WRITTEN EVIDENCE FROM URENCO (NCL0055)

ABOUT URENCO

1. Urenco is an international supplier of enrichment services and fuel cycle products with sustainability at the core of its business. Operating in a pivotal area of the nuclear fuel supply chain for 50 years, Urenco facilitates zero carbon electricity generation for consumers around the world.

2. Headquartered just outside of London, Urenco's global presence ensures diversity and security of supply for customers through its enrichment facilities in Germany, the Netherlands, the UK and the USA. Urenco is committed to continued investment in the responsible management of nuclear materials; innovation activities with clear sustainability benefits, such as nuclear medicine, industrial efficiency and research; and nurturing the next generation of scientists and engineers.

Urenco in the UK

3. At our Cheshire base at Capenhurst we operate three sites, which enable nuclear power stations around the world to generate electricity. We operate a Tails Management Facility (TMF) which converts nuclear material for long term storage. At our Urenco Nuclear Stewardship site we play a leading role in providing responsible stewardship of nuclear materials through waste management, long term storage and decommissioning services and we are developing capabilities to support Urenco's own decommissioning needs.

4. Our Capenhurst facility forms a central part of the 'North West Nuclear Arc', providing over 840 highly skilled jobs as well as supporting 40 apprentices and graduates to become the next generation of nuclear professionals.

EXECUTIVE SUMMARY

5. The Government's clear support for the nuclear industry is welcome and a continuity approach will provide certainty to operators, developers, the supply chain and educational establishments - and provide a solid base from which to further help the sector grow amid the current energy crisis. The *British Energy Security Strategy* and the introduction of the *Nuclear Energy (Financing) Act*, as well as the launch of the Future Nuclear Enabling Fund, Nuclear Fuel Fund, and the confirmation of High Temperature Gas Reactors (HTGRs) as the technology of choice for advanced nuclear demonstration provided clear policy and legislative signals of the role of nuclear in the UK's future energy mix.

6. The conflict in Ukraine has highlighted the greater need to move towards energy self-sufficiency and low-carbon domestic energy sources. With the cost of gas in Europe and

the UK at record levels, it is essential that the UK seeks to maximise energy generation from nuclear energy and other low-emission sources to achieve Net Zero and decarbonisation targets.

7. We, therefore, welcome the opportunity to respond to this inquiry which will examine the government's approach to developing new nuclear power and how policymakers and industry can collaborate to deliver the UK's nuclear ambitions whilst supporting Net Zero and energy security targets.

What technical challenges do the next generation of nuclear fission power plants, including Small Modular Reactor and Advanced Modular Reactors, face?

Advanced Nuclear Fuel Supply Chain

8. We understand that a significant challenge facing the development and deployment of small modular reactors (SMR) and advanced modular reactors (AMR) is the development of the nuclear supply chain, including nuclear fuel, in particular advanced fuels for advanced reactors.

9. The UK government confirmed High Temperature Gas Reactors (HTGRs) as the technology of choice for its AMR Research, Development & Demonstration Programme. In addition to clean, reliable, low-carbon electricity, the steam from HTGRs could be used in applications including clean hydrogen production, which is important for reaching Net Zero. However, HTGRs use new types of advanced nuclear fuel and the existing fuel supply chain will, therefore, require significant investment in order to produce these advanced fuels.

10. Currently, the only source of advanced fuel for a commercial enricher is Russia. The length of time it takes to establish the funding, address regulatory issues, and then construct the necessary fuel cycle infrastructure creates unique challenges to the front-end nuclear fuel supply chain needed to bring advanced reactors to market. Moreover, this capacity will not develop commercially without a sustained customer base and the advanced reactors that need advanced fuels cannot be deployed without a supply of fuel.

11. **POLICY RECOMMENDATION:** International collaboration is, therefore, fundamental to successfully realising the opportunities of advanced nuclear technologies and to help develop a non-Russian supply chain for the provision of advanced fuels. The government has a key role in working with the domestic civil nuclear supply chain to undertake research and development more efficiently by collaborating in key facilities and technologies unique to other countries and their domestic supply chains.

Regulatory Harmonisation

12. We would also emphasise that a significant technical challenge to the accelerated deployment of advanced nuclear technologies is the current lack of regulatory harmonisation. A clear pathway to regulatory approval for SMRs and AMRs to enable global deployment and roll-out is essential. Indeed, if a design for an SMR or AMR is required to be re-approved by each regulator it will increase costs, time and significantly impede the roll out of these new technologies.

13. **POLICY RECOMMENDATION:** The government has a key role in supporting the national regulator and industry to work together internationally so at least part of an SMR or AMR design can be replicated between jurisdictions and approved once with mutual recognition then possible by other regulators.

What support or interventions are required to bring these technologies to the grid as soon as possible?

14. As outlined above, advanced nuclear fuel capabilities will not develop commercially without sustained customer demand. In a developing market where there is a current lack of clarity on the type and number of reactors to be developed, there is a role of government to support market failures by developing an advanced fuel "fuel bank" and/or other contractual mechanisms. This would build market confidence in the level of demand for advanced fuels support investment in, and financing of, the UK nuclear fuel supply chain.

15. Activity also needs to start - or where started, to continue at pace - on enabling frameworks with the nuclear industry and government working in tandem. In particular, we would highlight the following enabling actions and interventions which could help bring these technologies to grid as soon as possible:

    a. **Nuclear insurance -** The challenge for how nuclear insurance frameworks accommodate the potential risk, which may well be different from advanced technologies or developments from SMR technologies or accident tolerant fuels for large light water reactors needs to be considered.

    b. **Review supply chain with the involvement of developers** – A supply chain gap analysis will provide a better understanding of supply chain readiness to support the roll out of new technologies.

    c. **Siting policy** – Planning/siting policy needs to be revised to be able to facilitate multiple industrial/brownfield sites from 2030s onwards, for AMRs and SMRs (inc heat/hydrogen opportunity).

    d. **Licensing for FOAK (UK Demonstrator) and NOAK** – It needs to be considered whether a site license for a UK Demonstrator could be taken forward

on the expedited basis of an AMR research reactor application for FOAK, and enable ONR to have the requisite capability/capacity to undertake multiple license applications for fleet deployment.

e. **Delivery / finance model** – The potential for operational/leasing finance models (such as aircraft leasing model) needs to be explored to establish whether this could help enable fleet deployment of AMRs in the UK.

f. **Uranium accounting** – Noting that advanced reactors will burn their fuel in different ways, it will be important to consider how uranium accounting might be dealt with going forward. Current best practice demands regular inspection of fuel to check it is still there, but this may be impracticable for advanced nuclear reactors, with longer fuel cycles, such as 5 years plus.

g. **Decommissioning** – There is a need to understand how all AMR developers should interact with the NDA's Radioactive Waste Management (RWM) with specific regard to the Geological Disposal Facility (GDF).

h. **Facilities** – A supporting ecosystem needs to be considered to ensure the appropriate location for centres of excellence that support the national interest in Net Zero, energy security, levelling-up, a joined-up industrial strategy and building back better.

i. **Process Heat** – An understanding of the demand for process heat across foundation industries in UK, to capture numbers for indicative market pricing for energy, projected customer demand and financial model projections could help further unlock the roll out of new technologies.

16. This will need to continue to be prioritised in order to develop an enabling roadmap to lay out a clear forward plan for the deployment of the required nuclear technologies to support the government's aim of achieving Net Zero by 2050. Ultimately, an effective deployment roadmap for small modular reactors and HTGR deployment, coupled with targeted interventions, such as the Future Nuclear Enabling Fund and GB Nuclear, will all help support the national interest in underpinning small modular reactors, as well as HTGR delivery models in UK.

When will fusion power supply electricity to the grid?

17. No Urenco response.

What are the advantages and disadvantages of developing fusion technologies over other energy sources?

18. No Urenco response.

What could be done to ensure that the UK's electricity supply is not affected by the high proportion of reactors being decommissioned?

19. Additional nuclear capacity will make the UK energy system cheaper and more resilient by providing clean, reliable power to the grid. New nuclear stations, enabled by RAB, would cut the UK's need for expensive fossil fuels to cover gaps in generation, and provide a backbone of firm, clean power.

How can the government ensure that the cost of decommissioning does not increase any further?

20. An Integrated Waste Management Strategy based on risk and the waste hierarchy provides a more flexible, safe, and cost-effective approach to waste management. However, we would encourage the Committee to recommend that the NDA broaden its business plan and acknowledge the role of integrated partnerships with critical enablers from the UK nuclear fuel supply chain to address shared industry concerns.

21. There are a number of emerging industry trends particularly regarding the Geological Disposal Facility (GDF), reclassification of waste materials, and international decommissioning needs, which would benefit from common solutions. By linking the NDA's strategic purpose with organisations' key challenges and ensuring closer collaboration, this will enable all parties to leverage opportunities in waste treatment, packaging, storage, transport, and disposal to support the whole of the nuclear industry to manage nuclear materials in a more sustainable, efficient, and integrated way.

22. We would also highlight that there needs to be an increased focus on decommissioning costs, as short-term cost saving exercises often leads to future legacy issues and increased lifecycle costs. In particular, this should include a prioritisation of supporting the strategy for Continued Reactor Decommissioning and finding solutions to problematic wastes.

How can lessons learnt from decommissioning programmes be used to benefit new nuclear power programmes?

23. Much of the decommissioning programme will require innovative approaches, and create new challenges for the supply chain. By successfully managing these challenges, the UK can become a world-leader in the decommissioning market, with significant potential for exports of products and services.

24. Indeed, systems and products for decommissioning are of a size and complexity similar to those for new build reactors, and the manufacturing quality requirements are similarly stringent. As such, as highlighted by the Nuclear AMRC; "companies which can secure a place in the decommissioning supply chain will be well placed to enter the new build

programme, and vice versa. Key areas for shared expertise include mechanical components and fabrications across all quality levels"[1].

25. It is also important to consider that new nuclear builds require decommissioning plans to be in place from the outset. Learning from experience from decommissioning can, therefore, help better inform the design of new plant, but also operational and maintenance regimes to make decommissioning quicker, cheaper, and more efficient in the future.

What needs to be done to improve the UK's approach to dealing with nuclear waste and to ensure that the government can meet its aims of transferring waste to geological disposal facilities?

26. To improve the UK's approach to dealing with depleted nuclear materials and to meet the government's aims of transferring this material to geological disposal facilities we would emphasise that a reinforced commitment between government, regulators, and industry on nuclear waste management has the potential to both stimulate innovation and promote the UK as a Centre of Nuclear Excellence.

27. Urenco has previously been involved in discussions with the government on "near surface disposal" for some depleted materials. This is a significant opportunity to ensure a national asset such as the geological disposal facility (GDF) is used most effectively, and built as efficiently as possible. Indeed, the potential size of the GDF could be significantly reduced if there was a near surface policy and facility for less hazardous Intermediate Level Waste (ILW). We would reiterate that any approach to dealing with depleted nuclear materials must reflect the different levels of risk for the different types of material and, as such, the different options.

28. The Netherlands has opted for long term storage of spent fuel, and COVRA (Central Organization of Radioactive Waste) is the recognised collecting service for this activity. There are clear lessons to be learnt from the approach adopted by the Netherlands.

How can the funding methods that support the development of nuclear technologies be improved?

Policy Framework

29. The UK government is already providing support for AMR & SMR technology development, through the UK SMR programme. It has also announced the Future Nuclear Enabling Fund (FNEF) that could provide up to £120m to help remove barriers to development and the £70 million Nuclear Fuel Fund (NFF) which aims to preserve the UK front-end nuclear fuel cycle capability.

[1] https://www.namrc.co.uk/intelligence/decommissioning/

30. These examples of funding are a welcome step forward, however developers will need to secure other sources of funding and this will only be possible with clear policy and regulatory certainty from the government.

Nuclear Produced Hydrogen

31. Nuclear reactors - large, small, and advanced - have a critical role in producing low-carbon hydrogen as nuclear is the only source of energy that can produce the required clean power and clean heat. This makes it a vital component as hard-to-abate sectors seek to decarbonise beyond electrification.

32. Cost is the principal barrier to low-carbon hydrogen production, rather than technical capability. Grey hydrogen is currently cheaper to produce, particularly since its carbon emissions are not adequately priced. Calibrated incentives and investments can, therefore, achieve the cost reductions necessary to make low-carbon hydrogen competitive.

33. In the immediate future, government must align hydrogen production pathways with nuclear technology to enhance hydrogen production. Support for nuclear projects to demonstrate the production of low-carbon nuclear hydrogen through heat-assisted electrolysis at a nuclear site would be welcome as it would be a vital first step in driving commercial investment by illustrating and helping prove the opportunity for nuclear hydrogen over the longer-term.

34. In the longer-term, government intervention and a long-term funding model to accelerate innovation and drive increased efficiencies are also required to ensure hydrogen can be produced at scale and incentivise commercial investment. Industrial hydrogen production does not require long-term government subsidies but driving down the cost of nuclear hydrogen production requires government intervention to support early scalability and provide investor confidence to drive further investment.

How can the UK leverage further private investment in this area?

35. The world of finance is evolving to address investor and lender concerns about environmental issues, including climate change, and increased focus on the social and governance performance of companies they work with. However, the current generation of nuclear power plants are reaching the end of life and there is huge uncertainty over the risks and timescales of decommissioning and commissioning this energy infrastructure.

36. The build cost and financing of new nuclear, therefore, has to include not just the construction and development requirements, but the range of infrastructure around that nuclear power station, particularly contributions to decommissioning costs. By

prioritising a deliverable, safe and efficient plan to decommission facilities this will help business and investors better plan for new build reactors and drive further investment in the sector.

37. To leverage private investment to meet the objectives of the British Energy Security Strategy, it is also essential that the UK's Green Finance Strategy and Taxonomy recognises the whole nuclear supply chain as green. This includes generation as well as the related fuel supply chain and decommissioning activities. This will help provide a level playing field for investment in low-carbon energy technologies and accelerate the transition from fossil fuels.

What support will industry need to meet the government's ambitions for delivery new nuclear power plants in the next decade?

Government Commitment to Investment in New Nuclear Technologies

38. The government should look to continue to publicly support nuclear energy, which is a proven low-carbon source of reliable energy generation, to instil renewed confidence in the sector. In particular, to maximise the contribution that nuclear energy can make to the delivery of Net Zero, a clear commitment to the deployment of further large-scale nuclear plants, but particularly new nuclear technologies such as smaller / advanced reactors is required to help unlock private investment.

Green Finance

39. The European Commission's recent classification of nuclear energy as 'green' under their EU Taxonomy Regulation is a positive development and is central to driving sustained investment from institutional investors committed to financing Taxonomy-aligned economic activities.

40. To leverage private investment to meet the objectives of the British Energy Security Strategy, it is essential that the UK's own Green Finance Strategy and Taxonomy recognises the whole nuclear supply chain as green. This includes generation as well as the related fuel supply chain and decommissioning activities. This will help provide a level playing field for investment in low-carbon energy technologies and accelerate the transition from fossil fuels.

41. Currently, "green" and "sustainable" debt markets are available for infrastructure projects but there is no consistency as to whether nuclear falls within these definitions and it varies between banks and investors how they regard the sector. Classification of nuclear energy as green in the UK Green Taxonomy will address this ambiguity and provide the clarity required to leverage private investment.

42. **POLICY RECOMMENDATION:** Equal access to climate finance for the nuclear energy supply chain alongside other low-carbon energy sources is central to the development of the sector. We would, therefore, encourage the Committee in its final report to recognise that the UK's financial policy framework in conjunction with the UK's Green Taxonomy has a critical role in accelerating the transition from fossil fuels and securing energy supplies by ensuring equal access to climate financing for all low-carbon energy sources, including nuclear.

Access to Talent

43. For the first time in decades, the UK is set to build a new fleet of nuclear reactors, as part of its continued transition to a Net Zero economy. This means that the UK will need increased numbers of highly-skilled people to build and operate the new fleet, as well as a skilled workforce to continue to run the existing stations, decommission the older ones, and safely process nuclear waste. However, an ageing workforce in the civil nuclear sector and a projected increased demand for specialist and generic skills across all parts of the nuclear industry, means action on skills is required now.

44. Indeed, as the Nuclear Skills Strategy Group, Nuclear Workforce Assessment 2021 highlights; the peak mobilisation of new workers (Construction and Engineering Construction) into the nuclear sector is expected to occur in the next two or three years with overlapping builds at Hinkley Point and Sizewell, with the possible addition of further developments at Trawsfynydd and Wylfa. This recruitment pressure will be further exacerbated by non-nuclear construction activities which pull on similar skill sets.

45. **POLICY RECOMMENDATION:** A new roadmap for nuclear skills is required to help ensure the UK can meet the demand for specialist and generic skills across all parts of the industry as it embarks upon its ambitious new build plans. Indeed, as the government implements its British Energy Security Strategy and guides the Energy Security Bill through Parliament, any skills strategy must be agile and flexible to reflect these developments as well as be able to reflect the move from existing reactor technologies to advanced designs.

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