failure of DBERR to monitor British Energy’s finances effectively gives no cause for comfort. By empowering the Secretary of State to direct the NDA to pick up future private nuclear liabilities, and in taking on the decision-making role regarding the cost allocation for new-build waste, the Government sends a signal to the industry that it is not merely prepared, but even willing to underwrite the costs of nuclear new-build.

Endnotes

- 1 'Nuclear power progress; site work underway on Finland's 1,600MWe EPR'. *Modern Power Systems* 15 March 2004.
- 2 For a detailed review of the problems up to March 2007, see Thomas, S, Bradford, P, Froggatt, A, Milborrow, D (2007) *The Economics of Nuclear Power*. Greenpeace International. <http://www.greenpeace.org/international/press/reports/the-economics-of-nuclear-power> (accessed September 2007)
- 3 Finnish Broadcasting Company TV news, 30 January 2007.
- 4 'Areva: Plane crash requirements to delay Olkiluoto-3 construction'. *Nucleonics Week* No. 33, 16 August 2007.
- 5 'Areva delay threatens China contract'. *Financial Times* 11 August 2007, p. 19 and 'Areva-Siemens consortium announces delay of Finnish nuclear reactor' *Datamonitor Newswire*, 13 August 2007.
- 6 'Areva to take 500-700 mln eur provisions for new Finnish reactor delay - report.' *Thompson Financial News* 13 August 2007.
- 7 'Areva delay threatens China contract'. *Financial Times* 11 August 2007, p. 19.
- 8 'DOE Loan Proposal Seen As Likely Failure By Industry, Wall Street'. *EnergyWashingtton Week* 1 August 2007.
- 9 'Senate bill could help finance US nuclear plants'. *International Herald Tribune* 31 July 2007, p. 1.
- 10 'Merrill Lynch global power and gas leaders conference'. *Nucleonics Week* 5 October 2006.
- 11 *The Energy Challenge*. <http://www.dti.gov.uk/energy/review/page31995.html> (accessed September 2007)
- 12 DBERR (April 2007). 'Nuclear power generation cost benefit analysis'. <http://www.berr.gov.uk/files/file39525.pdf> (accessed September 2007).
- 13 'EDF/Areva expect to submit safety case for UK EPR in July'. *Nucleonics Week* 14 June 2007, p. 12.
- 14 'Nuclear pre-licensing could be hampered by under-resourcing - NII'. *European Daily Electricity Markets* 6 June 2007.
- 15 'Four reactor designs submitted for pre-licensing process'. *Nuclear Engineering International* August 2007, p. 4.
- 16 For example, Vincent de Rivaz CEO of EDF UK stated EDF 'was ready to go without need for subsidies'. *Modern Power Systems* July 2007, p 6.
- 17 **Adam Smith Institute speech by Vincent de Rivaz: 6 June 2007**. <http://www.edfenergy.com/html/showPage.do?name=edfenergy.media.news.item.til&cmsPage=/opencms/export/www.edfenergy.com/media/news/20070607.html> (accessed September 2007).
'I am pretty confident that if we have future nuclear reactors in the UK there'll be no question of subsidies' Steve Kidd, World Nuclear Association, Open University Seminar, Nuclear or Not Conference 15 March 2005.
- 18 'Grid "will pay £1.4bn extra" for N-stations: Transmission group must upgrade to cope with planned power plants'. *Daily Telegraph* 13 July 2006, p.1.
- 19 PB Power (2006). *Powering the Nation: A Review of the Costs of Generating Electricity*. Parsons Brinckerhoff Ltd, Newcastle-upon-Tyne.
- 20 House of Commons Trade and industry Committee, Work of the NDA and UKAEA, August 2006 <http://www.publications.parliament.uk/pa/cm200506/cmselect/cmtrdind/1028/102804.htm> (accessed September 2007)
- <http://business.guardian.co.uk/story/0,,1850983,00.html> (accessed September 2007)
- 21 The Restructuring of British Energy, House of Commons Committee of Public Accounts. http://www.parliament.uk/parliamentary_committees/committee_of_public_accounts/pacpn070719.cfm
- 22 Energy Act 2004 Chapter Two, Transfers Relating to Nuclear Undertakings. www.opsi.gov.uk/ACTS/acts2004/40020--c.htm#38 (accessed September 2007)
- 23 Lords Hansard 15 January 2004, (Column GC170).
- 24 In footnote 3, p. 10 of Defra's Response to the Report and Recommendations of the Committee on Radioactive Waste Managing.
- 25 DTI (May 2007). *The Future of Nuclear Power* <http://www.berr.gov.uk/files/file39197.pdf>. This nuclear consultation document (see Box 8.4) states that additional quantities of intermediate-level waste (ILW) and high-level waste (HLW)/spent fuel (from ten AP-1000s) would increase the overall footprint of a co-located repository by approximately 50%.
- 26 Defra (25 June 2007). *Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal* www.defra.gov.uk/corporate/consult/radwaste-framework/consultation.pdf (accessed September 2007).
- 27 United Kingdom Nirex Limited (2005). 'Summary Note for CoRWM on Cost Estimates for CoRWM Option 7(Deep Geological Disposal) and Option 9 (Phased Deep Geological Disposal)'. September 2005.
- 28 United Kingdom Nirex Limited (2007). 'The Gate Process: Preliminary Analysis of Radioactive Waste Implications Associated with New Build Reactors'. (Technical Note) February 2007.
- 29 Letter to Greenpeace from the Department for Business, Enterprise and Regulatory Reform, 16 August 2007, following a Freedom of Information request.
- 30 NDA e-mail to Greenpeace, 13 August 2007.
- 31 Defra (25 June 2007). *Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal* www.defra.gov.uk/corporate/consult/radwaste-framework/consultation.pdf (accessed September 2007).
- A public consultation by Defra, DTI and the Welsh and Northern Irish devolved administrations gives 20-30 years until construction, CoRWM gives 2045 as the year construction begins. <http://www.corwm.org.uk/pdf/Annex5.pdf> (accessed September 2007).
- 32 DTI (May 2007). *The Future of Nuclear Power*. See p. 185 of <http://www.berr.gov.uk/files/file39197.pdf> (accessed September 2007).
- 33 NAO (6 February 2004). *Risk Management: The Nuclear Liabilities of British Energy plc*. http://www.nao.gov.uk/publications/nao_reports/03-04/0304264.pdf (accessed September 2007).
- NAO (17 March 2006) *The Restructuring of British Energy*. http://www.nao.org.uk/publications/nao_reports/05-06/0506943.pdf (accessed September 2007).
- 34 House of Commons Committee of Public Accounts (19 July 2007). *The Restructuring of British Energy: 43rd Report of Session 2006-7*. <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmpublic/892/892.pdf> (accessed September 2007)
- 35 See p. 58 of Thomas, S, Bradford, P, Froggatt, A, Milborrow, D (2007), *The Economics of Nuclear Power* Greenpeace International, June 2007. http://www.greenpeace.org.uk/files/pdfs/nuclear/nuclear_economics_report.pdf (accessed September 2007). See also criticisms of the DTI from the National Audit Office (2006) on this issue at http://www.nao.org.uk/publications/nao_reports/05-06/0506943.pdf (accessed September 2007).

GREENPEACE

We investigate, expose and confront the corporate powers and governments that stand in the way of international action to halt global warming and who drive continued dependence on dirty, dangerous sources of energy, including nuclear power.

We champion a clean energy future in which the life of all peoples is improved through the environmentally responsible and socially just provision of energy.

We promote scientific and technical innovations that advance the goals of renewable energy, clean fuel and energy efficiency.

November 2007

**Canonbury Villas
London
N1 2PN**

**www.greenpeace.org.uk
020 7865 8100**