Small nuclear power: Government Response to the Committee’s Fourth Report of Session 2014–15

Sixth Special Report of Session 2014–15

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The Energy and Climate Change Committee

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The current staff of the Committee are Farrah Bhatti (Clerk), Vinay Talwar (Second Clerk), Tom Leveridge (Committee Specialist), Marion Ferrat (Committee Specialist), Shane Pathmanathan (Senior Committee Assistant), Amy Vistuer (Committee Support Assistant), and Nick Davies (Media Officer).

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Special Report


Appendix: Government response

Introduction
The Government welcomes the Energy and Climate Change Committee’s report on small nuclear power.

This response has been prepared by the Department of Energy and Climate Change (DECC), with input from Office for Nuclear Regulation (ONR). The Low Carbon Innovation Co-ordination Group (LCICG) has also provided valuable input into the development of policy on SMRs.

The Committee’s recommendations are shown in bold and the paragraph references at the end of each recommendation correspond with those of in the Committee’s report. The Government’s response is given beneath each recommendation or group of recommendations.

The potential role of small nuclear power

Small modular reactors are an attractive proposition and we welcome the Government’s work looking into the feasibility of these reactors in the UK. However, we recognise that the nuclear industry’s immediate priority is rightly the successful delivery of the UK’s current conventional new build programme. (Paragraph 10)

Government is pleased that the Committee have endorsed its approach to SMRs. The Committee is right to note that the Government’s priority remains the 16GW of nuclear power that is proposed by the conventional new build programme.

However Government does recognise the long-term potential of SMRs as an additional source of generation, which is why it commissioned the SMR feasibility study. The study, published by the National Nuclear Laboratory in December 2014, provided an initial evidence base for SMRs and whether there is a role for SMRs in the UK. The study recommended a more in-depth analysis to establish the robust evidence base needed to enable a policy decision on SMRs and help Government decide whether it wants to pursue a UK SMR programme. This second phase of work is now underway and more detail is given below.
Choice of technologies and fuels

There are a number of advantages to switching to a thorium fuel cycle; however, the evidence we have heard suggests that this will not be a viable option unless the price of uranium changes drastically. The UK must for now remain an active participant in thorium research and development. We recommend that the Government commission a study to confirm the potential benefits of thorium in the longer-term and how any potential barriers to its use might be overcome. (Paragraph 17)

The Department of Energy and Climate Change is aware of the potential of thorium as a nuclear fuel and thorium fuel cycles fall within the scope of the Department's analysis of future nuclear scenarios.

The UK remains actively involved in research to develop thorium reactors and the thorium fuel cycle through organisations such as the National Nuclear Laboratory (NNL) and its partners, as well as the UK Research Councils’ Energy Programme.

The Government has drawn on this expertise to model future nuclear scenarios that include the use of thorium. These are not exhaustive, but a current overview of this approach is presented in the document "Nuclear Energy Research and Development Roadmap: Future Pathways", which is available from the UK Government website.

Amongst the conclusions of this modelling is the expectation that thorium reactors would be subject to the same fuelling limitations in roll-out as fast reactors, in which the rate of commissioning is constrained by the rate of production of start-up fuel from the existing reactor fleet.

Thorium fuels are also likely to differ from uranium fuels in their waste characteristics, including their radiological properties and the amounts of heat they generate. These waste characteristics will vary with the type of reactor in which thorium fuels are used and individual systems may offer significant advantages or barriers to the waste's management and final disposal.

It is anticipated that further analysis and fuel cycle modelling will be necessary to understand the implications on waste management and disposal of using thorium fuels.

Cost and investment risk

The commercial viability of small modular reactors (SMRs) remains unclear. It is important to understand the cost comparison with large-scale nuclear reactors as well as the comparison with other small-scale energy generation. Government should work with industry to better understand the economics of SMRs and set out a clear explanation of the conditions under which they are likely to be cost competitive in the UK. The National Nuclear Laboratory’s SMR feasibility study provides a useful preliminary financial analysis but itself acknowledges that a more detailed analysis is required. (Paragraph 29)
It is clear to us that Government support will be needed if small modular reactors are to be successfully deployed in the UK. The options for Government are discussed in more detail in Chapter four. (Paragraph 34)

The second phase of work on SMRs commissioned by Government will help address these recommendations.

The National Nuclear Laboratory Feasibility Study provided an initial evidence base on SMRs and Government recognises the value of the work taken forward by the consortium. However further analysis is required to provide the investment grade analysis needed for Government to determine its policy on SMRs or for industry to make investment decisions. The study recommends deeper investigation of SMR technologies, including an understanding of what is needed to bring them to market, further financial analysis to clarify the economic case and a testing of the possible engagement models for partnering with an SMR vendor. Government is taking forward this recommendation as a second phase of work, which will also address the remaining technical challenges and identify what benefits to the UK there could be from SMR deployment.

Phase 2 is likely to contain a number of work packages:

- A specification study to inform the key criteria needed to underpin any future SMR policy decision. The study is intended to set out the potential parameters of a techno-economic assessment that could be used to assess SMRs.

- A techno-economic assessment designed to provide an evaluation of credible reactor designs. The exact scope of the assessment will be informed by the specification study. However it is likely that the assessment will also consider what technical challenges are solvable, and what UK benefits can be derived. Additional economic modelling and assessment of the designs will also be taken forward at this stage.

- Alongside the techno-economic assessment Government will also consider undertaking additional work that will support the assessment and increase our understanding of the technologies.

This second phase of work is intended to provide the technical, financial and economic evidence base required to support a Government policy decision on SMRs. If a future decision was to proceed with UK development and deployment of SMRs, then further work on the policy and commercial approach to delivering SMRs will need to be undertaken, which could lead to a technology selection process for Generic Design Assessment (GDA).

Regulatory assessment

We were surprised to hear it might take six years to give regulatory approval (including a site-specific licence) for a small modular reactor. However, we recognise the importance of ensuring that a rigorous safety assessment is made of the design. The Minister explained that the Government will take an active role in trying to improve that Generic Design Assessment process—Government should provide an update on
these improvements in its response to us. We also call on DECC to ensure that the Office for Nuclear Regulation is adequately resourced to support SMR developers in the early stages of preparing their designs for approval. (Paragraph 41)

There is scope for further international collaboration on regulatory approval of new reactor designs. We welcome the Office for Nuclear Regulation’s involvement in the Multi-national Design Evaluation Programme, and encourage ONR to think innovatively about new ways to streamline its regulatory processes to ensure they remain robust and swift. (Paragraph 45)

Regulatory approval timescales, particularly in the case of GDA, are heavily influenced by the readiness of the Requesting Party in terms of their understanding of the UK nuclear regulatory process and the quality of their documentation. Were a Requesting Party to enter into the process with comprehensive, high-quality, UK-specific documentation, the relevant regulators (ONR and the Environment Agency) may be able to achieve an accelerated approach. However, it is not the case that SMRs would necessarily be easier or faster to assess because of their size; SMRs range in power output between designs producing a few megawatts and those producing up to 300 MW (analogous to current power stations). Some designs use novel technologies which would require regulators to build their knowledge of the design. As the Committee notes, it is important that any new reactor designs are subjected to rigorous safety assessment. Public confidence in SMRs would suffer if it were perceived that standards were being lowered to facilitate speedier design assessment.

Regulators are working to an agreed schedule which allows for the assessment of all designs currently proposed for deployment in the UK, but not at present for any others. It is the Government’s position that UK regulatory approval through the GDA process is intended for designs which have a serious prospect of being built in the UK, as opposed to a process whereby GDA achieved in the UK is used as a seal of approval to market products internationally.

The agreed schedule provisionally provides for one SMR design – following a selection process and subject to Government policy decisions – to potentially begin GDA in 2017. The figure of six years referred to appears to be based on an estimate of four years for GDA, followed by two years for site licensing. Should the Requesting Party and prospective licensee be the same, it is possible to run the two processes in parallel, reducing the total period needed but, as the report notes, any proposed new nuclear power station will need to pass through several regulatory processes. Lessons learned from the first round of GDA have been used to further streamline the process, and ONR is committed to continuously improve and refine GDA to build on experience after each successive round.

The Office for Nuclear Development at DECC, ONR and the Environment Agency have set up a New Nuclear Build Strategic Steering Group to ensure that DECC, as the responsible department for new nuclear, and the two regulators can share a common understanding of the information available on prospective new nuclear investment in the UK and of the resources needed to enable this investment, and use this as a basis for agreed actions.
The Steering Group ascertains the resources needed to conduct the GDA of reactor designs, and, following on from this, site licensing, environmental permitting, and site regulation during construction. The intention is to ensure that ONR’s decisions regarding deployment of its regulatory resources are informed by an understanding of the Government’s policy and priorities for nuclear development.

The establishment of ONR as a Public Corporation, outside of the Civil Service provides the regulator greater flexibility to recruit and retain nuclear specialists to meet its future resource demands. ONR is confident that it can satisfy these demands and ensure its integrity as an independent regulator.

Potential SMR development and deployment in the UK is also being discussed within the nuclear research community - in particular the Nuclear Innovation and Research Advisory Board (NIRAB) has been asked for advice by DECC and BIS, which has prompted NIRAB to actively look for possible related research and development projects.

ONR takes account of other international regulatory assessments through bi-laterals with other countries as well as the Multinational Design Evaluation Programme group. However, the limiting factor is often the difference between the UK’s goal-setting approach to nuclear safety and that of many other regulators, who are target based – meaning that the priorities of individual assessments are very different. ONR is committed to ensuring that it works collaboratively with international partners, and will contribute to and implement good practice in the international nuclear sector.

**Siting considerations**

**The Government should support the use of existing nuclear sites for the deployment of small modular reactors. These sites could potentially host a demonstrator module with minimal additional infrastructure requirements and with the support of a skilled local workforce. (Paragraph 50)**

The Government’s priority remains the use of all eight sites on the Nuclear National Policy Statement for the development of full-scale nuclear power stations.

The Government agrees that at some stage an exercise to identify sites, both for new full-scale nuclear power stations and potentially for SMRs, is likely to be necessary, and is considering what form this might take. However, the siting of nuclear installations is a sensitive matter and it is not the Government’s intention to name sites, other than those on the NPS, as potentially suitable for new nuclear power stations, in advance of such an exercise or of any serious expressions of interest in developing additional sites.

**Safety and security**

**We recognise that small nuclear reactors will generally raise similar questions of safety and security to those raised by large nuclear reactors. The UK already has robust processes in place to ensure the safe and secure operation and maintenance of the plant as well as transportation and management of fuel and spent fuel. (Paragraph 55)**
The Committee is right to highlight that both security and safety considerations will be of primary concern to Government as it develops its policy on SMRs.

There are no commercially operational SMRs anywhere in the world and designs are still evolving. Therefore it is not possible at this stage to make a definitive statement on the safety and security issues which may be raised by SMRs.

We can nevertheless be clear that any new reactors, including SMRs, proposed for construction and operation in the UK will be subject to robust and independent regulatory scrutiny and will only be allowed to start operating and to continue in operation if and when regulators are satisfied with their safety, security and environmental aspects.

The GDA process, which can take place before the formal regulatory process, considers safety, security and environmental aspects of reactor design and allows any issues specific to the design of the reactor to be identified and resolved at an early stage. This would be a key step in ensuring that any SMR design meets the UK’s rigorous regulatory requirements.

Ensuring safety is the legal duty of operators and safety at all nuclear sites is kept under regular review. The UK’s independent nuclear regulator, the ONR, carries out safety inspections to ensure operators are fulfilling their duties and that robust safety measures are in place across the industry.

DECC is responsible for the overall effectiveness of the security regime for the UK’s civil nuclear sites. The security regime is kept under continuous review and complies with international standards. As with conventional new build any SMR built in the UK would be subject to security regulation by the ONR during construction, operation and decommissioning. This would ensure that robust security measures are in place.

Public engagement

The Government must work with industry on a programme of proactive public engagement on small nuclear reactors—especially if such reactors might in the future be deployed in areas that are not currently considered suitable for nuclear power e.g. away from the coast, closer to centres of population etc. (Paragraph 57)

Government recognises the importance of engaging with the public on SMRs. We are aware that the design characteristics of SMRs mean they will raise issues not faced by large reactors such as the potential for distribution in greater numbers across the country and proximity to centres of population. These issues are likely to increase public interest in SMRs. Government will consider appropriate opportunities for public engagement during the policy development process.

The Nuclear Industry Council is the key engagement forum for Government and Industry. The Council has commissioned a number of workstreams covering areas such as skills and business capability. In addition the Council is taking forward a project on public understanding that is focussed on the development and delivery of key messages on nuclear. This workstream could be an effective delivery mechanism for work on engaging with the public on SMRs.