

# Evidence by Simon Bowen to the Energy Security & Net Zero Committee, November 20, 2024

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In his evidence to the Committee, Simon Bowen stated that other countries had implemented nuclear power programmes without the delays, cost escalation and project cancellations that are said to be a problem particular to the UK. He gave two examples to support this contention: the Barakah project in the UAE for four reactors of the APR1400 design supplied by the Korean Company, KEPCO; and the Taishan project in China for two reactors using the same design, the French EPR, as is being built at Hinkley Point and is proposed for Sizewell.

## Barakah

Bowen stated:

‘If you look at which countries are better, the case that everybody points to is Barakah, which is in the Emirates. Barakah was a nuclear new build, which started from nothing, with no capability and no regulator. They built it from nothing, they built the whole process and they built a regulator, with a huge amount of support from the global industry. By the time they were on the second unit, I think, it was delivered to time and cost. Now, is that used as a model? Absolutely. How did they do it? It was a joint venture between the country, the Government and the Koreans. The Koreans were prepared to fix price on their investment, and they did. It was a difficult first build, but they became very good at it.’

The authoritative published data do not support this portrayal. The company building the plant, Emirates Nuclear Energy Corporation (ENEC), announced a construction schedule of about 5 years per reactor when the order was placed.<sup>1</sup> On average, the reactors took about 75% longer to build than forecast and there is no evidence of improvement in construction time with each successive unit (see Table 1). There is no evidence to back the statement that: ‘It was a difficult first build, but they became very good at it.’

In terms of cost, there are no authoritative figures on the outturn costs in the public domain. The contract cost was reported to be US\$20.4bn and it was reported: ‘A high percentage of the contract is being offered under a fixed-price arrangement.’ There were subsequent reports that the project would cost US\$30bn. It seems unlikely given the substantial construction time overrun that the project came in at budget levels. How far any cost overruns were paid by the contractor, KEPCO, and how far they fell on ENEC is not in the public domain but there appears to be no evidence to back the statement that unit 2 was built to cost.

The implication that UK should seek a fixed price is unrealistic. Genuinely fixed prices for nuclear projects are a rarity because they represent such a huge risk for the vendor. A major factor in the financial collapses of Areva (France) in 2016 and US Westinghouse in 2017 was

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<sup>1</sup> [Nuclear Energy and Renewables: System Effects in Low-Carbon Electricity Systems](#)

that they had agreed fixed price terms for nuclear power plant sale: Olkiluoto (Finland) for Areva, and Vogtle and Summer (USA) for Westinghouse.

There has been only 3 calendar reactor years of service for Barakah completed by the end of 2023 so it is too early to determine the reliability of the station.

**Table 1 Barakah performance**

Unit no	Order date	Construction start	Commercial operation	Construction time (months)	% Life-time load factor to end 2023
1	12/2009	7/2012	4/2021	105	79.1
2	12/2009	4/2013	3/2022	107	92.2
3	12/2009	9/2014	2/2023	101	-
4	12/2009	7/2015	9/2024	110	-

Sources: Order date <https://www.world-nuclear-news.org/Articles/Application-in-for-next-two-Barakah-units>. Other figures from <https://pris.iaea.org/PRIS/home.aspx>

Notes.

1. Construction start is defined as being the pouring of first structural concrete
2. Commercial operation is defined as the date when the plant is handed over for operation to the plant owner and usually requires the passing of some performance test.
3. Load factor is defined as the output in MWh of the reactor in a given period expressed as a percentage of the output the plant would have produced had it operated uninterrupted at full power for that period.

## Taishan

Bowen stated:

‘..there are some really easy comparators between what everybody says is a fantastic build in Taishan [and Hinkley Point C]. Hinkley is two years behind Taishan—one year for covid and one year for engineering changes, and those are both massive lessons learned.’

It is questionable whether ‘everybody’ says Taishan is a ‘fantastic build’. The figures suggest ‘fantastic’ is not an accurate description (see Table 2). Taishan took longer to build than any of the 56 reactors in operation by end 2024 in China, and China appears to have no intention of building any more reactors of the EPR design. China expected to take 46 months<sup>2</sup> to build each of the two reactors. The actual construction period was about 2.5 times that. The estimated construction cost at time of investment decision was reported to be US\$7.5bn. The outturn figure is not definitively known but given the huge construction time overrun, it will inevitably be substantially more. The French Corp des Comptes, in its January 2025 report on the EPR,<sup>3</sup> stated: ‘The Taishan 1 and Taishan 2 EPR reactors were commissioned in China in 2018 and 2019, five years behind schedule and with a 60% cost increase compared to the forecast budget.’<sup>4</sup> This report also noted difficulties for EDF of getting information from the Taishan site. ‘Finally, the question of feedback could arise with regard to Taishan due to the difficulty in obtaining information on incidents occurring on its two reactors as mentioned at the EDF

<sup>2</sup> <https://www.bloomberg.com/news/articles/2010-11-24/china-builds-french-designed-nuclear-reactor-for-40-less-areva-ceo-says>

<sup>3</sup> <https://www.ccomptes.fr/fr/publications/la-filiere-epr-une-dynamique-nouvelle-des-risques-persistants>

<sup>4</sup> Machine translation of <https://www.ccomptes.fr/fr/publications/la-filiere-epr-une-dynamique-nouvelle-des-risques-persistants> p 16

board of directors). Indeed, reactor 1 did not operate satisfactorily for three years, with in particular under-use.<sup>5</sup>

Operating performance has been poor.<sup>6</sup> In July 2021, reactor 1 went off-line and did not restart till the following August. It shut down again in January 2023 and did not restart until December 2023. The cause of these long shutdowns has not been fully established but the first appears to be related to failures of the fuel perhaps caused by vibrations in the circuits. Unit 2 has not suffered such long shutdowns but its performance remains mediocre.

**Table 2 Taishan performance**

Unit no	Order date	Construction start	Commercial operation	Construction time (months)	% Life-time load factor to end 2023
1	11/2007	11/2009	12/2018	109	48.6
2	11/2007	4/2010	9/2019	113	77.7

Sources: Order date: <https://world-nuclear-news.org/Articles/Areva-lands-world-s-biggest-ever-nuclear-power-ord>. Other figures from <https://pris.iaea.org/PRIS/home.aspx>

It is therefore not justifiable to describe the Taishan project as ‘fantastic’. The most that can be said is that the Taishan project does not appear to have gone as badly wrong as the other three EPR projects, at least in the construction phase, Olkiluoto (Finland), Flamanville (France) and Hinkley Point (UK), but it appears not to be an experience China is willing to repeat.

## Conclusions

I have focused on a very small part of the evidence given by Simon Bowen partly because it is demonstrably factually wrong and must be corrected so that Members of the Committee and readers of the evidence are not misled.

It also contributes to the pervasive narrative being propagated by nuclear advocates, that there is nothing wrong with nuclear technology. This narrative suggests that it is inefficient planning and regulatory processes and indecisive governments that are at the root of problems with nuclear power plant construction projects. There is no evidence to support this contention and, for example, there is no evidence that any of the huge delays and cost overruns being incurred with the Hinkley Point C project are due to these claimed issues. The nuclear industry is unwilling to acknowledge any fundamental problems with the technology or failings on its part. The French Corp des Comptes report places the responsibility for the delays at Flamanville (now 13 years late and 4 times over budget) on EDF. It mentions:<sup>7</sup>

‘the excesses of the Flamanville 3 construction site as a consequence in particular of the lack of organization of the monitoring of the project by EDF and of failing governance.’

Until the apparent problems with the technology are admitted by government and the nuclear industry and a rigorous analysis of the problems that are causing delays and cost escalation, time and resources will be wasted trying to devise new procedures which will not address the actual problems.

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<sup>5</sup> Op cit p 26

<sup>6</sup> [https://www.tnpjvc.com.cn/tnpjvc/c100613/xxaq\\_nlyz.shtml](https://www.tnpjvc.com.cn/tnpjvc/c100613/xxaq_nlyz.shtml)

<sup>7</sup> Machine translation of p 58 of <https://www.ccomptes.fr/fr/publications/la-filiere-epr-une-dynamique-nouvelle-des-risques-persistants>