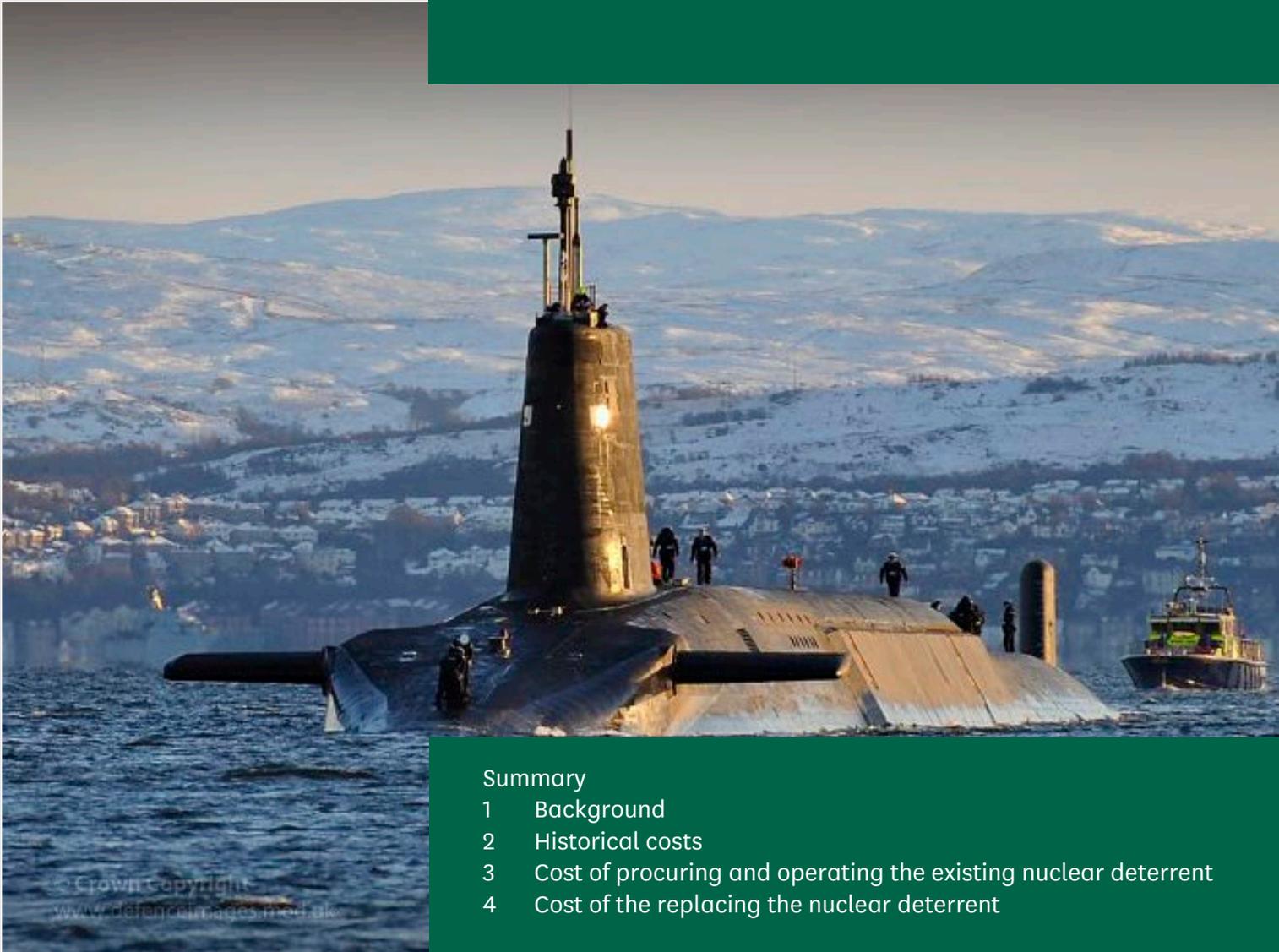


Research Briefing

22 August 2024

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The cost of the UK's strategic nuclear deterrent



Summary

- 1 Background
- 2 Historical costs
- 3 Cost of procuring and operating the existing nuclear deterrent
- 4 Cost of the replacing the nuclear deterrent

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Summary

Since the acquisition of the UK's first strategic nuclear deterrent in the 1950s, the cost of procuring and maintaining it, and which Government department should finance it, has always been a matter of debate.

Ascertaining precise costs for the nuclear deterrent can be difficult, as this information is not easily available from public sources. The nuclear deterrent is also supported by an overarching, and complex, network of programmes, infrastructure, equipment and people, which is referred to as the Defence Nuclear Enterprise (DNE). Separating out individual costs for the nuclear deterrent from within that structure is not straightforward, particularly since 2023 when the government started reporting all nuclear-related spending as a single line (the DNE) in its departmental estimates.

Synergies between the civilian nuclear sector and the defence nuclear enterprise complicate that picture further.

Cost of the current nuclear deterrent

The UK's current nuclear deterrent is provided by four Vanguard-class ballistic missile submarines (SSBN) which house the Trident II D5A missile and associated Mk4A/Holbrook warhead. The decision to procure Trident, as it is more commonly referred, was taken in the early 1980s. Spending on the programme was largely complete by the time of the 1998 Strategic Defence Review. Total acquisition expenditure on the programme was £12.52 billion, which equates to approximately £23 billion in 2023/24 prices.

Prior to 2023, annual in-service costs, which also included the costs of the Atomic Weapons Establishment (AWE) and the Nuclear Warhead Sustainment Capability Programme, basing, decommissioning and disposals, were estimated at 6% of the defence budget (£3 billion for 2022/23). In 2023 the decision was taken to [bring all nuclear-related programmes and expenditure, including in-service running costs of the deterrent, under one heading](#): the Defence Nuclear Enterprise (DNE), and to ringfence it within the MOD budget. In doing so, direct comparisons of in-service costs are no longer possible.

Replacing the nuclear deterrent

A programme is currently underway to replace the Vanguard-class submarines from the early 2030s.

The estimated cost of the design and manufacture of a new Dreadnought-class of four SSBN is £31 billion, including inflation over the life of the programme. A £10 billion contingency has also been set aside, making a potential of £41 billion for the Dreadnought programme. As of March 2023, 20% of the contingency had been accessed so far.

In 2016 the government said that [it expected in-service costs for the nuclear-deterrent, once the new Dreadnought SSBN entered service, to continue at approximately 6% of the defence budget](#). Following the decision in 2023 to amalgamate all nuclear-related spend under a single DNE budget, however, the government said that [an “equivalent comparison” for future in-service costs was no longer possible](#).

A programme to replace the UK's nuclear warhead was also confirmed in February 2020. The programme is in its early stages and the MOD has not yet assigned an estimated total cost. Work to agree future funding arrangements is currently underway.

Wider costs

The decision to amalgamate nuclear spending under one budget heading: the Defence Nuclear Enterprise (DNE), reflects the increasing interdependence between the nuclear deterrent and the Royal Navy's other conventional nuclear-powered submarine programmes, including the new AUKUS-SSN being developed in conjunction with the US and Australia. This is particularly relevant to the costs associated with basing, infrastructure and nuclear propulsion.

There are various costs associated with the nuclear deterrent and its replacement that are not part of the £31 billion capital costs of the Dreadnought programme but fall within wider spending on the defence nuclear enterprise. Those costs include the UK's participation in the US-led Trident Service-Life Extension programme, extension of the service-life of the current Vanguard-class SSBN, and various basing and nuclear infrastructure projects.

Spending on nuclear programmes across of the whole Defence Equipment Plan over the next ten years (2023-2033) is forecast at £117.8 billion, of which £109.8 billion has been budgeted for, currently leaving a deficit of £7.9 billion. [The MOD has said that deficit is “manageable”, although the Public Accounts Committee has expressed concern](#).

Who will pay for it?

In line with convention, the Dreadnought programme will be funded from the MOD's budget.

There has been a longstanding debate over budgetary responsibility for the nuclear deterrent, with frequent calls made for the capital costs of the replacement programme to be removed from the Ministry of Defence's budget.

In 2023 the decision was taken to [bring all nuclear-related programmes and expenditure, including in-service running costs of the deterrent, under one heading](#): the Defence Nuclear Enterprise (DNE), and to ringfence it within the MOD budget. The intention is to provide greater flexibility within the nuclear programme and to insulate the rest of the conventional equipment plan from any changes in nuclear spending.

1 Background

Since the acquisition of the UK's first strategic nuclear deterrent in the 1950s, the cost of procuring and maintaining it, and which Government department should finance it, has always been a matter of debate.

Ascertaining historical costs for the nuclear deterrent is difficult and complex, as this information is not easily available from public sources. Many records no longer exist, while others were classified. In the past successive Governments have often not discussed costs on the grounds of operational security. Historical information has also been presented in many different forms (i.e. current prices, constant prices, as a percentage of the defence budget) therefore making it difficult to provide an annual cost that is calculated in a consistent manner.¹ A cost set out in the early 1960s, for example, could not be directly compared to costs set out in the 1980s or the present day unless they were uprated to take inflation into account.

The decision in 2023 to report all nuclear-related spending (the Defence Nuclear Enterprise) as a single line in the MOD's departmental estimates² has also made it difficult to extrapolate costings for individual elements of the nuclear deterrent or to make direct comparisons with previous years. This is particularly relevant to comparisons of ongoing annual in-service costs. There are also interdependencies between the Defence Nuclear Enterprise and the civilian nuclear industry which are not easily identified or costed.³

1 Related Library briefing papers

- CBP8010, [Replacing the UK's nuclear deterrent: Progress of the Dreadnought class](#)
- CBP9777, [Replacing the UK's nuclear deterrent: The warhead programme](#)

¹ Current prices reflect the value of money at the time costs or benefits are realised, so changes over time shown in current prices include the effect of inflation. Constant prices adjust for the effect of inflation and show costs or benefits in money that has the same value over time (i.e. the value of money is held constant for a given base year). Further information is available in the House of Commons Library Statistical Literacy Guide [How to adjust for inflation](#).

² Ministry of Defence, [Letter to the Chair of the Public Accounts Committee, Equipment Plan 2023-2033: Update on affordability](#), 4 December 2023 and National Audit Office, [The equipment plan 2023-2033](#) (PDF), HC315, December 2023

³ These synergies were examined in a March 2024 command paper [Delivering the UK's nuclear deterrent as a national endeavour](#), CP1058

- CBP7353, [Replacing the UK's 'Trident' nuclear deterrent](#), July 2016

Further library briefings papers on nuclear weapons, including the UK's position on nuclear disarmament, can be found in the World Affairs section of the [House of Commons Library website](#).

2 Historical costs

2.1 V-Bomber Force

The UK's strategic nuclear deterrent was initially provided by the [RAF's V-Bomber force](#). George Ward, the Secretary of State for Air, said in 1957:

It has been said that we are devoting too much of our defence expenditure to the deterrent, but I can assure the Committee that we are neither starving our forces in other spheres to produce a British deterrent nor are we devoting the greater part of our research and development effort to it. In fact, of the whole of the defence budget, the V-bomber force will this year absorb only about one-tenth.⁴

In March 1958 the government of the time went on to state:

In our present Defence Budget we are spending about one-tenth of our money on the nuclear deterrent—our strategic bomber force, its nuclear bombs and the research and development that go with them, including work on ballistic missiles. We plan over the next five years to spend roughly the same amount as this year. We are also spending roughly another 10 per cent. on the defence by conventional forces of our deterrent bases at home. This figure includes the fighter force, the control and warning system, our defensive guided missiles, and the research and development related to them all. The total of these adds up only to about one-fifth of our Defence Budget.

Harold Watkinson, then Minister of Defence, reiterated the 10% figure in 1960:

In the defence debate on 20th July, I explained to the House the Government's plans for an independent British contribution to the nuclear deterrent of the West, based in the main on the V-bomber element of Bomber Command. This force is of the highest quality and has a formidable supply of nuclear weapons available to it. The cost of the strategic nuclear deterrent is expected to run at about 10% of the defence budget.⁵

The nuclear role of the V-force was withdrawn in 1969.

⁴ [HC Deb 09 May 1957](#), vol 569 cc1187

⁵ [HC Deb 26 October 1960](#), vol 627 c273W

2.2

Polaris

In 1962 the UK purchased the submarine-based Polaris system from the United States, under the Polaris Sales Agreement. In 1968 Polaris entered service and became the UK's main nuclear force.

In March 1981 the MOD put the cost of the Polaris procurement at £330 million, over a period of nine years (1963-1972). This was roughly equivalent to £2 billion in 1980 prices, when the Trident programme began (see below). This figure did not, however, include the Chevaline modification to Polaris, which was estimated at a further £1 billion.⁶

Discussing how Polaris would be paid for, the Civil Lord of the Admiralty, John Hay, stated on 2 March 1964:

It has always been the Government's view that the Polaris submarine programme Polaris being the carrier of the nuclear deterrent, should be taken on the defence budget as a whole; that is to say, it should not fall entirely on the Navy. For that reason, the defence budget includes a Polaris element. The extra money that we receive for Polaris is made up partly from additional cash from the Treasury and partly from a contribution from each of the Services.⁷

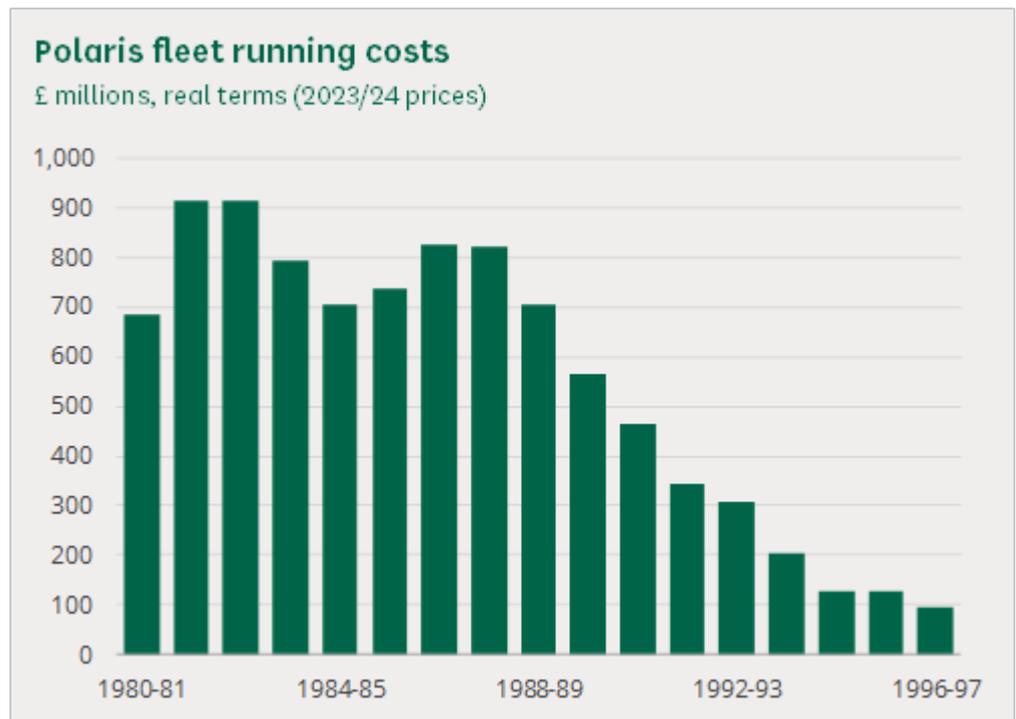
In terms of running costs, in 1993⁸ and again in 1997⁹ the MOD, responding to tabled questions, cited disproportionate costs as a reason for not disclosing the full costs of maintaining the Polaris fleet from 1968 onwards. However, in the 1997 answer it did set out expenditure on Polaris for the years 1980/81 to 1996/97 (in cash prices). The chart below shows the stated expenditure in real terms at 2023/24 prices:

⁶ [HL Deb 24 March 1981](#), c1155WA and [HC Deb 1 March 1983](#), c113W. Chevaline was a secretive programme begun by the UK Government in the 1970s to improve the penetrability of the warheads used by the Polaris missile system. It was only revealed in 1980 shortly before the decision to procure the current Trident missile system from the US.

⁷ [HC Deb 2 March 1964](#), c1080

⁸ [HC Deb 17 May 1993](#), c79W

⁹ [HC Deb 24 June 1997](#), c425W



Source: HC Deb 24 June 1997 c425W; HM Treasury, [GDP deflators at market prices, June 2024 \(Quarterly National Accounts\)](#)

When asked about the costs of the Chevaline modification in 1990, the MOD said “It would not be in the national interest to reveal such information”.¹⁰

The Polaris fleet began to leave service in 1994.

¹⁰ [HC Deb 20 March 1990](#), c524W

3

Cost of procuring and operating the existing nuclear deterrent

In July 1980 the Government decided to replace the Polaris nuclear deterrent system with Trident, under the terms of the [Polaris sales agreement](#) 1963, as amended for Trident ([Treaty Series 086/1980](#)) and ([Treaty Series 008/1983](#)).

3.1

Acquisition costs

Total acquisition expenditure on the Trident programme was £12.52 billion, which equates to approximately £23 billion in 2023/24 prices.

The then Defence Secretary, Francis Pym, made a statement to the House on the replacement of the UK's Polaris strategic nuclear deterrent system with Trident. In that statement he confirmed that the capital cost of procuring Trident would be taken out of the existing defence budget, in line with convention. He commented:

We estimate the capital cost of a four-boat force, at today's prices, as up to £5 billion, spread over 15 years. We expect rather over half of the expenditure to fall in the 1980s. We intend to accommodate this within the defence budget in the normal way, alongside our other major force improvements [...]

Of course there will be an effect on other weapons systems, but that is true of any weapons system. For instance, even the Tornado system—more expensive than the Polaris successor system that I have just announced—has its effect on other weapons systems. They all interact. But the provision of the strategic deterrent has always been part of normal defence budgeting. It is a weapons system, like any other weapons system – ships, tanks, or whatever it may be. Within the defence budget this can and will be accommodated in the same way as Polaris was accommodated 10 to 20 years ago...

Overall this expensive weapons system will take between 3 per cent and 4 per cent over the 15-year period, but at its peak years it will be about 5 per cent of the whole defence budget and 8 per cent of the equipment part of the budget.¹¹

Further questions about the cost were raised during the debate on procuring Trident in March 1981. Then Defence Secretary, John Nott, reiterated in that debate:

The strategic deterrent has been an integral part of the British defence budget under all Governments up to now. Trident is not an addition to that budget.¹²

¹¹ [HC Deb 15 July 1980](#), c1236- 1251

¹² [HC Deb 03 March 1981](#), c216

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 £7.5 billion (1981 prices).¹³

By the time of the 1998 Strategic Defence Review (SDR) the majority of costs associated with procuring Trident had been spent. The SDR subsequently put total acquisition expenditure on the Trident programme at £12.52 billion.¹⁴ However, it should be noted that this did not represent a doubling of costs on the Trident programme. Once inflation over the period 1980-1998 is accounted for, according to the [Treasury's GDP deflator](#), £5 billion in 1980 was worth approximately £12 billion in 1998.

£12.52 billion in 1998 equates to approximately £23 billion in 2023/24 prices.¹⁵

The programme was delivered well within budget, a point that the Defence Select Committee made in its final report on the Trident acquisition programme in 1994, and was acknowledged by the Government in its response to that report:

The Government welcomes the Committee's recognition that the trident programme continues to make good progress, with total estimated costs falling again this year and the submarine programme as a whole remaining well within budget (paragraph 2).¹⁶

3.2 Annual maintenance and running costs

After Trident became operational in 1994, annual expenditure for capital and running costs, including the costs for the [Atomic Weapons Establishment](#), ranged between 3% and 4.5% of the annual defence budget.¹⁷

¹³ [HC Deb 11 March 1982](#), c976

¹⁴ Ministry of Defence, *The Strategic Defence Review Supporting Essays*, July 1998

¹⁵ HoC Library calculation using HM Treasury, [GDP deflators at market prices, June 2024 \(Quarterly National Accounts\)](#)

¹⁶ Defence Committee, *Government replies to the sixth, seventh and eighth reports from the Defence Committee Session 1994-1995*, HC802, 25 October 1995

¹⁷ [HC Deb 3 July 2006](#) c713w

Annual in-service costs had been estimated at around 6% of the defence budget (amounting to around £3 billion per year in real terms up to 2022/23). Since 2023, however, all nuclear-related spend, including in-service costs, has been reported as part of the Defence Nuclear Enterprise.

In 2005-06, those in-service costs rose to approximately 5% – 6% of the defence budget.¹⁸ That increase in maintenance costs was due primarily to the programme of additional investment in sustaining key skills and facilities at the Atomic Weapons Establishment, as announced by the Defence Secretary in July 2005.¹⁹

In 2016 the government said that in-service costs, including the costs of AWE, basing and disposals remained at 6% of the defence budget and were expected to continue at this level beyond the introduction of the Dreadnought programme in the early 2030s.²⁰ 6% of the total defence budget equated to approximately £3 billion in 2022/23. In 2023, however, changes to the funding of the nuclear deterrent were made (see below).

Under the Polaris Sales Agreement, as amended, the UK also 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 in 2015 the government said that contribution historically equated to £12 million per annum (in 2015 prices).²¹

Amalgamation of spending under the Defence Nuclear Enterprise (DNE)

In 2023 changes were made to the funding arrangements for the nuclear deterrent. All nuclear programmes and expenditure across the MOD, including annual in-service costs, have now been brought under one heading: the Defence Nuclear Enterprise (DNE), and ringfenced within the departmental budget, reflecting the increasing interdependence between the nuclear deterrent and the Royal Navy's other conventional nuclear-powered submarine programmes, including the new AUKUS-SSN being developed in conjunction with the US and Australia.²² This is particularly relevant to costs associated with basing, infrastructure and nuclear propulsion. DNE spend now appears as a single line in the departmental estimates.

¹⁸ HC Deb 19 July 2005, c59WS; HM Government, [The future of the United Kingdom's nuclear deterrent](#) (PDF), Cm6994, December 2006, p.27

¹⁹ For more information on the Nuclear Warhead Capability Sustainment Programme see House of Commons Library, [Replacing the UK's Nuclear Deterrent: The warhead programme](#)

²⁰ [PQH1238](#), 6 June 2016

²¹ PQ 227194, [Trident Missiles](#), 19 March 2015

²² Ministry of Defence, [Letter to the Chair of the Public Accounts Committee, Equipment Plan 2023-2033: Update on affordability](#), 4 December 2023 and National Audit Office, [The equipment plan 2023-2033](#) (PDF), HC315, December 2023

“The Defence Nuclear Enterprise is the partnership of organisations that operate, maintain, renew and sustain the UK’s nuclear deterrent and submarine forces”.

[Ministry of Defence](#),
March 2024

In making this change, the MOD said it would provide greater flexibility in the Dreadnought programme (see below) and allow the department to “deliver programmes related to the nuclear deterrent on schedule”.²³ Ringfencing the nuclear budget would also allow the Department to “insulate” the rest of the defence equipment plan from any changes in the profile of nuclear spending (see [Wider costs associated with the nuclear deterrent](#)).²⁴

Amalgamating expenditure in this way does make it difficult, however, to determine the individual costs of the various elements of the nuclear deterrent, and specifically the annual in-service costs. In parliamentary questions the MOD has referred to the “interdependence” of the programmes to support, maintain and renew the nuclear deterrent and that expected costs would relate to “the combined nuclear enterprise”.²⁵

²³ Ministry of Defence, [Letter to the Chair of the Public Accounts Committee, Equipment Plan 2023-2033: Update on affordability](#), 4 December 2023

²⁴ As above

²⁵ HC Deb 20 November 2023, [Trident nuclear programme](#), c9. See also PQ187155, [Trident submarines: procurement](#), 12 June 2023

4 Cost of the replacing the nuclear deterrent

A decision to replace the UK's current nuclear deterrent was taken in 2006 and approved by two votes in Parliament in March 2007 and July 2016.²⁶

After almost a decade of work on the project, the vote in 2016 enabled the programme to move forward into its manufacturing phase, which will see the construction of four new Dreadnought class ballistic missile submarines (SSBN) over a 15-20 year period. The first submarine, HMS Dreadnought, is scheduled to enter service in the early 2030s.

Replacement of the Trident II D5 missile itself is not part of the Dreadnought programme. The UK is, however, participating in the US' current service-life extension programme for the Trident II D5 missile. In February 2020 the Government also confirmed that a replacement warhead programme was underway.²⁷

4.1 The Dreadnought SSBN programme

Overall acquisition costs

The estimated cost of the design and manufacture of a class of four SSBN is £31 billion, including inflation over the 35-year life of the programme.

A £10 billion contingency has also been set aside.

The 2015 SDSR confirmed that the costs of design and manufacture of a class of four submarines will be £31 billion, an increase of £6 billion on estimates set down in the programme's Initial Gate report in 2011 (at outturn prices).

This cost estimate includes all costs associated with acquisition including feasibility studies, design, assessment, demonstration and manufacture (including the US-UK Common Missile Compartment project).²⁸ It also

²⁶ HM Government, [The Future of the United Kingdom's Nuclear Deterrent \(PDF\)](#), December 2006; [HC Deb 14 March 2007](#) and [Division 46](#), 18 July 2016

²⁷ HCWS125, [Nuclear Deterrent](#), 25 February 2020

²⁸ [HC Deb 4 June 2009](#), c627W

accounts for expected defence inflation over the life of the programme²⁹ and investment in new facilities at BAE Systems in Barrow, which in 2013 the MOD suggested would be “limited to the modification of existing infrastructure to accommodate the differences between the Vanguard and Successor designs”.³⁰

A contingency of £10 billion has also been set aside by HM Treasury. This contingency represents approximately 35% of the submarine cost to completion and according to the MOD “is a prudent estimate based on past experience of large, complex projects, such as the 2012 Olympics”.³¹ However there is no guarantee that all this money will be spent. If it were then it would provide an upper end acquisition estimate of £41 billion.

The MOD has stated that “the revised cost and schedule reflect the greater understanding we now have about the detailed design of the submarines and their manufacture”.³²

The years of peak expenditure are expected to be principally 2018 through to the mid/late 2030s, as the programme is in full production.

Basing and infrastructure projects, the Trident II D5 Service-life Extension programme and work on the options for replacing the nuclear warhead are not part of the Dreadnought programme spend but fall within wider spending on the defence nuclear enterprise (see [Wider costs associated with the nuclear deterrent](#)).

What has been spent on Dreadnought so far?

In its [2022 Update to Parliament](#) the MOD confirmed that the programme remained within overall budget and, as of 31 March 2022, £12.5 billion had been spent so far on the concept, assessment and early delivery phases of the project.

At the time of writing, the 2023 update to Parliament setting out revised costs is yet to be published. In answer to a parliamentary question in January 2024 the MOD said that, as of 31 March 2023, £14.7 billion had been spent on the concept, assessment, and early phases of the programme so far.³³

²⁹ Defence inflation is often one of the largest sources of additional costs on a procurement programme.

³⁰ The Department is building new facilities at Barrow which will allow a modular build approach for the Dreadnought submarines, which are larger than the Astute or Vanguard class. The Primary build facility programme had a forecast cost of £240 million and was expected to be completed in 2022. The NAO also examines this programme in [Managing infrastructure projects on nuclear-regulated sites](#)

³¹ PQ24652, [Trident Submarines: Finance](#), 2 February 2016

³² HM Government, [National Security Strategy and Strategic Defence and Security Review 2015](#), Cm9161, November 2015, p.34

³³ PQ10942, [Trident submarines: procurement](#), 29 January 2024

Between 2018 and 2020 the MOD made several announcements of money being brought forward into the earlier years of the programme to drive out cost and risk and keep the project on track.³⁴ This re-profiling included access to the Dreadnought contingency fund, which is provided for in the Treasury Reserve. In December 2020 the MOD confirmed that £1 billion of the fund had been made available to the Department up to that point,³⁵ while the 2020 Spending Review made provision for a further £1.3 billion of contingency funds to be made available through to 2024-25, should it be required.³⁶ As of March 2023, the MOD had accessed £2 billion of the contingency fund (20% of its total).³⁷

On the issue of re-profiling, in February 2018 the then Secretary of State commented:

What is important to emphasise is that we are not talking about the whole cost of Dreadnought changing. What we are talking about is that it is important to get the profile correct for when the money flows into the system and when it is needed. At the moment it is not as we would wish it to be.³⁸

In a report on the MOD's equipment plan in April 2022, the Public Accounts Committee expressed concern over the stability of the plan and the ability of the department to control costs in its largest programmes, including Dreadnought. It suggested, with concern, that the MOD views the contingency fund "as a blank cheque, freeing it from the need to control costs".³⁹ It recommended that the department write to the committee, within three months, with detail of the current cost of the Dreadnought programme and the replacement warhead programme.⁴⁰

A more detailed breakdown of what has been spent so far on the Dreadnought programme, is available in Library briefing paper CBP-8010, [Replacing the UK's nuclear deterrent: progress of the Dreadnought class.](#)

Projection of in-service costs

In 2016, the government said that the annual in-service costs of the nuclear deterrent, once the Dreadnought SSBN enters service, were expected to

³⁴ This is discussed extensively in the Secretary of State's evidence to the Defence Committee on 21 February 2018 (Defence Committee, [Oral evidence: departmental priorities](#), HC814, 21 February 2018. Q.78); HM Treasury, [Autumn Statement 2018](#); HM Treasury, Spending Round 2019, Table 2.7: Ministry of Defence and PQ290758, [Armed Forces: Finance](#), 1 October 2019 and HM Treasury, [Spending Review 2020](#)

³⁵ Defence Committee, [Oral evidence: MOD Annual Report and Accounts, 2019-2020](#) (PDF), HC1051, 8 December 2020, Q.23

³⁶ HM Treasury, [Spending Review 2020](#), Table 6.11

³⁷ PQ168002, [Trident submarines](#), 22 March 2023

³⁸ Defence Committee, [Oral evidence: departmental priorities](#), HC814, 21 February 2018. Q.78

³⁹ Public Accounts Committee, [Ministry of Defence Equipment Plan 2021-2031 \(PDE\)](#), HC1164, April 2022, p.5

⁴⁰ Public Accounts Committee, [Ministry of Defence Equipment Plan 2021-2031 \(PDE\)](#), HC1164, April 2022, p.5

continue at approximately 6% of the defence budget (amounting to around £3 billion per year in real terms up to 2022/23).⁴¹

As outlined above, in 2023 the government brought all nuclear programmes and expenditure across the MOD, including annual in-service costs for the deterrent, under one heading in the departmental estimates: the Defence Nuclear Enterprise (DNE), and ringfenced DNE spending within the departmental budget. Following this change it is no longer possible to identify potential annual in-service costs for the Dreadnought SSBN when it enters service. In answer to a parliamentary question in June 2023 as to whether the in-service costs of Dreadnought could be expected to remain at 6%, the MOD confirmed:

The six percent figure was calculated for the Defence White Paper “The Future of the United Kingdom’s Nuclear Deterrent” in December 2006.

Due to restructuring of both the Submarine Enterprise and the Defence Nuclear Enterprise, an equivalent comparison is not available.⁴²

4.2

Replacement warhead programme

In February 2020 the Government confirmed that a replacement warhead programme was underway. Options for replacing the warhead have been studied since 2006 as part of the Nuclear Warhead capability Sustainment Programme (NWCSP). The expectation is, however, that the replacement warhead programme going forward will have a budget independent of the NWCSP.⁴³

Given that the Replacement Warhead Programme is still in its early stages, the MOD has not yet identified a total cost of the replacement programme.⁴⁴

In March 2023 it said that “it is too early to provide cost estimates... as much will depend on the eventual design requirements”.⁴⁵ In evidence to the Defence Select Committee in December 2020, MOD officials indicated that the complexity of the programme, any commercial arrangements, and the level of collaboration with the United States and its W93 programme would have an impact on any long-term cost estimate.⁴⁶

⁴¹ HL328, [Trident submarines](#), 6 June 2016

⁴² PQ190891, [Nuclear submarines](#), 27 June 2023

⁴³ PQ165426, [Trident submarines: Finance](#), 17 March 2023

⁴⁴ In [the 2006 White Paper](#) the MOD had estimated that a new nuclear warhead may cost in the region of £2-3 billion (2006 prices). This equates to £2.8-£4.3 billion in 2022/23 prices.

⁴⁵ PQ165426, [Trident submarines: Finance](#), 17 March 2023

⁴⁶ Defence Select Committee, [Oral evidence: MOD annual report and accounts](#) (PDF), HC1051, 8 December 2020, Q.29

In June 2023, the MOD confirmed that £127 million had been spent on preliminary work, to March 2021.⁴⁷

Consideration at the next spending review

In evidence to the Public Accounts Committee in February 2022, the MOD said that “a refinement of costs was needed at the next Spending Review” and that the programme would benefit from similar contingency funding arrangements that exist in the Dreadnought programme.⁴⁸ In March 2023 the MOD confirmed that work is currently underway to agree cost estimates and funding arrangements.⁴⁹

The previous Conservative government said that future funding arrangements would be considered at the next spending review.⁵⁰ On 29 July 2024 the new Labour government said that a multi-year spending review would conclude in Spring 2025.⁵¹ The new government is also conducting a new strategic defence review which it has said will “consider the efficiency and effectiveness of the nuclear programme”. That review is also due to report in the first half of 2025.⁵²

⁴⁷ PQ191139, [Nuclear weapons: procurement](#), 29 June 2023

⁴⁸ Public Accounts Committee, [Ministry of Defence Equipment Plan 2021-2031 \(PDE\)](#), HC1164, April 2022, p.12

⁴⁹ PQ165426, [Trident submarines: Finance](#), 17 March 2023

⁵⁰ PQ186133, [Nuclear weapons: procurement](#), 25 May 2023

⁵¹ HM Treasury, [Press release](#), 29 July 2024

⁵² Ministry of Defence, [Press release](#), 9 July 2024 and [Strategic Defence Review 2024-2025: Terms of reference](#)

4.3

Wider costs associated with the nuclear deterrent

Between 2023 and 2033 the Defence Nuclear Organisation has budgeted to spend £109.8 billion across the Defence Nuclear Enterprise, resulting in a £7.9 billion deficit on forecast costs.

Ministry of Defence, [The defence equipment plan 2023: Supplementary data tables](#), February 2024

The following costs associated with the nuclear deterrent and its replacement are not part of the £31 billion capital costs of the Dreadnought programme but fall within wider spending on the defence nuclear enterprise.

- Investment in HM Naval Base Clyde (£1.8 billion in total).⁵³
- Trident II D5 Service-life Extension programme, which in June 2023 was estimated at £821.5 million.⁵⁴
- Infrastructure projects related to AWE.⁵⁵ There are two main infrastructure projects underway at AWE under the remit of the Nuclear Warhead Capability Sustainment Programme (NWCSP): Project MENSA, a new nuclear warhead assembly and disassembly facility at the AWE site in Burghfield (currently estimated at £2.16 billion in total)⁵⁶ and Project Pegasus, a new enriched uranium storage and manufacturing facility at the AWE site in Aldermaston (current estimate £1.7 billion).⁵⁷ A third project to deliver a new plutonium manufacturing facility at AWE Aldermaston, Project Aurora, was removed from the NWCSP and established as an independent project in 2022 and is currently forecast to cost £2.3 billion in total.⁵⁸
- Core Production Capability facilities at Rolls Royce, that will build the latest nuclear reactor core designs benefitting both the Dreadnought programme and the Royal Navy's conventional nuclear-powered submarine programmes, including AUKUS (estimated at £3.77 billion).⁵⁹

⁵³ The announcement on 31 August 2015 of £500 million of investment for HM Naval Base Clyde, over a ten-year period, was part of the MOD's ongoing programme of work to establish a submarine centre of excellence at HM Naval Base Clyde once the entire Royal Navy submarine fleet is based there from 2020. In February 2017 a further £1.3 billion was announced for upgrades at HM Naval Base Clyde, including the waterfront, engineering support, accommodation and physical security. [PQ112914 of 21 November 2017](#) confirmed the separate funding arrangements.

⁵⁴ PQ191140, [Trident missiles](#), 29 June 2023

⁵⁵ All of these programmes are examined in greater detail in Library research briefing, [Replacing the UK's nuclear deterrent: The warhead programme](#)

⁵⁶ [DEP2023-0830](#) (PDF), October 2023 and Ministry of Defence, [MOD Government major projects portfolio data March 2023](#), July 2023

⁵⁷ Ministry of Defence, [MOD Government major projects portfolio data March 2023](#), July 2023

⁵⁸ Ministry of Defence, [MOD Government major projects portfolio data March 2023](#), July 2023.

⁵⁹ Ministry of Defence, [MOD Government major projects portfolio data March 2023](#), July 2023. The MOD is funding the construction of facilities for the manufacture and testing of new nuclear reactors cores to be used across the nuclear fleet. The project has been revised several times to accommodate the re-fuel of HMS Vanguard and the requirements of the new AUKUS programme, resulting in significant cost increases (Ministry of Defence, [Letter to John Healey MP, Deposited Paper 2023/0830](#) (PDF), October 2023)

- The costs associated with extending the life of the current Vanguard class SSBN.⁶⁰
- Nuclear and naval base infrastructure projects announced following additional investment in the defence nuclear enterprise at the Spring budget in March 2023, and in March 2024 as part of [the 'Delivering the UK's nuclear deterrent as a national endeavour' command paper](#) (PDF), including investment in Derby, Devonport and Barrow.⁶¹

In 2023/24, spending on the DNE totalled £9.4 billion.⁶² Spending plans set out in the MOD Main Estimate indicate that this is set to increase to £10.8 billion in 2024/25 in cash terms, although these plans may be revised at the Supplementary Estimates towards the end of the financial year.⁶³

Spending on nuclear programmes across of the whole Defence Equipment Plan over the next ten years (2023-2033) is forecast at £117.8 billion, of which £109.8 billion has been budgeted for, leaving a £7.9 billion deficit.⁶⁴ In response to what the MOD has called a “notional gap”, it said that the department is “not complacent and will act in successive planning rounds to ensure that costs are realistic, and projects are deliverable”.⁶⁵ The department has acknowledged that it “cannot rule out asking HM Treasury for more money for nuclear programmes in future planning rounds”.⁶⁶

The Public Accounts Committee has, however, expressed concern that managing the resulting deficit “requires significant work and is a huge challenge” that will be “difficult to deliver”.⁶⁷

4.4

Alternative cost estimates

An April 2019 study by the [Nuclear Information Service \(PDF\)](#) suggested that the MOD's cost analysis for the replacement programme is vastly underestimated and that the total cost of the UK's nuclear weapons programme, to

⁶⁰ In 2015 the MOD confirmed that the marginal repair and maintenance costs of a further extension to the life of the Vanguard class, into the early 2030s, “would be contained within the existing running cost of the deterrent” (PQ17622, [Trident submarines](#), 30 November 2015 and PQ80908, [Trident submarines: repairs and maintenance](#), 29 November 2021). See also, Ministry of Defence, [Press release](#), 1 March 2024 and [“Vanguard, Dreadnought and Holbrook: the UK's nuclear upgrade triad”](#), Global Defence Technology, April 2024.

⁶¹ Ministry of Defence, [Press release](#), 25 March 2024; Prime Minister's Office, [Press release](#), 24 March 2024 and Ministry of Defence, [Delivering the UK's nuclear deterrent as a national endeavour](#), CP1058, March 2024, p.8 and p.18; Babcock International, [Press release](#), 10 November 2023

⁶² Ministry of Defence, [Annual report and accounts 2023-2024](#) (PDF), HC65, July 2024, Annex C

⁶³ HM Treasury, [Main Supply Estimates 2024 to 2025](#), July 2024, p149

⁶⁴ Ministry of Defence, [The defence equipment plan 2023: Supplementary Data Tables](#), February 2024

⁶⁵ Ministry of Defence, [Letter to the Chair of the Public Accounts Committee, Equipment Plan 2023-2033: Update on affordability](#), 4 December 2023

⁶⁶ Public Accounts Committee, [MOD Equipment Plan 2023-2033](#) (PDF), HC451, 8 March 2024, p.11

⁶⁷ Public Accounts Committee, [MOD Equipment Plan 2023-2033](#) (PDF), HC451, 8 March 2024.

2070, is in the region of £172 billion.⁶⁸ A similar assessment by the [Campaign for Nuclear Disarmament](#) suggests that the real cost will be more in the region of £205 billion.⁶⁹

However, both these estimates consider in-service costs (at 6% of the defence budget) over the 30-year life of the Dreadnought SSBN, and the cost of additional factors such as infrastructure investment, the Trident service life extension programme, warhead replacement and decommissioning, among other things.

4.5 Who will pay for it?

In line with convention, the costs of the nuclear deterrent are funded from the MOD's core budget.

This has been reiterated by the MOD many times in the last few years.⁷⁰ In response to suggestions that the 2021 Integrated Review should separate the Dreadnought programme from the rest of the defence budget, in early February 2021 the MOD confirmed:

There have been no discussions on removing the capital costs of the Dreadnought submarine build programme from the defence budget. The Dreadnought programme is rightly funded as part of the Ministry of Defence's budget, as it has always been.⁷¹

Calls continue to be made, however, for the nuclear deterrent to be funded separately. In a debate on the King's Speech on 25 July 2024, Lord Lancaster of Kimbolton once again expressed concern over the cost of the nuclear programme and suggested that "the time has come when nuclear needs to be held outside the defence budget".⁷²

The longstanding debate over budgetary responsibility

In 2007 a disagreement erupted between the MOD and the Treasury over the funding of the capital costs of the replacement programme. The MOD suggested that the capital costs of procuring the nuclear deterrent had, in the past, been borne by the Treasury, a position which the Treasury refuted. The argument centred round an increase to the defence budget which was announced as part of the 2007 Comprehensive Spending Review. The CSR outlined that:

⁶⁸ Nuclear Information Service, [Trouble Ahead: Risks and rising costs in the UK nuclear weapons programme](#) (PDF), April 2019

⁶⁹ Campaign for Nuclear Disarmament, [£205 billion: The cost of Trident](#)

⁷⁰ For example: PQ HL2751, Procurement: Trident submarines, 14 November 2017; [HCWS328, Correction](#), 7 December 2017; and PQ116056, [Trident](#), 11 December 2017

⁷¹ HL12682, Nuclear submarines, 10 February 2021

⁷² HL Deb 25 July 2024, [King's Speech](#), c651

The 2007 Comprehensive Spending Review builds on this investment and grows planned defence expenditure by a further 1.5% a year over the CSRO7 period, rising to a total budget of £36.9 billion by 2010-11 - demonstrating the Government's strong commitment to defence at a time of acute operational intensity.

The settlement allows the MOD to [...] make provision for the maintenance of the nuclear deterrent. As set out at the time of the Trident White Paper, provision for this will not be at the expense of the conventional capability our Armed Forces need. Investment in conventional capability will continue to grow over this period, as it has done since 2000.⁷³

Some commentators considered this to effectively be a commitment to fund the capital costs of the replacement programme outside the core defence budget. However, when questioned on this issue by the Defence Select Committee in November 2007, the then Permanent Secretary to the MOD, Sir Bill Jeffrey, confirmed that while additional funding had been provided to the MOD, spending on the Trident replacement would then take place within the defence budget:

Q37 Mr Jenkin: Are you able to specify a budget line for Trident replacement over the next three years and can you tell us how much is going to be spent?

Mr Jeffrey: As the White Paper said it is provided separately within the defence budget. The figures in the existing baseline, as I recall, are of the order of £200 million, £300 million, £400 million in the three years of the spending review period.

Mr Woolley: It is about a billion over the course of the CSR period.

Q38 Mr Jenkin: Does that actually come of the 1.5% overall increase?

Mr Jeffrey: It does, yes.⁷⁴

He went on to clarify:

Q42 Mr Hamilton: The minister said, when the nuclear deterrent was agreed upon in the House of Commons, that it would not affect the defence budget in any way. You have just said that it will affect the defence budget; did I understand that correctly?

Mr Jeffrey: What I said was that the undertaking in the White Paper about the cost being provided additionally and not impacting on conventional capability has been met, but obviously once the money has been provided it takes its place within the defence budget. I do not think I am saying anything different from what was said in the White Paper or from what the minister said.⁷⁵

Liam Fox, then Defence Secretary, raised this issue again during an interview on the Andrew Marr Show on 18 July 2010, ahead of the anticipated Strategic Defence and Security Review (which was published in November 2010):

⁷³ HM Treasury, [Pre-Budget Report and Comprehensive Spending Review](#) (PDF), CM7227, October 2007

⁷⁴ Defence Committee, [Minutes of evidence, 28 November 2007, Q.37](#)

⁷⁵ Defence Committee, [Minutes of evidence, 28 November 2007, Q.42](#)

There's always been an understanding that the budget for the nuclear deterrent came from outside the defence budget, the core defence budget. Running costs for the deterrent have always come from inside the defence budget, although the capital costs were outside.⁷⁶

In a Daily Telegraph blog in July 2010, former Political Secretary to Tony Blair, John McTernan, argued:

Apparently the idea that the Ministry of Defence pays for Trident – a defence capability – has come as a shock to some in the MOD... except they did [know that]. It's no breach of the Official Secrets Act to reveal that during my brief time in MOD it was clear what the implications of the Comprehensive Spending review actually were. There was no special budget to pay for the upgrading of Trident.⁷⁷

The then Chancellor, George Osborne, consistently argued that the full costs of replacing Trident must come from the defence budget. At the end of July 2010, he unequivocally stated that “Trident costs, I have made it absolutely clear, are part of the defence budget. All budgets have pressure. I don't think there's anything particularly unique about the Ministry of Defence”.⁷⁸ An article in The Guardian also quoted one official as commenting that “the costs of Trident have always come out of the MOD budget. We know what Liam is up to. But does he expect that the Department of Culture will pay for Trident?”⁷⁹

A number of commentators, including the former Secretary of State for Defence, Bob Ainsworth, countered this debate, at the time, by pointing out that who pays for the capital costs of Trident is “to some degree...academic because it all comes from the same pot at the end of the day”.⁸⁰ The then Minister for the Armed Forces, Nick Harvey, also agreed with this point, acknowledging that “where precisely it is accounted is neither here nor there; it is a completely semantic and academic point”.⁸¹

Discussion from 2018 onwards

The question of budgetary responsibility resurfaced again in 2018 after a number of MPs made the suggestion that the Dreadnought programme should be removed from the defence budget as part of the MOD's 2018 [Modernising Defence Programme](#). On 27 November 2017 Sir Hugo Swire MP raised this point during oral defence questions:

In his ongoing and delicate discussions with the Treasury, will he remain aware, first, that there are those of us on this side of the House who believe that the defence budget has been pared back about as far as it can be, and secondly, that when it comes to Trident renewal many of us on this side of the House do not believe it should be part of the defence budget? Indeed, it

⁷⁶ http://news.bbc.co.uk/1/hi/programmes/andrew_marr_show/8832224.stm

⁷⁷ “Are Ministry of Defence sources having a laugh about Trident?”, Daily Telegraph Blog, 17 July 2010

⁷⁸ “Cabinet clash on Trident”, The Financial Times, 30 July 2010

⁷⁹ “George Osborne: Trident costs will be met by defence budget”, The Guardian, 30 July 2010

⁸⁰ [HC Deb 16 September 2010](#), c1047

⁸¹ [HC Deb 16 September 2010](#), c1055

distorts the defence budget, and if that is part of his argument, he will have considerably more support than perhaps he knows.⁸²

In response the then Defence Secretary, Gavin Williamson, replied:

Everything that my right hon. Friend has raised will be part of the review. He has raised the important question of nuclear capability being part of the defence budget. It has traditionally not sat as part of the defence budget; that changed only post-2010. It is vital to look at all options as part of the national security and capability review, and I look forward to speaking to him and seeking his advice and thoughts on the issues that he has raised.⁸³

However, the Ministry of Defence issued a correction on 7 December 2017 in a written statement:

I wish to inform the House that an error has been identified in the answer I gave to the hon. Member for East Devon (Sir Hugo Swire) in Defence Oral Questions on 27 November 2017, Official Report, column 21, on the subject of funding defence nuclear capabilities.

To clarify, the UK's nuclear deterrent has always been funded from the Defence budget.⁸⁴

On 11 December 2017 a Treasury Minister confirmed “The Government has no plans to transfer the costs of upgrading or replacing the UK's nuclear deterrent from the Ministry of Defence to another Government accounting department at this time”.⁸⁵

A discussion of the funding arrangements in 2007 and how they compare to current funding of the programme was also discussed by the Secretary of State in an [evidence session with the Defence Committee](#) on 23 February 2018.⁸⁶

2018 Budget allocation and the 2019 Spending Round

The allocation of additional funding for the MOD in the Autumn 2018 budget statement (£1 billion) and the 2019 Spending Round (£1.5 billion for capabilities up to 2021), in part to fund the Dreadnought programme, once again opened the argument about which Department should be funding the nuclear deterrent. In a similar vein to the disagreements which arose in 2007 and 2010, this allocation of additional funds was viewed by many as an indication of the Treasury's role, and responsibility, in part-funding the capital costs of the programme. In a Lords debate on the 2018 Autumn budget Lord West commented:

If the two tranches of money from the Treasury into the Dreadnought programme are an indicator that there is an acceptance that the capital cost of the new deterrent submarines should be funded outside the defence budget,

⁸² [HC Deb 27 November 2017](#), c21

⁸³ [HC Deb 27 November 2017 c21](#)

⁸⁴ [HCWS328](#), 7 November 2017

⁸⁵ PQ116056, [Trident](#), 11 December 2017

⁸⁶ Questions 59 to 75.

I welcome it. That will make a dramatic difference to the MoD programme. This of course was the plan until changed by George Osborne in 2010. Can the Minister tell us whether it is now the plan again? I hope that it is.⁸⁷

However, while the extra funding has been given to the MOD it has been made clear that, as before, once within the MOD budget it is up to the Department to determine how much is invested in the Dreadnought programme. Thereby indicating the MOD's budgetary responsibility for the nuclear deterrent. In November 2018 HM Treasury stated:

The £1bn additional funding for MoD will be used to invest in a number of key priority capabilities, one of which is Dreadnought. It is for MoD to decide how much of the additional funding is for Dreadnought, which they will do as part of their normal budgeting process.⁸⁸

Following the 2019 Spending Round, the MOD reiterated this point:

This additional funding will enable our world-class Armed Forces to begin to modernise and meet the intensifying threats and risks we now face, including prioritising investment in key capabilities such as shipbuilding, offensive cyber and the nuclear deterrent. We will decide on the allocation of this funding as part of our normal financial planning and budgeting process.⁸⁹

In March 2020 the then Chairman of the Defence Select Committee, Tobias Ellwood, raised this issue in an evidence session of the Public Accounts Committee, expressing his support for taking deterrent funding out of the defence budget.⁹⁰ In response to questioning, Sir Stephen Lovegrove, then Permanent Secretary at the MOD, raised the possibility of a ringfenced nuclear budget:

I think there is a very good argument for applying some form of ring fence around the biggest elements of nuclear. When the cost profiles move, which they inevitably do, they do have the ability, just because of their sheer scale, to impact the rest of Defence quite a lot.

The best example, again, is to look across to America. In America, the nuclear component of the DOD's budget is about 6% or 7%. When we are at the height of the recapitalisation that I talked about earlier, the nuclear component of the Ministry of Defence's budget is going to be up at around 18% or 19%. It is a very, very big swing factor, and that is an active subject of conversation with the Treasury.⁹¹

These arguments were raised again within the context of the Integrated Review. In answer to a question from Lord West in early February 2021, the MOD confirmed:

⁸⁷ [HL Deb 13 November 2018](#), c1819

⁸⁸ PQ188745, [Defence: Finance](#), 12 November 2018

⁸⁹ PQ290758, [Armed Forces: Finance](#), 1 October 2019

⁹⁰ Public Accounts Committee, [Oral evidence, Defence Nuclear Infrastructure](#), HC86, 11 March 2020, Q.107

⁹¹ Public Accounts Committee, [Oral evidence, Defence Nuclear Infrastructure](#), HC86, 11 March 2020, Q.108

There have been no discussions on removing the capital costs of the Dreadnought submarine build programme from the defence budget. The Dreadnought programme is rightly funded as part of the Ministry of Defence's budget, as it has always been.⁹²

2023 - a ringfenced budget

As outlined above, however, in 2023 the decision was taken to ringfence nuclear spending within the MOD budget as a way of introducing greater flexibility into the funding arrangements for the nuclear deterrent and to insulate the rest of the MOD's defence equipment plan from any changes in nuclear spending.

The next spending review

In evidence to the Public Accounts Committee in January 2024 the MOD said it could not rule out asking the Treasury for additional money for the nuclear deterrent in future spending rounds, although the current assessment was that the programme was in "a much healthier position than we have been in for a number of years".⁹³

The new Labour government has said that a multi-year spending review will conclude in Spring 2025.⁹⁴ The government is also conducting a new strategic defence review which it has said will "consider the efficiency and effectiveness of the nuclear programme". That review is also due to report in the first half of 2025.⁹⁵

4.6

Comparison to other areas of government spending

Assuming the entirety of the £10 billion contingency fund is spent, at a cost of potentially £41 billion the Dreadnought programme is one of the most expensive Government projects underway. It is a project that has around twice the budget of Crossrail, and three times the budget of the London Olympics in 2012.⁹⁶

With respect to other areas of public spending, expenditure on the nuclear deterrent is often compared to spending on the welfare bill or the NHS.

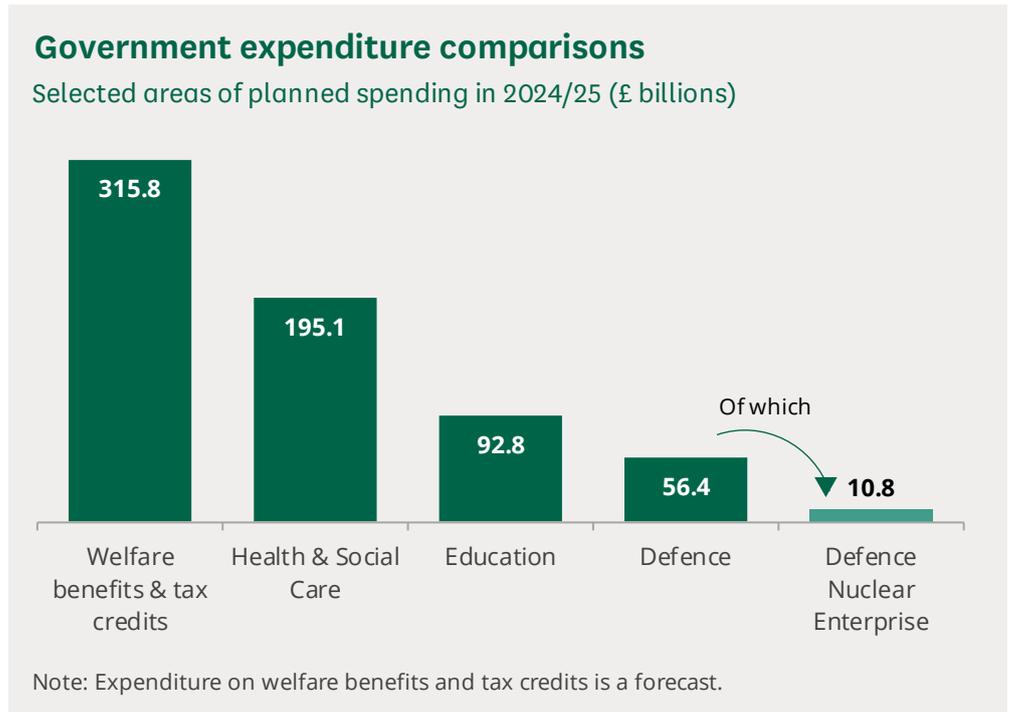
⁹² HL12682, Nuclear submarines, 10 February 2021

⁹³ Public Accounts Committee, [Oral evidence: Defence equipment plan 2023-33](#), HC 451, 22 January 2024, Q.78

⁹⁴ HM Treasury, [Press release](#), 29 July 2024

⁹⁵ Ministry of Defence, [Press release](#), 9 July 2024 and [Strategic Defence Review 2024-2025: Terms of reference](#)

⁹⁶ Michael Fallon [speech](#) to a reception of the Keep Our Future Afloat Campaign, House of Commons, 21 October 2015



Source: Department for Work and Pensions, [Benefit expenditure and caseload tables – Spring Budget 2024](#), UK welfare table; HM Treasury, [Public Expenditure Statistical Analyses 2024](#), Table 1.10; HM Treasury, [Main Supply Estimates 2024 to 2025](#), July 2024, p149

In 2024/25, total spending on the Defence Nuclear Enterprise is expected to amount to £10.8 billion. This equates to around 3% of forecast expenditure on welfare benefits and tax credits, or 6% of planned spending by the Department of Health and Social Care.

Overall, planned spending on the Defence Nuclear Enterprise equates to around 19% of the total defence budget.

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