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REPLACING TRIDENT

BACKGROUND BRIEFING FOR PARLIAMENTARIANS

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BRADFORD DISARMAMENT RESEARCH CENTRE JANUARY 2011

DEPARTMENT OF PEACE STUDIES : UNIVERSITY OF BRADFORD

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REPLACING TRIDENT

BACKGROUND BRIEFING FOR PARLIAMENTATRIANS

In December 2006 the Labour government set out its plans to replace the UK's current Trident nuclear weapon system when it reaches the end of its service life in the 2020s. This will enable the UK to retain nuclear weapons well into the 2050s. Trident is the UK's only remaining nuclear weapon system and if it is not replaced in some form Britain will cease to be a nuclear power.

The decision has proved controversial and it is likely to remain a contentious political issue for parliamentarians for many years to come. The purpose of this background briefing is to provide interested but uninformed parliamentarians, particularly new MPs, with an introduction to the debate.

1. Trident

Since the end of the Cold War the UK has reduced its nuclear arsenal to one system – Trident. The Trident system consists of three components: Trident ballistic missiles, nuclear warheads, and nuclear-powered submarines.

Submarines

The UK's Trident missiles are deployed aboard four *Vanguard*-class nuclear-powered ballistic missile submarines. The submarines were built at what is now BAE Systems' shipyard at Barrow-in-Furness and they are based at the Clyde Naval Base at Faslane in Scotland. The first submarine, HMS Vanguard, was launched in 1992 and entered service in 1994, the last, HMS Vengeance, entered service in 2000.

Trident missiles

Each submarine can carry 16 Trident II (D5) submarine-launched ballistic missiles (SLBMs). The missiles were designed in the United States by Lockheed-Martin. They have a range of approximately 4,600 miles and are accurate to within 90 metres. The missile was first deployed by the US Navy aboard its *Ohio*-class submarines in 1990. The UK bought the rights to 58 missiles from a larger collective pool of missiles held in the US. The UK has 50 left after test-firings. The United States has initiated a life extension programme to increase the service life of the missiles from 30 to 45 years in which the UK is participating. Trident missiles will be fully withdrawn

from service in the US by 2042. Each Trident missile can deliver 12 independently-targeted warheads, giving each *Vanguard* submarine the capability to deliver 192 warheads. The Labour government's 1998 Strategic Defence Review limited this to 48. The Coalition government's 2010 Strategic Defence and Security Review reduced it further to 40.

Nuclear warheads

The warheads carried by the Trident missiles are manufactured and designed in the UK by the Atomic Weapons Establishment. They are closely based on the 100 kiloton American W76 warhead design used for the US Trident fleet. By comparison, the bomb that destroyed Hiroshima was approximately 14kt (equivalent to detonation of 14,000 tons of TNT). In May 2010 the Coalition government declared that the total UK nuclear stockpile stood at 225 warheads of which 160 are classed as 'operationally deployed'. The 2010 SDSR stated that the total number of warheads will be reduced to 180 of which 120 will be operationally deployed.

2. UK nuclear posture of 'minimum deterrence'

The UK is one of nine countries known or suspected to possess nuclear weapons. It is one of five countries along with the US, China, Russia and France formally recognised as a 'Nuclear Weapon State' under the Nuclear Non-Proliferation Treaty (NPT).

The Nuclear Non-Proliferation Treaty

The NPT is widely acknowledged as the cornerstone of global nuclear order. It was negotiated in 1968 and acknowledged the existence of the five countries that had already tested nuclear

States known or suspected of possessing nuclear weapons	
United States	1,968 operationally deployed strategic warheads; 500 deployed non-strategic; ~2,600 active warheads in reserve; ~4,500 retired awaiting dismantlement
Russia	~2,600 operationally deployed strategic warheads; ~2,000 deployed non-strategic; ~7,300 in reserve or retired awaiting dismantlement
France	300
UK	225, 160 operationally deployed
China	~ 175 operational; total including reserve ~ 240
India	~60-80 operational
Pakistan	~70-90 operational
Israel	~100-200
North Korea	Suspected of possessing 2-10 nuclear weapons.

weapons. The Treaty called on these five nuclear weapon states to work towards nuclear disarmament, desist from helping any other country acquire nuclear weapons, but to assist other countries with the development of nuclear technologies for peaceful purposes, such as nuclear power reactors.

In return the non-nuclear signatories to the Treaty (every other country in world bar India, Pakistan, Israel and North Korea, all of whom possess nuclear weapons outside the Treaty) agreed not to acquire nuclear weapons and to also work towards nuclear disarmament with the nuclear weapon states. Members of the Treaty meet at the UN every five years to discuss implementation of the Treaty's three pillars: disarmament, non-proliferation, and peaceful nuclear technology. At the 2000 NPT Review Conference Britain agreed to an "unequivocal undertaking by the nuclear weapon states to accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament".

'Minimum deterrence'

Britain's nuclear posture is described as 'minimum deterrence' based on much lower levels of nuclear weapons than those of the US and Russia. It is based on the ability to inflict massive nuclear devastation upon an opponent with minimum nuclear force.

The government says this requires one fully-armed *Vanguard* submarine to be at sea on operational duty at all times, 365 days/year, a policy known as 'continuous-at-sea deterrence', or CASD. The missiles and warheads are not pre-targeted and usually require several days 'notice to fire', although this could be considerably reduced in a crisis. The government says that a credible 'minimum deterrent' requires nuclear weapons of global range that are invulnerable to a surprise pre-emptive attack. The government also says it would only ever use nuclear weapons as a last resort in "extreme circumstances of self-defence" but it does not rule out using nuclear weapons first in a crisis.

3. The Trident replacement programme

2006 White Paper and 2010 Strategic Defence and Security Review

In a White Paper released in December 2006 the Labour government presented its decision to replace the current Trident nuclear weapon system when it reaches the end of its service life in the 2020s. A decision was said to be needed in 2007 because the *Vanguard* submarines carrying the missiles are aging and need to be replaced if Britain is to continue to deploy the Trident missile over the long-term. The government stated that the submarines have a service life of 25 years, but that this can be extended to 30 years.

The first submarine, HMS Vanguard, was launched in 1992 and will therefore retire in 2022. The second submarine, HMS Victorious, is due to retire in 2024. If a new submarine is not available at this point then the UK will no longer be able to maintain the current posture of 'continuous-at -sea deterrence', i.e. it will no longer be able to guarantee that one nuclear-armed submarine will *always* be at sea. The government said it will take 17 years to design and build the new submarines thus requiring a decision in 2007 to ensure the first new submarine is ready by 2024.

The 2010 SDSR said that the life of the current *Vanguard* submarines can be extended by nine instead five years. The first new submarine is therefore required in 2028 rather than 2024.

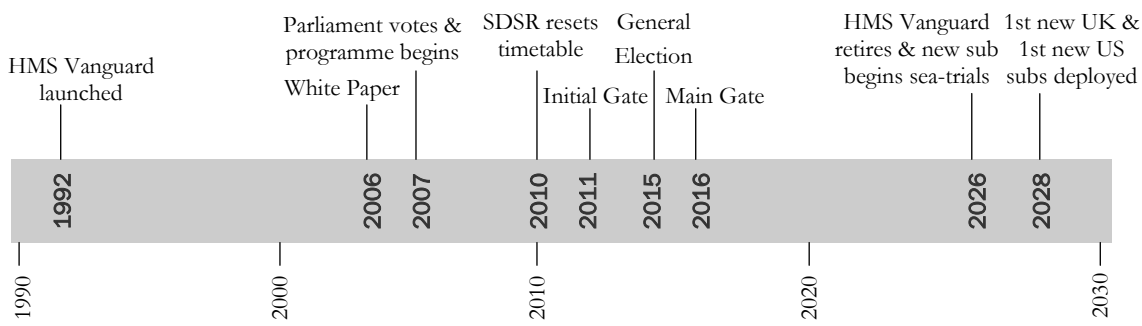
2007 vote in Parliament

In March 2007 Parliament voted on the Labour government's motion to take a decision in principle on whether to replace the Trident system and therefore begin a process to design, build and commission replacement submarines to carry the Trident missiles. The government provided three important assurances:

1. There will be renewed efforts to secure measures pursuant to nuclear disarmament under the Nuclear Non-Proliferation Treaty (NPT).
2. The replacement system will not involve any upgrading or expansion of current nuclear capability.
3. The decision to authorise research and design on a new fleet of submarines will not bind a future government or parliament to that decision and that there will opportunities in the future for Parliament to revisit the decision.

Future decisions

The Ministry of Defence will procure the new submarines according to its CADMID procurement cycle of Concept, Assessment, Demonstration, Manufacture, In-service, Disposal.



Trident replacement timeline

The vote in March 2007 authorised the first 'Concept' phase. Work on a new submarine design, labelled 'Successor', began in May 2007. Future key decisions are:

Initial Gate decision: The 'Assessment' phase will begin following an 'Initial Gate' decision by MOD when approximately 15% of the £15-20 billion procurement costs will be committed. The 2010 SDSR stated that the decision would be taken by the end of 2010.

Main Gate decision: The 'Demonstration' phase will begin following a 'Main Gate' decision. The Labour government stated that it is highly likely further parliamentary approval will be sought at this stage. Contracts will then be placed to build the submarines – the 'Manufacture' phase. The SDSR stated that the 'Main Gate' decision will take place in 2016.

Warhead decision: The Labour government stated that a decision on whether a new nuclear warhead is required or whether the current warhead can be maintained for the foreseeable future was likely to be needed during the current parliament. The 2010 SDSR stated that the decision can be safely deferred until the next parliament.

4. The UK Trident system and the United States

Since the 1960s Britain's nuclear forces have been heavily dependent on the United States. The UK's cooperative nuclear relationship with the US is a key feature of the 'special relationship' between the two countries. This continues today.

Trident system

The UK's Trident missiles are purchased directly from the US under the terms of the 1963 UK-US Polaris Sales Agreement as amended for Trident (Polaris was the previous submarine-based nuclear weapon system purchased from the US in the 1960s). Britain also received substantial design assistance with its *Vanguard* submarines. The UK's Trident warhead is based the US W76 Trident warhead design and was tested at the US Nevada test Site. Important components of UK warheads are bought off-the-shelf from the US. The UK enjoys substantial nuclear weapons cooperation with the US under the terms of the 1958 Mutual Defence Agreement that permits in -depth cooperation on nuclear weapons programmes.

Nuclear targeting

Under the terms of the Polaris Sales Agreement UK nuclear forces are formally "committed to NATO and targeted in accordance with Alliance policy and strategic concepts under plans made by the Supreme Allied Command Europe (SACEUR)". British warheads can be directly

integrated into NATOs' Nuclear Planning System and US nuclear war plans. There is a UK Liaison Cell at the headquarters of US Strategic Command (STRATCOM) responsible for US nuclear war plans.

Trident replacement

The US is also planning to replace its *Ohio*-class submarines that currently carry US Trident missiles. The US currently deploys 14 *Ohio*-class boats and the first is due to retire in 2027. The remaining 13 will reach the end of their service lives at a rate of roughly one boat per year thereafter, with the last retiring in 2040. The US Navy began preliminary studies for its next-generation ballistic missile submarine, labelled SSBN(X), in 2007. The US plans to finalise a new submarine design by 2018, begin construction in 2019 and deploy the first of 12 new submarines in 2028.

The UK has already begun working with the United States on a new submarine design. This has focussed on developing a 'Common Missile Compartment' to ensure the UK's new submarines will be able to accommodate whatever new missile the US eventually builds and deploys in the 2030s/40s to replace the current Trident missile.

The delay to the UK Trident replacement programme announced in the 2010 SDSR brings the UK programme in line with the US programme, thereby reducing operational and financial risk given current dependencies on the US.

5. Constraints on UK nuclear threats and use

The effects of using Trident

The bomb dropped on Hiroshima in August 1945 had a yield of 14 kilotons – an explosive power equivalent to 14,000 tons of TNT. 130,000 people died immediately or within 3 months and a further 70,000 in the following 5 years. Over 80% of those living within 1km of the site of the explosion died and over 50 % of those living within 1.5kms. There were also a wide range of health problems found in survivors. British Trident warheads are around 100kt, roughly 7 times the Hiroshima bomb.

A nuclear explosion has three immediate effects: blast, thermal radiation (heat) and nuclear radiation. Nuclear explosions also have a delayed effect through radioactive debris and fallout with long radioactive lifetimes. The use of tens of UK Trident warheads would likely devastate any country, cause casualties numbering in the millions, and potentially cause widespread societal collapse. The UK has accepted a number of constraints on nuclear threats and nuclear use.

Nuclear weapon free zones (NWFZ)

Britain has ratified protocols to three NWFZs covering Africa, Latin America and the South Pacific. In doing to Britain agrees not to deploy or use or threaten to use nuclear weapons in these geographic areas. Agreement has yet to be reached on protocols to the 1996 treaty covering South-East Asia and the 2007 treaty covering Central Asia.

International Court of Justice (ICJ) ruling

The UN Charter permits the use of force for individual or collective self-defence. In 1996 the ICJ issued an Advisory Opinion on the "Legality of the Threat or Use of Nuclear Weapons". The Court stated that the rules of humanitarian law applicable in armed conflict are fundamental and constitute intransgressible principles of international customary law. The ICJ has confirmed that it is a well-established rule of customary international law that the use of force in self-defence must be proportional to the armed attack and necessary to respond to it. The Court concluded that "the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law" but it could not "conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance of self-defence, in which the very survival of a State would be at stake".

The British government accepted this Opinion and does not dispute that international humanitarian law applies to nuclear weapons. The 1949 Geneva Conventions and their 1977 Additional Protocol form the core of intentional humanitarian law and have been ratified by the UK. The UK has repeatedly stated that it would only consider use of nuclear weapons in "extreme circumstances of self-defence". Use of nuclear weapons would therefore only be legal if their use constituted a proportionate response to aggressive actions, was a necessary response to an attack, discriminated between combatants and non-combatants and did not cause unnecessary suffering.

Negative Security Assurances (NSAs)

In 1978 and again in 1995 Britain and the other nuclear weapon states issued a 'negative security assurance' to non-nuclear weapon states to assure them that they will not be threatened with or subject to a nuclear attack. The UK assurance was updated in the 2010 SDSR. It declares that "the UK will not use or threaten to use nuclear weapons against non-nuclear weapon states parties to the NPT" with two caveats: 1) the assurance will not apply to any state in material breach of their own non-proliferation obligations under the NPT; and 2) the UK reserves the right to review this assurance if the threat from biological or chemical weapons increases significantly.

Controversies

The decision to begin the process of replacing the current Trident system, beginning with the procurement of new 'Successor' submarines to carry the Trident missile, has proved controversial in four areas: **strategic need**; **cost**; **type of replacement**; and **global nuclear disarmament**.

5. Strategic need

The Labour government argued in its 2006 White Paper that the UK must retain a nuclear arsenal for a number of reasons:

- To deter acts of aggression against British/NATO vital interests.
- To insure against the re-emergence of major strategic military threats, chiefly major powers with large nuclear arsenals.
- To prevent nuclear coercion or blackmail, particularly by nuclear-armed 'rogue' states.
- To preserve peace and stability in Europe and support Euro-Atlantic collective security.
- To deter state-sponsored acts of nuclear terrorism.
- To provide an independent centre of nuclear decision-making in NATO besides the US.
- To enable intervention against nuclear-armed adversaries to order to maintain regional and global security.

Advocates of Trident replacement argue that the future is uncertain and we cannot be sure that a major nuclear threat to the UK and NATO will not re-emerge in the 30-50 year timeframe of Trident's successor. Significant nuclear arsenals remain, some of which are being modernised and expanded. It would be irresponsible to relinquish nuclear weapons until a verifiable global nuclear disarmament process is well underway involving all states that currently possess nuclear weapons. The UK must retain a nuclear capability as long as other countries possess nuclear weapons. Furthermore, nuclear weapons remain essential to international stability as an insurance against military adventurism, particularly by other non-democratic nuclear powers.

Opponents of Trident replacement argue that a Cold War-era nuclear system such as Trident is not relevant to the complex strategic threats we face now and are likely to face in the future. These will be driven by a mix of environmental, economic, military and political sources of insecurity, including the effects of climate change, mass poverty and economic injustice, global pandemic diseases, mass migration and refugee flows, weak and failing states, international terrorism, the spread of WMD and advanced conventional military technologies, ethnic and sectarian nationalism and competition over access to key resources such as oil and water . Future conflicts will be complex, diverse and characterised by 'hybrid wars' combining international and

civil war, terrorism, and insurgency. Opponents argues that nuclear deterrent threats offer no solution to such complex future conflicts.

Opponents also say that the 'logic of nuclear deterrence' may have worked with the Soviet Union, but is unlikely to work against WMD-armed 'rogue' states or terrorist groups. They argue that nuclear weapons do not provide an insurance against attack only an assurance of revenge. Furthermore, strategic nuclear threats to the UK and NATO that threaten the survival of the state are not likely to re-emerge and that the use of nuclear weapons by the UK for anything other than the very survival of the state would be deeply counter-productive to wider global political aims.

6. A nuclear weapons-free world?

Shortly after Labour published its White Paper on Trident replacement in 2006 a new global opportunity emerged to rethink current nuclear weapon policies and take significant steps towards a nuclear weapons-free world . It has been led by four influential former US statesmen (Henry Kissinger, William Perry, George Schultz and Sam Nunn). They argued in two articles in the *Wall Street Journal* in January 2007 and 2008 that the impact of the 9/11 attacks and spectre of nuclear terrorism plus the global turn to new nuclear power generation as part of the solution to climate change and energy security concerns have combined to place a major question mark over whether the international community, particularly the West, can indefinitely restrain the spread of nuclear weapons technology and knowledge. They question whether we can safely and indefinitely manage complex relations between a growing number of nuclear powers and permanently keep nuclear material from civilian nuclear power programmes that can be used to make basic nuclear weapons out of terrorists' hands. They expressed extreme scepticism and argued the only solution over the long-term is verifiable global nuclear disarmament.

Their call to work towards a world free of nuclear weapons became a central plank of the Obama administration's foreign policy articulated in full by President Obama in Prague in April 2008. It is reflected in negotiation of a New START (Strategic Arms Reductions Treaty) agreement with Russia and changes in US nuclear posture set out in a new 'Nuclear Posture Review' in April 2010.

Citizens, officials, parliamentarians, and former senior policy-makers in many other countries have joined the call for serious progress towards nuclear disarmament. This has led to a major international 'Global Zero' initiative launched in Paris in December 2008 by a host of influential political, business and faith leaders, including many from the UK. It has resulted in statements by senior former foreign and defence statesmen and women echoing those of Henry Kissinger *et al*

from the UK, Australia, Belgium, France, Germany, Italy, the Netherlands, Norway, Poland, 204 Japanese parliamentarians, 40 European military and political leaders and a major International Commission on Nuclear Non-Proliferation and Disarmament sponsored by the Japanese and Australian governments that released its final report on *Eliminating Nuclear Threats - A Practical Agenda for Global Policymakers* in December 2009.

The Labour and Coalition governments have declared a full commitment to this goal and a desire to take an active leadership role in examining the practical steps and challenges involved. Advocates of nuclear disarmament argue that the UK has the potential to take a major leadership role as the most progressive of the five recognised nuclear weapon states and should either relinquish its nuclear capability after Trident or radically reduce the size and readiness of its nuclear arsenal. Others argue that the UK should wait until the US and Russia have significantly reduced their nuclear arsenals before taking any further steps and warn that a water-tight global verification system for any future nuclear disarmament treaty is essential but highly unlikely.

Nevertheless, at the last NPT Review Conference in May 2010 the nuclear weapon states, including the UK, agreed to "further diminish the role and significance of nuclear weapons in all military and security concepts, doctrines and policies" and to "commit to undertake further efforts to reduce and ultimately eliminate all types of nuclear weapons, deployed and non-deployed, including through unilateral, bilateral, regional and multilateral measures".

7. Like-for-like replacement

The Labour government and Conservative Party within the current Coalition argue that Trident should be replaced with a like-for-like system, i.e. four new submarines carrying the Trident missile with one submarine continuously at sea on operational duty (although it may be possible to maintain a 'continuous-at-sea deterrence' posture with only three new submarines instead of the current four). The Liberal Democrats do not accept this argument and, according to the 2010 Coalition Agreement, "will continue to make the case for alternatives" based on the view that if the UK does still require a nuclear capability, then it does not require a system as sophisticated as Trident designed to attack the Soviet Union with multiple nuclear warheads of global range.

Anything other than a direct 'like-for-like' replacement will require rethinking what 'minimum deterrence' means for the UK in terms of the size of the nuclear arsenal, the number of warheads and missiles deployed on the single submarine at sea, and the range of the missiles and explosive yield of the warheads. It will also require rethinking whether we still require a nuclear system continuously at sea to guard against a 'bolt from the blue' surprise attack. The Trident

replacement timeline and current 'like-for-like' programme are based on this apparent necessity.

Potential options are inevitably shaped by the perceived benefits of the current Trident system, including the capabilities it provides, the costs already sunk into the industrial support and command and control infrastructure, and the very close nuclear relationship the current Trident system affords with the United States.

Maintaining the UK's submarine-building industry is also a key consideration. The Labour government's 2005 *Defence Industrial Strategy* stated that the UK must retain the sovereign capability and skills to design, build, support, operate and decommission nuclear-powered submarines. All of the UK's conventionally-armed attack submarines and its ballistic missile *Vanguard* submarines were built at BAE Systems' Barrow shipyard and are powered by nuclear reactors built by Rolls Royce in Derbyshire. BAE Systems and other key suppliers in the submarine-building industry argue that if new 'Successor' submarines are not built then the UK will lose critical skills and its technological autonomy and risk the closure of Barrow.

If the UK is to opt for an alternative nuclear force structure then it is likely to be a variant of the current submarine-based Trident missile system, or possibly a new submarine-based nuclear cruise missile. Four broad possibilities emerge, all of which have pros and cons:

1. A '**Trident lite**' replacement programme that adheres to current understandings of 'minimum deterrence' but with fewer missiles and warheads and potentially three rather than four submarines. This is the current government's approach.
2. A downsized '**reduced readiness**' programme that ends 'continuous-at-sea deterrence', cuts the number of submarines, and significantly reduces numbers of warheads and missiles. Submarines would be regularly, but not continuously, deployed at sea with some flexibility in terms of deployment and duration patterns.
3. A flexible, dual-use '**hybrid**' submarine programme in which the new submarines are designed for conventional missions whilst retaining the capability to deploy and fire Trident missiles if required to do so at varying levels of readiness. This would also end 'continuous-at-sea deterrence' and cut the number of submarines, warheads and missiles whilst maximising the flexibility of a major new military platform as budgets are squeezed.
4. A new nuclear-armed **cruise missile** aboard the UK's new *Astute*-class attack submarines. A cruise missile would have a shorter range and smaller payload than a Trident missile and be more susceptible to interception but could provide a suitable 'emergency deterrent'.

8. Cost

In 2006 the government's cost estimates at 2006/07 prices for replacing the Trident system were between £15-20 billion based on:

- £11-14 billion for four new submarines.
- £2-3 billion for the possible future refurbishment or replacement of the warhead.
- £2-3 billion for infrastructure over the life of the submarines.
  £250 million to participate in the US Trident II missile life extension programme.

In November 2008 MOD's Permanent Under Secretary Sir Bill Jeffrey stated that these costings were only 'ballpark estimates'. The 2010 SDSR, however, reported that a value for money review of the Trident replacement programme had identified a number of savings and that current project costs remained within the 2006 estimate.

Others argue that MOD has struggled to bring in major equipment projects on time and to budget, not least the current *Astute*-class attack submarine programme being built by BAE Systems at the Barrow shipyard where the new 'Successor' submarines will be built. (In 2008 the National Audit Office forecast that the *Astute* programme was set to overrun its 'most likely' cost at approval by 48% and was already 47 months behind its 'most likely' in-service date at approval). History suggests that the government's procurement figure is likely to be too low because of the impact of defence inflation. Alternative estimates suggest a procurement figure of £30-£35 billion for the Trident replacement system.

Critics also argue that MOD cannot afford the cost of the Trident replacement programme. It has been widely publicised that MOD faces a major funding shortfall in its future equipment budget of up to £36 billion over the next 10 years. Its budget will be cut by 7.5% over the current Parliament under the 2010 Comprehensive Spending Review, and this comes after major cutbacks announced in December 2008 and December 2009.

In 2006 the Labour government insisted that the Trident replacement programme would not come at the expense of conventional capabilities. In July 2010 Chancellor George Osborne announced that MOD would have to fund the capital costs of replacing the current Trident system from its own core budget rather than have it provided through the Treasury reserve. When combined with the cut in the defence budget, it is clear that the commitment made in 2006 cannot now be realised and that the Trident replacement programme will have important conventional military opportunity costs.

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