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BASIC

How much does the UK spend on nuclear weapons?

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Introduction

The UK is the only nuclear weapons state that deploys ballistic missile submarines (SSBNs) as its sole nuclear weapons delivery platform.[1] The UK's first submarine-based 'deterrent', the Polaris SSBN system, entered service with the Royal Navy in 1968, and since April 1969 a British SSBN carrying nuclear weapons has always been on patrol as part of a 'continuous at sea deterrent' (CASD).

In 1980, the UK Government announced its decision to procure the Trident C4 missile system to replace the ageing Polaris system, and then in 1982 to procure instead the D5 variant of the Trident missile because of its increased capabilities and potential long-term financial savings resulting from operating the same missile as the US Navy. From 1994 onwards, four UK-designed and built Vanguard class submarines carrying the Trident missiles progressively replaced the Resolution-class SSBNs.

In 2007 the UK Government, endorsed by a Parliamentary vote (409 votes to 61), began a programme to maintain the UK's nuclear weapon system beyond the early 2030s. Under this programme the current Vanguard class SSBNs will be replaced by the 'Dreadnought' class. The UK will also participate in the current US service-life extension programme for the Trident II D5 missile, which will enable this missile to be deployed aboard the new submarines until the early 2040s.

Since 2007, 'conceptual' work has been ongoing on considering potential designs for replacement submarines, propulsion systems and other key components. The 'Initial Gate' phase, consisting of £3 billion in procurement of important items, was also approved. In October 2010, the UK Government decided to delay the ultimate decision on whether to proceed and how many submarines to order until 2016. The delivery date for the first submarine was also put back to 2028. In July 2016, the House of Commons backed the renewal of the UK's Trident nuclear weapon system by 472 votes to 117.[2]

The recent parliamentary and expert discussions of financial costs of British nuclear weapons have taken place within the wider political context of austerity and cuts to public spending. This report draws upon a mixture of publicly available data and estimates in order to outline both the current operating costs of the Trident nuclear weapon system as well as the estimated costs of the current plans to renew the UK's nuclear arsenal by replacing the four Vanguard-class submarines under the existing posture.

While estimating costs may seem like a simple task, two factors make it more complex, especially in relation to future expenditure: incomplete data in the public domain and problems in defining attributable expenditure. A history of cost over-runs and delays highlight the fact that nuclear weapons systems are perhaps the most complex and expensive systems of any government procurement, have the longest lead-times and perhaps the most stringent assurance requirements.[3] As Paul Ingram notes, "There are significant challenges in assessing costs in an environment of bespoke innovation, technology that is specific and without clear reference, and a future of uncertain requirements".[4]

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Components of the UK's nuclear weapon system

The UK's Trident system has three key technical components—the platform; the missile; and the warhead—underpinned by a range of supporting industrial and manufacturing infrastructure, as well as additional naval protection forces for the submarines.

The technical components

The platform for the UK's current strategic nuclear weapon system is the Vanguard-class SSBN. The UK's four SSBNs—HMS Vanguard, HMS Victorious, HMS Vigilant and HMS Vengeance—entered service in December 1994, December 1995, June 1998 and February 2001 respectively. All four submarines were designed and built in the UK by Vickers Shipbuilding and Engineering Ltd (VSEL), now BAE Systems, in Barrow-in-Furness, Cumbria.[5] Each submarine is powered by a Rolls Royce PWR2 nuclear reactor and has 16 independently-controlled missile tubes which house the Trident II D5 missiles. Each missile can be fitted with up to 12 warheads, which can be directed at different targets.[6] Since 2015, however, each submarine only carries up to eight operational missiles and no more than 40 warheads.[7] Under the CASD strategy, at any given time, Britain has at least one submarine armed and at sea.[8]

The Trident II D5 submarine-launched ballistic missile (SLBM) carried on the UK's Vanguard-class submarines is a three-stage solid-fuel inertial-guided rocket. Each missile has a range of between 6,500 kilometres and 12,000 kilometres, dependent on payload, and is accurate to within a few metres. Each missile has a MIRV (multiple independently-targetable re-entry vehicle) capability which enables each Trident missile to engage multiple targets simultaneously. The Trident II D5 missile was designed and manufactured in the United States by Lockheed Martin. Under the Polaris Sales Agreement (modified for

Astute Class submarine Audacious under construction

Trident), the UK has title to 58 missiles. Aside from those currently deployed, the missiles are held in a communal pool at the US Strategic Weapons facility at King's Bay, Georgia, USA. Maintenance and in-service support of the missiles is undertaken at periodic intervals at King's Bay, normally after a submarine has been through refit.[9]

The nuclear warhead on the Trident II D5 missile was designed and manufactured in the UK at the Atomic Weapons Establishment (AWE) at Aldermaston, Berkshire. Although public information is limited, the nuclear warhead is reported to be closely related to the W76 warhead used by the United States, a thermonuclear warhead with a yield of around 100 kilotons.[10] In 2010, the UK Government announced that it would reduce its overall nuclear weapon stockpile from around 225 warheads to no more than 180 warheads by the mid 2020s.[11]

The onshore infrastructure and skills base

The UK's Trident system is underpinned by three main types of supporting industrial and manufacturing infrastructure: submarine basing infrastructure; submarine construction and maintenance infrastructure; and warhead research and manufacturing infrastructure.

Basing infrastructure

The Naval Base at Faslane, Strathclyde, is home to the UK's Trident submarine force. It is managed under a partnership arrangement between the Ministry of Defence and Babcock International, and has a staff of over 7,000 (split roughly in half between military and civilian posts) and is also home to conventionally-armed submarines. The nuclear warheads carried onboard the Vanguard-class SSBN submarines are stored and fitted to the UK's Trident II D5 missiles at the Royal Naval Armaments Depot (RNAD) at Coulport, near Faslane. The RNAD is managed by the ABL Alliance—an alliance of AWE, Babcock and Lockheed Martin—under a 15-year contract with the UK Ministry of Defence agreed in 2012.[12] In-service maintenance of the SSBNs is conducted at Faslane; while deep maintenance/refit and decommissioning is conducted at HM Naval Base Devonport in Plymouth (see below).

Submarine construction and maintenance infrastructure

This comprises the building yard at Barrow-in-Furness, Cumbria, owned by BAE Systems, and the operational and refit and support site at Devonport, Plymouth, owned since 2007 by Babcock International and employing approximately 2,500 personnel.[13] The propulsion system for the submarines is built by Rolls Royce in Raynesway, Derby. The submarine construction and maintenance infrastructure also includes a highly specialised and skilled workforce and large-scale purpose-built physical infrastructure. Together, these requirements carry significant levels of fixed costs that must be incurred for the UK to retain key SSBN capabilities. However, it seems to be mainly government (public) money that is invested in the infrastructure, begging the question as to the purpose of the private ownership or management of these facilities.

Warhead research and manufacturing infrastructure

The UK's expertise in nuclear weapons design is concentrated at three Atomic Weapons Establishment (AWE) sites in West Berkshire: at Aldermaston (the main research and production site, which covers an area of approximately 750 acres and employs about 4,000 personnel), Blacknest (a centre of expertise in seismic monitoring and arms control verification) and Burghfield (the warhead assembly and disassembly site).[14] Since 1993, AWE has been a government-owned, contractor-operated (GO-CO) facility. Up until March 2016, it was managed by an equal partnership consortium, AWE Management Ltd, comprising US defence company Lockheed Martin, the UK-based Serco group and the US-based Jacobs Engineering Group (which purchased the share previously owned by British Nuclear Fuels in 2008), with each owning a third of the consortium.[15] Hence, two-thirds of the consortium was owned by US companies. In March 2016, however, the joint venture was restructured so that Lockheed Martin could take a majority holding in the consortium: Lockheed Martin now owns 51 per cent of the consortium, with Jacobs and Serco each owning a 24.5 per cent stake.[16] It also means that the US-owned companies' stake in the consortium has increased to more than 75 per cent.

The principal role of AWE is to build, maintain and certify the existing weapons stockpile, as well as to ensure good stewardship of nuclear weapons knowledge. It also plays an international role in supporting arms control measures and disarmament verification. AWE is currently working on a programme to upgrade the current UK Trident warhead to the 'Mark 4A' modified warhead, which will have increased accuracy and destructive power and an extended lifetime.[17] AWE also cooperates with the French Government on warhead research under the terms of the 2010 UK-France 'Teutates' Treaty, and continues to undertake long-standing collaborative research with US nuclear weapons laboratories under the terms of the 1958 US-UK Mutual Defense Agreement.[18] About 4,920 staff and 890 contractors are employed at AWE, which is estimated to contribute £475 million annually to the local economy.[19]

Overall, the Ministry of Defence estimates that "maintaining and sustaining the UK's nuclear deterrent supports over 30,000 UK jobs and makes a significant contribution to the UK economy".[20]

Naval protection forces for the SSBNs

In 2007, the UK Government confirmed that the conventional force elements in support of Britain's nuclear weapons included a combination of 'committed' and 'contingent' force elements, as shown in Table 1.

Table 1: Conventional force elements assigned to support UK nuclear weapons, 2007

Force Element	Committed [1]	Contingent [2]
Attack submarines	0	2
Destroyers and frigates	0	1
Minewarfare vessels	1	3
Survey vessels	1	0
Merlin ASW helicopters	0	5
Maritime and reconnaissance aircraft	0	8

[1] Force elements committed to the military task as their primary role

[2] Force elements held contingent are assigned to a number of tasks and are not planned routinely to deploy in support of the deterrent.

Source: House of Commons, Hansard, Written Answers, 8 Mar. 2007, Column 2131W

Cost of procuring and operating nuclear weapons

There are three main budget lines in relation to the UK's current nuclear weapon system: the costs associated with acquiring the SSBNs, missiles and warheads; the annual maintenance and running costs, including the cost of additional naval and police forces for protecting the system; and anticipated future decommissioning costs. In 2017, the newly created Defence Nuclear Organisation, a top level budget-holder within the Ministry of Defence, took on oversight of this network of equipment, people and infrastructure, which has become collectively known as the Defence Nuclear Enterprise.

Acquisition costs

A decision was taken in 1980 to replace the Polaris nuclear weapon system with the Trident system. At that time, the UK Government estimated that the capital cost of the Trident system (submarines and missiles) would be £5 billion (or £12.02 billion in 1998 prices) spread over 15 years. In 1982, and following on from a decision to procure the Trident II D5 missile instead of the Trident I C4 variant, the capital costs of procuring and maintaining Trident were estimated to be £7.5 billion. By the 1998 Strategic Defence Review (SDR) most procurement costs for Trident had been spent, and total acquisition expenditure on the programme was said to be £12.52 billion (or £18.35 billion in 2015-16 prices).[21] Thus, allowing for inflation, the Trident Programme was delivered roughly within budget, as acknowledged by the UK Defence Select Committee in 1994.

Maintenance, running and force protection costs

Once the Trident system began to be used in 1994, the UK Government estimated that annual expenditure for capital and operating costs, including the cost of the AWE, ranged between 3 per cent and 4.5 per cent of the annual defence budget.[22] These costs increased *as a proportion of the defence budget* (presumably because the rest of the defence budget was reduced in real terms) to between 5 per cent and 6 per cent in 2005-06 and according to several subsequent UK Government statements have remained at this level ever since.[23] The UK Ministry of Defence's budget for 2017-18 is £35.7 billion and is expected to increase every year to 2020-21 when it is estimated to be £39.7 billion.[24] Thus, according to this rough government estimate (that capital and operating costs for British nuclear weapons are about 5-6 per cent of the annual defence budget), current annual capital and operating costs for the Trident system are about £2 billion per annum. Unfortunately, it has always been difficult to get a clear sense of what 'capital and operating costs' are included in this figure. Does it include maintenance of infrastructure for basing, submarine construction and maintenance and warhead research and manufacturing, as well as the initial decommissioning costs for the submarines? Does it include some sort of average capital cost including construction of the submarines over the lifetime of the system, or (more likely) standard capital and operating costs for years of operation (which requires some capital investment) and therefore excludes the years of major spending on submarine construction (which would be much higher)? Neither the UK Government or the Ministry of Defence have ever appeared willing or able to provide detailed costed estimates in lifecycle terms.

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Additional information has occasionally been supplied by the UK Government (usually in answer to parliamentary questions) to enable some further disaggregation of this spending.[25] In 2007, for example, the then UK Defence Secretary gave a breakdown that included costs for expenditure at the AWE and life extension costs, as shown in Table 2.

Table 2. Estimated UK nuclear weapon costs, 2008-2010, at 2007 prices (£ million)

	AWE	SSBNs (1)	Life-Extension (2)	Total
2008-09	800	700	200	1700
2009-10	900	800	300	2000
2010-11	950	750	400	2100

(1) Estimate costs of the Vanguard submarine fleet and supporting naval infrastructure

(2) Estimated costs of the programme to maintain the UK nuclear weapon capability beyond the life of the current system, as set out in the 2006 White Paper, 'The Future of the United Kingdom's Nuclear Deterrent' (Cm 6994)

Source: House of Commons, Hansard, Written Answers, 30 October 2007, Column 1358W, <https://publications.parliament.uk/pa/cm200607/cmhansrd/cm071030/text/71030w0066.htm>.

However, the fact that these costs are broken down by year suggests that these rough numbers do not include future spending and therefore only cover spending in those particular years. As these numbers are in

the £2 billion area, this strongly suggests that future submarine (warhead, missile and infrastructure) costs are not included in the 5-6 per cent number above. This future spending will be significantly higher throughout the 2020s.

In addition, running costs for AWE appear to have expanded considerably since 2007, as part of a major new investment programme—the Nuclear Warhead Capability Sustainment Programme—and annual spending from 2010-11 has been estimated at around £1 billion per year up until 2024-25, of which approximately 40 per cent is capital expenditure.[26] In an effort to contain costs, a few projects have been cancelled or scaled back in recent years, and in March 2016 the Ministry of Defence announced that it had secured an improved contract with AWE Management Ltd that it anticipated would lead to improved performance.[27] However, the latest report from the House of Commons Public Accounts Committee cites a 146 per cent (£1.1 billion) cost increase in the upgrades to the AWE warhead assembly facility and a six a year delay in the work.[28]

The costs and timetable for the programme to upgrade the current UK Trident warhead to the 'Mark 4A' modified warhead have never been disclosed.[29] The AWE is also currently conducting studies to explore options for a potential future warhead as part of the ongoing Successor programme, although the UK Government's view is that a replacement warhead is not required until at least the late 2030s, possibly later.[30] As at March 2015, at least £85 million has been spent on such studies.[31]

Recent research also suggests that nuclear power generation, and specifically the proposed £19.6 billion Hinkley Point C nuclear power station, will be used to cross-subsidise the UK's nuclear weapon programme. In evidence submitted to the public accounts committee in October 2017, two scientists from Sussex University stated that the costs of the Trident programme could be "unsupportable" without "an effective subsidy from electricity consumers to military nuclear infrastructure". [32]

Some of the recently announced spending on submarine construction infrastructure includes, £206 million for the upgrade of facilities at the submarine construction yard in Barrow in 2014 and a further £225 million in March 2016.[33]

Under the Polaris Sales Agreement, as amended, the UK pays the US Department of Defense an annual contribution towards the overall cost of the Strategic Weapons Facility at Kings Bay. This contribution, which includes maintenance work, is based on the UK's share of the overall Trident II D5 missile inventory and historically has equated to £12 million per annum.[34] It is unclear whether this sum is included in the government's 5-6 per cent of the defence budget estimate.

As mentioned above, the Royal Navy also has additional costs in devoting conventional resources to protecting the SSBNs, and it was confirmed in 2009 that these costs were excluded from the government's 5-6 per cent of the defence budget estimate.[35] In 2007, the UK Government estimated the annual operating cost of 'committed support' to be around £25-30 million annually, and that of 'contingent conventional force elements' to be around £250-300 million.[36] In 2016, however, the Ministry of Defence said that it was unable to cost the individual capabilities charged with safeguarding UK nuclear weapons:

> *The Department does not cost the safeguarding and security of individual capabilities. Given the multi-layered make up of security arrangements protecting the deterrent, overlapping with those of wider defence personnel and capabilities, identifying accurate costs could be achieved only at disproportionate cost.*[37]

In addition, providing police cover for the UK's military nuclear programme costs £73 million a year.[38]

Decommissioning costs

Currently, the UK Government has no final disposal solution for its nuclear submarines and facilities. Old submarines are partially dismantled, non-nuclear components recycled, their reactor cores removed and stored in cooling ponds at Sellafield indefinitely, whilst the hulls and reactors are sealed and maintained afloat in port, at Rosyth and Devonport. Various and fluctuating government cost estimates have been given for this process over the years. The cost of this process for all past and current UK submarines was estimated by the UK Government at some £1.75 billion in 2006, while two years later the estimated current liability for in-service submarines only (Vanguard and Trafalgar class fleets and HMS Astute, and excluding decommissioning of facilities and out of service submarines) was £455 million.[39] In 2006, in response to a parliamentary question, the UK's undiscounted costs of nuclear liabilities (totalling £9.7 billion) were disaggregated as follows:

£3.39 billion	Costs associated with decommissioning, care and maintenance of redundant facilities (the conditioning, retrieval and storage of contaminated materials); research and development; and the procurement of capital facilities to handle the various waste streams. (Location: AWE Sites, Berkshire)
£2.13 billion	Decontamination and decommissioning of Naval Test Reactor and waste disposal (Location: Dounreay)
£1.05 billion	Costs associated with the research, development and construction of the NIREX Deep Waste Repository (Location: Not yet known).
£0.93 billion	Storage of nuclear materials (Locations: Springfields, Capenhurst and Sellafield).
£0.91 billion	Nuclear Propulsion decontamination and decommissioning liabilities at various sites which conduct nuclear submarine decommissioning work on behalf of MOD (Locations: Sellafield, Derby and mobile support equipment).
£0.50 billion	Berthing and decommissioning of out of service submarines (Locations: Rosyth and Devonport).
£0.33 billion	Decommissioning of current in-service submarines (Location: Rosyth and Devonport).
£0.18 billion	Sundry provisions, the bulk of which is in respect of costs of storage of low level waste (Location: Sellafield).
£0.15 billion	Dismantlement of Warheads (Location: AWE Sites, Berkshire).
£0.12 billion	Decommissioning of nuclear submarine refit and refuelling facilities (Location: Devonport Dockyard).
£0.03 billion	Nuclear Decommissioning and Decontamination of Rosyth Dockyard on completion of the final Nuclear Submarine Project contract (Location: Rosyth).
£0.01 billion	Decommissioning and disposal of the Neptune Test Reactor (Location: Derby).[40]

In March 2015, the UK Ministry of Defence estimated that nuclear decommissioning would cost around £4 billion over several years.[41] This cost estimate is thought to include decommissioning the Navy's seven nuclear-powered submarines and the four Vanguard class SSBNs. The UK Government has said that the decommissioning of the Trident submarines will be covered within the existing operating budget.[42] However, the larger decommissioning costs—for nuclear facilities, for example—clearly will not.

In May 2018 it was acknowledged, that the UK held 20 decommissioned nuclear submarines in different stages of disassembly, with nine still carrying fuel. Maintenance and storage costs for these submarines averaged a total of £2.5 million a year over the last 10 years. In 2016-17, the UK MoD held a £3.3 billion provision for the storage and disposal of these 20 submarines and a further seven Trafalgar and Vanguard-class submarines.[43] Between 2015 and 2017, the MoD's nuclear-related liabilities increased from £3.6 to £10.3 billion over the next 120 years.[44]

How much will Trident replacement cost?

The Successor programme is being run as several sub-programmes covering submarine design, design of a new PWR3 nuclear propulsion plant, and design of a 'common missile compartment' which will house the Trident missile launch tubes in collaboration with US submarine designers.[45] According to UK Government estimates, replacing the current class of nuclear submarines is expected to cost £31 billion (an increase of £6 billion on estimates set down in the programme's Initial Gate report in 2011, largely attributable to the decision to procure a new generation nuclear reactor propulsion plant, the PWR3). Another £10 billion has been put aside to cover any extra costs or spending over the estimate (and it has already been agreed that £600 million of that contingency will be accessed in 2018-19).[46]

Three companies, BAE Submarine Solutions (Platform), Babcock International (support), and Rolls Royce (power plant) known as the Tier One industrial partners were awarded contracts for the collaborative Concept Phase.[47] With the addition of AWE Management Ltd, these four companies account for 97 per cent by value (£48.9 billion as at 2017-18) of the Successor programme, although in turn they work with around 1,500 sub-contractors.[48] A new executive agency—the Submarine Delivery Authority employing 1,300 people—was established in April 2018 to manage the programme.[49] At present about 3,000 people work directly on the Dreadnought programme, but it is expected to support up 6,000 jobs.[50]

As at March 2016, the UK Government had allocated or spent around £4.8 billion in the development of the Successor programme (£905 million in the Concept Phase and £3.9 billion in the Assessment Phase).[51] The next phase of the programme, 'risk reduction and demonstration', began in September 2016, with construction of the first submarine formally commencing on 5 October 2016.[52] The submarines will be built in 16 units, grouped into three 'mega units' (Aft, Mid and Forward) with the aim of shortening the overall build timeframe. Two contracts were initially awarded: £986 million for platform construction, and £277 million for

The NAO estimate the Government need to bridge a £2.9 bn "affordability gap" with Dreadnought.

continuing design work, purchasing materials and long lead items and investing in facilities at Barrow.[53] In March 2018, contracts worth £960 million for the second phase of production were agreed.[54] The number of investment stages is undefined and will be clarified as the build progresses.[55]

In addition, extending the life of the current Trident missiles into the early 2040s is expected to cost around £250 million.[56] Operating the current Trident submarines until 2028, four years longer than planned, is also expected to cost between £1.2 and £1.4 billion, although savings from the Submarine Enterprise Performance Programme are expected to offset some of that.[57] In November 2015 the Ministry of Defence confirmed that any other costs from a further life extension to the Vanguard class "would be contained within the existing running cost of the deterrent".[58] This optimism may be misplaced, however, with the risk that additional expensive retrofitting of the Vanguard class of submarines may be needed in order to avoid the interruption of CASD patrolling for the first time since 1969.[59]

In 2018-19, the forecasted spend on the Dreadnought programme is £5.2 billion, which represents 14 per cent of the defence budget. It includes £1.8 billion on procuring and supporting submarines, £1.4 billion on the missiles and warheads, £790 million on the propulsion systems and £220 million on managing the programme.[60]

Government estimates for future running costs of the existing and the follow-on system assume they will continue to sit within 6 per cent of the defence budget—approximately £2.1 billion per year, rising to £2.38 billion by 2020-21.[61] However, the National Audit Office (NAO) suggests that the Government faces the challenge of needing to bridge a £2.9 billion "affordability gap" from 2018 to 2028—the NAO estimates that £50.9 billion would need to be spent over the next decade on Dreadnought but the MoD has only forecast spending £43.9 billion—and this includes assumed £3 billion efficiency savings over the same period.[62]

There have also been several non-governmental attempts to estimate the lifetime cost of the follow-on system, which suggest that the UK Government estimates above are likely to underestimate the true cost. The Liberal Democrats in September 2006 estimated a capital and operating cost for the Successor system as £76 billion over its development and 30 year deployment lifetime, while in 2009 Greenpeace estimated it to be at least £97 billion.[63] In a March 2012 study, defence economist Keith Hartley estimated a total cost of some £87.4 billion (in 2011 prices).[64] These overall cost estimates have not generally involved a deflator (to discount future costs) as normally required by the UK Government in estimating costs of major projects. However, a 2007 BASIC report applied such a discount rate to future costs and added them to the annual running costs to come up with an equivalent annual cost over the operational life of the Successor system of £3.9 billion (in 2006 prices).[65]

The BASIC Trident Commission in 2014 estimated that the capital costs for the planned system (2012-2062) would amount to £50.6 billion, while the Campaign for Nuclear Disarmament (CND), argued in 2016 that it would cost at least £205 billion (for capital *plus* in service costs), as shown in Table 3.

Table 3: The cost of replacing Trident: BASIC Trident Commission and CND compared (£ billion)		
	BASIC (2014)	**CND (2016)**
Successor submarines	22	31
Contingency Fund	-	10
Refits to Vanguard & infrastructure	9.6	-
Missiles – Life Extension Programme	2.3	0.35
AWE capital & new warheads	16.7	8
In service costs (over lifetime of the system)	-	142
Conventional support forces	-	1
Decommissioning	-	13
Total	**50.6**	**205.0**

Sources: The Trident Commission: An independent, cross-party inquiry to examine UK nuclear weapons policy, BASIC, Background papers to the Concluding Report, BASIC July 2014, Paul Ingram, Paper 3: Measuring the financial costs, pp. 21-22; and 'The costs of replacing Trident', CND Briefing, 2016, <http://www.cnduk.org/about/item/download/288>.

With some further adjustments, the BASIC Trident Commission estimated that the 'annual equivalent cost today' of continuing the current system and constructing four replacement SSBNs over the period 2016 to 2062 would be around £2.9 billion each year of operation or 9 per cent of the defence budget.[66] In the peak years of spending as the Successor programme moves into production (2021-27), the Commission estimated that spending is likely to rise to between £3.5-4 billion a year.

The main difference between the BASIC and CND estimates is that the latter includes in-service costs, based on figures previously presented by Conservative MP and Chair of the Foreign Affairs Committee, Crispin Blunt, in which the '6 per cent of the defence budget estimate' for day-to-day running costs is extrapolated over the lifetime of the system (without deflating the figure).[67]

In 2018-19, the forecasted spend on the Dreadnought programme is £5.2 billion, which represents 14 per cent of the defence budget.

Conclusions

The acquisition costs of Britain's Trident nuclear weapon system amounted to £18.35 billion (in 2015-16 prices) incurred between 1980 and 1998. According to UK government estimates, annual operating costs for this system have ranged from between 3-4.5 per cent (1994-2004) and 5-6 percent (2005-to date) of the annual defence budget. And the UK Government expects future operating costs (including the costs of the AWE, basing and decommissioning) to remain at 5-6 per cent of the defence budget through to 2021, although several recent statements only cite a 6 per cent figure. Under the current defence budget for 2018-19, 6 per cent of spending equates to approximately £2.2 billion per year, and is likely to rise to £2.38 billion by 2020-21. However, calculating future overall in-service costs is difficult and makes assumptions about the state of the British economy and projected levels of defence spending over the next 50-60 years. Over the 30-year lifetime of a new system that enters into service in 2031, total in-service costs could range between £71.4 billion and £140.5 billion.[68]

The UK Government estimates that the Dreadnought programme will cost £31 billion to procure (with an additional £10 billion contingency) and will be funded from the Ministry of Defence's core equipment procurement budget. However, this sum will almost certainly be in addition to the 6 per cent of the annual defence budget figure cited as operational and capital costs for the system. The government's own auditors and many independent experts suggest that the UK Government's assessment of future costs to be under-estimated and that the true cost of replacing the UK nuclear weapon system will be much higher.[69] The Infrastructure and Projects Authority—the government's own centre of expertise for infrastructure and major projects—has rated the Dreadnought programme Amber/Red, meaning that it assesses that: "Successful delivery of the project is in doubt, with major risks or issues apparent in a number of key areas".[70] And, as noted above, the latest NAO report confirms that 14 per cent of the MoD's total budget will be allocated to nuclear projects in 2018-19. Hence, in the absence of additional funding, it is almost certain that resources will be diverted in the 2020s from procurement programmes for conventional forces to complete the Dreadnought programme.

Over the 30-year lifetime of a new system that enters into service in 2031, total in-service costs could range between £71.4 billion and £140.5 billion.

Further reading

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