

Review of the Siting Process for a Geological Disposal Facility

Department of Energy and Climate Change

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This evidence is submitted by the Royal Academy of Engineering. As the UK's national academy for engineering, we bring together the most successful and talented engineers from across the engineering sectors for a shared purpose: to advance and promote excellence in engineering. The views described in this response were assembled through consultation with our Fellows who have expertise in radioactive waste management.

Executive summary

1. The Academy believes that the focus of the consultation on the "siting of a geological disposal facility (GDF)", rather than a deep disposal facility places undue emphasis on geology as being the crucial factor in the long term safety of waste materials. Instead, the Academy recommends placing the emphasis on the primary importance of ensuring a whole systems approach towards waste management; ensuring that waste is disposed within a system which balances appropriate geology with a robust engineering facility.
2. The Academy questions the value of using terminology in the consultation that refers to one geological disposal facility (GDF), a decision that could risk creating the impression that certain choices have already been made. Rather, we suggest that the phrase "geological disposal facilities" or "deep disposal facilities" is used. For the purposes of this document, and to keep with the conventions of the consultation, we will continue to use the singular phrase.
3. Before successful identification and implementation of a disposal facility can be made, there is a need to undertake open dialogue with the public about the benefits and risks of the generation, storage and safety of nuclear energy and its waste materials. A well-coordinated and comprehensive communications strategy should aim to raise awareness of the facts about the safe use and storage of nuclear materials. This could include:
 - thorough engagement with the broadcast and print media on the use, storage and safety of nuclear materials
 - the reopening of visitor centres at UK nuclear sites
 - the creation of suitable up to date exhibitions within the UK's museums
 - demonstration of the nature of radioactive waste , where it comes from, how it compares with other hazardous wastes and how it is contained in engineered packages
 - explanation of the major role of engineering in the construction of deep disposal facilities and delivering a 200-300 year time period during which waste materials can be safely stored
 - current overseas examples of what is being done to store nuclear waste.
4. The government should undertake research to learn from the experience of other countries that have engaged their citizens on the siting of the deep disposal of waste, drawing from their experience of the situations in which the public have accepted long-term storage solutions. As an extension of this point, the Academy

also supports exploration of the potential for international discussions, in which the UK would play a part, to share research and knowledge between countries on the best practice involved in making decisions on siting and engaging the public in the process. Gaining international consensus on this issue could stimulate greater local community support.

5. It is important that the engineered packages considered for the disposal of waste are demonstrated to be robust for a period of 200-300 years, and that their robustness is tested on independent measures of engineering soundness distinct from but alongside measures showing their suitability to the geological environments for which they are being designed.
6. The Nuclear Decommissioning Authority's existing suite of documents on the Generic Disposal System Safety Case should be built on to further develop the Generic Design Assessments. Such developments should encompass the implications of different geological settings to the scaling of engineered packages being considered for waste disposal. Among the settings which should be considered are clay, salt and hard rock.
7. The government has indicated its view that the decision on whether or not to retrieve waste from a disposal facility (or retain its availability) can be delayed until after that facility's operations cease; because the potential to retrofit retrievability into engineered systems renders obsolete the need for a decision now. The Academy believes this position to be problematic. Retrofitting retrievability into facilities would carry extra cost and a better approach would be to agree a presumption in favour of retrievability of waste at the outset of any process, enabling engineers to design systems accordingly.
8. It is important to show how the regulatory framework for the management of siting disposal facilities will be responsive to the concerns of society and give the public confidence that nothing is going to be consented to unless it has passed a robust safety case.
9. The government must clarify the waste inventory being proposed for deep disposal. It should be stated that uranium, plutonium and spent fuel will not be consigned for deep disposal but should be kept as a National Strategic Fuel Reserve and stored safely and robustly in shallow engineered stores, in the event that they need to be used.
10. The option should be made available to have more than one repository of waste. For example, High-Level Waste (HLW) could be stored separately from cemented Intermediate-Level Waste (ILW), in a different repository. The Academy believes that, in this event, a repository for cemented ILW should be initiated first and can provide further explanation for this position if required.

Do you agree that a test of public support should be taken before the representative authority loses the Right of Withdrawal? If so, what do you think would be the most appropriate means of testing public support, and when should it take place? If you agree with the need for such a test, please explain why.

11. The principle of conducting a test of public support in the siting process is an important and useful mechanism for helping to develop community trust and enfranchisement in the safety of disposal facilities. However, the Academy is not decided on the best way to carry out such a test of public support and recommends further research and consultation in this area.
12. With good communication programmes and open access by the public to information, the demonstration of engineering robustness in the siting process and strict regulatory oversight, there is a greater chance of building confidence throughout communities that the siting of disposal sites near them will be a safe decision in the long term and offer up community benefits in the short and medium term.

Do you agree with the proposed amendments to decision making within the MRWS siting process? If not, how would you modify the proposed phased approach, or, alternatively, what different approach would you propose? Please explain your reasoning.

13. We fully support the intention to raise national awareness before entering the formal siting process.
14. It is important that this process of awareness-raising should not be confined to the issue of siting the GDF. There are fundamental weaknesses in the public understanding of radiation and its health impacts (or lack thereof). Such misunderstanding leads to misguided fear over the siting of these facilities. A comprehensive and well-planned and executed programme of dialogue with the public is needed to disperse these fears, covering all aspects of nuclear energy and radiation (including its use in medicine).
15. The time allocated to the 'learning' phase for communities interested in the siting of waste near them (as shown in Figure 4 as one to two years) may be inadequate given the scale of the challenge of counteracting negative perceptions. The need for well-prepared and consistent information for engaging interested communities may necessitate a longer period of time for this learning phase than is presently being proposed.
16. The disposal of radioactive waste is a long-term process, not least because of its health implications. The long-term – and necessarily meticulous – nature of this process should be better articulated.
17. The Academy would like to see the focus of debate move towards the safety of the whole system used to dispose waste. The debate should move away from the current impression that local geology completely determines the issue of whether a deep disposal facility can be sited in a given location.
18. The Academy would like to see a greater emphasis placed on the whole systems approach towards deep disposal which is required for safety; this should include emphasis on the engineering processes attached to deep disposal and the integrity of the facilities being used to store waste. The UK has a long track record in deep mine engineering and a strong skills base from which to design disposal solutions. Such is the extent of this expertise that disposal facilities can be designed which would ensure the safe storage of waste for a timeframe of 300+ years and ensure the safety of waste materials for a number of proposed and different geological environments in which they might be disposed. The

latter point is a distinction that merits being raised with the public and which should be considered as part of a messaging strategy.

19. An alternative to waiting for volunteers to come forward, before siting considerations are continued, would be to take the Generic Safety Assessments already available and to develop them in more detail to encompass scenario planning for disposal of waste in clay, salt and hard rock formations. In all instances, robust engineering has a part to play in planning for deep disposal of waste, though specific conditions may need to flex to take account of a range of geological environments.

Do you agree with this approach to revising roles in the siting process set out in the White Paper? If not, what alternative approach would you propose and why?

20. We agree with the proposed approach to revise roles. The key decision-making body should be the one that is most accountable to the local host community. It is important to note that, given the long timescales likely to be involved in the engagement and siting process, reforms to the structure of local government might be initiated in the period subsequent to a local decision-making body being announced. This would have the potential to reduce or amend its role or capacity to act from that for which it was originally intended. This point merits further consideration.
21. Recognition needs to be given to the possibility that some communities will not occupy the role of designated host but could still be affected during the construction and emplacement phases of the deep disposal facility. Equally, communities that experience the transportation of waste materials through them could also be considered an affected community. This may need to influence the potential benefits packages that are formulated to obtain community buy-in. Conversely, implementation of an engineering led assessment to demonstrate that waste can be safely contained for 200-300 years within a given repository – and confined space – may also help reinforce the case for a narrowing and concentration of public consultation and the community benefits packages which arise as a result. This should also be factored into plans.
22. The Committee of Radioactive Waste Management (CoRWM) may be considered for the role of independent advisor to communities interested in disposal being made near them. In such an instance, it would need to have its terms of reference revised.
23. The Academy considers that, in such an eventuality, CoRWM should be able to draw on the technical expertise of experts outside its own organisation, in order to furnish it with suitable knowledge and help provide communities with appropriate guidance. Such expertise could be drawn from national institutions and academies. The role of organisations such as the Academy should be as a source of independent experts who can be called upon for assistance when requested by CoRWM.

Do you agree with this proposed approach to assessing geological suitability as part of the MRWS siting process? If not what alternative approach would you propose and why?

24. We reiterate our view that the debate needs to shift away from a focus on geology to assessing the safety of the whole system.
25. Early on in the assessment process, not only should more high level information on the UK's geology be made available to the public, but also more information on the engineering concepts for different geologies and the robustness of the engineered packages themselves being considered as options. We appreciate that elements of this geological information may be uncertain and will potentially require a period of interrogation by professionals before distribution to the public. The information should be made clear and easy to understand.

Do you agree with this approach to planning for a GDF? If not, what alternative approach would you propose and why?

26. It should be made clear that distinct phases of interim and permanent waste storage are each integral parts of the overall waste management cycle and any strategy for the disposal of waste. It is important to educate members of the public as to both of these stages and to ensure that a false either / or distinction between safe interim storage and permanent storage is not allowed to develop.
27. The role of regulators should be made absolutely clear, in order to reinforce public confidence about safety protocols. For example, their role in ensuring a transparent and robust process in which GDFs are only consented to and licenced after passage of a safety case should be clearly promoted.

Do you agree with this clarification of the inventory for geological disposal - and how this will be communicated with the volunteer host community? If not, what alternative approach would you propose and why?

28. We recommend that the description and definition of the waste inventory is clarified.
29. The government must clarify the waste inventory being proposed for deep disposal. It should be stated that uranium, plutonium and spent fuel will not be consigned for deep disposal but should be kept as a National Strategic Fuel Reserve and stored safely and robustly in shallow engineered stores, in the event that they need to be used (quite possibly as part of a site that also encompasses deep disposal, a point which should be considered in more depth). National policy clearly states that nuclear energy is to form a significant component of the UK's energy mix for the foreseeable future. The National Strategic Fuel Reserve is a sensible and prudent step to secure the UK's access to valuable fissile and fertile energy reserves.
30. The option should be made available to have more than one repository; for example, there should be an option to consider the co-existence of separate repositories for HLW and cemented ILW. The Academy feels that any repository dealing with cemented ILW should be prioritised. The Academy supports the notion of further R&D being concentrated on engineering designs and delivery systems being considered for a robust deep repository. This will only serve to enhance insight throughout the decision-making process.
31. The principle of retrievability should be maintained as a viable option for these repositories and concept designs should factor in the engineering that will enable waste to be retrieved.

32.The public should have access to accurate images of UK HLW and other waste deposits (rather than images from overseas sites of copper encased spent fuel), in order to build openness.

Do you endorse the proposed approach on community benefits associated with a GDF? If not, what alternative approach would you propose and why?

33.The Academy finds the outlined approach to community benefits acceptable.

34.It has been highlighted that opposition may arise from communities that do not host the facility but nevertheless are significantly affected during its construction and operational phases. We recommend that consideration be given over how their concerns are integrated into the process.

Do you agree with the proposed approach to addressing potential socio-economic and environmental effects that might come from hosting a GDF? If not, what alternative approach would you propose and why?

35.The Academy considers the outlined approach to be sensible.

36.The Academy seeks only to emphasise that the assessment and regulatory process involved in siting waste should be characterised by a joined up approach towards planning that emphasises the whole-systems approach to the facilities which are needed.

Do you have any other comments?

37. The key points of this response are highlighted in the executive summary above.