

**CoRWM informal comments on DECC pre-consultation discussion paper on
the key factors that could be used to compare
one option for long-term plutonium management with another**

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Introduction

1. These are informal comments from some members of CoRWM on the DECC pre-consultation discussion paper (DECC, 2009). They have not been discussed by the full committee and do not represent an agreed CoRWM view.
2. CoRWM is interested in the long-term management of plutonium because one of the options being considered is to treat it as a waste, that is to immobilise the plutonium in a suitable medium and emplace it in a geological disposal facility. Another option, re-use, would produce spent MOX fuel that would be waste and would require geological disposal. The third option mentioned in the paper, indefinite storage, is one that CoRWM considered for the long-term management of higher activity wastes (HAW) (CoRWM doc. 700).
3. These comments cover two issues raised in the DECC discussion paper. One is the identification of the key factors in comparing long-term management options for plutonium. The other is the issue of how DECC should take into account differing views on the relative importance of the factors when comparing options. Our comments on both issues draw on CoRWM's experience in assessing options for the long-term management of HAW (CoRWM doc. 700).

Identifying the Key Factors

4. Table 1 shows the key factors listed in the DECC pre-consultation paper on plutonium (DECC, 2009) and the criteria used by CoRWM in comparing options for the long-term management of HAW (CoRWM doc. 700). The following comments arise from comparing and contrasting the factors and criteria.

Safety

5. DECC has identified one main factor "safety and hazard", with components relating to worker dose and risk of public exposure to radiation. CoRWM had three main criteria for safety, one for short-term public safety, one for long-term public safety and one for worker safety. Each main criterion had sub-criteria for radiological and conventional safety and these included routine situations and accidents. We think the DECC approach combines too many aspects of safety into one main factor. In view of the importance of safety, and the different weights stakeholders and the public tend to attach to its various aspects (para 22), we suggest that DECC should include several key factors related to safety and hazard when comparing plutonium management options.

Security

6. CoRWM used one criterion for security with sub-criteria relating to risk of misappropriation and short-term and long-term vulnerability to terrorist attack. DECC lists security and proliferation resistance as separate factors but the explanations given indicate these are very similar. We suggest that DECC combines the two factors and gives further thought to the aspects of security that should be considered in comparing plutonium options. For example, it might be desirable to consider short-term and long-term vulnerability to theft and terrorist action.

Environment

7. DECC identifies only one factor for environmental effects. CoRWM used one "environment" criterion but had five sub-criteria (Table 1). We think that DECC will also need to identify various components of environmental impact of plutonium long-term management options. In addition to those considered by CoRWM, DECC will need to take into account potential increases and decreases in global warming from plutonium disposal and re-use.

Socio-Economic

8. CoRWM considered direct employment and spin-off opportunities as sub-criteria of a main socio-economic criterion. DECC identifies "social factors" but it is unclear what this includes apart from "impact on local communities". It would be better to split social factors into socio-economic and amenity (para 12).

Implementability

9. CoRWM used one main criterion for implementability with sub-criteria of technical aspects and regulatory requirements. DECC lists four factors that seem to relate to implementability: availability, practicability, technical maturity and engineering challenge. We think that using these four factors will intrinsically assign too much importance to technical aspects of plutonium options. We suggest combining them into one main factor, with several components.

Flexibility

10. CoRWM used one criterion for flexibility. DECC lists two factors: future-proofing and reversibility. We agree that both these factors should be considered but think that they are both aspects of flexibility.

Costs

11. DECC gives cost-effectiveness as a key factor but also mentions affordability. Neither of these factors corresponds to the single cost criterion used by CoRWM. We carried out a straightforward comparison of the total costs of each option for the long-term management of HAW (CoRWM doc. 700). We think that cost-effectiveness and affordability are too difficult to assess and that our approach is preferable. The only modification required for plutonium options would be to have a means of dealing with costs less than zero if the re-use option is assessed to make a profit.

Amenity

12. CoRWM used four sub-criteria for amenity: visual impact, noise, transport and land-take. DECC does not include amenity but its "social factors" might include aspects such as visual impact, noise and land-take. This requires clarification. DECC identifies transport as a separate factor and we comment on this below (para 20).

Burden on Future Generations

13. Burden on future generations was a main criterion in CoRWM's work, with sub-criteria of cost, effort, worker dose and environmental impact. It was a principal discriminator between storage and disposal options (CoRWM doc. 700). We think DECC should include a key factor of burden on future generations if it wishes the indefinite storage option for plutonium to be considered on an equal footing with disposal and re-use.

Other Factors Identified by DECC

14. *Coherent nuclear strategy*: The explanation for this factor consists of the observation that decisions on plutonium need to be part of a coherent, strategic approach to all nuclear matters. We do not understand how this factor could be used in a comparison of options. Any of the three options could be considered to be part of a coherent nuclear strategy, depending on one's view about other aspects of the options. We think that, when drafting the consultation document, DECC should explain that a sustainable and viable method for the long-term management of plutonium is one component of a coherent strategic approach to nuclear matters.
15. *Energy resource*: The energy value of plutonium is not a factor in its own right. It should be considered as part of other factors, in particular costs (para 11) and environmental effects (para 7).
16. *International best practice*: The explanation for this factor seems to mix two different factors. One is technical and concerns identifying the current and emerging technological options. The other is how other countries feel about what the UK should be doing with its plutonium, including non-nuclear states. This is a separate factor and would be better described as "international views".
17. *International conventions/treaties*: This was implicitly covered by CoRWM as part of implementability (regulatory requirements sub-criterion). The rationale was that the UK must comply with those conventions and treaties that it has ratified and no option would be implementable unless it did comply. However, there could be differences between options in the extent to which they were perceived to be consistent with international conventions, treaties and laws. For plutonium this probably merits consideration as a separate factor.
18. *Proliferation*: The explanation given for this factor is that it covers the impact of plutonium policy on nuclear non-proliferation policy and materials creation. It is unclear what this means. Perhaps consistency with overall UK policy on non-proliferation would be a better definition of the factor.
19. *Public perception and acceptability*: This factor should be omitted. It is not for those carrying out a comparison of options for the long-term management of plutonium to second guess what the public may or may not perceive or accept. Finding this out is the whole point of a public consultation.
20. *Transport*: The explanation for this factor mentions environmental, safety and security aspects of transport of plutonium, MOX and spent fuel. All these aspects of transport, and its costs, should be considered as part of other factors. However, there remains the issue of whether transport per se should be included, in a way analogous to the consideration of the proximity principle in waste management in general. We believe that it should.

Taking Account of Views on the Relative Importance of Factors

21. The important principle here is that DECC should not attempt to put forward one "correct" view of the relative importance of the various factors to be considered in comparing options for the long-term management of plutonium. The approach should be to investigate the effects of various views on relative importance of factors on the outcome of the comparison, then use this information as an input to a decision on the preferred option.
22. How this investigation is carried out depends on the methodology to be used for the comparison of options. If it is highly quantitative then it may be necessary to devise or

elicit several sets of weights for the factors, each reflecting a different view on their relative importance. If it is more qualitative then it may be unnecessary to devise numerical weights: reasoning may be enough. CoRWM used both types of method in its assessment of long-term management options for HAW. For DECC's information, Table 2 shows a summary of the views on weights expressed by participants in CoRWM's public and stakeholder engagement (CoRWM doc. 700).

References

CoRWM doc. 700. CoRWM's Recommendations to Government, November 2006.

DECC, 2009. Pre-consultation discussion paper on the key factors that could be used to compare one option for long term management of plutonium with another. July 2009.

Table 1 DECC Key Factors and CoRWM Criteria

<i>DECC Comparison of Plutonium Options</i>		<i>CoRWM Comparison of HAW Options</i>	
<i>Key factor</i>	<i>Mentioned in explanation</i>	<i>Main criterion</i>	<i>Sub-criteria</i>
Safety and hazard	risks and dangers, worker dose, risk of public exposure	Public safety, short term (up to 300 years)	radiation non-radiation
		Public safety, long term (beyond 300 years)	radiation
		Worker safety	radiation non-radiation
Security	intrinsic protection of plutonium, other levels of protection needed	Security	misappropriation vulnerability to terrorist attack pre- emplacement vulnerability to terrorist attack post-emplacment
Proliferation resistance	reducing the value of plutonium to terrorists, ease of getting plutonium in useful form		
Environmental	effects on the environment	Environment	radiological pollution <300 years radiological pollution >300 years chemical pollution physical disturbance use of natural resources
Social factors	impact on local communities	Socio-economic factors	employment spin-offs (jobs, knowledge, investment)
		Amenity	visual impact noise transport land take

<i>DECC Comparison of Plutonium Options</i>		<i>CoRWM Comparison of HAW Options</i>	
<i>Key factor</i>	<i>Mentioned in explanation</i>	<i>Main criterion</i>	<i>Sub-criteria</i>
Availability	when option can be delivered	Implementability	technical regulatory requirements
Engineering challenge	how challenging would the option be to implement		
Practicability	whether option can realistically be employed over a suitable time frame		
Technical maturity	maturity of technology		
Future-proofing	how option would be affected by future energy and waste policy demands	Flexibility	flexibility in 300 year period
Reversibility	whether option would foreclose other options		
Cost effectiveness	cost- effectiveness, affordability	Costs	total costs (development, implementation, operation, closure, monitoring)
		Burden on future generations	cost effort worker dose environmental impact
Coherent nuclear strategy	plutonium decisions should be part of a coherent nuclear strategy		
Energy resource	energy value of plutonium could be considered as a valuable resource		

<i>DECC Comparison of Plutonium Options</i>		<i>CoRWM Comparison of HAW Options</i>	
<i>Key factor</i>	<i>Mentioned in explanation</i>	<i>Main criterion</i>	<i>Sub-criteria</i>
International best practice	what other countries are doing, current and emerging technological options, other countries views on what the UK should do		
International conventions/treaties	requirements of international treaties and conventions		
Proliferation	impact on non-proliferation policy and materials creation		
Public perception and acceptability	-		
Transport	environmental, safety and security aspects of transport of plutonium, MOX and spent fuel		

Table 2 Overview of Weights Elicited in CoRWM Assessment of HAW Options

Rank	CoRWM Members	Citizens' Panels	Schools' Project	Users of Discussion Guide
1	Safety, short term	Security	(Safety, long term)	Environment
2	Security	Safety, short term	Safety, short term	Security
3	Burden	(Safety, long term)	Environment	(Safety, long term)
4	Flexibility	Burden	Security	Safety, short term
5	Worker safety	Flexibility	Worker safety	Flexibility
6	Environment	Environment	Burden	Burden
7	Implementability	Worker Safety	Socio-economic	Worker safety
8	Amenity	Implementability	Amenity	Implementability
9	Socio-economic	Socio-economic	Implementability	Socio-economic
10	Safety, long term and Cost not weighted	Amenity	Flexibility	(Cost)
11		(Cost)	(Cost)	Amenity