GOVERNMENT RESPONSE TO THE HOUSE OF LORDS SCIENCE AND TECHNOLOGY SELECT COMMITTEE REPORT:

“Nuclear research and technology: Breaking the cycle of indecision”

1. The Government welcomes the House of Lord’s Science and Technology Committee’s report on the UK’s nuclear research and technology landscape. We set out below the actions we intend to take or have already taken in the light of the Committee’s questions and recommendations.

2. The Committee’s previous, 2011 report on Nuclear Research and Development Capabilities was welcomed by the Government of the day and remains a key consideration in the development of the current nuclear innovation programme and its supporting actions.

3. The Government recognises the importance of research and development in the nuclear sector and continues to develop policy and deliver actions in this area.

4. In the 2015 Spending Review, the Government announced funding for “an ambitious nuclear research and development programme that will revive the UK’s nuclear expertise and position the UK as a global leader in innovative nuclear technologies”.

5. In November 2016 the initial £20m phase of the nuclear innovation programme was launched\(^1\), covering five key areas: Advanced Fuels; Materials and Manufacture; Advanced Reactor Design; Recycling and Reprocessing; and Strategic Tools and Nuclear Facilities. Government is currently considering the form and delivery of the next phase of the nuclear innovation programme in the light of the evidence provided by NIRAB and other sources.

The following paragraphs respond to the specific questions posed by the Committee.

*The Committee restates its recommendation from 2011 that a non-departmental public body (NDPB), distinct from the National Nuclear Laboratory (NNL), be set-up with a co-ordinating and supervising role for nuclear R&D in the UK.*

6. Following the last Report from the Committee, the Government created the foundations for an enduring structure to coordinate and manage publically funded nuclear R&D in the UK. This structure consisted of two key elements: a cross-government board, consisting of the major public sector funders of Nuclear R&D; and an external advisory board of independent sectorial experts from industry, academia and key research facilities.

\(^1\) [https://www.gov.uk/guidance/funding-for-nuclear-innovation](https://www.gov.uk/guidance/funding-for-nuclear-innovation)
7. The close working of this structure has resulted in the provision of an ambitious nuclear R&D programme supported by a comprehensive and robust evidence base focused on the UK’s needs and experience.

8. The cross government board is now enshrined in the Nuclear Innovation Thematic Committee, which is a key part of the wider Government energy innovation governance structure.

9. Today, the Government in partnership with the Nuclear Innovation and Research Office has announced the creation of a successor framework to the NIRAB.

10. Following the launch of the first phase of the 2016-21 Nuclear R&D programme in November 2016 and the ongoing work on the UK’s Industrial Strategy, the nuclear innovation landscape has changed and we recognise that the remit of the advisory framework needs to reflect this. The new body will, as part of its continuing function:
   - monitor the delivery and impact of the BEIS nuclear innovation Programme and recommend any amendments that may arise from the resulting outcomes or developments from the Industrial Strategy and a future Nuclear Sector Deal;
   - advise where innovation could drive down the costs across the whole nuclear cycle;
   - review the landscape of UK facilities based on outputs from the nuclear innovation programme and wider HMG aims and monitor and recommend opportunities for international co-operation.

11. The Nuclear Innovation and Research Office (NIRO) will also continue to provide a secretariat function for the successor to the NIRAB.

12. With respect to the 2013 roadmap, the roadmap itself may change in the light of the Industrial Strategy and a potential Nuclear Sector Deal. However, NIRO will support Government in delivering the aspirations of the roadmap and taking forward the NIRAB recommendations.

Despite the additional £250m over five years promised by the Government in 2015 the amount of UK funding for nuclear research, development and innovation is much lower than public funding levels in other leading nuclear nations, including the US, France and Japan. If the Government's aim is for the UK to be active across the main areas of nuclear R&D and not simply to restrict its interest to being an operator of equipment supplied by others it needs to make significant investments, particularly in those areas (such as Generation IV technologies) that both NIRAB, in its final report, and this Committee, in 2011, have recommended.

13. The Autumn 2015 statement committed the Government to an ambitious nuclear research and development programme that will revive the UK’s nuclear expertise and position the UK as a global leader in innovative nuclear technologies. As part of this commitment, an initial programme of over £20 million was launched in November 2016, supporting innovation in the civil
nuclear sector across 5 major areas from 2016-18 and building on the recommendations set out by the NIRAB.

14. Towards 2021, the allocation of the remaining funding is being developed in line with the NIRAB recommendations. We aim to make further announcements on the next tranche of funding in the autumn as part of our commitment to providing significant investment in the UK nuclear innovation landscape by the Government.

The development of nuclear energy within the UK cannot be seen in isolation or as an end in itself. It must be seen as part of a wider energy policy which seeks to balance the competing demands of affordability, security of supply, decarbonisation and interoperability with other elements in the electricity generation mix.

15. The Government agrees that the UK must have safe, secure and future-proof supplies of energy that are available to all. The Government believes that the nuclear sector in the UK has a strong role to play in the future electricity generating mix.

Civil nuclear is a long term industry where changes in direction in successive Governments’ policies and periods of lack of clarity have had a detrimental effect on the development of the industry, particularly in respect of civil nuclear generation over the last 20 years. The Government has highlighted the importance of the nuclear sector in its industrial strategy green paper and must develop a clear, long term vision and set of goals for civil nuclear strategy. In light of the strongly critical evidence we have received the Government needs to review and refresh the 2013 strategy for nuclear energy, in conjunction with the NIC and take swift and concrete steps towards its further implementation. Furthermore this strategy must be widely publicised and provide both a clear vision and consistency for the long term in conjunction with other existing or planned energy technologies.

16. The Government’s Industrial Strategy, announced in the Green Paper in January 2017, will impact almost every sector of the economy. The nuclear sector has been engaged in the industrial strategy consultation and in the context of that strategy has been leading work to develop a potential Nuclear Sector Deal. The Government will be able to say more about what the Industrial Strategy means for the future of the UK’s civil nuclear sector in due course.

The Government must decide whether it wishes the UK to be a serious player in developing nuclear generation technology as a designer, manufacturer and operator or alternatively to restrict its interest to being an operator of equipment supplied by others from overseas.

17. The UK Government recognises the potential that emerging nuclear technologies could have for the UK’s nuclear supply chain and we have heard industry’s views on this at previous Nuclear Industry Council meetings.
Unlocking investment in the UK is a key driver behind the government’s approach to nuclear, and we will continue to provide support to remove market barriers, and leverage the existing skills and expertise we already have in the UK. We are also currently engaged with industry as they develop a potential nuclear sector deal and the issue of future technologies is being considered as part of this.

We re-state our 2011 recommendation that the UK should re-join the Generation IV International Forum (GIF). In 2011 the Government told us that the UK’s membership of Euratom was sufficient to be involved in the development of advanced reactor designs. But, as we discuss in Chapter 6, the UK is leaving Euratom and this adds to the importance of the UK re-joining GIF. The UK cannot maintain a world leading position for fission or fusion technologies by acting in isolation.

18. We already engage on a working level with the Generation IV International Forum (GIF) both directly and through our existing Euratom membership. We will continue to maintain this close relationship as we leave the European Union and Euratom, and will consider the appropriate membership status as part of that process.

Both the Government and the nuclear industry have high hopes for the newly re-constituted NIC. However, the Committee is disappointed by the baffling hiatus between meetings of the NIC from 2014 to 2017.

19. We agree that the Nuclear Industry Council (NIC) is an important body which facilitates co-operation between Government and the nuclear industry and provides strategic decision making and advice. The hiatus between 2014 - 2017 was partly due to a formal review of the Council, which was undertaken by the then Department of Energy & Climate Change (DECC) in partnership with the Nuclear Industry Association.

20. Members of the NIC agreed that the Council needed a refined membership and a more strategic focus to be effective and so a reformed NIC was launched in February this year. The reformed NIC has a smaller membership comprised of experts and leaders from across the nuclear industry and has a longer term focus than its previous incarnation. It has met twice already this year and we agree it is important to maintain this momentum. The Council is set to meet again in the autumn and its focus so far has been on developing a potential Nuclear Sector Deal, which is being led by the NIC co-chair, Lord John Hutton.

21. We are pleased that the Committee recognises the value in developing a potential Nuclear Sector Deal. The Nuclear Industry Association (NIA), under the leadership of Lord John Hutton, have been coordinating this work with a wide group of industry stakeholders and with oversight from the Nuclear
Industry Council. Industry are currently developing proposals, which are focused on cost reduction across the sector – vital to raising and maintaining the sector’s competitiveness. And skills, of course, are a critical cross-cutting issue for the sector in terms of ensuring we have the capability across the fuel full nuclear life-cycle. Any sector deal will need to be clear on the opportunities for the development of more world-class skills in the UK, but also ensure that, where needed, the right actions from industry – and support from Government – are in place to realise those opportunities.

Small Modular Reactors

The Government should seek technical advice from NNL as a matter of routine, as well as other industry experts, when considering technical decisions such as the development of SMRs.

22. We regularly consult NNL on research funding priorities and have commissioned advice from them specifically on SMRs on a number of occasions.

23. A consortium led by NNL produced the SMR 2014 Feasibility Study that set out to determine the specific benefits available to the UK by investing in SMRs. This report provided the initial evidence base for SMRs. The recommendations made by NNL were implemented by Government including the need to undertake further evidence gathering to increase our understanding of SMR technologies and the challenges they present. NNL has continued to support Government as it develops its approach on SMRs.

24. Government is reviewing how it can make better use of NNL so that it can ensure the technical advice provided by NNL is an integral part of the SMR policy development process.

It is important to recognise that there are several distinct questions that arise from the consideration of SMRs. Perhaps the most important, given that deployment before the late 2020s is unlikely, is what role they could be expected to play alongside the other elements in the UK energy mix at that time. In principle a number of SMRs on a single site could replace a single large reactor. Alternatively SMRs could be more widely distributed with attendant advantages and disadvantages. Both public acceptability and availability of finance, public and private, will be very important. Although a UK role for SMRs would be important, alone it would be unlikely to justify major investment. A joint venture between manufacturers with different and substantial home markets would be welcome.

25. Government agrees that SMRs offer a number of potential benefits to the UK, both in terms of securing a low carbon energy future and broader industrial benefits. However, the development, and potential deployment of SMRs,
raises a number of technical, commercial, regulatory and public acceptability questions that need to be addressed.

26. It is also important to recognise that there is a great deal of diversity in the SMR market. The wide range of technologies, at different levels of development and market readiness, means that it is unlikely that a single policy approach from government on SMRs would be suitable for the sector.

27. As we move to de-carbonise our economy, there will continue to be a demand for the secure, low carbon energy that nuclear provides. This could include energy from SMRs. For example, third generation modular reactors have the potential to play an important role within the near-term electricity generation market, but only if they can reduce costs to a competitive level. While more novel modular reactor technologies offer the potential to deliver major breakthroughs in cost, safety or functionality but are less technologically mature and require further basic research and development support.

28. If the market is going to commercialise and deploy an SMR design, we understand that the right market conditions and regulatory framework must be in place. We recognise that elements of the existing framework may not be best suited to facilitate SMR deployment. One of the aims of the SMR competition was to give industry an opportunity to discuss their views including identifying potential barriers and this engagement has provided valuable insights into the conditions industry considers necessary to deliver an SMR in the UK. This has been complimented with evidence gathering to help Government is best placed to make strategic decisions and consider models for Government interaction with SMRs.

29. We also recognise that Government could have a role in reducing barriers, including on siting and regulatory approvals, which could help de-risk projects and ensuring they are acceptable to the public. We anticipate that as SMR development proceeds across the world there may be benefits to international collaboration, for example, in design assessment and licensing and we welcome the UK’s regulators current engagement with international counterparts on SMRs. Government is also open to exploring global partnership opportunities, including sharing IP.

We are disappointed that the Government launched a competition for SMRs and has not kept to its stated timetable. This has had a negative effect on the nuclear sector in the UK and if the Government does not act soon the necessary high level of industrial interest will not be maintained. It is particularly alarming that the results of Phase One of the competition, which does not involve the selection of an SMR design, have yet to be announced by the Government.
30. The SMR competition has attracted significant interest from industry and has provided participants with an opportunity to discuss their proposals directly with Government. We are grateful to vendors who have given their time to the Government’s evidence gathering process.

31. We are in continued engagement with industry about the policy framework for SMRs and have been holding further meetings with competition participants over the summer to discuss the enablers we are considering to help facilitate SMR development and deployment.

We did not detect any urgency from the Government to make a decision on the SMR competition. Whilst acknowledging the need for due care, the Government must publish its strategy for SMRs without delay if industrial interest is to be maintained and if commercial opportunities are not to be missed. We have reached a critical moment for the future of the United Kingdom as a serious nuclear power strategically positioned to capture coming opportunities.

32. Government acknowledges that industry is eager for greater clarity on the approach we will adopt on SMRs. The commercial case for SMRs is still uncertain. Given this uncertainty, it is essential that the Government’s approach is informed by thorough evaluation of best available evidence. We must invest time now to make a strategic decision for the UK – a decision that could have implications stretching many decades into the future.

33. The time taken has also allowed those in the SMR industry to join together where they see mutual benefits, and to further develop their designs and proposals. The greater the certainty vendors can provide on technical and commercial aspects of their designs, the more attractive an investment proposition it becomes and the more likely they will be to attract the necessary private sector investment. Government is undertaking a further round of engagement with industry to discuss options and our on-going policy development for SMRs. We expect to be in a position to close the existing SMR competition shortly and to announce our policy approach to SMRs in the coming months.

34. It can be challenging to attract private sector investment and so operators must have confidence not only in the technical feasibility of SMRs, but also that the commercial proposition as a whole is sufficiently attractive. We recognise that the Government could have a role in reducing barriers, including on siting and regulatory approval, which could help in de-risking projects.

35. Government has also been supporting the industry in other ways, for example, in advanced manufacturing and the first round of funding for the nuclear R&D programme, which will benefit the whole sector including SMR developers.
The Government should also publish its techno-economic assessment of SMRs immediately and make clear whether it believes there is a sound economic case for the UK to make a substantial strategic investment.

36. Government is committed to publishing the techno-economic assessment of SMRs and we expect this to happen shortly. We will provide more information on the Government objectives for SMRs once the policy development process is complete. We intend to make an announcement on SMRs in the coming months.

National Nuclear Laboratory

We do not see any great advantage at present in the merging of the UKAEA and the NNL which are two organisations of a very different character.

The NNL is well-placed to be a source of independent advice to the Government and to support and deliver research and development in the UK nuclear sector. To do this properly, it will require dedicated core funding. Whilst acknowledging the current climate of financial stringency, we urge the Government to give early consideration to providing modest funding to the NNL commensurate with that provided to other UK national laboratories and similar bodies.

37. The Government concurs with the Committee’s view that the merging of the UKAEA and the NNL does not currently offer any advantages over the existing organisational structures. We will, however, continue to keep this matter under review as the UK’s nuclear R&D landscape develops further.

38. NNL has unique capabilities and expertise across the whole fuel cycle that are a vital resource for providing technical advice to Government.

39. In order to formalise the delivery of NNL’s advisory function to Government, and to separate this from their commercial business, Government has agreed with NNL to expand the remit of NIRO. The overarching aim of the advisory function is to provide independent strategic expert advice to Government that will de-risk investment, inform policy and enable maximum value for money to the UK taxpayer.

40. NIRO will continue to be hosted by the NNL, and staffed by NNL and external secondments, with a series of ethical barriers and appropriate oversight from Government. This new arrangement will streamline Government’s access to independent advice and support, and enhance the independence of the advice provided.

41. We have allocated £500,000 as core funding for this office in 2017/18. In addition, the office will receive a further £350,000 of funding so that it can support BEIS’ research and innovation programme and continue to act as the Secretariat for the planned successor to NIRAB.
42. With agreement from Government, NNL continues to reinvests their profit (c. £10m per year) into updating its facilities, maintaining critical parts of the nuclear skill base, and delivering its own strategic research and development programme.

**EURATOM**

*We note the Minister’s reassurances that the Government is devoting significant resources to maintaining and, potentially, even enhancing some of the benefits that the UK currently achieves from membership of Euratom. We echo Lord Hutton’s suggestion that the Government should convene a working group of industry and government representatives to develop a plan to preserve the essential benefits of Euratom.*

*There is a real urgency for Government action on this. The UK’s membership of Euratom must not be allowed to expire without a suitable replacement being in place. Such an eventuality would put the UK at risk of losing its lead in fusion research and in effect throw away decades of research. Furthermore it would put the UK at risk of losing access to the markets and skills it needs to construct new nuclear power plants and may leave existing stations unable to acquire fuel.*

43. The Government recognises the need for urgent action in respect of Euratom and is pushing ahead with the primary legislation and regulatory arrangements needed to establish a domestic nuclear safeguards regime; it is already in negotiations with the EU about Euratom, and is discussing future nuclear agreements with the International Atomic Energy Agency and with the relevant third countries where new co-operation agreements are required. In respect of nuclear research, the Government agrees that a collaborative effort with industry is vital to ensure the future success of the UK’s nuclear industry and fusion research. Richard Harrington, Minister for Energy and Industry, hosted an Industry Forum on 4 September to launch a dialogue on Euratom Exit between industry, academics, other stakeholders and government representatives. Following the Industry Forum, Government will continue to work closely with the nuclear industry and research establishment industry.

44. The nuclear industry remains of key strategic importance to the UK and the Government has a clear objective to ensure that projects and investment will not be adversely affected by the UK’s withdrawal from Euratom. This includes ensuring continued access to markets and skills, maintaining the UK’s ability to trade in nuclear materials and equipment, and continued R&D collaboration. We are confident that we will reach the right agreement with our European partners as there is a clear common interest in maintaining close and effective co-operation on nuclear issues, including fusion and other nuclear research. The UK is a world leader in fusion research and
development (R&D) and we have no intention of compromising this. Maintaining and building on our fusion expertise and securing alternative routes into the international fusion R&D projects (JET and ITER) will be a priority. On 26th June the UK committed to continuing to fund its fair share of JET costs after we leave the EU should the JET contract be extended to 2020.

45. The Government is also committed to ensuring the UK nuclear industry has the required skills to deliver on its existing decommissioning requirements together with supporting our current nuclear fleet and new nuclear programme. Openness to international talent remains one of UK’s most distinctive assets.

46. Our withdrawal from the Euratom Treaty will therefore in no way diminish our nuclear ambitions and the Government remains firmly committed to bringing forward the UK’s first new nuclear power plants in a generation and not only maintaining but building on our leadership role in respect of nuclear research and development.