

| Major Projects Office  |   |
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| Title:   | Comments on DECC Funded Decommissioning Plan and Waste Transfer Pricing Consultations |
| <p><b>Summary overview</b></p> <p>By way of summary response to the consultation, the Councils seek following:</p> <ol style="list-style-type: none"> <li>Clarification as to whether Government objectives for regional or national Geological Disposal Facility presents a potential conflict of interest in terms of new nuclear development being 'without public subsidy';</li> <li>Clarification on the safeguards and mitigation/compensation measures to be explored in the event that a Geological Disposal Facility is not forthcoming, and locations for new nuclear power stations will have to incur the impacts of on-site storage of nuclear waste for 160 years;</li> <li>Clarification from Government that further work will be carried out to lessen the current complications surrounding the Waste Transfer Pricing methodology, and that assurances will be given that the price determined will be commensurate with the level of impact incurred during the long term on-site storage of nuclear waste – thus giving assurances that locations hosting new nuclear power stations will have the requisite level of mitigation/compensation measures put in place.</li> </ol> <p><b>Introduction</b></p> <p>The proposals for the building of new nuclear power stations in the UK envisage the Government taking title to, and disposing of, the intermediate level radioactive waste (ILW) and the spent fuel by the reactors. On the other hand, there has been a determination that nuclear power should not be subsidised by the state, and consequently that the developers of nuclear power stations should bear the full cost of the disposal of their wastes. This presents a potentially conflicted set of circumstances given Government's overall view that nuclear power should be developed without state subsidy.</p> <p>The methodology envisaged was that nuclear developers would set up separate funds into which they would pay a proportion of their cash flow during the operational lifetime of the power station. By the time the power station ceased operation (the Government's original assumption was a generating life of 40 years, though the proposed reactors are being evaluated on 60 years) the fund would have accumulated enough money to pay for the decommissioning of the reactor site, and to pay to the Government the full cost of taking over ownership of the spent fuel and ILW and disposing of it in the planned Geological Disposal Facility (GDF).</p> <p>This GDF is being progressed by the Managing Radioactive Waste Safely programme (MRWS) which is seeking a volunteer community to host a GDF. One fundamental aspect of a volunteer process is the inability to prescribe</p> |   |

timescales: volunteering relies on consent, which cannot be 'programmed'. So while MRWS envisages ILW disposal being available from 2040, with High Level Waste (HLW) and spent fuel disposal from 2075, these can only be planning dates. As the GDF is also assumed to be disposing of England and Wales' legacy waste (Scotland's policy envisages indefinite storage), disposal of new build wastes is unlikely to be available until considerably later than these dates.

In March 2010, DECC launched consultations on "*The Financing of Nuclear Decommissioning and Waste Handling Regulations*" and "*Consultation on a Methodology to Determine a Fixed Unit Price for Waste Disposal and Updated Cost Estimates for Nuclear Decommissioning, Waste Management and Waste Disposal*", which presented Government thinking on how the developers' fund should be set up, administrated and monitored, how the Government waste disposal costs should be estimated, and the method by which the developers' fund contributions should be calculated. The consultations ran to 18th June 2010.

In December 2010, DECC launched further consultations: "*Consultation on revised Funded Decommissioning Programme Guidance for New Nuclear Power Stations*" and "*Consultation on an updated Waste Transfer Pricing Methodology for the disposal of higher activity waste from new nuclear power stations*". These incorporated the Government response to comments received on the March 2010 consultations, and set out the updated Government intentions in these areas. The consultations close on 8th March 2011.

This paper assesses these two consultation papers, with a particular emphasis on aspects which may be of interest or concern to stakeholders local to proposed new build reactor sites.

### **Consultation on revised Funded Decommissioning Programme Guidance for New Nuclear Power Stations**

This consultation deals with the set up, structuring, contents, control, and monitoring of a Funded Decommissioning Plan (FDP) for a new build reactor. The objective of an FDP is that the developer builds up sufficient funds in a Fund to meet "the full costs of decommissioning their installations; and their full share of the costs of safely and securely managing and disposing of their waste; and that in doing so the risk of recourse to public funds is remote at all times". As can be seen by the contents list given in Appendix 1, this is a lengthy and technical document largely given over to assuring stakeholders that the process will in fact ensure that adequate funding is accrued to decommission the reactor and deal with its waste, that this is adequately protected so that it will in fact be available at the right time. It also seeks to assure that the arrangements adequately protect against changing circumstances and possible default, and that

the detailing and updating of decommissioning and waste management plans is adequate. Overall, this must ensure that the developers can fund and carry out the decommissioning of the reactor and associated plants, with sufficient funds left over to manage and dispose of the ILW and spent fuel, with these funds transferred to the Government.

The arrangements for funding which are set out aim to ensure that the funds transferred are sufficient, with a high degree of certainty, for the Government to manage and dispose of the wastes. Thus much of the technical content of the consultations details the methodologies by which estimates are carried out, and risk premia added to the payment, such that the risk that the Government will subsidise the eventual waste disposal is less than 1%.

The Government's base case for decommissioning 'assumes that the site is restored to a state similar to "Greenfield" or similar to its state prior to construction'. During this process four stages are envisaged:

- De-fuelling reactor for the last time and transferring the resulting spent fuel to the fuel pond;
- Stage 1. Conditioning and packaging of potentially mobile wastes (e.g. spent resins) Transfer of conditioned wastes to interim storage to await final disposal;
- Stage 2. Demolition of non-essential non-radioactive facilities (e.g. administrative buildings that will not be needed to manage the decommissioning process) Transfer of spent fuel remaining in cooling pond to interim store; and
- Stage 3. Dismantling of reactor and any other structures remaining on site and management and disposal of resulting waste Disposal of ILW and spent fuel from interim stores. Remediation of site. De-licensing.

A notional sequence might be for the reactor to operate from around 2020 to 2080, with decommissioning completed by, say, 2100. While it is possible that the ILW disposal envisaged in Stage 3 might be available, the requirement for the spent fuel to cool for at least several decades before disposal means that even if spent fuel disposal capability were available, the fuel would not be suitable for disposal by the end of decommissioning, and would need to stay on site until it was disposable. In the Government's Base Case, it assumes that it will take ownership of the wastes before disposal capability is available.

*2b.32 The Base Case assumes that the spent fuel from a new nuclear power station is kept in interim storage on the site of the power station until the point at which it is disposed of in a GDF, and that the encapsulation of spent fuel is also carried out on-site. In the absence of proposals for centralised facilities these are considered to be prudent assumptions. However in the event that regional or central facilities were available for*

*either storage or encapsulation of spent fuel that should lead to significant reductions in waste management costs.*

*2b.33 The Government expects to take title to and liability for an operator's spent fuel and ILW on a specified Transfer Date, or schedule of Transfer Dates, aligned with the operator's decommissioning timetable. It is currently expected that the Transfer Date(s) will precede the Assumed Disposal Date (the date on which the Government expects to be able to dispose of the ILW and spent fuel in a GDF).*

*2b.34 . . . . After the Transfer Date the Government will be responsible for ensuring the future management of the waste. The Secretary of State will expect the operator's waste management plans for the period between the Transfer Date and the Assumed Disposal Date to be of the same standard of robustness and prudence as its plans for the period before the Transfer Date.*

*2b.35 The Lump Sum Payment would be a full and final payment for all remaining waste management costs (including the decommissioning of interim stores if necessary). The level of the Lump Sum Payment would not be set at the outset but instead would be estimated in the operator's FDP and regularly reviewed.*

Thus the FDP process envisages the Government taking ownership of the wastes on the site (and, by inference, of the site itself, which will by definition still be licensed at that stage), with enough funding transferred to pay for the management of the waste until disposal is available, and then for the disposal itself.

As has been outlined, the Consultation is mainly concerned with the technical and financial attributes of the processes designed to ensure that the reactors will be decommissioned, and that the Government will be obtain sufficient funds to dispose of the wastes. Apart from the generalised institutional and taxpayer concerns that the State does not end up subsidising a private reactor operator, the matters of primary concern to stakeholders local to new build reactors will be the level of assurance that sites will indeed be decommissioned, that wastes will indeed be removed, and that sites will indeed be delicensed and returned to a satisfactory end state.

Without analysing the technical arrangements at more than a superficial level, the key points would appear to be:

1. A great deal of effort has been expended to ensure that reactor owners keep updated plans and programmes for decommissioning their reactors, and put aside adequate funds to perform these tasks.

2. There are incentives, including liability for criminal prosecution, to compel new build reactor developers to fulfil their obligations to decommission reactors and manage wastes.
3. Unlike the previous Magnox and AGR generations of UK reactors, the decommissioning of the Pressurised Water Reactors such as those being assessed for UK new build is relatively well established, and there seems no reason to doubt that decommissioning can be achieved on suitable timescales.
4. This would lead to the new build developer being able to decommission the reactor(s), to remediate the site, to place the resulting wastes in interim storage, and to transfer ownership of the wastes, the interim stores, and future waste management and disposal funding, to Government.
5. However, the likely timescales for ILW and spent fuel disposal will mean that the (now Government owned) wastes are likely to remain on site for a considerable period before transport for disposal.

If these measures provide adequate assurance that decommissioning and waste management can and will be planned and executed, then the prime local stakeholder concern may well be the timing of waste leaving the site and the uncertainty in the programmes. These timescales are driven by the MRWS programme rather than anything to do with the individual new build reactor programme. The drivers within MRWS include:

1. The timescale for identifying a suitable volunteer site
2. The time taken to complete surface and subsurface geological investigations to ensure that a disposal safety case can be met
3. The programme for developing the GDF
4. The disposal programme and the rate at which the GDF can accept wastes
5. The specification for heat generation of disposable wastes and the time taken for the wastes to meet this specification

In the case of spent fuel from new build reactors, (5) is likely to be the limiting factor. Spent fuel when it leaves the reactor is still generating a significant amount of heat. This heat generation reduces with time, but must be taken account of when calculating the conditions that will develop in the repository as waste is emplaced. This will mean that the GDF safety case will have a limiting value for the amount of heat generation which can be allowed for a given waste type, and this will in turn feed into a relationship between the spacing of the disposed waste and the time between spent fuel being removed from the reactor and its disposal.



The MRWS and new build documentation to date has emphasised that new build reactors will use high burn-up fuel<sup>1</sup>. In fact, this is a development generic to all PWRs (including Sizewell B), but it is nevertheless true that higher burn-up spent fuel produces more heat for longer. This will mean that, for a given GDF heat limit, high PWR fuel will need a longer cooling time before it can be disposed of. The precise cooling time cannot be known until the GDF site is identified and the disposal parameters optimised, but periods up to 160 years after the start of reactor operation have been discussed<sup>2</sup>. This would, in the case of a new build reactor starting in 2020, lead to spent fuel being stored on site until 2180.

This may, of course, be reduced by further work, but unless this timescale was much reduced, then the probability is that the spent fuel will remain on new build sites for several decades after the reactor has been decommissioned and the ownership of the spent fuel stores has been passed to the Government.

The key factor in the consultation is then section 2b.32, which restates that “The Base Case assumes that the spent fuel from a new nuclear power station is kept in interim storage on the site of the power station until the point at which it is disposed of in a GDF, and that the encapsulation of spent fuel is also carried out on-site”. In fact, both the continued interim storage on individual new build sites, and the eventual provision of encapsulation plants at all of them, is highly unlikely to be optimal, and in the case of encapsulation is even unlikely to be practical. This is, in fact, acknowledged in the same section by the statement “However in the event that regional or central facilities were available for either storage or encapsulation of spent fuel that should lead to significant reductions in waste management costs”.

Thus, in the case where new build is delivered on more than a single site, the current Base Case is likely to maximise both the cost of waste management and the residence time of spent fuel on individual sites. Thus the single factor which is likely to reduce residence time of wastes on sites is for Government to move to the provision of regional, or, more optimally, national interim storage of spent fuel. Depending on the developing timescales this might also be more optimal for the storage of ILW. Of course, there will be challenges in providing a national spent fuel storage facility without opening the Government to further charges of subsidising nuclear power. However, since the overall cost will, as acknowledge by the Government, inevitably be less, this must be a challenge that is capable of

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<sup>1</sup> ‘Burnup’ refers to the amount of heat that a given amount of nuclear fuel produces before it is removed from the reactor. This has increased as reactors and nuclear fuel have developed, with Magnox reactors producing less than 6,000 megawatt-days of power per tonne of fuel, while modern PWRs are aiming at 50,000 to 60,000 megawatt days per tonne.

<sup>2</sup> See, for example The arrangements for the management and disposal of waste from new nuclear power stations, DECC, November 2009, para 53

being met.

### **Consultation on an updated Waste Transfer Pricing Methodology for the disposal of higher activity waste from new nuclear power stations**

As already discussed, the methodology proposed for the management of wastes from new build reactors involves the Government taking title to the spent fuel and ILW produced by the reactors during their operational life and during their decommissioning. This was an inevitable consequence of the failures of successive Governments over the last several decades to provide disposal facilities for higher activity radioactive wastes and spent fuel from nuclear power stations.

The imperative for the nuclear new build programme to be without public subsidy has led to the development of a complex process by which to estimate the future costs of waste and spent fuel disposal, and to feed these estimates back into the Decommissioning and Waste Management Plans discussed above in the context of the Funded Decommissioning Programme consultation. This estimating process is dealt with in this consultation, which covers the estimating methods and their development as the operational programmes of new build reactors and the MRWS process develop.

As can be appreciated by the contents of this Waste Transfer Pricing Methodology, as seen in Appendix 2, the document is mainly concerned with the technicalities of the estimating process, and particularly how this has developed to attempt to minimise the risk that Government will end up subsidising the waste management and disposal costs of new build reactor wastes and spent fuel. There is considerable complication in devising such a methodology for reasons including:

1. Current disposal estimates are at a very generic level as without a specified site they cannot know what geological environment will apply, and hence what waste packaging or repository design will be optimal. For example, the currently assumed spent fuel disposal system, as currently defined in Sweden, is appropriate for hard crystalline rock environments, but is very different from the Swiss concept for a clay environment.
2. The current planning date for the selection of a site for the GDF is 2025, which is the start date for the first possible site-specific optimisation of the design of the GDF and hence the start date for an estimate of site-specific disposal costs.
3. The planning date for first ILW disposal is 2040, with a first date for HLW disposal of 2075, thus it will be decades before real costs are available for spent fuel disposal, and complex predictive methods are thus essential.

The Consultation proposes that the final price to be paid by the operator is set 30

years after the nuclear power station has commenced operation, which would infer this price being set until around 2050.

As this consultation deals with the details of developing a price, rather than affecting the physical arrangements and timescales for dealing with waste on sites, the interests to local stakeholders are different. Principal concerns remain as to the robustness of plans and their likelihood of being delivered, and these matters are dealt with above. However, the pricing methodology is important to local stakeholders in the sense that a price dictated later in the new nuclear process (i.e. circa-2050) leaves significant uncertainty as to the overall level of funding available to mitigate the long term effects of new nuclear. This uncertainty could affect the level of funding sought by local councils and stakeholders by way of mitigation and compensation for the hosting of new nuclear, so as to provide sufficient levels of mitigation for the long term.