

## Written evidence from Nuclear Consulting Group (NCL0014)

### UK Parliamentary Inquiry: ‘Call for Evidence on Delivering Nuclear Power’

#### 1. Introduction

Nuclear energy continues to be a contentious option in the shift away from fossil fuels. Some argue that it provides dispatchable electricity supply while others say that the cost of building and maintaining new plants and other key issues outweigh any benefits.

So, in our collective journey to net-zero, can nuclear really play a role in combating climate change? What about the possibility of accidents and the consequences of those accidents? Is there room for new reactors alongside the renewable energy evolution? Is it that we don't have the organisation quite right, or are there other reasons why nuclear takes such a long time to build? And can Small Modular Reactor technology really work?

Although an Inquiry called ‘Delivering Nuclear Power’ may seem to have pre-judged outcomes - we will try to set out a clear, evidence-based response in a people, press and policy-friendly way.

#### 2. Cost and Time

It's worth recalling that UK Govt. Dept. for Business, Energy & Industrial Strategy (BEIS) state quite clearly in their ‘Regulated Asset Base (RAB) Impact Assessment’ report to Parliament, that construction costs of nuclear power plant are:

- '20% higher than expected at final investment decision (FID) for Europe,' and '100% higher than expected at FID for all nuclear (internationally).'

Also, on average, the construction period of nuclear power plants are:

- '40% higher than expected at FID in Europe,' and '90% higher than expected at FID from data of all nuclear power plants.'<sup>1</sup>

If you follow the money and do the sums. nuclear construction costs have consistently increased, making it uncompetitive with plunging renewable construction costs. Meanwhile, storage technology costs such as batteries and hydrogen electrolysis are set to fall dramatically.<sup>2</sup>

In this context and given the, let's say, over-optimistic construction cost predictions of EDF and all other nuclear corporations internationally – the evidence-base strongly suggests any current time-line and/or cost estimate for new nuclear in the UK may prove unreliable.

---

<sup>1</sup> <https://publications.parliament.uk/pa/bills/cbill/58-02/0174/ImpactAssessment.pdf>

<sup>2</sup> <https://www.bbc.com/news/science-environment-62892013>

With little interest from the investment market, and the fact that Lazard states that utility-scale solar and onshore wind costs less than a quarter of new nuclear,<sup>3</sup> perhaps the Treasury's concerns should be taken more seriously.<sup>4</sup>

### **3. UK RAB & EDF France**

Hinkley Point C (where EDF UK, a subsidiary of EDF France, is building two EPR nuclear reactors) is over-due and over-budget.

Next in line is Sizewell C in Suffolk, planned to be incentivised by the fiscally dextrous RAB mechanism, a new funding model that transfers a significant aspect of the financial liability unfairly and squarely onto the shoulders of already hard-pressed UK electricity consumers and taxpayers - who would be stumping up for upfront costs, inevitable delays and all further cost hikes.

In the present energy and cost of living crisis, it could be 'fool me once, fool me twice' to plans for yet more EDF reactors - all hugely costly, massively over-budget and over-time everywhere they're put up. Meanwhile, EDF are still working on activating a 'contingency option' in its contract with the UK government, trying to avoid over-time and over-cost penalties at their construction site at Hinkley Point C.

Not forgetting the horrible mess across the channel, with more than half of EDF France's nuclear reactor fleet offline, many due to progressive corrosion, with the French nuclear regulator ASN warning that a 'large-scale plan' lasting 'several years' is needed<sup>5</sup> – forcing the President Macron to fully nationalise the ailing and ageing French nuclear corporation.<sup>6</sup> And by the by, EDF is still doing business with Russia - months after Vladimir Putin's forces invaded Ukraine.<sup>7</sup>

### **4. Nuclear Climate Casualty**

As if we didn't know already, climate-driven sea-level rise is significantly faster than previously thought, resulting in more frequent and destructive storms, storm surge, severe precipitation and flooding.

With rare extreme events today becoming the norm in the future, existing risk mitigation measures become increasingly obsolete. The corollary is that present and planned coastal nuclear installations in Britain may be at risk, implying significantly increased expense for any nuclear construction, operation, waste management and decommissioning. Put simply, coastal nuclear sites are literally on the front line of climate change, and not in a good way.<sup>8</sup>

Accordingly, the UK Institute of Mechanical Engineers (IME) have stated that UK nuclear infrastructure (together with spent nuclear fuel and radioactive waste stores) will be

---

<sup>3</sup> <https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/>

<sup>4</sup> <https://www.bbc.com/news/uk-politics-60903879>

<sup>5</sup> <https://www.euractiv.com/section/electricity/news/fixing-edfs-reactors-corrosion-mystery-to-take-several-years-french-regulator-warns/>

<sup>6</sup> <https://www.cnbc.com/2022/07/06/frances-edf-to-be-fully-nationalised-borne-.html>

<sup>7</sup> <https://www.energylivenews.com/2022/07/27/edf-and-veolia-criticised-for-keeping-ties-to-russia/>

<sup>8</sup> <https://www.nuclearconsult.com/wp/wp-content/uploads/2021/06/Climate-Change-UK-Nuclear-June-2021.pdf>

increasingly vulnerable to sea-level rise, flooding, storm surge, and ‘nuclear islanding’. Perhaps alarmingly, IME point out that these UK coastal nuclear sites may need considerable investment to protect them against rising sea levels, and even relocation or abandonment.<sup>9</sup>

## **5. Small Modular Reactor (SMRs)**

Nuclear has always gone ‘big’ to achieve economies of scale. The key idea behind SMR’s is to attempt to replace these economies of scale with the economies of modularisation.

But this is by no means a given, as it remains cheaper to build one 1.2GW unit than a dozen 100MW units. We see exactly the same in wind power. One of the main reasons why offshore wind costs has come down so much is the move to larger wind turbines. Thus, SMRs may well prove more expensive than large reactors per KW/hr - the key parameter.

Further, recent research co-authored by the former Head of US nuclear regulation (NRC), finds SMR’s produce significantly more radioactive waste per KW/hr than ‘conventional’ large reactors.<sup>10</sup>

Not only that, but SMR technology is defined as reactors providing up to 300 MW power.<sup>11</sup> The fact is, at 470 MW, the Rolls Royce effort is just not an SMR.<sup>12</sup> Rather, half the size of the 900 MW reactors that make up the bulk of the French nuclear fleet.

## **6. Cheaper, Faster, Better**

Happily, help is on the way. Last year, solar and wind made up three-quarters of total new electricity generation capacity installed across the world – and, with other renewables, the total figure was 84%.<sup>13</sup> Renewables supplied 40% of UK electricity in 2021<sup>14</sup> and a quarter of US electricity during the first half of 2022.<sup>15</sup> All this, because utility-scale renewables can be built on time and to budget, and cost less than one-quarter of new nuclear.

With the UK Govt. Investment Minister saying North Sea wind power will be more valuable to the UK than the oil and gas industry,<sup>16</sup> there's no one left to dispute the fact that net zero heavy lifting will be done by renewable power.

It’s not just that nuclear is slow and expensive – it’s just far too inflexible to ramp up and down with the swings of demand. In contrast, the variability of wind and solar technologies can more easily be integrated into evolving, flexible electricity grids.

## **7. Winter may be a long time in UK Energy Policy**

---

<sup>9</sup> Institute of Mechanical Engineers (IME) (2009): Climate Change: Adapting to the Inevitable, IME 2009. <https://www.imeche.org/policy-and-press/reports/detail/climate-change-adapting-to-the-inevitable>

<sup>10</sup> <https://news.stanford.edu/2022/05/30/small-modular-reactors-produce-high-levels-nuclear-waste/>

<sup>11</sup> <https://www.iaea.org/topics/small-modular-reactors>

<sup>12</sup> <https://www.rolls-royce.com/innovation/small-modular-reactors.aspx#/>

<sup>13</sup> <https://reneweconomy.com.au/renewables-snapshot-are-we-on-track-to-decarbonise-the-globe/>

<sup>14</sup> <https://www.businessgreen.com/news/4053954/official-renewables-provided-cent-britains-electricity-2021>

<sup>15</sup> <https://www.eia.gov/todayinenergy/detail.php?id=53779>

<sup>16</sup> <https://www.thetimes.co.uk/article/growth-in-north-sea-wind-farms-will-eclipse-value-of-oil-and-gas-bgk6vxs08>

This winter, with millions struggling under the cost-of-living and energy crisis, placing huge sums of public money into the deep pockets of EDF France nuclear may look much less palatable to people, press and policy.

Meanwhile, the real UK energy transition is set to involve a set of practical, technically and economically viable options - including the expansion of renewable energies in all sectors, rapid growth and modernisation of electricity grids, interconnection, energy efficiency and demand-side management, rapidly enhanced storage technologies, market innovations from supply to service provision, intelligent deployment of limited gas resources, the restructuring of the built and transport environments.

The thing is, despite significant public investment, inevitable cost and time over-runs, new nuclear's contribution may only prove marginal at best.

**Dr Paul Dorfman, Chair of Nuclear Consulting Group**  
**Associate Fellow, Science Policy Research Unit**  
**Sussex Energy Group, University of Sussex**  
**Member, Irish Govt. Environment Protection Agency Radiation Protection Advisory Committee**

**On behalf of the Nuclear Consulting Group, 29.09.2022**