IChemE policy response

Nuclear Decommissioning Authority Consultation on Draft Strategy, August 2020

Consultation response from the Institution of Chemical Engineers (IChemE)

The Institution of Chemical Engineers

The Institution of Chemical Engineers (IChemE) advances chemical engineering's contribution worldwide for the benefit of society. We support the development of chemical engineering professionals and provide connections to a powerful network of around 35,000 members in 100 countries.

We support our members in applying their expertise and experience to make an influential contribution to solving major global challenges, and are the only organisation to award Chartered Chemical Engineer status and Professional Process Safety Engineer registration.

Chemical, biochemical and process engineering is the application of science, maths and economics in the process of turning raw materials into every day, and more specialist products. Professional chemical engineers design, construct and manage process operations all over the world. This includes the nuclear industry sector from design and build through operations and decommissioning. Beyond nuclear, oil and gas, pharmaceuticals, food and drink, synthetic fibres and clean drinking water are just some of the products where chemical engineering plays a central role.

IChemE members use their professional competence to produce evidence-based contributions to policy inquiries.

The response to this consultation was led by members of IChemE's Nuclear Technology Special Interest Group (SIG). There are over 1,100 members of the SIG and they were all given the opportunity to comment on the document and the consultation questions. Members were asked the questions outlined within the NDAs Strategy 4 (S4) document, responses from members were then collated, reviewed and a consolidation is presented here.

1. We are currently developing our sustainability strategy. How ambitious should we be in supporting UK government and the devolved administrations' sustainability targets, including their commitment on carbon reduction?

The NDA, as with IChemE within its Climate Change position statement, should be ambitious, leading by example and committing to high standards for sustainability targets. This should include action to:

- Undertake full life cycle analysis of environmental costs.
- Align carbon reduction targets with Net Zero 2050 targets, while maintaining priority of high hazard risk reduction.
- Conduct best practicable environmental option (BEPO) analysis.
- Align with devolved government strategies with stretch targets identified in addition to baseline targets.

- Share innovation, information, and learning (where appropriate) in support of future nuclear missions e.g. via the Nuclear Innovation and Research Office (NIRO) and the Nuclear Innovation and Research Advisory Board (NIRAB).
- Produce detailed definitions of sustainability and net zero targets and how the strategy will support these.

2. Our approach to the development of this Strategy has been to engage collaboratively with key stakeholders. In your opinion, is there anything we should have done differently during this development phase?

The strategy states that the implications of leaving the EU have been taken into consideration, however, it is not clear where these implications have been incorporated or whether all those specific to the nuclear industry have been identified e.g. regulatory divergence from EURATOM, Article 37 requirements and procurement strategies etc., all of which may impact the medium- to long-term delivery of the NDAs Strategy.

There should be clear indications of what is considered and that there are back up plans in the event a deviation from the assumptions.

There should be continuous international benchmarking of the NDAs Strategy 4 and its delivery to ensure best practices are used and drive taxpayer value for money

The NDA should aim to ensure that any public / private solutions do not diminish the NDA's core Intelligent Customer capabilities needed to support the long-term delivery of its mission.

3. We are planning to update the document that describes the NDA Value Framework, which was originally developed with stakeholders over 10 years ago. In your opinion, does the Value Framework still capture the factors that should be considered in our decision making?

The application of the current framework has been sufficiently flexible so as to capture the most relevant factors given the stage and level of the decision-making. However, it could be an improvement to provide greater clarity in some areas.

A validation of the current framework would offer re-assurance to current projects which have been sanctioned using the process e.g. high hazard risk reduction across the estate.

There is opportunity to make the framework more relevant to the challenges and trade-offs that are faced by industry today. This could include reducing the overlap / repetition between factors and recognising the practicalities of delivering solutions.

We would support consultation of the new framework which should seek inputs from the managers of the different entities being faced with decommissioning. This includes EDF, Magnox and Sellafield.

As the strategy states the operating environment in which the NDA operates is seeing many changes and these could be short term and significant thus, we would recommend that the framework undergoes a regular, perhaps annual, review that includes the specific stakeholders HM Treasury, BEIS, MoD, DEFRA, EA and the NAO to ensure the approach is meaningful and consistent.

To maintain delivery within these changing times we would commend the inclusion of provisions to ensure supply chain stability for long-term projects.

4. Section 3.0 in the Strategy summarises the NDA's current strategic position. In your opinion, what are the key issues the NDA should address and are they adequately covered by this Strategy?

Benefits should be maximised where they can be scaled up under the 'One NDA' umbrella, these include boiler/pond/graphite removal etc. This will provide benefits of scale as well as common and transferable capabilities within the entire NDA estate.

Lessons learned in other countries should be actively sought out with collaborative working with international decommissioning teams who have worked on similar tasks e.g. Japan's Tokai Magnox design reactor.

We would encourage community engagement and development to engage and retrain staff and supply chain capability, equipping them with transferrable skills to work within both the UK and international nuclear sector.

It is recommended that a common framework and strategy for decommissioning is developed and agreed. This would support the necessary ongoing work to align stakeholders, including site licence companies (SLCs) and regulators around increasing risk appetite in the short-term (i.e. within the next 5-10 years). For example, utilisation of novel technologies which may increase short term risk but could accelerate long term activities leading to an earlier reduction in significant nuclear hazards.

The NDA should help in transferring information to UK Plc to support future decommissioning requirements which will arise from the use of new nuclear technologies – these include spent fuel management, fuel cycle and the overall lifecycle of facilities.

A final important issue is strengthening confidence in the commercial side of projects by ensuring that the costing models recognise not only short term value for money but also the entire lifecycle and sustainability of projects. This is especially important when there are significant uncertainties (e.g. around delivery scope and nuclear challenges) which can impact overall delivery costs.

5. The NDA is committed to reviewing the way in which we express the level of concern presented by a facility to help us prioritise our work and to track our progress in reducing the level of concern. What other aspects of progress would you like us to track? How would you like to be engaged in the development of this work?

This topic could be both national and project specific and thus only generalisations could be presented here. IChemE via its Nuclear Technology SIG and its members would welcome any opportunities to support the development of this work. We are able to provide feedback and engagement from our members who have a broad range of expertise across the nuclear industry and have access to the wider chemical engineering community which may offer additional opportunities for innovation and learning.

However, specific areas that we would recommend for tracking include:

- Progress on critical enablers as well as facility high hazard risk reduction
- Demonstration of local contract engagement through the supply chain
- Continued engagement with stakeholders, local communities and within education to make sure that what NDA delivers and achieves is known to as wide a stakeholder community as possible and that the knowledge of those stakeholders on the NDA approaches to safety, sustainability and environment in the nuclear industry are strengthened.

- Consideration of using near-term deliverables within projects, along with the lead-and-learn approaches to address uncertainties, to demonstrate a value for money approach in delivering decommissioning milestones.

6. Do you agree with our aspiration to re-use waste for a purpose on site (e.g. void filling and landscaping) where it represents a net benefit and allows the site end state to be achieved? What factors should we consider?

Whilst recognising the focus should be maintained on high hazard risk reduction within existing facilities the re-use of materials used to support the longer-term strategy would appear a good approach that would not increase lifecycle waste disposal costs. In addition, the re-use of waste on site would reduce the risk of dose exposure of the public and be more socially acceptable.

Further stakeholder engagement (via local communities, education etc.) may be required to alter a potential perception that the UK is just 'burying nuclear waste'. We would encourage the NDA to be as transparent as possible to the public to build trust based on reason and evidence.

We would encourage within the re-use approach the inclusion, where possible, of material that might be treated as very low-level waste (VLLW) from existing legacy facilities for use in other potentially unrelated NDA projects e.g. use of lead shielding to support construction of near surface disposal capabilities.

7. As well as ensuring that remediation of our sites is safe, sustainable and publicly acceptable, we also aspire to enabling their beneficial reuse as early as possible. What are your views on using controls (e.g. land use restrictions) to protect people and the environment from residual hazards so that the site can be used in a restricted way until it is suitable for unrestricted use?

Nuclear sites are controlled under the licensing and permissioning regimes of the nuclear and environmental regulators. We support the environmental aim of ensuring that nuclear site owners to return their sites to unrestricted use wherever it is achievable, but we recognise that this may not be achievable, or be of limited value, to deliver it in the near term, particularly in remote location sites.

We recognise that whilst security considerations for areas which are near active sites will ultimately limit potential re-use. We would support the appropriate recovery of NDA sites to deliver long term sustainability aspirations. For instance, re-using it for renewable power generation or perhaps re-wilding to support wildlife and vegetation may offer the UK Plc. an opportunity to offset carbon emissions.

8. Do you think it is appropriate for us to seek interim uses of our land and in your opinion, what should these include

Where the risk is deemed sufficiently low, it is a sensible approach to consider interim land re-use. Appropriate examples include light industry, in particular those that are part of the site supply chain.

Alternatives may also include scientific research. For any re-use, it is important to consider the de-licensing of sections of the site, access and moving or installation of fences and other security measures.

9. To support the development of a suitable range of treatment technologies we need to invest now in creative thinking and innovation to secure significant benefits in the long term. Do you believe the NDA should continue to adopt this approach recognising that there could be a short-term cost burden, as delivery of the next generation of treatment facilities will take time to implement?

The NDA needs to be supported throughout its mission with both the equivalent capabilities and expertise it has to date plus potentially wider expertise and capability to meet projected future needs. The mission is multigenerational and the NDA needs to support the maintenance of the skills of the current generation as well as the development of the skills of the next generation.

In addition, new technologies may have different needs to present ones, e.g. glass encapsulation has specific requirements that are different to other novel technologies and future generations may be able to harness better value for money waste management by moving storage location or sharing treatment facilities.

Long term costs and benefits of innovation are paramount to supporting the NDAs strategy. The implantation of these innovations must be managed to overcome cultural barriers to their use

The NDA should maintain a list of key issues that may delay or potentially prevent decommissioning and use this list to focus its research funding on the development and realisations of suitable solutions.

A wide range of ideas including those of high innovation should be considered and encouraged for review so as not to stifle innovation across the estate. Benchmarking against other countries research portfolios should be carried on a continuous basis to seek potential collaborative opportunities.

The NDA should consider the development of a research support decision making tool that looks to recognise not only the management of safety and risk issues within the use of innovation but also those that are not directly related to the technology itself including institutional bias and public perception.

The tool should encourage the challenge of traditional norms by seeking to understand how proven decommissioning technologies or processes that have acceptance in other countries but not in the UK may be adapted for the UK or whether the UK regulatory system be modified to accept them. Thus, potentially creating a wider range of innovative tools that can be deployed in support of the NDAs mission.

There may be value in managing these opportunities through a leg of the organisation that is independent of the baseline owners to avoid operational pressures altering the direction of innovation and losing future potentials.

10. We implement the *Waste Hierarchy* and minimise the amount of waste we have to dispose of. However, to complete our mission we do need a range of disposal facilities to accommodate our diverse radiological and non-radiological waste inventory. Do you think our overall disposal vision is clearly articulated and do you support our key messages?

Our considered view is that the concept of the waste hierarchy needs to be further explained to the public. A particular focus should include explaining the difference between VLLW, LLW and HWL and how their risks compare with conventional radiation exposures such as transatlantic flights and providing further information on special waste materials such as graphite.

Additional efforts should be considered to engage internationally to understand if practicable solutions can be found which would be of benefit of all parties involved. Different countries face different challenges with waste disposal and an international alliance/dialogue may provide the opportunity to discuss, understand and develop strategies to address the very difficult challenges that may still need solutions.

Given the prolonged and difficult process that has occurred to date regarding the Geological Disposal Facility (GDF). We would encourage exploring other long term solutions which do not need the GDF as part of suitable contingency planning. Such activities may reduce the overall uncertainty in Site License Company (SLC) requirements for waste storage in the long term and may ultimately reduce lifecycle costs due to new treatment technologies or decay of radioactivity prior to final disposal.

It is noted the Scottish Higher Activity waste policy does not align with the NDA Strategy, therefore it is important that a relationship and dialogue between the NDA and the devolved Scottish Government be developed further to ensure key requirements/aspects of strategy and activity are delivered/not compromised.

11. How should we develop our HSSEW strategy to better support NDA group operations?

COVID-19 has demonstrated the need for group resilience, with greater focus on business continuity – provision of functional appropriate IT equipment, training on its use as well as guidance on how to manage teams while working remotely all support this. This will support the long-term health and welling of teams who have the support required to continue to perform and deliver to the best of their ability. The NDA should look at Japan, Ukraine and the US to identify what aspects of their different approaches are within and not within acceptable HSSEW criteria

Good management practice should be applied in all organisations and operations.

12. SAR is a new topic strategy for the NDA. Does it cover everything that you would expect? Should more emphasis be placed on group resilience?

Nuclear material security should be a high priority. As the UK leaves the EU, leaving the EURATOM arrangements will present new challenges to maintaining safeguards as well as security. It is however noted that the ONR is cognisant of this in its operations and provides support to BEIS to engage with industry, and/or make provisions in its regulatory planning. ONR as a consequence has developed and set in place a new regulatory arm for safeguards that works closely with both its existing safety and security regulatory purposes which will strengthen the security oversight.

SAR needs to be fully supported by continuous, long-term funding in order to support the safe and secure operation of nuclear sites. Spending reductions can reduce the ability to maintain this and this can lead to costly mistakes and breaches. SAR policies are only successful if effective expertise, equipment and procedures are put in place and maintained.

13. Cyber security is a new topic strategy for the NDA. What are your views on adopting this approach and what else should we be doing in this area?

Cyber security is an important consideration for any organisation and particularly important to the NDA given the materials in its control thus we would assume that the NDA would consider this a high priority task.

Standardisation in IT systems across the NDA's estate will help reduce the cyber threat as well as promoting collaborative working between SLCs

Continuous learning should be taken from other high security sectors. This should include good practice, examples of threats and how to implement protocols effectively. Such sectors include the NHS and universities who are supported also by a number of non-profit organisations such as JISC. Consideration should be given to opening dialogue with these as well.

Understanding of international best practice should also be noted where threats and risks may come from other sources, but where learning can still be transferred.

14. What are your thoughts about the scope of the RD&I strategy going beyond traditional STEM subject boundaries? What areas of research would maximise benefits to the NDA group?

IChemE considers that extending the strategy beyond STEM would be beneficial if it incorporates skills relevant to the success of the NDA e.g. use of behaviour sciences to support change and transformation initiatives within the estate.

The NDA should promote RD&I where it recognises weakness or can see useful benefits whether this is in STEM or other areas. Wider engagement with SLCs to understand these requirements, as well as communicating their benefits to the public would be of benefit in this area

Our experience would support RD&I using opportunities to engage with non-nuclear industries to identify solutions that may be applicable to nuclear decommissioning. This would avoid or minimise the risks entailed within the specification of bespoke solutions. Standardised processes would also enable more cost-effective solutions in terms of RD&I and their implementation.

It would be beneficial we consider for NDA to conduct an up-to-date audit of research requirements including what development, manufacturing and process capacities are needed and when. This would enable the development of stronger links between academia, NDA and the nuclear industry to provide relevant, timely, fit for purpose solutions which are adequately resourced to tackle the NDAs challenges.

15. Do you think the encouragement of a culture which promotes innovation is an important topic for the NDA, and do you support the approach being taken?

Building and maintaining a culture of innovation is important and is fully supported. Cultural change within the NDA and the SLCs on implementation of new targets and technologies needs to be addressed in order to support and potentially accelerate the delivery of the NDAs mission. However, innovation should not be pursued at the cost of delivering current proven technologies if it delays high hazard risk reduction. Solutions must be timely, robust and meet required tolerances.

Sufficient NDA and SLC resources need to be deployed in order to develop and implement innovative solutions, with a robust approach taken to incorporate academic input as well as wider learning from other industries and countries

Innovation is not a singular aspect of evolving techniques, equipment, chemical processes and handling. It is the outcome of wider employment of companies and engineers. It is important that a holistic approach is taken to problem solving and addressing difficulties faced by the NDA. It is important not to consider decommissioning in isolation, with consideration being given to innovation across the complexity of the life cycle of materials, their management, and the processes.

16. We are keen to have greater diversity in the NDA group workforce; what more should we be doing to achieve this?

Good practice examples include the use of blind applications and anonymised CVs. This includes removal of information including name and to learning institutions in order to provide wholly impartial reviews of candidates.

Increase diversity within the nuclear industry by recruiting more from external organisations and experience outside of the nuclear sector. Inclusion of this wider expertise will bring different perspectives and help the sector learn and improve. Currently there is a high focus on entry level positions which will inevitably diminish diversity of thought and innovative thinking. The Royal Academy of Engineering has a diversity progression framework and resources for employers as well as professional engineering institutions.

We would encourage continued engagement and support of STEM activities in schools

The COVID-19 pandemic has demonstrated that work can be carried out remotely to a high standard within the nuclear industry. This experience should be used to facilitate recruitment from a diverse range of regional areas to remove relocation as a factor, therefore providing the NDA with a wider recruitment pool

Consideration should be given to diversity and inclusion within the supply chain, and support provided if required in order to maintain the high standards set out by the NDA.

17. How far should we engage our supply chain in meeting any future sustainability targets?

Sustainability targets should be clearly defined and clearly identified in terms of strategy delivery. There should be an expectation that sustainability will form part of any procurement policy when engaging with the supply chain. Where appropriate support may be provided to small and medium enterprises (SMEs) who may not have the same resources as larger organisations to pursue sustainability.

18. We are developing our group-wide digital vision; in your opinion, how ambitious should we be?

IChemE recognises the value of a group-wide digital vision and has made digitalisation one of its priorities within its strategy 2024. We are now establishing how this will be delivered by our members, for our members and for the benefit of society. We would commend being as ambitious as possible whilst recognising that collaborative opportunities of working under ‘One NDA’ also carry with them ethical and security concerns surrounding the setting up of databases, the use of up to date, common data and software standards amongst SLCs and the sharing and storage of data.

All pertinent records should be available in a simple and searchable format. This includes drawings, historic paper records etc. This should include use of version control where appropriate, to understand when and where changes are made.

Limitations in data access may mean that lessons are not learnt from historic activities. This could invite unnecessary duplication of work and lead to errors or potentially exposure to unnecessary hazard and risk.

19. How should we reduce the barriers for entry into the supply chain for local SMEs?

SMEs enter business in two ways. Direct supply to the end-user and via contractors who use the supply chain. SMEs should be provided with opportunities to network and understand industry needs and requirements so as to successfully engage with potential nuclear organisations.

Whilst the approach of sending work to only members of preselected consortia can reduce cost and potentially improve response times to NDA needs this may generate limitations to accessing innovative and flexible SMEs and may unfortunately result in forms of cartels. We therefore suggest alternative approaches be sought to break down those barriers and access not only alternative SMEs but also intelligence networks like those that exist and are available within ancillary organisations like the IChemE.

The IChemE and other professional bodies (Nuclear Institute, IMechE, ICE, The Society for Radiological Protection etc.) also offer opportunities to engage with and understand industry opportunities and needs without contractual obligations. This can include apprenticeships and higher education, research and innovation, process safety and wider issues related to training and policy.

Support local SMEs in their ability to meet procurement rules and strategies through grants and co-operative training and consider the provision of competitive renumeration packages to attract the ‘best athlete’.

20. How can we involve more people in our work and better coordinate our engagement activities?

We would encourage the NDA board to consider additional opportunities for engagement with them directly as well as more frequent briefings with both the nuclear and wider sectors. Such opportunities would facilitate an increase in visibility, transparency and confidence in its work to a wide audience.

21. We recognise the value of international engagement to our mission. Where our core mission allows, how best could we utilise the capabilities of the NDA group to progress broader UK interests?

The IChemE recognises the value of international engagement and its own broad international membership with inherent international knowledge, research and innovation potential has been used to assist government bodies in delivering their missions.

We would encourage the NDA to not only use its own capabilities but also draw on the assistance of organisations like ourselves to enhance those capabilities.

It is important to maintain the two-way flow of knowledge and experience with other organisations across the nuclear sectors. This specifically includes learning from other countries. Frameworks should be put in place to allow transfer of knowledge and information between countries and international organisations. Examples of positive interactions include UK support for Fukushima, as well as ORANO engagement to support the post operational clean-up of the UK’s reprocessing facilities.

We would also encourage two-way engagement with not only international nuclear agencies such as WANO, IEAE and the OECD to understand synergies in challenges and approaches to nuclear decommissioning (including geological disposal) but also international non-nuclear organisations, like IChemE where the challenges of decommissioning and waste management in other high hazard environments may well be similar.