

Response from Scientists for Global Responsibility

Introduction

This response is made on behalf of Scientists for Global Responsibility (SGR), a UK not-for-profit organisation of about 1000 science, design and technology professionals whose concerns include environmental sustainability and energy security.

Although we are making some comments on the methodology proposed, this should not be taken to imply that we agree with a technology that results in the burial of large quantities of waste containing plutonium and other long lived actinides that will remain highly dangerous for many millennia.

The methodology goes into considerable detail on means of allowing for some uncertainties, but omits consideration of more fundamental uncertainties such as whether the proposed method of disposal of high level waste is sound. Also, it does not really examine the likelihood that the economy many decades into the 22nd century, when the waste emplacement from new nuclear power stations is expected to take place, will be able to support the process on the basis of a sum of money set aside many decades earlier.

Because our views on the process are fundamental, we have not responded specifically to the three questions in the consultation document, but cover the major issues as a whole.

Disposal technology

The consultation assumes that the disposal of spent fuel elements will be based on the Swedish KBS3 method. There are uncertainties about the integrity of the copper canisters in anaerobic conditions [1], and thus whether this method provides a means for protecting people and the environment as intended. If the assumed technology proves to be inadequate, the costs of waste disposal could be much greater – particularly if ongoing care for the waste were to be required.

Affordability of waste emplacement well into the 22nd century

The basic assumption is that a sum of money judged to be sufficient to cover disposal costs put aside near the end of reactor operation will be sufficient to carry out these operations very many decades later. Various economic scenarios could invalidate the assumptions.

- 1) Assuming continued economic growth, the costs of energy and materials may escalate more than the general rise in costs. This seems highly likely as readily accessible fossil fuels will be severely depleted. If there is a significant global nuclear

build that operates on the government's assumption of a once-through nuclear fuel cycle, nuclear fuel costs would be likely to be high as high grades of uranium ore would be depleted. Cement production is very energy intensive. There is likely to be global competition for materials required for the disposal as countries like China and India may have consumption levels comparable with those in the UK. Thus even a fund whose growth matches general rise in economic output may fall short in relation to energy and relevant materials. Furthermore, labour rates would be expected to rise roughly in line with economic growth, but if the fund is invested in more 'conservative' investments, it may not keep up with overall growth. If the fund grows by 1% per year less than average economic growth, the shortfall over 70 years would be a factor of 2, and if it lags by 2%, the shortfall would be a factor of four. Thus the fund would not be adequate to pay for the manpower required at a wide variety of skills. Any assumption that a real term growth in the fund would buy more person-hours of labour in the middle of the 22nd century than when that sum of money is put into the fund is likely to be invalid.

- 2) If economic growth were to fail (and any number of scenarios can be envisaged for economic failure over such a long timescale), the fund is unlikely to be adequate to cover the costs of the disposal process. Indeed, given that even the Government's Chief Scientific Advisor has warned of the potential of major resource shortages by 2030 [2] – leading to major economic shocks – it seems that such events over the coming decades are more likely than not.

Failure of utility before fund is built up

In early reactor operation, the quantity of radioactive waste will build up faster than the amount of energy generated. As sale of energy is assumed to be the source of the funding, if the operating utility should go bankrupt at this stage, the fund may be inadequate to deal with the waste generated. As many of the utilities expected to be involved in new build are not UK-based, it may be very difficult to pursue any shortfall in such circumstances.

Accuracy of cost estimates

Given the wide level of uncertainty in the costs (as acknowledged by the consultation document) it is bizarre that many of the figures in the examples are given to an accuracy of four or even five significant figures!

References

1. Nuclear Engineering International (2010). The copper controversy. 21 December.
<http://www.neimagazine.com/story.asp?sc=2058502>
2. Beddington J (2009). Food, energy, water and the climate – a perfect storm of global events? Government Office for Science.
<http://www.dius.gov.uk/assets/bispartners/goscience/docs/p/perfect-storm-paper.pdf>

Date of submission:

04/03/11