1: Summary

1.1: In this evidence to the PAC, we raise significant but neglected queries over public accounting for Hinkley Point C (HPC). The issues arise in the problem that growing recognition of the seriously unfavourable costs of HPC when compared with other low carbon energy, appears to have having little effect on the intensity of UK Government commitments to nuclear power. We outline evidence that the persistence of these nuclear attachments despite adverse economics, is partly due to a perceived need to subsidise the costs of operating and renewing the UK nuclear-propelled submarine fleet.

1.2: This military nuclear infrastructure shares with civil nuclear power, a necessity to maintain a large scale national base of nuclear-specific skills, research, training, design, engineering, industrial and regulatory capabilities. Without large revenue flows to this highly-specialised joint industrial base from civil nuclear supply chains ultimately funded by electricity consumers, we document clear concern in defence policy debates, that the costs of UK nuclear submarine capabilities could be insupportable.

1.3: If UK pursuit of uncompetitive nuclear power is partly justified as a means to sustain these shared civil-military specialised nuclear capacities, then availability of lower cost domestic low-carbon power means electricity prices are higher than would otherwise be the case. Opportunity costs may also arise in foregone support for other strategically important UK industries. It is this that would amount to an effective subsidy from electricity consumers to military nuclear infrastructures. Remarkably, this civil-military link is well documented in defence debates, but entirely neglected in energy policy discussion.

1.4: To see the significance of the questions raised by this, does not imply a generally critical position on nuclear power. The matters at stake are fundamental issues of rigour and value for money in public accounting, as well as transparency and democratic accountability in government. Suggesting specific questions, we hope the PAC will take this opportunity to start a process of investigating these issues.

2: Background

2.1: On the basis of an invitation following an exchange with the Committee secretariat, we submit this evidence to the upcoming inquiry of the Public Accounts Committee on Hinkley Point C (HPC).

2.2: A number of important but up-to-now seriously-neglected questions are currently intensifying, over public accounting issues around the case for Government support for HPC. These hinge on the remarkable persistence and intensity of UK Government attachments to what is increasingly recognised as an economically untenable project. Many have noted a dearth of credible strategic rationales. This evidence presents a case that the reason lies (at least partly), in a deep but opaque commitment to maintaining national capabilities to build and operate nuclear-propelled submarines.

2.3: In short, this evidence submits that an undetermined part of the full costs of this expensive, controversial – but officially highly-prioritised – military infrastructure are in effect (without clear public acknowledgement or justification), being loaded into electricity prices. With costs of alternative large-scale domestic low-carbon energy resources like offshore wind power confirmed as significantly more favourable than HPC, it seems a hidden subsidy is being imposed on electricity consumers.
2.4: The costs in focus here are not those of the relatively well-documented directly weapons-related linkages between civil and military nuclear infrastructures (involving fissile and other special nuclear materials) 5. Instead, the matter of current interest is entirely-undiscussed in UK energy policy: concerning the ‘submarine capabilities’ that are deemed central to military nuclear strategies 6. What is at issue, is the sharing between civil and military spending of the costs of maintaining joint national industrial capabilities in: skills, training and recruitment provision; domestic supply chains; nuclear research, design and engineering facilities; as well as general regulatory and industrial support 7.

2.5: If a UK withdrawal from civil nuclear power on grounds of uncompetitive economics were to leave these shared costs borne entirely on the military side, then UK military nuclear infrastructures would be significantly more expensive. If civil nuclear commitments are being maintained (despite adverse economics) in order to help cover these shared costs, then it is this that amounts to a cross-subsidy.

3: Current Evidence

3.1: Evidence for opaque civil-military links in these areas goes back many years. A 2015 study by SPRU at Sussex University for the first time documented many details 8. But, though well acknowledged on the military side 9, discussion is strikingly absent in UK civil energy policy literatures. Associated issues are thus entirely unaddressed in UK energy strategy or public spending debates. So, the questions raised are not just about rigorous public accounts or value for money, but democratic accountability.

3.2: International law and politics make general links between civil and military nuclear activities a sensitive issue – and so unsurprisingly difficult to document 10. However, evidence for influence on UK energy policy of commitments to maintain UK nuclear submarine capabilities includes the following:

3.3: Significant commentary by the National Audit Office (NAO). The 2008 NAO report on the Trident Programme stated that “[o]ne assumption of the future deterrent programme is that the United Kingdom submarine industry will be sustainable and that the costs of supporting it will not fall directly on the future deterrent programme” 11. This brief remark suggests that without wider costs of joint capabilities being partly borne elsewhere (eg: on the civil side), nuclear submarine infrastructures would be significantly more expensive. In itself, this implies a strong military incentive to sustain a civil nuclear industry, even if this is uncompetitive in energy terms alone. What the NAO describes here as an “assumption” is very important. But it seems never to have been fully or openly explored in public.

3.4: Clearly-stated industry confirmation. The above broad picture is confirmed by statements associated with the UK submarine industry. In a report for the defence think-tank, the Royal United Services Institute, a former executive of prime submarine contractor BAE Systems acknowledged incentives to “mask” this significant military cost behind civilian energy programmes 12. The leading UK nuclear submarine propulsion reactor manufacturer Rolls Royce, has long been clear privately about the importance to their own business model, of growing revenues from lower tier roles in civil nuclear supply chains in order to help cover costs of military activities 13. Other interests associated with the UK nuclear submarine programme also confirm this link 14.

3.5: The unexplained acute energy policy reversal of 2003-2006. A material indication of this pressure is apparent in the turbulent period when – contrary to accelerating international trends – current UK commitments to nuclear power were intensified 15. An unprecedented U-turn occurred in 2003-6, with a detailed Energy White Paper in 2003 finding on the basis of a comprehensive earlier review process 16, that nuclear power is “unattractive” 17. Then a hasty further Energy Review of 2006 abruptly shifted this without clear reason, to a position that new nuclear “had a role to play” in the UK’s energy future 18. This turnaround was further entrenched in a relatively brief 2008 White Paper announcing a UK “nuclear renaissance” 19. With the cursory nature of this process successfully challenged by Judicial Review 20; Parliamentary scrutiny repeatedly noting the policy shift to be inappropriately opaque 21;
and even pro-nuclear commentators commenting on the extraordinary decision-making secrecy; no satisfactory explanation has yet emerged for the summary reversal of the 2003 White Paper. Yet high-level statements of UK energy policy have since remained both unwavering and under-qualified in their onward support for nuclear power as a supposedly essential part of the UK energy mix.

3.6: Concurrent rising intensity of expressed concerns over UK nuclear submarine capabilities. With official documents failing to give sufficient reasons for why the UK should be so unusual on the world stage in the proportional scale of its commitments to new civil nuclear power, possible explanations must be sought elsewhere. Here, given obvious sensitivities, it is not surprising that exact modalities for UK civil-military nuclear links will inevitably remain obscure. But it is nonetheless pertinent, that there also occurred in exactly the period of the 2003-6 energy policy U-turn, a dramatic rise in activities aimed at maintaining ‘nuclear submarine capabilities’. With lobbying for civil nuclear power by military industrial interests noted in that period to be among the most effective ever experienced, MoD quietly commissioned a major study of the civil-military nuclear connections. A series of Parliamentary Select Committee inquiries heard evidence which repeatedly confirmed that UK submarine capabilities display dependencies on a continuing civil nuclear programme.

3.7: Civil-military links are implicitly prominent in important UK nuclear policy interventions. Civil-military nuclear industrial dependencies are quite well documented on the military side. But, with one Parliamentary witness emphasising that any connections must be “carefully managed to avoid the perception that they are one and the same”, they have remained almost entirely unacknowledged on the civil energy strategy side. Yet despite this apparent lack of candour, a number of joint policy initiatives nonetheless underscore official recognition of the importance of these links. A joint civil-military ‘Key Suppliers Forum’ was set up in 2006; with announcement for the National Nuclear Skills Academy following in 2007. The Cogent agency spans both civil and military nuclear needs, with combined nuclear skills prioritised in many other policy initiatives. The priority UK research programme on small modular reactors (SMRs) also addresses perceived joint civil-military demand. The prime importance of reserving business for the UK submarine supply chain was signalled, with Rolls Royce benefiting from £100 million worth of project contracts.

3.8: The increasingly globally anomalous intensity of UK commitments to nuclear power. UK nuclear submarine industry interests have since reinforced many engagements in civil nuclear policy. But this military industry pressure for maintaining a UK civil nuclear programme has remained entirely undiscussed in official energy policy documents – or in wider public debate. And this occurs at a time when the relative economic performance of renewable energy is recognised to be growing far more favourable, with many countries abandoning civil nuclear power and the UK enjoying unusually competitive renewable resources in strategically important industrial policy areas like offshore wind. So, there is a telling dearth of other credible explanations for the intensity of UK nuclear commitments. Among the most tangible indirect evidence of the strength of military pressures to maintain civil nuclear power, then, is the otherwise-unexplained persistence in UK Government attachments to HPC.

3.9: Growing international evidence for the importance of nuclear submarine links. It is striking that countries currently pursuing ambitious stated programmes for civil nuclear development also tend to operate – or aspire to – nuclear submarine capabilities. Echoing UK debates, a presidential statement in Brazil (for instance) explicitly emphasises submarine capabilities as a way to pursue a permanent seat on the UN Security Council. Anxieties have recently been expressed in France over links between a declining nuclear industry there, and the sustaining of the ‘Force de Frappe’. In the US (as in the UK), explicit discussion of this issue has been muted up to now. But the radically improving economics of renewable energy as a competitor to nuclear power are now forcing a striking change of approach. In August 2017, a flurry of high-profile publications marked a new candour over a
US version of exactly the civil-military dependency diagnosed here for the UK. The Energy Futures Initiative expressed concern that “a sustained decline in the commercial industry could also have a negative impact on the US nuclear naval program.” Former US Energy Secretary Moniz confirms that “a strong domestic supply chain is needed to provide for nuclear Navy requirements. This supply chain has an inherent and very strong overlap with the commercial nuclear energy sector.” Despite official silence, the smaller national nuclear industry means the situation is likely even more acute in the UK.

3.10: Beginnings of a reframing of UK pro-nuclear positions. Still somewhat behind the US, there are now signs that communications strategies are also being recalculated in the UK. Coinciding with the announcement of highly favourable contracts for offshore wind energy in September 2017, Rolls Royce acknowledged for the first time in a major public statement, that there also exists a deep interlinkage between British civil and military nuclear industrial capabilities. Arguing for an entirely new and untested form of small modular reactor (SMR), Rolls Royce devotes a whole section of their report to this issue – stating that “expansion of a nuclear-capable skilled workforce through a civil nuclear UK SMR programme would relieve the Ministry of Defence of the burden of developing and retaining skills and capability. This would free up valuable resources for other investments.” This is direct industry confirmation of what this evidence holds to be a longstanding hidden UK policy issue.

4: Conclusions and Questions

4.1: These recent presentational shifts in the US and UK thus confirm cumulative long-term evidence of important civil-military nuclear links. With the credibility of earlier-propounded official rationales for UK civil nuclear commitments now seriously reduced, these recent statements also suggest mounting pressures on industry to deploy an ostensibly new strategic argument. So, given the high stakes, it seems appropriate for this new storyline to be scrutinised before it becomes simply taken-for-granted like previous ones (eg: based on now-discredited cost projections). Such interrogation need not imply any prior position either in favour or against civil or military nuclear capabilities. It simply addresses an issue that has remained remarkably unexplored in official public investigations.

4.2: With renewables now overturning longstanding assumptions in global energy markets, now seems an opportune moment for examining the depth and scale of these potentially highly significant influences of military strategy on national energy policy. Whatever the merits or demerits might be for UK energy or defence policy, a window of opportunity is still open but diminishing on both sides. It is on these grounds, therefore, that we urge the UK Parliamentary Public Accounts Committee to take a lead in giving these pressing and important issues the rigorous and open attention that they deserve.

4.3: Of course, it is in the nature of these issues that openly available evidence is incomplete. The absence up to now of any public analysis, questioning or debate, means this must be expected. Among the queries which are therefore salient to pose to responsible Government figures are the following.

4.4: What official analysis has been made of impacts on the presently-accounted costs of UK military nuclear infrastructures (including submarine supply chains), of withdrawal from civil nuclear power?

4.5: What official judgement has been made concerning levels of cross-subsidy that may be justified (if any) on electricity consumers in order to support committed UK military nuclear infrastructures?

4.6: In deciding whether to proceed with HPC, what official appraisals exist of other strategic factors (if any) that might qualify the clear cost advantages of domestic UK renewables over nuclear power?

4.7: What communications have taken place and what positions have been taken among different arms of Government with regard to the complex public accounting challenges at stake in this issue?

4.8: What overall position has Government taken on needs for clear critical scrutiny, rigorous policy analysis and wider democratic debate of arguments on all sides of this major public spending issue?
The initial detailed academic analysis in (Cox et al. 2016) has recently been summarised in a more accessible two-part communication for these issues were highlighted in MoD-commissioned reports by the USA-based Rand Corporation in 2005 (Schank, Riposo, et al. 2005). These issues have been widely discussed on the military side, by influential think tanks (Schank, Riposo, et al. 2005; Schank, Cook, et al. 2005). These links include well known issues around proliferation risks of uranium enrichment (Irish Times 2004), the diversion of plutonium from civil to military programmes via reprocessing that occurred in the UK (Arnold 2001), as well as supplies of tritium from civil to military reprocessing and processing (Bennet et al. 2011) and government reports (Ministry Of Defence 2005; Ministry Of Defence 2008).

As discussed in Cox et al. (2016) UK politicians have in recent years tended to show consistently unusual intensity in their commitments to new nuclear power – at odds with global patterns of nuclear development. This picture is puzzling given that the UK’s nuclear industry is comparatively weak in international comparisons, whilst the UK renewable resource is unusually large scale and competitive (see Johnstone & Stirling 2015a). Successive UK administrations have become the main global governmental proponents of what is repeatedly referred to as an impending “nuclear renaissance” (HMG Government 2013). Challenged on the flagship UK national radio news programme in March 2016, for instance, former British Energy Minister Amber Rudd clearly expressed the intensity of this position, in stating that “investing in nuclear is what this Government is all about for the next twenty years” (Rudd quoted on BBC Radio 4 2016). The present Energy Minister, Greg Clarke has said in the past that there is “no limit” to how much new nuclear capacity the Conservative Party would be prepared to build in the UK (Greg Clarke quoted in Collins 2010).

For example regarding the UK’s nuclear turnaround between 2003-2006 discussed below, in a detailed account of this period by nuclear advocate Simon Taylor (2016) points out that many politicians did not understand why the UK was rethinking its position on nuclear as the evidence base had not changed. The intensity of UK Government commitments to new nuclear build are at odds with most authoritative and independent appraisals of alternative energy options available to the UK – such as the most comprehensive recent Government assessment in the 2003 Energy White Paper itself (see PIU 2002 and DTI 2003 at endnotes 16 and 17 below). They have been described as ‘puzzling’ by former US Vice President Al Gore (Harvey 2015).


Referred to as ‘the deterrent’, British national nuclear weapons capabilities have remained a uniquely officially-prioritised element in UK post-WWII policy. A leading figure in Attlee’s Labour administration (1945-51) set the continuing mood, in stating that “[w]e’ve got to have this thing over here whatever it costs (and) we’ve got to have the bloody Union Jack on top of it” (quoted in Jack 2016). Current debates over the renewal of Trident capabilities display a similar perceived over-riding importance in high-level expressions of Britain’s national identity, for instance in contemporary statements reported in the national press from an unnamed British Army general, that there may need to be a “mutiny” if an anti-trident politician were to become Prime Minister (Mortimer 2015). See also statements cited in footnote 45.

As highlighted on page 27 of (Schneider and Froggatt et al. 2017) and 6c (Schneider and Froggatt et al. 2016). Pp 36-41.

As highlighted by slide 34 in the presentation by John Molyneux: (2012) Nuclear new build industrial challenges – a Rolls Royce perspective. Available in a form marked as “confidential” here, this slide is also reproduced in Cox et al. (2016).

A full range of statements given in evidence to various Parliamentary Select Committee Inquiries concerned with submarine nuclear capabilities, is surveyed by Cox et al (2016) with full quotes given in appendices.

As highlighted on page 27 of (Schneider and Froggatt et al. 2017) World Nuclear Industry Status Report, this occurred at a time when international rates of reactor construction were at a historic low.

Before the 2003 White Paper, the UK Government Performance Innovation Unit (PIU) undertook an especially substantial review and consultation in The Energy Review. Unusually constituted by a process of recruiting the best available independent energy expertise as well as seconded high-level civil servants – and independent also from traditional positions taken within the incumbent energy ministry – the PIU came to similar conclusions to the later White Paper, concluding that: “the immediate priorities of energy policy are likely to be most cost-effectively served by promoting energy efficiency and expanding the role of renewables” (PIU 2002 page 5.).

Page 44. DTI (2003) Our Energy Challenge states: “Although nuclear power produces no carbon dioxide, its current economics make new nuclear build an unattractive option and there are important issues of nuclear waste to be resolved. Against this background, we conclude it is right to concentrate our efforts on energy efficiency and renewables”.


Mr Justice Sullivan described the Government’s nuclear consultation at this time as “flawed”, “misleading” and “procedurally unfair”. This episode is reported by the BBC News (2007) here.

The Environmental Audit Committee (2016) outlined that “the Government has failed to clarify the nature of the review” and that “...the..."
manner in which it is being conducted appears far less structured and transparent than the process by which the [2003] White Paper itself was reached”

22 Nuclear advocate Simon Taylor (2016) notes the “secrecy” in which the second energy review took place “behind closed doors”, with a secret working group within Tony Blair’s cabinet office which many in the cabinet office itself were not aware of.

23 Steve Thomas (2016), a leading expert in nuclear policy, explores the “remarkable” policy turnaround, between 2003-2006, concluding that official arguments around climate change and energy security do not offer sufficient explanation. Without being able to find a more detailed explanation, many commentators put this policy reversal down to what Thomas calls a “failure” (page. 421) on the part of the civil service and policy making more widely, in the face of what is simply described as the effects of the nuclear “lobby” (page 421). But the nature and substance of this ‘lobbying’ remains opaque, with Thomas concluding that “There is a common perception that there is a strong nuclear lobby in Britain... however, it is not readily apparent who that lobby might contain.” (p. 88). The present evidence bears directly on this issue.

24 This is confirmed by the strong statements of support for new nuclear as discussed in endnote 1 including Amber Rudd’s statement that “investing in nuclear is what this Government is all about for the next twenty years” (Rudd quoted on BBC Radio 4 2016).

25 While countries like China, Russia, and India are building a greater number of reactors (in addition, incidentally, to also operating nuclear-manufactured submarines), the UK’s nuclear new build agenda is, as a proportion of national electricity generation capacity, the most ambitious not just in Europe but (by some measures) in the world (eg: Vaughan 2009; Schneider and Froggatt et al. 2017).

26 See Cox et al (2016, p. 48): figure 6: which provides a histogram showing the intensity of activity in UK military nuclear policy, in 4-year increments over the period 1955-2014. There is a marked increase in this activity in the period discussed here.

27 On the website of the Keep Our Future Afloat Campaign (KOFAC), the “influential champion of the UK submarine industrial base” has been described by Rt Hon Geoff Hoon MP as “one of the most effective defence lobbies I have come across.” (KOFAC 2006).

28 The MoD commissioned the influential USA based think tank (the RAND Corporation) to research the industrial and supply chain issues around maintaining the UK submarine base – particularly highlighting the skills shortages that the UK faced in this area and the associated difficulties in sustaining a nuclear-qualified workforce between submarine orders (Schank, Cook, et al. 2005; Schank, Riposo, et al. 2005)

29 The full quote from the Dalton Institute’s evidence to the Innovation, Universities, Science and Skills Committee (2009: EV419)

“Engineering the Future” report, is as follows: “The UK is not now in the position of having financial or personnel resources to develop both programmes in isolation. For example, reactor physicists on the military programme can develop their skills and knowledge by researching civil systems, and then only when necessary divert to classified work to follow a specialist career path. This link does however need to be carefully managed to avoid the perception that civil and military nuclear programmes are one and the same.” (Innovation Universities Science and Skills Committee 2009).

30 This includes Parliamentary Select Committee reports (eg: House of Commons Defence Committee 2007), reports by nuclear industry skills bodies (Bennet et al. 2011) and government reports (Ministry Of Defence 2005; Ministry of Defence 2008).

31 EV 419 in Innovation Universities Science and Skills Committee (2009).

32 One very rare but salient exception being an external report for DECC by the consultancy Oxford Economics which stated that “the naval and civil reactor industries are often viewed as separate and to some extent unrelated from a government policy perspective. However, the timeline of the UK nuclear industry has clear interactions between the two, particularly from a supply chain development point of view.” (Oxford Economics 2013. page 31).

33 Initiated by BAE Systems with Government support in 2006, the Key Suppliers Forum (KSF) “is composed of the customer (MoD), the prime contractor (BAE Systems), the Department of Trade and Industry (DTI) and the ten Key Supplier Partners, who represent around 75 per cent of the Astute programme’s material spend. The full KSF membership controls around 95 per cent of the total cost of the submarine programme, including through-life costs. The purpose of the KSF is to ensure a consistent understanding of current and future submarine programmes, and the affordability challenges to be addressed.” As discussed in Ireland (2007: 4).

34 The approval of the NSAN as a National Skills Academy was announced by David Lammy, Skills Minister, in September 2007. As discussed in a 2008 Memorandum of Evidence on Nuclear Engineering (Innovation Universities Science and Skills Committee 2008) available here, the aims were to “...build on and coordinate existing training provision on a national and regional basis... This will address the decommissioning of existing facilities, the on-going needs of the power generation industry, the Royal Navy propulsion programme and new civil build” (p. 7).


36 See Rolls Royce evidence in House of Commons Select Committee report on Small nuclear power (UK House of Commons Energy and Climate Change Committee 2014) and a more recent inquiry on nuclear in the UK (House of Lords Science and Technology Select Committee 2017).

37 Rolls Royce was named as a ‘preferred bidder’ for supplies of heat exchangers and systems to treat and waste processing of reactor coolant, as reported by Insider Media here (Insider Media 2015).

38 In 2006 BAE systems signed a memorandum of understanding with the nuclear power reactor designer and manufacturer Westinghouse, that it would join a consortium of support firms which will work together should Westinghouse win UK orders for its AP1000 reactor as reported here (CNA Media 2006). In 2012 Rolls Royce announced that it was “…actively pursuing opportunities in the UK new-build programme... This secures our ability to maintain those skills within Rolls-Royce, ‘ as reported in The Engineer (Harris 2012).

39 The Government’s ‘value for money statement’ for HPC (DECC 2016) has already been cited above, as have recent Contracts for Difference (CFD) allocations (BEIS 2017), which show winning offshore wind projects now coming in at prices substantially lower than the guaranteed HPC ‘strike price’. There is now a wealth of international literature corroborating the accelerating global nature of this trend (Frankfurt School-UNEP 2016). It is very clear on this basis that solar and wind power are more competitive than new nuclear power.

40 In Europe Belgium, Germany, Switzerland and Scotland, have made plans to abandon nuclear power. Taiwan and South Korea are also proposing to phase out nuclear power. France is also planning to reduce reliance on nuclear capacity and Chinese nuclear ambitions have been scaled back (Schneider et al. 2017)

41 The UK has the best onshore and offshore wind and tidal resource in Europe as stated by the Department of Energy & Climate Change (2013).

42 One authoritative acknowledgement of the uncertainties and ambiguities around the rationales and drivers of this decision making is discussed above in relation to analysis by the nuclear expert Steve Thomas (2016).

43 See Cox et al (2016) pp. 33. Figure 3: Circumstantial relationships between different categories of international military, civil nuclear and geopolitical status.

44 See earlier-cited statements at endnote 3. Also: as discussed by Barckham & Norton-Taylor in The Guardian (Barckham & Norton-Taylor
Global investments in non-hydro renewables are now greater than global investments in nuclear, hydro and fossil fuels combined. As cited above, BEIS (2017) and available here.

A Report by the Energy Innovation Reform Project (2017) on the future costs of new nuclear in the USA notes that: “A sustained decline in the commercial industry could also have a negative impact on the U.S. nuclear naval program” (p.7). Available here. In the high profile journal Foreign Affairs (Gallucci & Schellenberger 2017) it is argued that the decline of civilian nuclear in the USA “would significantly undermine U.S. and Western national security interests”. Available here. At a similar time, a report by the Energy Futures Initiative (2017) clearly highlights the risks posed by US civilian nuclear decline to US naval supply chains.

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