

Memorandum submitted to the House of Commons Energy Security and Net-zero Select Committee for their inquiry on:

Revisiting the nuclear roadmap

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Summary

Under the assumptions currently driving HM Government policy, it is impossible to meet the stated target of 24 GW of new nuclear by 2050. We estimate that 15.9 GW is the likely maximum possible installed capacity for large-scale nuclear. Furthermore, the investment required is high, amounting to 2.4% annually of UK gross fixed capital formation. In the light of extensive development and construction over-runs on current nuclear projects, it is very hard to recommend that the Government commission additional projects before addressing the causes of risk leading to these problems.

Introduction

Our analysis is underpinned by the UK 7see[®] whole economy analytical framework [1–3] and publicly available national datasets. 7see[®] exploits multiple national accounting procedures, curating and maintaining disparate accounts (economic stocks and flows, energy use, employment, transport) in parallel, whilst retaining each of their unique measurement unit and accounting requirements. It is calibrated by historical data from 1990. The 7see framework can be used to examine the systemic effects of future innovation and technologies, such as up-stream in the net change in demand for energy, employment and imports given the impact on other parts of the economy [4].

Responses

1. Is 24GW by 2050 a credible plan?

1.1 Previously, we modelled what we considered the likely fastest rate for nuclear new build for the UK [5] following a report by the National Audit Office [6]. In Figure A we have updated that analysis to show the continuing build of Hinkley Point C and the updated development programme for Sizewell C. We have assumed each installation is a single site with an average installed capacity of 3 GW, and each begins construction every five years in line with HM Government’s current expectations [7].

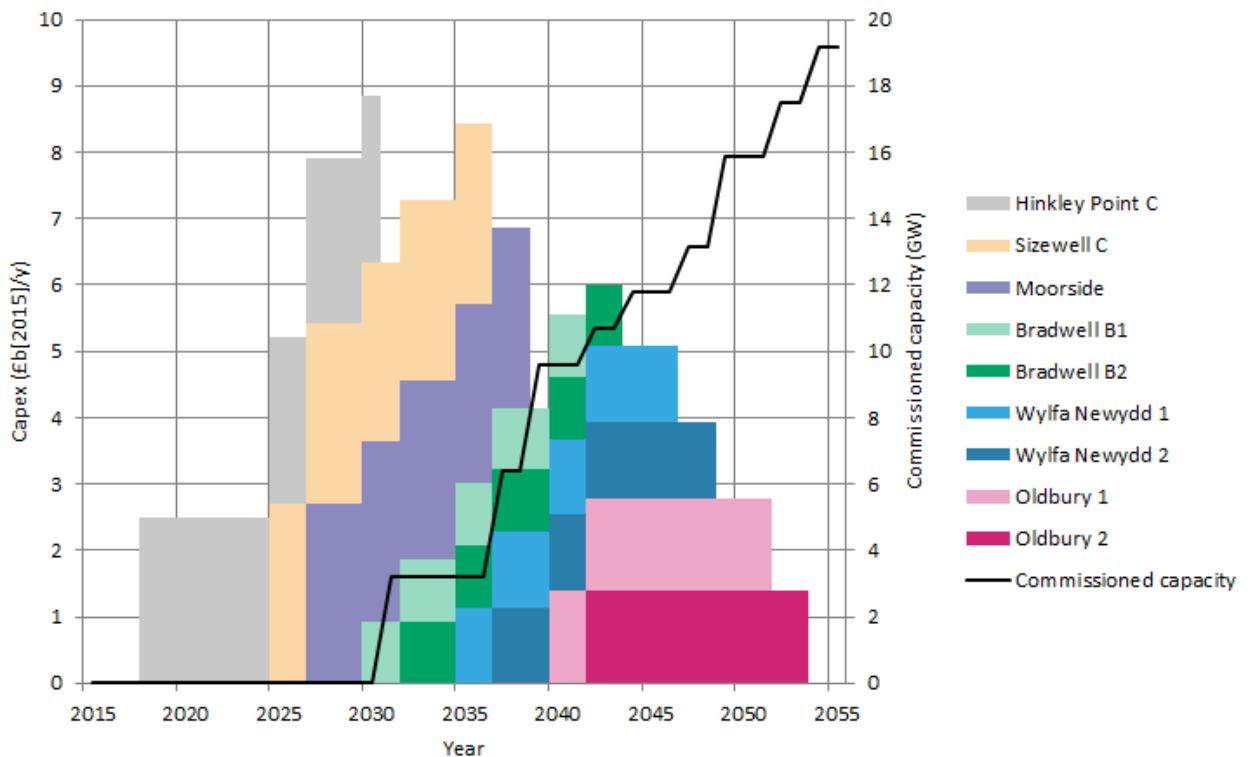


Figure A. Updated fastest nuclear new build schedule and total installed generating capacity.

1.2 Under these assumptions, commissioned capacity reaches 15.9 GW by 2050, well below the stated target of 24.0 GW. Furthermore, it is noted that “Optimism bias has historically contributed to consistent underestimations of nuclear costs and construction times.” [8].

1.3 The envelope of capex shows a peak of almost £9b/y (at 2015 prices), forming 2.4% of total national investment of gross fixed capital formation (GFCF).

1.4 We conclude that 24 GW by 2050 is not a credible plan.

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

- 2.1. The country's energy mix has an increasing proportion of intermittent renewable energy. Despatchable power is needed not only to meet peaks in demand but also to provide baseload during low wind conditions. Nuclear plant has some capability to moderate generation to match demand [8], however, this has not been common practice. This implies that nuclear power may not readily complement weather-dependent renewables since its high capital and low operational costs mean nuclear is most effective economically when operated at high load factor.
- 2.2. For generation able to make-up for the shortfall inherent with intermittent renewables, there are better options compared to nuclear. For example, renewable hydrogen stored underground and used in dedicated hydrogen CCGT stations could meet short- and long-term shortfalls in renewable power. Renewable hydrogen technology has lower costs compared to nuclear and without the need to husband radioactive waste for many years.
- 2.3. The complexities of nuclear power will be a disproportionate draw on the limited technical capabilities of the UK, which are also needed for other low-carbon measures. This can be seen as an employment opportunity cost.
- 2.4. The high cost and long construction times per unit of nuclear power mean that supposed private investment will likely always need to be underwritten by Government. In principle, offshore wind, for instance, with its much lower unit cost and construction time mean that private finance can gain experience at lower risk and not depend on Government assistance.
- 2.5. Nuclear fission carries a high level of risk across a broad range of types of cause of risk [9], though not all relevant causes of risk in the energy supply chain are in the most severe category for nuclear, with many being in the least significant category [10].
- 2.6. We conclude that the Government should **not** commit to additional large-scale reactors beyond the schemes under development.

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

We offer no response to this question.

4. How will future nuclear projects be financed?

We offer no response to this question.

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

We offer no response to this question.

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