Net Zero Needs Nuclear: A Roadmap to 2024

All-Party Parliamentary Group on Nuclear Energy

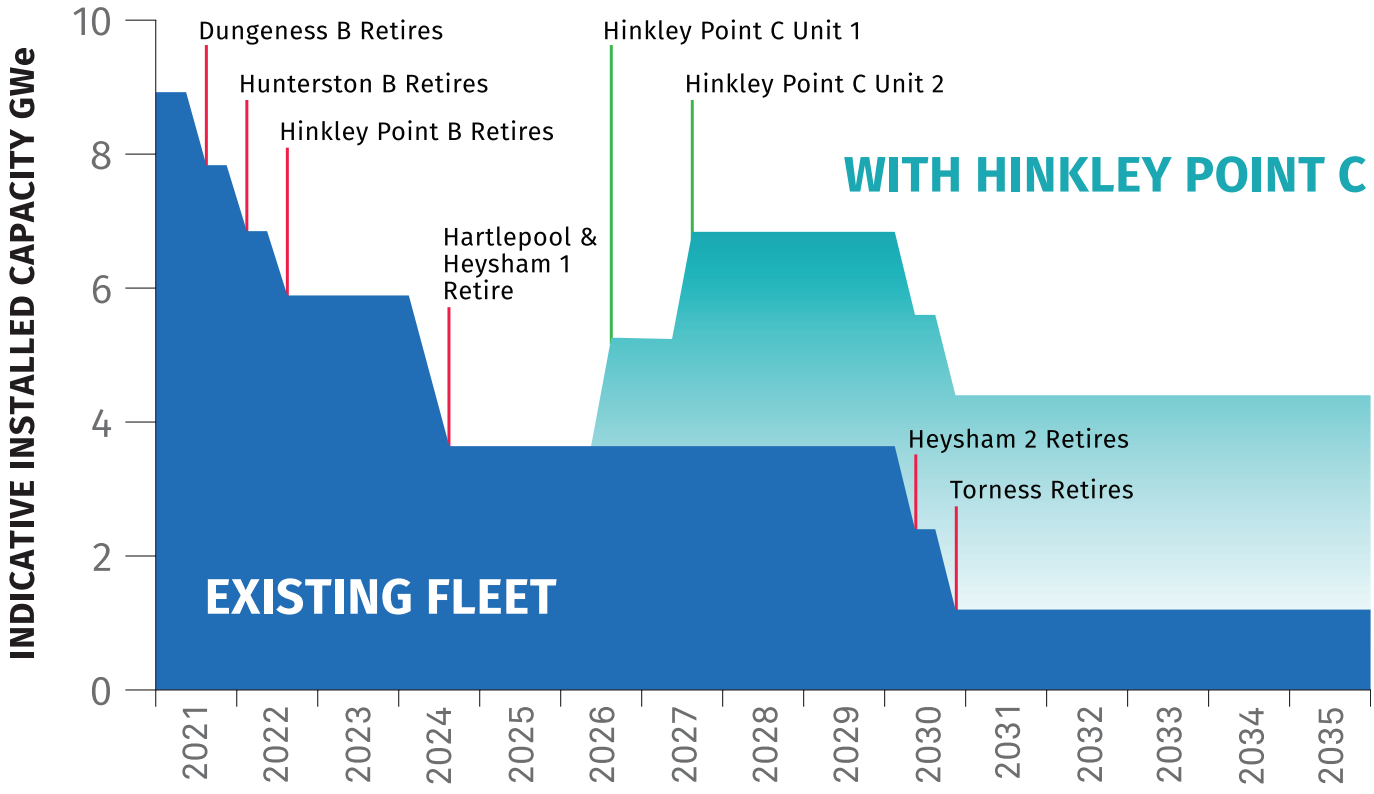
30 June 2021

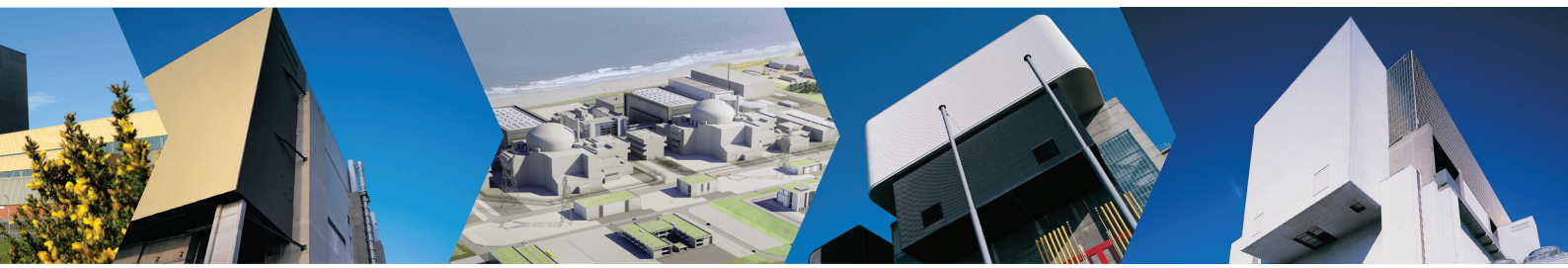
1. Executive Summary

The UK needs to take decisions urgently in this Parliament to restore nuclear capacity to at least 10 GW with deployable technologies, by the early 2030s. Most of our current nuclear fleet will retire by March 2024. With new investment, we can cut emissions, create tens of thousands of high-quality jobs, and secure the UK's world-class nuclear skills base. Without new investment, the UK will lose critical capabilities and our position as an international leader in nuclear technology.

The most critical step now is for Government to begin legislating for a financing model for new nuclear in 2021. The Government should also identify and support the specific projects that can deliver new capacity. Alongside this, the industry must continue its work to reduce costs on new projects at least 30% by 2030, in line with existing commitments.

Nuclear capacity to 2035





2. Nuclear: Urgency and Opportunity

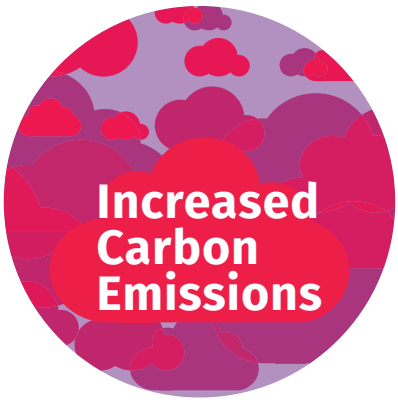
The nuclear industry is ideally placed to support the Government's twin goals of levelling up the UK economy and cutting emissions; 78% by 2035, hitting net zero in 2050. Nuclear is the most powerful and jobs-rich form of low-carbon energy. The industry has saved the equivalent of six years of national carbon emissions, more than any other source, while 90% of its jobs are outside London and the South East at a GVA per worker of £100,000. Hinkley Point C, for instance, has already generated more than £3 billion of investment in the South West and provided training for hundreds of apprentices. The project will ultimately sustain 71,000 jobs throughout the supply chain and power 6 million homes from a quarter of a square mile. A new programme of nuclear investment can bring that kind of opportunity to all parts of this country.

Nuclear energy in the UK, however, needs action now. The seven Advanced Gas-Cooled Reactor (AGR) power stations have been the most productive low-carbon assets in our history and have given decades of extra service to the country because of the exemplary skill and innovation of the British nuclear industry. Nonetheless, the first AGR has already retired, and a second will join it within months. Five stations will have retired by March 2024, and all seven by 2030. The Pressurised Water Reactor (PWR) at Sizewell B will be the only station of our existing fleet still operating in the next decade.

Even before these retirements, UK progress on the decarbonisation of power has stalled. Emissions from electricity generation to date in 2021 are higher than in 2020, the first year-on-year increase since 2012.

Nuclear is the only clean power source the UK can rely on to stabilise our grid and to bolster our energy security. No other technology can substitute for nuclear. If the nuclear fleet is allowed to retire without replacement, we will fall further from our climate goals. We will lose critical skills and unique capabilities that the UK will struggle to recover, while investors and developers will lose confidence in the UK as our expertise fades:

Fleet Retirement Without Replacement



Category	Fleet Retirement Without Replacement
Jobs	Job losses starting this year, and accelerating to 2030, in nuclear operations and the supply chain, concentrated in lower-income regions outside the big cities
Emissions	200 million tonnes of extra carbon emissions by 2035
Cost	Higher industry and consumer costs from peaking fossil fuel generation and imported power (if available) to cover gaps: in January 2021, spot prices reached £1,500/MWh before any fleet retirements Increased system costs from loss of grid inertia provided by nuclear
UK Capability	Loss of all AGR fuel demand at Springfields, designated as of "strategic national importance", leading to capability loss without new nuclear projects Loss of reactor engineering expertise, hampering future new build projects
UK Energy Security	Loss of 30% of indigenous clean power generation
UK Energy Stability	Loss of grid stability as the firm power base shrinks while demand rises

3. Nuclear: Using Net Zero to Level Up

The solution is in our hands. The Energy White Paper and the Prime Minister's 10 Point Plan outlined the Government's comprehensive support for nuclear power, pursuing multiple large-scale nuclear projects and investment in SMRs, AMRs, and fusion. If this vision is delivered, we will see tens of thousands of new, well-paying jobs across the UK, new export markets and lower emissions.

Building new capacity to replace the retiring fleet is the essential starting point to realise this vision, and to provide proof of cost reduction and UK value creation in nuclear projects. Decisions must therefore be taken in this Parliament to restore nuclear capacity to at least 10 GW by the early 2030s on the basis of deployable technologies. We have outlined these decisions and the dates by which they must be taken below:

A Roadmap to 2024

Date	Action
Complete	Issue guidance on entering Generic Design Assessment (GDA) for SMRs and AMRs
End of 2021	Commence legislation for a financing model to cover all stages of large and small new nuclear projects
End of 2021	Confirm policy for new UK reactors to utilise fuel manufactured in the UK
End of 2021	Agree five-year funding settlement and approach for delivery of an AMR demonstrator
Early 2022	Produce National Policy Statement on siting of new build projects, including for SMR and AMR deployment
Early 2022	Establish the policy and legislative framework to enable orders by end of 2022 for UK deployment of fleet of SMRs by early 2030s
Autumn 2022	Support Sizewell C to Final Investment Decision (FID)
End of 2023	Commit to the next tranche of the STEP Programme, including selection of a site
March 2024	Enact regulatory changes to allow integration of modular reactors with urban and industrial systems, to allow the use of alternative fuels and coolants, and to support fusion energy
Mid 2024	Government commitment to at least 1 additional Gigawatt-scale nuclear power plant and to enable further Gigawatt-scale development

These decisions cannot be postponed. Each delay makes it harder to mobilise investment, maintain skills and close the clean power gap. The nature of the nuclear industry also means that we will live with those consequences for many years. Swift implementation of the plan outlined above, however, would cut emissions and create skilled, stable, well-paying jobs across the country:

Benefits of A Roadmap to 2024

Category	Benefits of A Roadmap to 2024
Jobs	More than 90,000 jobs, especially in UK regions
Emissions	16 million tonnes of emissions per year saved compared to gas-fired generation from two additional GW-scale projects, and 15 million tonnes per year from an initial fleet of 10 SMR units deployed, by 2035 Support industrial decarbonisation with low-carbon heat, hydrogen, and DAC
Cost	Cost reduction from project risk reduction, commitment to series build, factory build, modularisation, and reactor technology innovation leading to lower consumer bills Lower system costs from more efficient build, and lower balancing/curtailment needs
UK Capability	Securing of sovereign capabilities in nuclear fuel manufacture, enabling of advanced fuels development and additional fuel export opportunities Secure capabilities of existing UK nuclear supply chain Establishment of a domestic SMR technology, driven by 80% UK content, with strong export potential Development of world leading advanced modular construction capabilities and global reactor expertise Fuelling global nuclear energy leadership in science, technology and innovation
UK Energy Security	Preservation and growth of indigenous clean power capacity
UK Energy Stability	Strong base of firm, clean power to improve grid stability and frequency balance

From top: Aerial view of Westinghouse Springfields nuclear fuel manufacturing facility in Lancashire; EDF Energy's Sizewell B nuclear power station; CGI rendering of the UK SMR technology envisaged by the Rolls-Royce-led UK consortium.

4. Net Zero Needs Nuclear

If the decisions set out in this document are taken, the nuclear sector will help realise the Government's vision of a net zero economy with prosperity shared across all parts and all communities of the UK. This roadmap, however, is not the end of the story: 10 GW of capacity provides the foundation for a wider expansion of nuclear energy to 2050, not the limit of our ambition. We know that the UK will need ten times as much clean energy to decarbonise our economy and many more good jobs to ensure a just transition. We will need new sources of power, heat and clean-burning fuels to replace the 85% of our energy that comes from fossil fuels.

Nuclear is ideally placed to meet this challenge. It is the most jobs-rich form of low-carbon energy and the UK's only proven source of clean, firm electricity to stabilise an ever-expanding grid. It is also the only low-carbon energy source that can produce both power and heat, unlocking sustainable solutions across the economy. Nuclear reactors can provide electricity for our homes, businesses and EVs, green hydrogen and synthetic fuels for transportation, and low-carbon heat for industrial processes. Nuclear energy bolster our energy security and open new export markets for our technology. The UK can be a leader in a net zero world, with global expertise and capabilities, but to realise that vision, we need to act now.

5. About the APPG

The APPG on Nuclear Energy provides a forum for MPs and Peers to engage with leading businesses and organisations that are working to enable the UK to meet its decarbonisation targets through the implementation of civil nuclear projects, and to discuss policy options to support these.

The Group was established in July 2015. It is a cross-party group of MPs and Peers that focuses on raising awareness of, and building support for nuclear energy projects that will enable the UK to meet decarbonisation targets.

Contact the APPG on Nuclear Energy

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