PERFORMANCE AND INNOVATION UNIT ENERGY REVIEW

MEMORANDUM BY PROSPECT SUPPORTED BY TRADE UNIONISTS FOR SAFE NUCLEAR ENERGY

EXECUTIVE SUMMARY

Introduction (Paragraphs 1-6)
This Memorandum supplements the submission from the Electricity Supply Trade Union Council (ESTUC).

Level Playing Field Issues (Paragraphs 7-11)
There are a number of "level playing field" issues that currently disadvantage the nuclear industry. Changes are needed to:

- Introduce an international licensing regime, at minimum including Europe, North America and Japan. There is a strong case for also including countries, like India and Pakistan that are major builders of nuclear power stations.
- Streamline planning processes.
- Replace the Climate Change Levy with a carbon tax.
- Include hydro and nuclear power in the EU emissions trading scheme.

Capacity (Paragraphs 12-18)
The nuclear contribution to energy output in the UK is set to decline sharply. Action is needed immediately if capacity is to be maintained.

The earlier Magnox stations have plant closure dates that can now only come forward. The AGR stations are unlikely to enjoy significant design life extensions.

Nuclear expertise in the UK has been dissipated due to extensive contracting and sub-contracting of work. It now needs to be pooled within a framework of effective project leadership and organisation.

There are a number of emerging technologies that the energy market is not currently structured to support. These include:

- Intrinsically safe power station design.
- Generation of nuclear power from thorium.
- Conversion of long-lived intermediate level waste to short-lived high-level waste.
- Development of the fast breeder reactor.

The lead times for new plant could be reduced as a result of changes in the licensing regime.

Building new reactors is unlikely to add significantly to the volume of waste or waste arisings in the UK, though some reactor types could results in new waste forms.

The DTI programme to assist countries of the former Soviet Union to run their existing nuclear power plants safely should be continued and enhanced.

Security of Supply (Paragraphs 19-20)
Global reserves of uranium are more secure than the sources of European supply of natural gas.
Uranium has enjoyed greater price stability over the last 30 years than both oil and gas.

There is a continuing role for reprocessing and there is a strong case for early licensing of the Sellafield MOX plant on both employment and financial grounds.

Fusion (Paragraph 21-24)
Investment in nuclear fusion research must be maintained to keep the UK's energy options open.

Decommissioning (Paragraphs 25-27)
We believe that there is a strong case for a Decommissioning Agency, separate from commercial interests and directly answerable to the Minister for Energy.

We should be glad to further develop our proposals for a Decommissioning Agency and to submit our conclusions to the PIU review at a later date.

Radioactive Waste (Paragraphs 28-33)
We agree with the House of Lords Science and Technology Committee in their report of March 1999 that future development of the nuclear industry should be conditional on achieving a satisfactory solution for the management of nuclear waste.

Temporary or interim surface storage of some waste products is inevitable but long-term surface storage is not a sustainable solution.

Consideration needs to be given to a more carefully signposted and staged process of moving from surface storage to disposal.

A staged approach would be assisted by a change in the classification of radioactive waste to take account of half-life as well as the initial level of radioactivity. This is in line with proposals from the then Department of Environment in 1994 and would ease the immediate pressure to develop a long-term solution.

Risk (Paragraphs 34-36)
Public concerns about the nuclear industry and about radiation in general need to be addressed seriously and objectively as part of any rational assessment of risk.

Binding together scientific risk assessment with the need to build confidence in the system sets a complex and challenging agenda. One way forward may be to develop a common standard of risk assessment, applicable to the nuclear industry and all other hazardous industries. This would be in line with moves by the HSE to develop inspection on a broader definition of hazards rather than on an industry-defined basis.

Evidence from other countries suggests that public attitudes can be changed by transparent and inclusive consultation and decision-making processes.

Regulation (Paragraphs 37-38)
To ensure that the UK is not exposed to criticism over elements of its nuclear safety regime, consideration needs to be given to availability of resources and funding arrangements for the Nuclear Installations Inspectorate.

INTRODUCTION

1. This Memorandum is submitted by Prospect with the support of Trade Unionists for Safe Nuclear Energy (TUSNE).

2. Prospect is a new trade union, formed by merger of the Institution of Professionals, Managers and Specialists (IPMS) and the Engineers' and Managers' Association (EMA). It will be formally vested on 1 November. IPMS represents 75,000 scientific, technical and specialist staff in the Civil Service and related bodies and major companies. In the energy sector, IPMS represents scientists, engineers and other professional specialist staff in the nuclear industry. Our members are engaged in operational management, research and development and the establishment and monitoring of safety standards, environmentally and in the workplace. Organisations in which IPMS members work include AEA Technology, British Nuclear Fuels, Environment Agency, HSE (Nuclear Installations Inspectorate), National Nuclear Corporation, National Radiological Protection Board, Nukem Nuclear, Amersham, Nirex, Serco Assurance and the UKAEA. IPMS members are also directly involved in a range of sectors and functions for which environmental issues are of significant professional concern. Within the Civil Service, IPMS has a wide and diverse membership across policy, research and executive functions in the Department for Environment, Food and Rural Affairs (DEFRA) and the bodies linked to it. We also have a wide-ranging membership in conservation bodies, including English Nature and the Countryside Commission, and in the Natural Environment Research Council.

3. EMA represents engineers and managers in the electricity supply industry in a range of companies including British Nuclear Fuels, British Energy, GPU, Innogy, London Electricity, National Grid, NPower, Power Gen and Scottish Power.

4. Trade Unionists for Safe Nuclear Energy (TUSNE) is an informal grouping of trade unionists supportive of the civil use of nuclear power within a balanced energy policy and a safe and clean environment. It is supported by the major trade unions within the electricity supply industry. These are the Amalgamated Engineering and Electrical Union (AEEU), EMA, GMB, IPMS, Manufacturing Science Finance (MSF), Public and Commercial Services Union (PCS), Transport and General Workers Union (TGWU), and UNISON.

5. All unions are actively involved in the work of the Trade Union Sustainable Development Advisory Committee (TUSDAC), which works in parallel to the Advisory Committee on Business and the Environment. TUSDAC is jointly chaired by the Environment Minister and General Secretary of the GMB Union on behalf of the TUC.

6. This Memorandum supplements the submission by the Electricity Supply Trade Union Council (ESTUC), which TUSNE also fully supports. It focuses specifically on the role of nuclear and seeks to address issues raised in the PIU’s Initial Scoping Note. We agree with most of the propositions in the Scoping Note, though we believe that the issue of security of supply is relevant to all forms of electricity generation and not just nuclear. Network and capacity risks are addressed in more detail in our other submission.

LEVEL PLAYING FIELD ISSUES

7. There are a number of "level playing field" issues, which currently disadvantage the nuclear industry.

International Licensing

8. The lead times for new nuclear plant could be reduced as a result of changes in the licensing regime. At present, national licensing systems mean that good and properly licensed designs have to be relicensed at considerable extra cost before they can be reused. The existing licensing regime also militates against the adoption of new reactor designs. The PBMR for example, is not licensed in the UK. However, there are dangers that moving to a common European licensing regime could create a French monopoly. We would therefore like to see an international licensing regime that includes Europe, North America and Japan at minimum. There is a strong case for also including countries, like India and Pakistan that are major builders of nuclear power stations.

Planning

9. Under current planning timescales there is no prospect of any private company investing in new nuclear capacity. Planning inquiries are structured so that opponents can prolong them for years, regardless of the merits of their case, sometimes inhibiting rational consideration of key issues. The consequence is that time needed for construction has to be added to a planning inquiry that make take ten years. A more streamlined approach is needed.

Taxation

10. The Climate Change Levy (CCL) is an energy tax, not a carbon tax. It is wholly inappropriate that attempts to "internalise" the costs of producing carbon-based emissions should not recognise the role of nuclear as the principal non-CO_2 producing technology currently available. This means that the nuclear industry will have to pay a share of CO_2 waste management costs as well as its own. The CCL should be replaced by a carbon tax.

11. Emissions trading is an attractive idea and may be an effective way of focusing the minds of plant managers. However, it has parallels with the CAP milk quota scheme, which is by no means ideal, so practical difficulties may arise. From the UK perspective, one of the biggest dangers is that trading in "hot air", in particular between Eastern Europe and the USA, will allow climate change targets to be met without substantively addressing the issue of domestic emissions. This could have adverse competitive consequences for UK traded goods. Proposals to exclude hydro and nuclear power from the EU emissions trading scheme make no sense.

CAPACITY

12. The nuclear industry currently generates around one third of UK electricity, without CO_2 emissions, thus contributing to national and international emissions targets. Yet, it is now recognised that the scale of the actual environmental challenge requires much larger cuts in CO_2. The Royal Commission on Environmental Pollution has stated that stabilising atmospheric carbon dioxide at twice the pre-industrial revolution level will

require a reduction of 60% on 1990 levels by 2050 and of 80% by 2100. The Kyoto agreement, even if fully implemented, will only make a small impact, postponing a 2^0 rise in mean temperature by 6-8 years. Achievements in this order are not compatible with a declining nuclear contribution. Nuclear and hydro are the only large-scale producers of energy that do not emit CO_2. Small-scale intermittent producers could only be relied on if there was substantial back up capacity to ensure maintenance of electricity supply on the grid.

13. Yet, on current trends the nuclear contribution to energy output in the UK is set to decline sharply. Action is needed immediately if capacity is to be maintained.

Existing

14. The earlier Magnox stations have plant closure dates that can now only come forward. The AGR stations are less likely to enjoy significant design life extension, despite reductions in operating costs per unit of 25% over the last 5 years and rising employee productivity. Future operating decisions will be based both on the robustness of the plant and commercial viability. The latter is currently under pressure due to falling market prices. This alone will negate any Kyoto improvements made by the UK to date.

New

15. Nuclear expertise in the UK has been dissipated due to extensive contracting and sub-contracting of work. It now needs to be pooled within a framework of effective project leadership and organisation. There are benefits to be gained from international partnerships, such as that between BNFL and the US company Westinghouse. As indicated below, new and lower cost designs are emerging.

16. In addition, there are a number of emerging technologies that the energy market is not structured to support. These include:

- Intrinsically safe power station designs. These include the Gas Turbine Modular Helium Reactor (GTMHR), under development by the US General Atomics Company and funded by the US Department of Energy, European companies including Framatome, and Fuji Electric in Japan, with a view to the first power being generated in 2009. In South Africa, the electricity company Eskom is developing a Pebble Bed Modular Reactor (PBMR) in partnership with the country's Industrial Development Corporation, BNFL and the US company Exelon. The net thermal efficiency of the PBMR is 45%, compared to 30-35% for conventional light water reactors.
- Looking further ahead, there is also the possibility of nuclear power generated from thorium. If it came to fruition, this would effectively resolve problems associated with long-term nuclear waste.
- Also in the longer term, it is technologically feasible to convert long-lived intermediate level waste to short-lived high-level waste thus avoiding the need for very long-term storage.
- Fast neutron reactors extract much better value from the energy potential of fuel and minimise wastes but high capital and development costs, coupled with ready

availability of relatively inexpensive uranium resources, means that commercialisation remains at least 30 years away.

17. New reactor build is unlikely to add significantly to the existing stock and predicted waste arisings in the UK. Three of the potential new reactor types (APP80, AP600 and CANDU) may not introduce any new forms of waste and they are developed from existing technology. New forms of waste may result if replacement build is based on the PBMR, which uses tiny spheres of uranium oxide (UO_2) coated with carbon and silicon carbide. If there is to be any replacement build, it is suggested that the Decommissioning Agency should be involved early in the planning stage (see Annex 1). This is especially important because the drive for improvements to reactor performance may lead to the use of novel materials (e.g. erbia – Er_2O_3), significant changes to materials specifications, or proposals to use other types of fuel 9e.g. mixed oxide or thorium).

18. There is a stark alternative to further development of nuclear generating capacity in the UK, and it is one that has already been posed by the Russian company GazProm. GazProm is contemplating building new nuclear capacity to meet domestic demand whilst exporting gas supplies to the rest of the world. It does not demand a detailed knowledge of Russian nuclear experience to conclude that new nuclear capacity should only be build where the highest operational standards can be ensured. Public acceptability of continued operation of nuclear power plants in the UK is at risk from further accidents like Chernobyl. The DTI runs a programme to assist countries of the former Soviet Union to run their existing nuclear power plants safely. This programme should be continued and enhanced, with increased participation by the Nuclear Installations Inspectorate (NII) and other competent organisations such as Serco Assurance (formerly AEAT Consulting).

SECURITY OF SUPPLY

19. Global reserves of uranium are more secure than the sources of European supply of natural gas. Over 50% of global uranium production from mines in 2000 came from Australia and Canada whereas around 60% of European natural gas was from Algeria and Russia. Furthermore, DTI energy price figures show that uranium has enjoyed greater price stability over the last 30 years than both oil and gas. In addition, all the indications are that there are sufficient reserves of uranium and more than sufficient reserves of thorium for the foreseeable future.

20. We believe that there is a continuing role for reprocessing and that there is a strong case for early licensing of the Sellafield MOX plant (SMP) on both employment and financial grounds. We consider that the financial case produced by BNFL in January 2001 for the operation of the SMP is robust. The positive Net Present Value of over £300 million shows that it does have a viable long term role and there is no doubt that, after a difficult period, relations with international customers have improved significantly. BNFL is a major source of high quality employment in West Cumbria. The range and depth of the skill base supported by BNFL is illustrated by the growth of the Westlakes Science Park. This includes several incubator companies expected in the near future to produce spin-off technologies and / or products that will both further strengthen the

regional economy and contribute positively to the UK's wider engineering base and export trade.

FUSION

21. Fusion is the great hope for the future as it could provide sufficiently large amounts of power and would result in few objectionable waste emissions, in particular there are no greenhouse gas emissions. Supplies of fuel are cheap and widely accessible. It would give a non-negligible quantity of radioactive waste, but it is very much easier to deal with than fission waste and on very much shorter time-scales. It is also inherently safe since with any malfunction or incorrect handling the reactions will stop. However, the technology is very difficult and many physical and technological problems have to be solved before the feasibility of a reactor can be demonstrated. At present levels of funding, it is unlikely that a commercial power plant could be operational much before the middle of this century. Thus it may be approaching the end of this century before fusion could be expected to make a major impact on world energy problems.

22. Unfortunately, because of the difficult technology and no perceived need for urgency at the present time, there is a lack of total commitment world wide to the funding of fusion research. Thus research funding is in danger of reducing to the level of a "trickle" barely able to sustain itself. This is a dangerous position as the skills and experience of one generation of workers may not properly transfer to the rising new generation, resulting in old knowledge having to be rediscovered. It is important that funding for such a major project should be sufficient to maintain its forward momentum.

23. The UK is currently leading this field of research with the JET tokamak, operated on behalf of Europe by UKAEA at its Culham site in Oxfordshire. Also UK is at the forefront of research into the feasibility of spherical tokamaks, with its successful UKAEA MAST machine now in operation. This is a promising line of research, which is still in its infancy but could result in a very compact reactor design if early promises are sustained. UKAEA is also conducting important studies into the safety and environmental impact of fusion, which is of considerable significance with regard to meeting the objectives of an overall energy policy. As far as future projects are concerned, UKAEA is taking an important role in the planning of the international "next step" device (ITER).

24. Despite the technological difficulties, there has been a great deal of progress on fusion over the last decade, with many megawatts of power produced on JET. Also the technologies required for a burning plasma device - ITER - are being built and tested, meaning that ITER can be built with confidence that it will work. We are that the DTI Fusion Policy Review has "concluded that UK should continue its current role as a key player in fusion research", presumably this includes collaboration in the ITER project. Given the considerable skill and expertise that has been developed in the UK it is vital for the success of this project that UK continues its important contribution.

DECOMMISSIONING

25. Whatever the future of nuclear power, there are already substantial nuclear liabilities to be dealt with. Decommissioning is, and will continue to be, a fact of life for many

years to come. A clear strategy for decommissioning will also be essential in winning support for any programme of new build.

26. Decommissioning involves substantial costs and will require technical expertise of the highest order. It is therefore extremely important that decommissioning work is undertaken safely, effectively and efficiently. Further, as nuclear liabilities extend beyond the lifespan of any commercial venture, a strategic overview is required. At present, despite its national importance, there is no co-ordination of decommissioning programmes. For example, the UKAEA's capabilities in this area were fragmented around 1995 with no discernible technical or financial benefits. We believe that there is a strong case for a decommissioning agency, separate from commercial interests, to undertake this task. For reasons of public confidence, a decommissioning agency should be located within the public sector and be directly answerable to the Minister for Energy. In all functions, the objective would be to reap the benefits from separate strategic management without erecting barriers that inhibit or prevent the spread of best practice across the whole range of decommissioning activities.

27. Following preliminary discussions with the Department for Trade and Industry (DTI) and with the major operating companies, we developed proposals for further and wider consultation - see Annex 1. These were developed originally as IPMS proposals, and thus refer specifically to companies organised by IPMS. Others, such as British Energy, would clearly also be involved. Nonetheless, we believe that these proposals remain fundamentally sound, though they would benefit from updating in the light of recent policy and market developments. For example, in July we discussed with the DTI their own proposals for a Liabilities Management Agency. We should be glad to undertake further developmental work on our proposal for a Decommissioning Agency in the light of emerging thoughts from DTI and to submit our conclusions to the PIU review at a later date.

RADIOACTIVE WASTE

28. All energy sources have environmental risks that need to be managed. Here we focus on the perceived environmental hazard from nuclear waste, which has been the focus of particular opposition to the future development of the nuclear industry. We agree with the House of Lords Science and Technology Select Committee that this should be conditional on a satisfactory solution for the management of radioactive waste. As indicated in the report by the Parliamentary Office of Science and Technology, sustainable treatment of radioactive waste must be based on the premise that future generations are not left with burdens and risks created by the current generation and on decisions made in a fair and open way, informed by the best possible scientific information and in accordance with the "precautionary" and "polluter pays" principles.

29. At present, increasing amounts of nuclear waste are being stored above ground on licensed sites. Some of this is in the form of large parts of partly decommissioned reactors which are intentionally left in a safe, maintained condition to allow the process of radioactive decay to effect a change from the present intermediate (ILW) category to low level waste (LLW) within 50-100 years. This sort of interim storage of major

facilities is essential to the principle of keeping the dose to the workers As Low As Reasonably Practicable (ALARP) by disposing of LLW rather than ILW. There is, however, also temporary storage of intermediate level waste (ILW) pending advice on the strategy for long-term storage or disposal. We agree with the conclusions of the 1995 White Paper that such storage should conform to the principles of passive safety i.e. that waste is immobilised and does not necessitate any maintenance, monitoring or other human intervention other than that required to maintain safe storage. It is also essential that adequate records are maintained and that the waste continues to be packaged in a form suitable for safe storage and transport.

30. There is a continuing need for the work, currently undertaken by Nirex, to maintain and update the National Radioactive Waste Inventory and evaluate the packaging proposals of waste producers. The British Geological Survey maintains the National Geosciences Record Centre, which includes the Nirex archive. In any future investigations BGS would be able to provide comprehensive, objective, impartial and up-to-date geoscientific information, advice and services to meet the needs of a nuclear waste burial programme.

31. However, as the Health and Safety Executive has indicated, long-term surface storage is not a sustainable solution. The need for care and maintenance of surface stores results in continuing doses of radiation to nuclear workers and these stores present a large target to external disruptive events. Yet, attempts by Nirex to develop new disposal sites (Billingham, the shallow sites and Sellafield), in effect to move directly from surface storage to disposal, have failed for a variety of reasons. It is suggested that consideration be given to a more carefully signposted and staged process of moving from surface storage.

32. In the context of long-lived ILW we believe that efforts must continue to identify and engineer a deep geological facility within which there is a declared period of monitorable and retrievable engineered storage for an interim phase, of perhaps 50-100 years. Such a facility would need to be located and designed with the safety requirements of storage and eventual disposal in mind. However, at the end of the interim storage period underground the options would be to progress to continued underground storage on the same site, or to backfilling and sealing operations that would constitute disposal, or to any alternative waste management option developed by that time. This would be consistent with the conclusions of the Royal Society study group, which supported a staged approach to long-term disposal, and also with Swedish, US and French experience. Such an approach would meet the requirement to reduce the burden on future generations in that the bulk of the short-term environmental impact and cost associated with developing and operating the facility would be incurred by those responsible for producing the waste. It would be consistent with today's understanding of the science and safety of disposal but would leave open more clearly the option for alternative action in the longer term in accordance with the precautionary principle. Such an approach would permit continued long-term site-specific research in order to build confidence in the suitability of the site and facility for disposal. This approach could also be extended to the management of HLW and reprocessed spent fuel.

33. A staged approach would be assisted by a change in the classification of radioactive waste to take account of half-life as well as the initial level of radioactivity. Short-lived wastes presently classified as ILW could be stored for tens of years until they have decayed sufficiently to permit reclassification and disposal as LLW. This applies to safestore and it would reduce the amount of material requiring deep disposal as ILW. Though Drigg would become full more quickly if it also took short-lived ILW and a second repository for shallow burial would be required rather sooner than anticipated, this would ease the immediate pressure to develop a long-term solution. The Fourteenth Annual Report of the Radioactive Waste Management Advisory Committee (RWMAC) supported a reclassification of waste taking into account half-life on the basis of a study visit to France. Similarly, the proposal by the DOE in 1994 to reclassify wastes to ensure the disposal of waste streams to the most appropriate category of facility for which they are suitable from a health and safety viewpoint indicates that consideration should be given to half life. This proposal was supported by the joint trade unions.

RISK

34. The UK is at the forefront of international developments in quantitative risk assessment for nuclear waste disposal and has developed research data and assessment techniques, which enable science-based models of long term repository safety to be developed and applied. Nonetheless, public concerns about the nuclear industry and about radiation generally need to be addressed seriously and objectively as part of any rational assessment of risk. All proposals for managing radioactive waste must meet the test of public acceptability, which is a social rather than technical issue, and it must be recognised that there may be no single continuum of risk assessment. For example, risk from natural phenomena tends to be viewed differently from human created risk. There may be differential perceptions about risk to workers and to the wider public and undoubtedly perceptions are influenced by the potentially catastrophic nature of nuclear incidents, however slight the probability of occurrence. Binding together scientific risk assessment with the need to build confidence in the system sets a complex and challenging agenda. One way forward may be to develop a common standard of risk assessment, applicable to the nuclear industry and all other hazardous industries. This may assist the general public in assessing nuclear risks in relation to the risks from other activities. This is in line with moves by the HSE to develop inspection on a broader definition of hazards rather than on an industry-defined basis.

35. Continued monitoring may promote the confidence of the general public in the safety of the system but has additional implications for the nuclear workers involved in monitoring and is dependent on sustaining institutional responsibility, thus reinforcing the case for an independent co-ordinating body. Consistent with the Environment Agencies' guidance, we believe that future generations should not be subject to impacts greater than those, which would be acceptable today.

36. Evidence from other countries indicates that such strategies, as well as wider perceptions about security of supply, can influence public attitudes to nuclear development. Positive attitudes generally result from transparent and inclusive decision-making processes. For example, sections of the US population have become less averse to new nuclear build in the light of the Californian energy crisis and the public were

actively involved in the debate leading to the development of the Waste Isolation Pilot Project at Carlsbad. An opinion poll in Finland in 2000 showed that there was greater trust in the country's own nuclear power industry than that of others. This is attributed to 20 years good experience of operating nuclear power stations in Finland in contrast with more general opinions about nuclear power influenced by the proximity of Russian nuclear power plants close to Finland's borders. A similar poll in Sweden, conducted in July, found that 55% of respondents wanted to continue to use Sweden's nuclear power units for as long as they continue to satisfy safety requirements. 24% wanted older reactors to be eventually replaced with new units. A site for a new nuclear power station has been agreed with the local community in Finland and there is a shortlist of sites agreed with local communities in Sweden.

Regulation

37. Within the nuclear sector there has been a chronic decline in the ability of the Nuclear Installations Inspectorate (NII) to regulate the nuclear industry effectively through the triple thrusts of industry privatisation, a reduction of NII's resources and the level at which its regulatory contact is pitched. Revised business practices, including cost centre management, splintering of responsibilities and a programme of staff reduction and contractorisation, all significantly increase demands on the Inspectorate. The result is that NII now regulates a broader range of licensees and nuclear activities than any other comparable nuclear regulator internationally. At the same time, regulating the safety of increasingly ageing plant and other demands, such as the safety of continued storage of nuclear waste and the advent of large scale decommissioning, continue to demand significant attention.

38. The International Convention on Nuclear Safety (ICNS) requires signatory governments to ensure that competent nuclear safety regulatory regimes operate in each country and to implement peer review arrangements to confirm this. To ensure that the UK is not exposed to criticism over elements of its nuclear safety regulatory regime, consideration needs to be given to the availability of resources and funding arrangements for the NII.

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Annex 1

THE CASE FOR A DECOMMISSIONING AGENCY

Introduction

1. Whatever the future of nuclear power, there are already substantial nuclear liabilities to be dealt with. Decommissioning is, and will continue to be, a fact of life for many years to come. It involves substantial costs and will require technical expertise of the highest order. It is therefore extremely important that decommissioning work is undertaken safely, effectively and efficiently.

2. Decommissioning is a young activity within a mature industry and there are no scientific or technical projects of a comparable size or value. Currently a range of organisations are involved in decommissioning activities. These include UKAEA, BNFL and British Energy, with core expertise in nuclear power, as well as others with a wider range of interests, including the Ministry of Defence and the Atomic Weapons Establishment. WS Atkins and Rolls Royce are among the most experienced of contractors in the decommissioning field. No doubt others will express an interest as the scale of decommissioning work increases. The fact that the UKAEA has attributed cuts in the cost of its nuclear decommissioning programme to the fact that the work has been allocated by competitive tender, will provide further encouragement to contractors.

3. However, as nuclear liabilities extend beyond the lifespan of any commercial venture, a strategic overview is required. As the Radioactive Waste Management Advisory Committee (RWMAC) has noted, "*There are obvious problems with funds being held within a Plc which can offer no assurance that it will remain in existence over the period until deferred decommissioning is undertaken*".

4. At present, despite its national importance, there is no such co-ordination of decommissioning programmes. On the one hand, leaving this role to the private sector will not in itself result in dissemination of knowledge and experience. On the other, vesting the responsibility in either Ministers or officials will not inspire public confidence. We believe that there is a strong case for a decommissioning agency, separate from commercial interests, to undertake this task.

What does decommissioning involve?

5. Current decommissioning strategy for power stations involves three stages:

Stage 1 All fuel is removed from the reactors, ponds and stores and transported from the site. This occurs within the first five years of the reactor being shut down.

Stage 2 All plant and buildings, other than the reactor, are dismantled or demolished and removed from the site. Residual radioactivity can then be left to decay for safety and cost reasons.

Stage 3 When radiation levels have reduced, the reactor can be dismantled and removed under strictly controlled conditions. During the lengthy period before this can take place the site has to be stored in a safe manner.

6. An alternative strategy for stages 2 and 3, proposed by the nuclear generators, is that stations would be put into "safestore" conditions about 30-35 years after shutdown, with full demolition a hundred years after that.

7. Although decommissioning of other nuclear plant follows broadly similar lines, it is not divided into three stages in the same way. This is because, first, fuel cycle plant can contain a much wider range of radioactive gases, which need to be characterised and treated. Therefore post-operational clean-out (POCO) and the treatment of the resulting waste is particularly important. Second, whereas decommissioning of power stations is complicated by the fact that a major proportion of the radiation after closure comes from the irradiated structures of the reactor itself, the vast majority of radiation in fuel plants is contained in the waste. Once this has been removed, the actual decommissioning of the plants is more straightforward. Nonetheless, the same overall principles apply.

8. All decommissioning strategies require the approval of the Nuclear Installations Inspectorate on a case-by-case basis. Further, all dismantling of nuclear power stations generates its own substantial volumes of radioactive waste, the management of which poses separate challenges.

The economic significance of decommissioning

9. There is a range of estimates, but no absolute certainty, about the scale of decommissioning liabilities. As far as UKAEA is concerned, liabilities are estimated at approximately £7.9 billion. British Energy, in evidence to the House of Lords Trade and Industry Select Committee into “Management of Nuclear Waste”, estimated undiscounted liabilities for decommissioning all its power stations at £13.1 billion (including its share of decommissioning BNFL facilities). BNFL’s Annual Report and Accounts 2000 estimate liabilities of around £34.2 billion (undiscounted) of which £16.2 billion is recoverable by the company and Group under commercial agreements.

10. These figures, although not precise, are important for two reasons. First, as discussed below, the liabilities must be funded. Second, they show the scale of work to be undertaken in the UK alone and, as the Government's conclusions to the 1994 Nuclear Review acknowledged, '*The world market for decommissioning and waste management services is expected to grow rapidly over the next 10 years. There is already considerable international interest in UK approaches to liabilities management and in the skills and practical experiences of BNFL, AEA Technology and other British firms active in the market. Success in an increasingly competitive home market can only increase the competitiveness of British firms overseas and their ability to secure a substantial share of the business on offer*". A key pioneering project is the dismantling of the Windscale advanced gas-cooled reactor, which is intended by the UKAEA to demonstrate that a reactor can be dismantled safely, and thus also provides an opportunity for UK firms to develop their decommissioning skills and to display them to the international market.

Management of decommissioning

11. The case for separate management of nuclear liabilities already has some acceptance. For example, the previous Government expressed the view that "*Within its first year, the setting up of UKAEA GD as a dedicated liabilities management organisation ....produced significant improvements in ....planning and overall management*". UKAEA has itself argued that "*Of particular importance is the clear separation of the planning of the liabilities management programme from its execution by decommissioning contractors*". Similarly, the Radioactive Waste Management Advisory Committee has favoured the creation of an independent fund "*retained for the sole purpose of decommissioning plant*". This implies at least a degree of separation from other nuclear operations.

12. However, there is a balance to be struck. The reality is that nuclear expertise resides in organisations that are engaged in a range of activities across the nuclear fuel cycle and that nuclear R&D is a composite activity. There are already indications that R&D applications to the front end of the technology are helping to reduce the costs of decommissioning projects. Thus, although there are benefits to be had from separate strategic management, it makes no sense to erect barriers, which inhibit or prevent the spread of best practice across the whole range of decommissioning activities.

13. Therefore, it is of the highest importance that a decommissioning agency should have access to the main sources of nuclear expertise residing in UKAEA and BNFL. Though this need not imply a monopoly over decommissioning operations and is not to suggest that either organisation should be regarded as a potential decommissioning agency, clearly it does make sense to retain and develop the expertise of existing decommissioning teams. The decommissioning agency should, for reasons of public confidence, be located within the public sector and be directly answerable to the Minister for Energy. It would require a standing secretariat, which, as and when appropriate, would bring together relevant expertise to advise on issues such as tender specifications and qualifications for bidders. The ACSNI and NUSAC models are helpful in this regard. It is not envisaged that an agency on the Next Steps model would be required, nor that ownership of the liabilities or site licences would transfer.

14. The decommissioning agency would take an overview, adding value to but not replacing existing advisory and regulatory bodies. For example, the Health and Safety Executive (HSE) and Nuclear Installations Inspectorate (NII), would be among those advising the decommissioning agency but it would not subsume their role. The decommissioning agency could, for instance, have a role in defining safety, environmental and value for money requirements. However, it would also need to have an executive role on issues such as regulation, training standards and the financial viability of contractors. These, and other functions, are considered in greater detail below.

Organisation criteria

15. It is reasonable to expect that organisations involved in the execution of decommissioning activities should satisfy the following minimum criteria:

- *Technical Competence*

16. Britain currently has 37 research assemblies and prototype reactors, three commercial power stations and extensive nuclear fuel cycle plant and associated waste facilities at various stages of decommissioning. As already noted, UKAEA is a key player in this process. Its core mission includes a requirement to "*Caring for and, at the appropriate time, safely dismantling active facilities no longer in use*". It is engaged in pioneering work, for example at Windscale, with the explicit intention of advancing knowledge and technical expertise in decommissioning operations. Other important operators are BNFL, for its work on reprocessing options, and Magnox Electric, which has been at the centre of the "safestore" debate and has considerable experience of stage 1 decommissioning of Berkeley.

17. Pragmatically therefore, it is clear that existing technical competence in the decommissioning field is from these sources and it makes sense for this expertise to be deployed elsewhere rather than requiring other organisations to separately develop the same expertise. However, it would be complacent simply to assume that UKAEA, Magnox Electric and BNFL can, or should, determine the standard for technical competence in the future.

18. Indeed, in some senses, because decommissioning is in its infancy it is difficult to describe in detail what should be involved in a UK / industry technical competence standard. In decommissioning, as in other nuclear activities, key standards on safety and environmental issues, will continue to be enforced by the Nuclear Installations Inspectorate. Technical expertise and its application is, however, still evolving. At present each decommissioning exercise is approached on a one-off basis, but this is not the hallmark of a mature industry. Attention needs to be given to standardising decommissioning practice. A decommissioning agency could therefore include among its role the collation of data on decommissioning work in progress and the dissemination of new and best practice. Such information should assist decommissioning "customers" in assessing the track record and abilities of potential contractors either to undertake specific aspects or decommissioning work or to manage all aspects of a decommissioning project. It could become the basis for a standard pre-qualifying procedure for tendering purposes, on satisfaction of which contracts could be awarded by competitive tender.

- *Health and safety*

19. The need to meet all appropriate safety and environmental standards to the satisfaction of the regulators is a fundamental requirement in all nuclear activities. However, recent developments give cause for concern:

- Competitive pressures, specifically the overriding need to make a profit, bring tight deadlines and pressures to minimise the number of workers. This may conflict with safety requirements and the commitment of management and workers to safety.

- Some contractors are comparatively inexperienced in this field. They may not have the safety culture of the established nuclear industry, which has evolved since the 1956 Fleck Report following the Windscale fire in that year.

- Moving away from a single site operator for a nuclear site to having many different employers on the same site increases complexity. There are more interfaces between the various contractors (each possibly with their own version of safety rules and procedures), creating possibilities of inconsistencies and misunderstandings between parties. Each new contractor will have to spend time and money learning the details of the plant and local safety instructions and working practices. Contractors who develop new knowledge or techniques have no incentive to pass it on.

  This, for example, is an issue of concern at Sellafield given that it is both an operational site and one on which a number of difficult decommissioning projects are in progress. BNFL has the highest concern to ensure that decommissioning operations are carried out safely and cleanly because, if any incident occurred (whether caused by contractors or BNFL, and whether on the BNFL or UKAEA part of the site), there would be a direct impact on the company's licence to operate, which would adversely affect its commercial operations.

20. Similarly, the NII has increasingly expressed concerns about the dangers of fragmenting responsibility for safety and that too many interfaces are involved when a high degree of fragmentation and sub-contracting takes place. Consideration must therefore be given to the ability of organisations to assume site-wide responsibility for safety and to the role of the decommissioning agency in instituting appropriate arrangements.

- *Operational quality*

21. As mentioned above, organisations involved in decommissioning are dependent on technical / scientific expertise in developing and enhancing knowledge and experience. Allied to this however, is the need to ensure that operational staff deployed on a range of decommissioning activities are competent within their own remit. In plain terms, the best R&D expertise will count for nothing if it is applied inconsistently or to inadequate standards by staff contracted to do the work. All organisations involved in decommissioning must be able to demonstrate that staff at all levels have been trained to a satisfactory level, including in safe working practices. It cannot be safely assumed that individual employees of even the most experienced contractors are familiar with working on nuclear licensed sites and the special responsibilities that this entails. In this connection, it is interesting that BNFL have worked with Cumbria TEC to develop a NVQ in decommissioning for blue-collar staff. Although NVQs are not the only possible route, all contractors should be required to produce independently accredited credentials for all staff involved in decommissioning projects.

22. Looking to the future, the ageing profile of existing decommissioning experts is also of concern especially as there is a dearth of university courses from which to attract graduates with appropriate knowledge and expertise. The decommissioning agency could have a useful role in liaising with higher education institutions on a range of issues, including course development and design, careers advice and placement of undergraduates.

- *Value for money*

23. In recent years the concepts of value for money and least cost have often been interpreted as synonymous, often at a cost to quality of service provision. However, the scale and risks associated with the task of nuclear decommissioning are such that adopting this short-term perspective would be both irresponsible and potentially dangerous. As far as decommissioning is concerned, value for money considerations must take account of:

- The benefits of wide-ranging expertise, allowing lessons learned in one area to be applied to subsequent projects with no additional cost and for continuing pursuit of improved techniques.

- The need for adaptability in the light of unforeseen circumstances.

- Continuing long term responsibility for the management and dismantling of nuclear liabilities, outwith normal commercial timetables.

- The need for the highest standards of safety and for public opinion to be reassured on this issue.

24. With the exception of continuing long-term responsibility, these criteria make no prior judgement on the ownership of organisations involved in decommissioning. Neither do they rule out a partnership of public and private sector expertise, though all private sector involvement would need to be within a framework of public accountability.

- *Financial Viability*

25. All contractors should be required to have sufficient funds to deal with contingent liabilities arising from their work. Post-privatisation there has been no scrutiny of the long-term financial security of contractors, but there is earlier evidence of problems in this area. For example, one UKAEA contractor became insolvent in the process of undertaking a major contract. As suggested above, the decommissioning agency should have executive authority on this matter.

Funding

26. There are four main issues to be addressed:

- How much money is needed to cover nuclear liabilities?
- Where will this money come from?
- How should it be managed?
- What should be the returns to organisations involved in decommissioning?

27. There has been considerable academic and political debate over the scale of nuclear liabilities. It is not the purpose of this paper to rehearse the arguments, though it should be noted that the sum of money required would in part depend on the timetable for decommissioning. As far as sources of funds are concerned, the previous Government provided a substantial dowry on the privatisation of British Energy. The company is also expected to make its own provisions to a separate decommissioning fund, though these are

not open to effective public scrutiny. A Parliamentary answer, on 16 October 1996, noted that "*....contributions to the segregated fund are determined by British Energy and the Nuclear Generation Decommissioning Fund Ltd, owned by the trustees of an independent trust, under the terms of the contractual arrangements between them. It is for British Energy to deal with its operational liabilities*".

28. This position is widely perceived as unsatisfactory. Our view is that at the time of construction (for new plant) and operation (for existing plant), the operator and public should have a reasonable idea as to how long the site will require a nuclear site licence and have to be considered radioactive, and that this should be part of the planning process. The plan would have to be changeable. On the positive side, research and development into improved options should be encouraged. New research by BNFL has already contributed to cost reductions in decommissioning some of the Magnox reactors. On a less optimistic view, consideration also needs to be given to the potential consequences of scenarios such as early closure of a nuclear facility or cost increases arising from a change in the regulatory regime. RWMAC's recommendation is that operators should be required to explain how such situations would be dealt with, but that most risks could be accommodated financially. Therefore the financial provisions for decommissioning should be on the basis of the agreed programme, not on the basis of a notional "worst case" scenario.

29. However, it is also important that actual nuclear costs are made more transparent. Lack of transparency has led to the perception of a "black hole" of back-end liabilities. The money set aside for decommissioning should be open to scrutiny. It must also be protected by strong regulation from being misappropriated. Experience in other privatised utilities is worrying. For example, despite the clear need for repair and replacement of water and sewerage infrastructure, privatised water utilities have recorded huge increases in profits at the same time as cutting investment. Unless, there is a publicly regulated fund for all nuclear liabilities the suspicion will persist that either the liabilities are not being covered or that the money is being used for other purposes, such as tax cuts. Regulation of the fund by the decommissioning agency would command greater public confidence and credibility as well as helping to ensure the decommissioning activity continued at a planned pace.

30. Regulation is also required on the contractor side. The decommissioning market is both large and specialised. Opportunities for competition, especially for large decommissioning projects, are inevitably limited, particularly given the need to apply rigorous technical and safety competence criteria. Furthermore, organisations gaining decommissioning experience in the UK will be well placed to win lucrative contracts overseas. It is therefore proposed that, in the national interest and in anticipation of widening overseas markets, consideration is given to regulating profits from UK decommissioning contracts. The existing price regulation mechanisms of the major privatised utilities are a useful, though not precise, precedent. The decommissioning agency would need to give further consideration to an appropriate regulatory framework.

Summary and conclusions

31. Many of the concerns expressed in this paper have been previously aired, for example in response to the previous Government's Review and in debate about privatisation of the

nuclear generating industry. Privatisation has reshaped the structure and operating arrangements both of the generating industry and of the UKAEA. However, it has not addressed to public satisfaction the financing and management of decommissioning. Despite this, an increasing number of decommissioning projects are being undertaken and the scale of decommissioning activity is set to increase significantly, both in the UK and overseas.

32. We believe that a decommissioning agency could play an important role in ensuring the safe, efficient and effective execution of this work. Although there is no intention to pre-empt debate at this stage by detailing its organisational structure and operating remit, it is clear that it would be resourced from expertise already within the nuclear industry. It would:

- Combine the advantages of separate strategic management of nuclear liabilities with an ability to fully utilise existing nuclear expertise.

- Command public confidence as well as industry support through location in the public sector whilst working with private sector bodies able to satisfy technical, safety, quality and value for money criteria.

- Provide a strengthened resource of information and expertise. For example, it could develop a database of accurate design information and operational history as well as acting to disseminate new and best practice and monitoring the credentials of staff involved in decommissioning projects.

- Regulate the use of decommissioning funds.

33. We urge that early consideration is given to this proposal and would welcome an opportunity to discuss it further.