



## Hidden military implications of 'building back' with new nuclear in the UK

After speaking at SGR's 'Transition Now' conference, **Phil Johnstone** teams up with **Andy Stirling**, both of the University of Sussex, to reveal even more evidence of the unwelcome institutional links of nuclear energy.

At a time when such discussions are muted in academic enquiry, media coverage and wider energy policy, Scientists for Global Responsibility (SGR) have provided crucial analysis of the role that militaries play in influencing the direction and speed of low carbon transitions.<sup>1</sup> Indeed it is remarkable given the central role that war and the military have played in past energy transitions and how large global military spending continues to be,<sup>2</sup> that there seem only such marginal levels of academic curiosity regarding how contemporary energy system dynamics might be shaped by military imperatives. There is tendency in contemporary analysis of 'sustainability transitions' for example, to treat energy and other 'systems' as discrete and bounded, governed by their own internal properties and seemingly disconnected from wider dynamics. This leaves questions of how military ambitions shape the direction of energy policy trajectories almost entirely unaddressed.

A key example of these tendencies can be seen in conventional energy policy analysis of UK commitments to new nuclear power, the UK being one of the few OECD countries still enthusiastically pursuing the technology. As we discuss below, given the now clear disadvantages of new nuclear compared to renewables, this commitment does not make sense when considered simply within the confines of energy policy rationales. What we have outlined through research spanning several years, is that a key driver of the UK's intense enthusiasm for new nuclear reactors stems from elite imperatives to sustain

the capabilities, skills, and supply chain activities necessary for Britain to build, maintain, and operate the nuclear propelled submarines that underpin its nuclear weapons system. In other words, civil nuclear channels a subsidy towards military nuclear activities. At a time when the UK Government seeks to 'build back better' following the COVID-19 pandemic and sees nuclear as playing a role in this, our analysis holds potentially significant implications for the UK's climate action, for discussions concerning the health of British democracy – and for the building of a more peaceful and less militarised world.

### The oddity of UK nuclear commitments

We are currently living through momentous and global shifts in energy systems. Over the past decade, renewables have surpassed official expectations with rapid construction and plummeting costs. Renewables now increasingly offer the cheapest energy sources worldwide.<sup>3</sup> As highlighted by recent Lazard data, cost advantages of renewables over new nuclear now typically dwarf costs of managing intermittency.<sup>4</sup> Costs of batteries and other storage and grid management options are also declining rapidly.<sup>5</sup> Between 2010-2019 wind costs fell globally by 70% and solar costs by 89%.<sup>4</sup> Nuclear costs on the other hand, have risen by 26% over the past decade.<sup>4</sup> Indeed, global nuclear new build continues to stagnate,<sup>6</sup> is plagued by delays and cost overruns,<sup>6</sup> with leading nuclear companies face bankruptcy or potential insolvency.<sup>7</sup> Some are withdrawing entirely from nuclear investment, because it is no longer

» ‘economically rational’.<sup>8</sup> Much touted predictions of a global ‘nuclear renaissance’ since the early 2000s have simply not materialised.<sup>6</sup>

The UK’s long running ‘nuclear renaissance’ has performed particularly poorly, with costs tripling.<sup>9</sup> Delays of nearly ten years for the only new power station under construction, and new nuclear very seriously failing to contribute towards the aims of rapid emissions reductions and energy security “significantly before 2025”. The National Audit Office (NAO) and Public Accounts Committee (PAC) found that the Hinkley C nuclear project could “lock in” consumers to a “bad deal” that will “hit the poorest households the hardest”.<sup>10-11</sup> Indeed, while new nuclear was originally justified on grounds of economic benefits,<sup>12</sup> the government’s own figures show that even when integration costs are considered, renewables are now far cheaper.<sup>13</sup> During this period of stark failure in initially firm nuclear policy commitments, renewables have climbed from under 10% of electricity generation in 2010 to 43% in 2020.<sup>14</sup>

With very few companies left investing in new nuclear worldwide, the UK government is mounting a desperate attempt to secure nuclear investment through even more extravagant financial arrangements – including forcing consumers to pay upfront for potential cost overruns under a ‘regulated asset base’ (RAB) or direct government financing.<sup>15</sup> Meanwhile, intense enthusiasm for entirely untested Small Modular Reactors (SMRs) continues despite these technologies being irrelevant for rapid climate action and almost certainly more expensive than conventional reactors.<sup>16</sup>

As we have documented,<sup>17</sup> this intense enthusiasm is particularly odd by comparison with a country like Germany, which is phasing out nuclear power. The UK has a far more abundant and cost-effective renewable resource and a nuclear industry that performs particularly poorly when compared with Germany and other countries.<sup>18</sup> It is the UK with its abundant renewables resource that stands in the best position to enact a transition to a non-nuclear future and reap the benefits of investment and jobs in renewables. Yet the relentless obsession for new nuclear continues. This obsession makes no sense – until we consider that Britain is a nuclear weapons state.

### Civil-military nuclear interdependencies

‘Material interdependencies’ between civil and military nuclear infrastructures have long been well documented around fissile materials, enrichment and reprocessing.<sup>19,20</sup> What is new in our research, is the highlighting of hitherto neglected ‘industrial interdependencies’ between civil and military nuclear power particularly in relation to nuclear-powered submarines.<sup>21,22</sup> Maintaining the reservoir of skills, research and development, and supply chain activities necessary for nuclear submarines, is an expensive long-term endeavour. Maintaining civil nuclear construction is crucial to sustaining this reservoir of capability. What has become clear in recent years is that the countries that tend to pursue intense nuclear new build programmes tend to be established or aspiring nuclear weapons states.<sup>22</sup> Recent statements from high-level officials confirm the industrial interdependencies between civil and military sectors – for instance French President Emmanuel Macron’s blunt statement in 2020:

*“to oppose civilian nuclear and military nuclear in terms of production...[and]...research, does not make sense for a country like ours...without civilian nuclear, no military nuclear, without military nuclear, no civilian nuclear.”<sup>23</sup>*

Such candour is also found in the USA, with a prominent think tank outlining that the military complex is “*tied to the fate of the commercial nuclear industry*”.<sup>24</sup> Meanwhile, the Atlantic Council –describing a “*a mutually reinforcing feedback loop*” between the civil and military nuclear sectors – puts a value on the economic contribution of civil nuclear ‘human capital’ to the US defence nuclear enterprise at \$26.2 billion.<sup>25</sup> In other words, civil nuclear underwrites considerable costs associated with the military nuclear complex in the USA. This is particularly relevant for naval nuclear propulsion including submarines, where a report by former US Energy Secretary Ernst Moniz advocating national security benefits of civil nuclear highlights the “strong overlap” between the nuclear navy and commercial nuclear industry.<sup>26</sup>

The smaller scale of the UK nuclear industry means these industrial pressures are likely to be even greater. Although no official statements have been made (and the issue remains almost entirely undiscussed in energy policy), UK military policy documents do provide clear evidence for these same interdependencies. For example, Rolls Royce have long emphasised that a decline in civil nuclear has “*reduced the support network available to the military programmes*” emphasising that that “*...this will especially be so if, despite renewed calls for them, a new generation of civil nuclear power stations is not constructed*”.<sup>27</sup> As the UK considered renewal of Trident, a prominent security expert expressed concerns that “*if the UK does not build new civil nuclear stations... the entire burden of the nuclear safety and regulatory regimes would fall on the defence budget*”.<sup>28</sup> It was highlighted in 2009 by the Dalton Institute that “*The UK is not now in the position of having financial or personnel resources to develop both [civil and defence] programmes in isolation*”, with Rolls Royce in the same report stating that: “*a larger involvement in the broader [civil] industry will also have a spillover benefit to military capability*”. A RUSI report in 2008 highlighted the benefits of “*masking*” costs of submarines in other infrastructural projects, the most related of course being civil nuclear.

In 2014, a heavily redacted formerly secret report noted that the UK nuclear submarine industry was in serious disarray due to atrophy in crucial skills and expertise exacerbated by decline in the civil nuclear industry.<sup>29</sup> The report recommended further ‘engagement’ with the civil nuclear sector as a solution to these challenges, urging that “*the [submarine] programme seek imaginative methods to better engage with the emergent civil new-build programme...to the benefit of defence*” and that “*the Research Programme Group establish a workstrand to look at leveraging to maximum effect civil nuclear investment*”.

This advice seems to have been readily taken up. In 2017 (following evidence submitted by the authors to a Public Accounts Committee (PAC) inquiry into nuclear power<sup>30</sup>), it was confirmed by the Permanent Secretary of the Ministry of Defence (MoD) that civil nuclear new build presented opportunities for the submarine industry in “*...building up its nuclear skills*” but there would need to be “*...concerted government action to make it happen*”.<sup>31</sup> This ‘concerted action’ can be seen in the documentation around the ‘nuclear sector deal’ a year later, which provided for the “*...greater alignment of the civil and defence sectors with increased proactive two-way transfer of people and knowledge*”.<sup>32</sup> Rolls Royce also confirmed the importance of civil nuclear to underwriting costs for the submarine programme, outlining that investment in SMRs could “*relieve the MoD of the burden of developing and retaining skills and capability...free[ing] up resources for other investments*”.<sup>33</sup>

Despite this strong evidence, there remains no official acknowledgement from the UK Government that energy strategy is being motivated in part to subsidise nuclear submarine infrastructures. Nonetheless, rare statements are made by



There is strong evidence of ‘industrial interdependencies’ between the UK’s civil and military nuclear programmes

government officials that clearly demonstrate the inseparability of civil and military nuclear in the UK. For example, in 2018 the then Under Secretary for Energy Richard Harrington referred to the separation of civil and military nuclear as an “*artificial distinction*”.<sup>34</sup> Yet official energy policy remains silent on the matter. This is despite acknowledgement by the National Audit Office that factors “*beyond the energy trilemma*” are influencing the government’s persistent attachment to costly new nuclear.<sup>10</sup> The long-awaited 2020 Energy White Paper reiterated intense nuclear commitment, despite the government’s own data showing severe cost disadvantages for nuclear compared to renewables – data that were conspicuously left out of the White Paper itself.<sup>35</sup> At the same juncture however, an interview with a senior figure at Rolls Royce, highlighted that developing SMRs would “...*help Rolls-Royce maintain UK capabilities for the country’s military nuclear naval program*”.<sup>36</sup> This continued heavy military influence on continuing UK government commitment to nuclear has significant implications for the UK’s climate ambitions, the state of democracy, and for movements towards a more peaceful world.

### Implications for decarbonising, democratising and demilitarising energy futures

The COVID-19 pandemic has sparked discussions around ‘building back better’ in ways that drive low carbon energy, providing economic opportunities and jobs. Yet the UK government continues to justify new nuclear based on climate change arguments that are no longer credible. Since Tony Blair announced that nuclear was ‘back with a vengeance’ in 2006, only one power station out of several proposed developments is currently underway. Eighteen years after the launch of the UK’s new nuclear programme, and nearly ten years beyond its own due date, Hinkley Point C may be built by 2026. But it is extraordinarily rapid growth in renewables and energy efficiency, that has seen the UK’s grid rapidly decarbonise and coal virtually eliminated. New nuclear has thus far made no contribution at

all. And with government commitments to reduce emissions by 62% as soon as 2030, further new nuclear beyond Hinkley (whether large or small), cannot make any meaningful contribution. Beyond this, research shows that high costs, long lead times and institutional effects associated with nuclear, can crowd out renewables investment.<sup>37</sup> So, continued nuclear enthusiasm represents a considerable opportunity cost for rapid climate action: slowing investment and growth in more rapid, effective and affordable renewables, energy efficiency and grid transformation.

The matter of jobs and climate has of course been central to discussions around ‘building back’ after COVID-19. Yet despite the stream of rhetoric from the nuclear industry and much media coverage around nuclear jobs, it is clear there are already more jobs provided by renewables in the UK than nuclear, with the difference set to grow fast. Similar evidence in the USA highlights how more jobs are already associated with solar and wind than with nuclear, despite the USA having more nuclear reactors than any other country. So why are nuclear jobs so important to the UK government compared to other types of low carbon employment? And here we arrive back at the evidence provided above, that it is the retaining of nuclear military capabilities which makes this such a priority.

Not only are military-influenced obsessions with new civil nuclear detracting from climate action, but associated efforts at concealment are eroding the transparency, rigour, and quality of democratic UK policy making. It is on these grounds crucial that the UK nuclear debate is opened up beyond the narrow confines of now-discredited energy and climate policy rationales, so that citizens and energy consumers can make informed decisions. To see this does not imply a ‘pro’ or ‘anti-nuclear’ position. Instead, this is simply a matter of responsibility shared to a greater or lesser degree across all politicians, activists and citizens – to work towards a more vigorous, transparent and democratic debate in which rationales are not hidden, but properly scrutinised and evaluated.



» Nor is this a new issue. It chimes strongly with concerns that were at the forefront of discussion in the burgeoning progressive movements of the 1970s, in which SGR itself was born.<sup>38</sup> In this light, the challenge is not just the technical imperative to reach zero carbon, but a democratic question over what kind of zero carbon world we want to build? It is here that it is so crucial to scrutinise the real drivers of nuclear infrastructures. Without understanding the evident strength of military pressures on civil energy systems, these forces threaten to subvert and overpower not only the climate agenda, but democratic policy making itself. If renewable energy and energy efficiency are to realise their full promise for shifting the world onto “soft energy paths” “towards a durable peace”, then it is imperative that energy debates recover some of their former rigour and vigour. With a newly accelerating nuclear arms race in which the UK is scandalously complicit, now is the time for renewed efforts to reconcile the longstanding aims of SGR between climate, peace and democracy. It is only in a world free from nuclear weapons, that nuclear distractions and obstructions can be removed from the essential goals of reaching zero carbon.

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For more details of the SGR conference, including web-links to the videos and slide presentations, see p.40.

## References

- Parkinson, S. (2019). The Carbon Boot-print of the Military. *Responsible Sci.* 2, 18.
- Johnstone, P. & Mcleish, C. (2020). World wars and the age of oil : Exploring directionality in deep energy transitions. *Energy Res. Soc. Sci.* 69, 101732
- Eckhouse, B. (2020). *Solar and Wind Cheapest Sources of Power in Most of the World.* Bloomberg <https://www.bloomberg.com/news/articles/2020-10-19/wind-solar-are-cheapest-power-source-in-most-places-bnef-says#>
- Lazard. (2020) *Lazard's Levelized Cost of Energy Analysis – Version 14.0.*
- Lazard. (2019). *Lazard's Levelized Cost of Storage Analysis – Version 5.0.*
- Schneider, M. et al. (2020). *Nuclear Industry Status Report 2020.* (Myce Schneider Consulting Project).
- Green, J. (2017). Not just Toshiba – the global nuclear industry is in crisis everywhere. *The Ecologist* [http://www.theecologist.org/News/news\\_analysis/2988607/not\\_just\\_toshiba\\_the\\_global\\_nuclear\\_industry\\_is\\_in\\_crisis\\_everywhere.html](http://www.theecologist.org/News/news_analysis/2988607/not_just_toshiba_the_global_nuclear_industry_is_in_crisis_everywhere.html)
- BBC News. (2019). Nuclear plant in Anglesey suspended by Hitachi. BBC News Online <https://www.bbc.co.uk/news/business-46900918>
- Watt, H. (2017). Hinkley Point: the ‘dreadful deal’ behind the world’s most expensive power plant. *The Guardian* Online.
- NAO. (2017). Hinkley Point C.
- PAC. (2017). No one protected interests of consumers in Hinkley power deal. Public Accounts Committee website: <https://www.parliament.uk/business/committees/committees-a-z/commons-select/public-accounts-committee/news-parliament-2017/hinkley-point-c-report-published-17-19/>
- BERR. (2008). A White Paper on Nuclear Power, Meeting the energy challenge.
- BEIS. (2020). BEIS Electricity Generation Costs.
- BEIS. (2021). Digest of UK Energy Statistics (DUKES). Digest of United Kingdom Statistics. <https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>
- Butler, N. (2018). Should the UK government fund new nuclear? *The Financial Times* Online
- Ramana, M. V. (2021). Small Modular and Advanced Nuclear Reactors: A Reality Check. *IEEE Access*, 9.
- Johnstone, P. & Stirling, A. (2020). Comparing nuclear trajectories in Germany and the United Kingdom : From regimes to democracies in sociotechnical transitions and discontinuities. *Energy Res. Soc. Sci.* 59, 101245.
- Birmingham Policy Commission. (2012). *The Future of Nuclear Technology in the UK.*
- Edwards, R. (1985). *Nuclear Power, Nuclear Weapons: The Deadly Connection.* Campaign for Nuclear Disarmament.
- Bergeron, K. (2002). *Tritium on ice: The dangerous new alliance of nuclear weapons and nuclear power.* MIT Press.
- Stirling, A. & Johnstone, P. (2020). Evidence from SPRU to the Bradwell Pre-Application Consultation.
- Stirling, A. & Johnstone, P. (2018). A Global Picture of Industrial Interdependencies Between Civil and Military Nuclear Infrastructures. *Editorial Assistance.* vol. 13
- Macron, E. (2020). Notre avenir énergétique et écologique passe par le nucléaire. Déplacement du Président Emmanuel Macron sur le site industriel de Framatome. Elysée webpages <https://www.elysee.fr/emmanuel-macron/2020/12/08/deplacement-du-president-emmanuel-macron-sur-le-site-industriel-de-framatome>
- CSIS. (2018). Nuclear Energy, Naval Propulsion, and National Security. Centre for Strategic & International Studies <https://www.csis.org/events/nuclear-energy-naval-propulsion-and-national-security>
- Ichord, R. & Oosterveld, B. (2019). *The Value of the US Nuclear Power Complex to US National Security.* Atlantic Council.
- Energy Futures Initiative. (2017). *The U. S. Nuclear Energy Enterprise : A Key National Security Enabler.* <https://static1.squarespace.com/static/58ec123cb3db2bd94e057628/t/5992f7e0bf629ad8f9d575ec/1502803938248/EFI+Nuclear+Report+FINAL+08.2017.pdf>
- House of Commons Defence Committee. (2006). *The Future of the UK's strategic nuclear deterrent: the manufacturing and skills base.* Crown Copyright.
- Stocker, J. (2007). *The United Kingdom and Nuclear Deterrence.* Routledge.
- Grimes, R., Ion, S. & Sherry, A.R.N. (2014). Nuclear reactor test facility review. Ministry of Defence.
- Stirling, A. & Johnstone, P. (2017). Some Queries over Neglected Strategic Factors in Public Accounting for UK Nuclear Power: evidence to the House of Commons Public Accounts Committee Inquiry on Hinkley Point C.
- PAC. (2017). House of Commons Committee of Public Accounts Hinkley Point C. <https://publications.parliament.uk/pa/cm201719/cmselect/cmpubacc/393/393.pdf>
- Nuclear Industry Council. (2017). *The Nuclear Sector Deal Nuclear Industry Council Proposals to Government for a Sector Deal.*
- Rolls Royce. (2017). *UK SMR : A National Endeavour.* <https://www.rolls-royce.com/~media/Files/R/Rolls-Royce/documents/customers/nuclear/a-national-endeavour.pdf>
- Hansard. Nuclear Sector Deal. (2018). House of Commons Hansard <https://hansard.parliament.uk/Commons/2018-07-11/debates/6F49AF80-F000-4AE7-9AIF-D45827C3975E/NuclearSectorDeal>
- HM Government. (2020). *Energy White Paper: Power our Net Zero Future.* The Stationery Office, Crown Copyright.
- Chaffee, P. (2020). Rolls-Royce Pushes for Major SMR Commitment. *Nucl. Intell. Wkly.* 14.
- Sovacool, B.K., Schmid, P., Stirling, A., Walter, G. & MacKerron, G. (2020). Differences in carbon emissions reduction between countries pursuing renewable electricity versus nuclear power. *Nat. Energy* doi:10.1038/s41560-020-00696-3.
- Lovins, A. (1977). *Soft Energy Paths: Towards a Durable Peace.* Friends of the Earth International.