MANAGEMENT OF THE UK'S PLUTONIUM STOCKS

A consultation on the long-term management of UK owned separated civil plutonium[1]

Response submitted by British Pugwash

Q1 Do you agree that it is not realistic for the UK Government to wait until fast breeder reactor technology is commercially available before taking a decision on how to manage plutonium stocks?

We agree whole-heartedly. However the preamble to this question is slightly unbalanced. It makes no mention of the policy decisions taken by HMG during the period between 1988 and 2008 on the development of a capability at Sellafield to manufacture MOX fuel using the plutonium held in the stockpile in the UK, as an alternative approach to the use of this material. It also gives a rather slanted view of fast reactor technology in para 3.3. The phrase "Fast reactor technology has for decades been described as being "about 30 years away" has more frequently been used in relation to fusion reactor technology. In both cases it is equally misleading – the timescale for making the technology available largely depends on the financial resources made available. The decision not to make government funding available on the necessary scale, both in the UK and the US, was taken on economic and/or political grounds, and not because there was a strong case that the technology was unfeasible, or would take very many years to develop.

Q2 Do you agree that we have got to the point where a strategic sift of the options can be taken?

No.

In November 2009 the British Pugwash Group published a report produced by a working group which it set up in 2007 on the Management of Separated Plutonium in the UK.[2] That report examined a large number of potential options, including all those described in the Consultation Document. Its conclusion was that a decision between the three key options – 'bury it', 'burn it' or 'do nothing' (ie continue to store it indefinitely) could not be taken on the basis of publicly-available information. Too much of the key information was being withheld, allegedly on security or commercial confidentiality grounds. We took the view that the recent history of the Sellafield MOX plant (SMP) gave indications that its design had been seriously flawed, but without further information it was impossible to assess how expensive it would be to remedy its defects and bring it up to the design level of throughput (it is currently operating at a throughput of only a few % of the design level) or to replace it altogether. The Consultation Document does not address this question, and does not

[1] Department of Energy & Climate Change February 2011 (cited hereinafter as 'Consultation Document')
[2] "The Management of Separated Plutonium in the UK" British Pugwash November 2009. See http://www.britishpugwash.org/documents/Manage_Sep_Plutonium_2009_fin_Color_2.pdf

give any technical detail on the defects of SMP. It is not clear whether HMG has done a serious study of the feasibility or costs of the options of reconstructing it or replacing it. Equally, it has not published detailed information on the comparative cost of the 'bury it' or 'burn it' options (the documents published by the NDA have been redacted to remove all such detail). This is a subject of strong disagreement between some US experts and the UK NDA, and the British Pugwash Group was unable to get access to sufficient information to form an independent view on this matter.

In our view, what is required is not a 'strategic sift' of the available options, but a proper costed optioneering study, taking all three options up to the point where a rational decision can be taken on technical, economic and strategic grounds. In our view that study should be published, with minimum redaction on security grounds, so that there can be a proper public debate before a final government decision is taken. We also think that a full, un-redacted, version of the technical reports on the failure of SMP it achieve its design throughput should be published, including an explanation of the reasons why the comparable French plant at La Hague, unlike SMP, is operating successfully, so that it is possible to make an independent assessment of the feasibility and cost of modifying SMP so that it can reach its design throughput. If the NDA is to remain in the lead on this activity, it should take responsibility for the technical and economic content of each optioneering study, so that it is fully answerable for any further high-technology failure in this area.

Q3 Are the conditions that a preferred option must in due course meet the right ones?

If the MOX route is eventually recommended, this must clearly be based on a realistic appraisal of the market for this product. The Consultation Document is ambivalent about the question whether the objective is simply to manage the existing stockpile of plutonium, or whether this is to be part of a wider activity within an expanding international nuclear renaissance. In para 3.12 it states that "it is unlikely that the value of the fuel will reach a point where it covers the full cost of its manufacture. It is not possible to more accurately predict what the value of the MOX fuel would be as prices would ultimately have to be negotiated with the reactor operators, and this in turn will be influenced by the price of natural and enriched uranium through market supply and demand". This is an unacceptably vague formulation of the problem. A commercial project must take (and seek to justify) a view on the likely trends in the demand for the proposed product, and the price which it may expect to command in that market. In assessing the future development of that demand, it has to take account of the recent and prospective developments in that market – the rising price of oil and gas, the pressure on governments to limit the release of greenhouse gases, and the pressure on uranium prices, accentuated by the low energy per kg of heavy metal given by the present generation of reactors.

The Consultation Document mentions (para 3.15) that several third generation reactors (eg EPR and AP1000) are capable of using MOX fuel, but it does not indicate whether HMG is prepared to use its currently strong negotiating position to ensure that the generation of 'new build' reactors will in fact be required to be capable of burning MOX fuel (either on a 40% or a 100% core basis). In our view it should certainly do so.

The Consultation Document (para 3.18) rightly draws attention to the need for a thought-through policy on the eventual disposal of spent MOX fuel. This will involve reaching binding agreements with the organisation responsible for the design of the UK geological disposal facility on the specification of an acceptable disposal package for such fuel. That in turn will require HMG to reach as decision to proceed with the establishment of a geological disposal facility in the reasonably foreseeable future.

In para 3.22 it is stated that "a new MOX plant would have to operate for about 30 years[3] to convert the UK's plutonium to MOX fuel" ie it assumes that the only function of a new MOX plant would be to convert the existing stockpile to MOX. However, the planned 'new build' (say 10 GW) will generate about 2 tons of plutonium a year within its spent fuel, and it would be possible for this to be recovered by reprocessing, thereby providing a further source of plutonium for conversion to MOX. Furthermore, within a world-wide nuclear renaissance, there may well be a growing demand from overseas customers for reprocessing and MOX-fabrication services. These possibilities will need to be considered within the Business Plan for the new MOX plant.

If the UK were to consider seriously the 'disposal option' (ie burying it without first burning it in a reactor), it would have to consider the proliferation hazard of creating a 'plutonium mine'. The immobilisation options discussed in the Consultation Document do not provide a defence against a malign organisation with an ability to process the 'immobilised' plutonium chemically to recover the plutonium.

The 'continued long term storage' option raises questions of security of the store against terrorist or other malign attack, aimed at either dispersion of the plutonium into the environment or procuring enough to make a nuclear weapon. These issues are discussed extensively in the BPG report cited above, but are not raised in the Consultation Document, apart from the bland statement that it "does not address terrorist threats and proliferation sensitivities by putting the plutonium beyond reach". On the basis of our work on this aspect (see ref 2), we think that the security implications of this option need to be addressed further, and where possible included in the public consultation.

Q4 Is the UK Government doing the right thing by taking a preliminary policy view and setting out a strategic direction in this area now?

Yes, provided that this preliminary policy view is rapidly followed up by a serious costed study as defined above, <u>with the results published</u>, before a final decision is taken. UK government activity in this area has been far too leisurely for two decades or more. A timetable measured in months rather than years should be set to generate a document which will permit a firm decision to be taken.

Q5 Is there any other evidence government should consider in coming to a preliminary view?

[3] It should be noted that this figure assumes that the new MOX plant will have a throughput of only about 40 tons/year – ie considerably less than the original design throughput of SMP

Yes. This subject is closely linked to wider energy policy issues, and it is important that decisions on plutonium should not be taken in isolation from those wider issues. As the recent book by David MacKay[4] has shown, the sustainable energy options open to this country during the period up to 2050 without a large contribution from nuclear power are very technically and economically uncertain, so the choice of reactor systems is critical, and the problem of ensuring that they will have sufficient fuel at an acceptable price is very real.

Q6 Has the UK Government selected the right preliminary view?

For the reasons spelt out above (for example in response to Q2), it is currently impossible to answer that question using information in the public domain.

Q7 Are there any other high level options that the UK Government should consider for long-term management of plutonium?

If the UK were to decide not to proceed further with nuclear power for the foreseeable future, there are other options that it might wish to consider – eg selling or making available the plutonium in its stockpile to a country such as France or Canada which is interested in making/ using MOX fuel, and which could be relied upon not to make it available to a malign end-user.

[4] "Sustainable Energy – without the hot air" UIT Cambridge 2009. Available online at http://www.withouthotair.com.