ICE submission on the Energy Security and Net Zero Committee's Revisiting the Nuclear Roadmap Inquiry

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About the ICE

The Institution of Civil Engineers (ICE) is a 97,000-strong global membership organisation with over 200 years of history.

It is a centre of engineering excellence, qualifying engineers and helping them maintain lifelong competence, assuring society that the infrastructure they create is safe, dependable and well designed.

Its network of experts offers trusted, impartial advice to politicians and decision makers on how to build and adapt infrastructure to create a more sustainable world.

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Submission

General Remarks

The UK's nuclear energy policy can be characterised as intermittent and inconsistent. It was the first nation to establish a civil nuclear programme, with Calder Hall connecting to the grid in 1956, but despite this pioneering history, the UK has not built a nuclear power plant since 1995, when Sizewell B began generating electricity.

Hinkley Point C has paid the price for this inconsistency in the form of cost and time overruns.

It is the ICE's view that many forms of low-carbon energy production will have a role to play in the net zero transition, from nuclear to wind, solar to tidal, hydropower to hydrogen, and all forms of energy storage, short and long term. As many renewable energy technologies become ever more affordable, the government and policymakers will need to clearly articulate the role that nuclear will have in the UK's energy generation mix. Clearly, adequate environmental and safety protections will need to be in place to ensure that the risks to the UK's human, environmental and ecological health are not realised.

The government has work underway to support improvements to the planning and regulatory systems, but clarity is required as to the long term pipeline of projects, and how they fit into the wider national infrastructure strategy in order to attract the levels of private investment required to finance this element of the net zero energy transition. Further public buy-in will also be required – an effort that will need to be led by government.

Private investment will be required to prioritise new nuclear in the future. as such, getting the nuclear project pipeline and regulatory environment right will be an important step forward in the country's journey to net zero.

1. *Is the Government's policy to reach 24GW by 2050 a credible one?*

The target is ambitious, but the Hinkley Point C project presents an opportunity to restart the UK's nuclear programme to deliver on the government's goal. The success of this approach will, however, require the government to commit to a longer term pipeline and take forward the initial lessons on standardisation and workforce training approach provided by Hinkley C.

As with any other kind of large infrastructure build, a clear pipeline of upcoming work is required to retain the interest of private investors, stem the flow of specialist skills and incentivise investment in the plant.

The ICE recommends that this target be retained as consistent with the previous government's roadmap to provide greater certainty to investors and the supply chain servicing current and future projects.

2. *Should the Government commit to a further large-scale reactor?*

A forward pipeline of work requires further investment in large scale reactor projects. This commitment provides an opportunity to take forward early lessons from the construction of Hinkley C.

Opportunities to learn from Hinkley C

The ICE's 2024 paper highlighted the value of prefabrication and modular construction, which are key features of Hinkley Point C's construction[1].

For example, the dome was made up of prefabricated panels which were shipped to Hinkley Point C and welded together in an onsite factory[2]. Since the fabrication of the first dome, an improved approach has been taken in the fabrication of the second dome, while the 'factory' approach to manufacturing many elements that would have been constructed in situ is also providing substantial benefits.

Further, more than 8,000 people have been trained in Hinkley Point C's new Centres of Excellence for welding, electrical, mechanical and construction skills. Almost a third of those trained come from lower socio-economic areas.

Sizewell C has also incorporated a comprehensive Science Technology Engineering and Mathematics (STEM) engagement programme, helping to educate and inspire the next generation[3].

If these lessons are properly leveraged in future projects, the example of Hinkley Point C could provide a blueprint for future nuclear power projects. These projects will help create a better-skilled workforce, stimulate the local economy and support the UK's transition to a low-carbon future.

Delivering another large-scale reactor will require public buy-in

But taking forward more investment in nuclear will require public support. The Institution of Mechanical Engineers in 2020 found that only 26% of people aged 18 to 24 understand that nuclear power is a low-carbon energy source, although this rises to 61% of those aged 65 to 74 years old[4].

Similarly, YouGov in 2019 found that only a third of UK adults (33%) have a favourable view of nuclear energy, making it less popular than gas (40% favourability). Of those

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[1] ICE (2023) Nuclear New Build Insight Paper Refresh
[2] EDF Energy (2023) Big Carl's Spectacular Dome Lift Caps the Year at Hinkley Point C
[3] ICE (2019) Hinkley Point C: innovative and record-breaking civil engineering on a mammoth scale
[4] Institution of Mechanical Engineers (2020) Public Perceptions: Nuclear Power

favourable, less than half (44%) want to see greater use of nuclear power, while 42% of all UK adults believe nuclear use should be reduced[5].

There is a need for politicians and the nuclear industry to coalesce around the benefits of nuclear and communicate a better story around this to the public to reduce misinformation that can generate subsequent opposition to projects.

3. *How is the Government supporting the investment in and deployment of Advanced Modular Reactors?*

Advanced Modular Reactors were supported in the Nuclear Sector Deal and more recently the expansion of developer flexibility to develop SMRs were included in proposed change tested via the National Policy Statement for Nuclear Energy Generation EN-7: consultation document.

Further regulatory reform earlier this year, and the establishment of the Nuclear Regulatory Taskforce represent further improvements to streamlining the policy environment for nuclear energy.

As a subset of Advanced Modular Reactors, integration of inherent and passive safety measures, off-site construction and higher fuel burn-up rates, small modular reactors (SMRs) promise a safer, lower-waste and reduced-risk venture, with earlier returns for investors[6].

The Government's work, including the inclusion of SMRs in planning rules, removal of the set list of 8 sites for development and removal of the expiry date on nuclear planning rules – improving long term planning for industry, is welcome.

Further work in the wider planning environment, including the Planning and Infrastructure Bill, is an important step forward in streamlining planning for infrastructure, including nuclear reactors and building support for projects and the benefits they provide.

The ICE welcomes this inquiry as a next step in informing government decision making.

A consistent pipeline of AMRs and SMRs will be critical

Rolls-Royce argues that an SMR reactor could provide 440 megawatts of electricity, enough to power a city the size of Leeds, and that a production line would be more

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[5] YouGov UK (2019) Shale gas is even less popular in UK than coal
[6] Ioanna Playbell (2017) Economy, Safety and Applicability of Small Modular Reactors

affordable than a one-off bespoke major project[7]. Government support will need to be consistent and long term – including after this Parliamentary term, for delivery efficiencies and the benefits of nuclear energy to be effectively realised. Cross and intra-party support for advanced and small modular reactors will be required given the timelines the construction of the reactors work to.

But these projects will require a skilled workforce to deliver them. The UK faces skills shortages, increased defence spend and forthcoming infrastructure strategy and spending review announcements which will all drive demand for skilled infrastructure, engineering and nuclear specific skillsets. Internationally, competition from other countries with similar infrastructure and defence investment profiles will also be competing for these skilled workers[8]. The government will need to phase its pipeline and plan the workforce to deliver these major nuclear projects strategically.

4. How will future nuclear projects be financed?

Construction of a modern nuclear power station is a capital-intensive exercise that can take many years. Hinkley C alone is projected to cost £46 billion[9].

The capital cost estimates for nuclear power that are being used to inform current government policy rely on costs escalating over the pre-construction and construction phase of the new-build programme at a level below those that have been experienced by past US and European nuclear build programmes. This would imply that the funding and financing requirements may be even larger than what is currently forecast.

The partnership between Great British Energy and the Crown Estate has the potential to leverage circa £60bn in private investment into the UK's drive for energy independence and clean power. As above, the National Wealth Fund, and its ability to crowd in further private investment will be critical to a future programme's success.

But financing of nuclear builds has presented challenges in the past. Wylfa Newydd, for example, suspended work after a failure to reach an agreement on financing and commercial arrangements[10].

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[7] Rolls-Royce (2018) UK SMR: A National Endeavour
[8] Boston Consulting Group (2025) Uplift in Demand, Shortfall in Supply: Can the UK Deliver on Its Infrastructure Investment Ambitions?
[9] 2 BBC News (2024) Hinkley C: UK Nuclear Plant Price Tag Could Rocket by a Third
[10] BBC News (2024) Wylfa Newydd - The complex history explained

The ICE supports the government's introduction of the Regulated Asset Base model (RAB)

This model significantly reduces the cost of new nuclear and although the consumer contribution starts when construction begins, rather than when energy is produced, it reduces overall costs to the consumer over the long term by reducing the cost of financing. The successful use of RAB financing for the Thames Tideway Tunnel increases confidence in it as a financing mechanism for large infrastructure projects[11].

This approach ultimately transformed a potentially high-risk construction project into a low-risk utility-type investment, thus increasing the attractiveness of the project to investors and reducing costs at every stage.

Those lower costs meant that, while early estimates suggested that the project's annual impact on bills would be £70–80 per year (2014–15 prices), more recent projections suggest it will peak at £20–25 – 70% below the level at which the government greenlit the project. The project design also included a package of 52 'legacy benefits' that the project company committed to deliver across five areas: environment; health, safety and well-being; economy; people; and place[12].

In the nuclear sector, it is also expected the RAB model will lower consumer costs in the long term. By providing a more stable and lower rate of return for investors during the construction phase, the RAB model is expected to save consumers over £30bn on each larger-scale nuclear power station[13]. The model offers greater financial certainty, which can help prevent project cancellations and ensure the successful completion of new nuclear power stations. The RAB model has been successfully used in Australia in the regulation of electricity and gas networks. It was first introduced in the mid-1990s and has provided a framework for investment in essential utility infrastructure[14]. The RAB model is also expected to attract domestic investment from pension funds, insurers and others, thus reducing reliance on overseas investors.

The RAB model should be considered for use in future projects.

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[11] Tideway (2024) Tideway Annual Report Charts Successful Year as Super Sewer Testing Begins
[12] The Infrastructure Forum (2024) Thames Tideway Tunnel Note
[13] Department for Business, Energy and Industrial Strategy (2021) New Finance Model to Cut Cost of New Nuclear Power Stations
[14] World Nuclear News (2020) Viewpoint: Combining the RAB and Alliance Models for New Nuclear in the UK

5. *How well are GB Nuclear, the Office of Nuclear Regulation and DESNZ co-ordinating to deliver new nuclear capacity?*

More clarity is required on how Great British Nuclear will work with and operate in the context of Great British Energy and the National Wealth fund.

Recently released strategic priorities for the National Wealth Fund outline the Fund's focus on clean energy investment, yet focus on carbon capture, green hydrogen, gigafactories, ports and green steel over the course of this Parliament.

A lack of clarity on the proposed relationship between GB Energy and GB Nuclear also presents a coordination challenge. This has been raised in parliament on multiple occasions[15].

Conclusion

The ICE thanks the Committee for this opportunity to submit evidence and would welcome the opportunity to appear at the session on this topic.

The government will need to offer a clear direction and pipeline of work to attract the private capital it will need to support a refreshed roadmap for the net zero transition and the role of nuclear within that.

There is positive work underway looking at the regulatory environment, and refining planning arrangements to enable the development of nuclear, but strategic workforce planning will need to be a key feature of any refreshed roadmap in order to ensure project deliverability.

For the pipeline of work to be reliable and financeable, the government will also need to engage with the public to demonstrate the value of nuclear technologies as part of the decarbonisation of the energy system.

[15] New Civil Engineer (2024)