

A Replacement For Trident: Can We Afford It?

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About Nuclear Information Service

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Headline issues

- The affordability of remaining a nuclear weapons state has always been an issue for the UK. Britain considered scrapping its nuclear weapons in 1976, when under pressure from the International Monetary Fund to make cuts in public expenditure. Financial pressures also caused the government to abandon the independence of its nuclear warhead design programme and cancel plans for a replacement for free-fall nuclear bombs in the 1990s.
- The defence procurement programme is in trouble because of competing demands for military equipment and high cost inflation. If approved, the replacement for Trident would be likely to become the single most expensive scheme in the defence procurement programme, tying up huge sums of money with significant implications, in particular, for the Royal Navy's equipment programme.
- The programme to replace Trident is a high risk initiative because its long lead-in time means that changing circumstances may make it far less relevant to the nation's security needs by the time it comes into service than it may appear to be at the current time. Considerable financial risks are created by the programme's reliance on monopoly suppliers and specialist skills, and also the high overhead costs associated with essential on-shore infrastructure.
- The credit crunch is likely to magnify the replacement programme's risks and compound the pressure on its affordability. In the medium term period, when the replacement for Trident is scheduled for construction, the economic picture will be heavily influenced by the need to recover the costs of the short-term spending stimulus which the government is currently applying in the hope of limiting the force of the recession.
- Over this period, spending on a nuclear weapons replacement programme would be competing with flagship government goals to halve child poverty, raise the state pension in line with earnings, and keep education spending growing as a share of national income, which now appear to be out of reach as a result of the credit crunch.
- Long term trends over the 40 year life of the new weapons system – a decreasing tax base, increasing oil prices, and the encroaching impacts of climate change - can only serve to increase the costs and risks of the UK's nuclear weapons programme. Elements of the UK's nuclear weapons infrastructure appear to be particularly vulnerable to the impacts of climate change.
- If things go badly wrong during the replacement programme, there is a danger not just of wasting large sums of public money, but of forcing defence and foreign policies in directions that may prove to be dead ends in years to come.
- Given the status which the UK government attaches to being a nuclear weapons state, a critical failure which led to the project being dramatically delayed, scaled down, or even cancelled would have implications for national self esteem and our sense of importance as an international player. On the other hand, as well as freeing up resources, a decision not to replace Trident would support other government initiatives to tackle the proliferation of nuclear weapons.

- Evidence from polling suggests that most Britons would reject replacing Trident if they knew the costs involved and had an understanding of what else might be purchased at the same cost. As a consequence of the credit crunch, public appreciation of value for money is likely to be sharpened, and thus proposals for the new weapons system are likely to face renewed scrutiny.

Executive summary

The affordability of remaining a nuclear weapons state has always been an issue for the UK. Historical archives and testimony from decision-makers over previous decades show that the very high costs of building nuclear weapons and maintaining the infrastructure needed to support them have always been at the margin of what the country can afford.

In December 1976 the Cabinet considered options for cutting military spending to help meet reductions in public spending demanded by the IMF which included the option of scrapping the UK's Polaris nuclear deterrent, even if it meant the definitive disappearance of Britain as a major military power. At the end of the 1970s it became apparent that the secret Chevaline warhead design programme had placed huge demands upon the defence budget and had proved to be a poor bargain. As a result the UK abandoned its own warhead design programme, relying instead on American design and manufacturing expertise to produce its nuclear weapons. During the 1990s a programme to replace the WE177 nuclear free-fall bomb was abandoned on the grounds of cost.

The British establishment has therefore been prepared to abandon nuclear weapons capabilities in the past, if forced to, as a result of harsh economic realities. This report considers whether such a course of action would make sense now, and asks whether the United Kingdom can afford to replace its arsenal of nuclear weapons as the country enters the uncharted economic waters of what looks likely to be the most severe recession in living memory.

Costs, risks, and opportunities

The first part of the report looks at some of the risks and uncertainties that have traditionally plagued major defence projects and which may add to the costs of replacing Britain's nuclear weapons. It highlights difficult choices that will have to be made on spending priorities, especially at the Ministry of Defence, and asks whether nuclear weapons are able to address the country's security needs.

The overall procurement costs of a replacement for the Trident nuclear weapon are estimated by the government to be between £15 and 20 billion. Total operating costs over the life of the programme will amount to around £37.5 billion.

The costs of replacing Trident would add a heavy load to the already stretched defence procurement budget. Competing equipment demands from the armed forces, high cost inflation driven by rapid technological advances in the defence sector, and the demands of UK military involvement in Afghanistan and Iraq have placed considerable strains on the procurement budget, which is currently said to be underfunded by a sum of £15 billion.

If approved, the replacement for Trident would be likely to become the single most expensive scheme in the defence procurement programme, tying up huge sums of money, so questions about its purpose and value become particularly pertinent. The implications for the Royal Navy, which has had to bear

the brunt of recent cost-saving exercises, would be significant. Spending on new aircraft carriers and fuel tankers has already slipped, on top of a previous decision to reduce the number of Type 45 destroyers on order, and the addition of a replacement for Trident to the defence procurement programme can be expected to place substantial further pressure on naval projects.

Delays in the procurement programme are particularly acute in the maritime sector. Difficulties in the submarine sector arise because the firms which construct submarines and supply their specialist components are monopoly suppliers, with the Ministry of Defence as their sole customer. The construction programme currently underway for Astute class submarines has seen real difficulties in providing incentives for suppliers to deliver to time and budget. Submarine industry insiders and the National Audit Office have recognised that cost escalation, programme delays, and poor value for money are key areas of risk in the programme to replace Trident. The task of managing these risks is likely to be a harder challenge than originally anticipated as a result of the rocky economic climate within which the programme will be implemented.

The United Kingdom's nuclear deterrent programme has opportunity costs. The considerable sums of money required to replace and operate nuclear weapons could be spent in other ways to address security concerns, or could be spent outside the defence budget to support social or environmental programmes. Nuclear weapons appear to have little, if any, role to play in addressing many of the threats identified in the National Security Strategy. The appendix to the report presents a comparison of some of the alternative military and civilian programmes which could be funded instead at the same cost as replacing Trident.

Evidence from polling suggests that most Britons would reject replacing Trident if they knew the costs involved and had an understanding of what else might be purchased at the same cost. As a consequence of the credit crunch public appreciation of value for money is likely to be sharpened, so the programme to replace Trident can be expected to face heavy scrutiny.

The credit crunch and economic downturn

The second part of the paper considers the implications of the credit crunch and the predicted economic downturn on government spending and the impact that this will have on a decision to replace the UK's nuclear weapons, basing its deductions on the government's own view of how the recession will play out as presented in the November 2008 Pre-Budget Report. The medium term impacts of the recession over the next decade are likely to have an impact upon the affordability of the UK's nuclear weapons programme.

Sharp falls in the volume of housing transactions, the declining fortunes of many financial companies, and rises in unemployment resulting from the crisis have caused damage to the economy that will have a lasting impact. In addition, the medium term economic picture (coinciding with the major period of expenditure on replacing Trident) will also be influenced by the need to recover the costs of the short-term spending stimulus which the government is applying in the hope of limiting the force of the recession.

The Institute of Fiscal Studies points out that if all departments experience a conservative 1.5 per cent lower growth rate in spending over the next Comprehensive Spending Review period compared with the current one, then spending on defence, the Home Office and local government would all be cut in real terms. The Institute predicts that government spending will face real cuts in the medium term, and

if the methods used to apportion spending between departments in the previous spending round were repeated, defence spending would face a 4 per cent reduction over the period 2011-12 to 2013-14. Spending on replacing Trident would be competing with flagship government goals to halve child poverty, raise the state pension in line with earnings, and keep education spending growing as a share of national income, which now appear to be out of reach as a result of the credit crunch.

Long term trends

Finally, the impact of long term economic trends on the nuclear weapons programme is discussed. If the programme to replace the Trident nuclear weapons system proceeds according to schedule, the first of the planned new submarines would enter into service in 2024 and the system would remain in service until the 2050s. Long term economic trends will therefore have an impact upon the viability of the programme, especially during the operating and decommissioning phases.

A long term trend in falling tax revenues may increase the Government's difficulties in financing a successor to Trident. Pressure on tax revenues will add to pressure on government spending, in turn increasing the financial and political risks of replacing Trident.

Manufacturing, transport, and the extraction and processing of natural resources are all dependent on oil in the modern global economy. Oil prices have been volatile over recent months and, looking to the longer term, are expected to rise over the next decade. This will push up the costs of building a replacement for Trident, and would also add to the costs of operating it. Credible forecasts predict an oil supply crunch and price rise in the middle of the next decade as spare capacity narrows.

In the longer term the costs of operating the UK's nuclear weapons infrastructure is likely to be influenced by the increasing impacts of global climate change. Elements of the UK's nuclear weapons infrastructure appear to be particularly vulnerable to the impacts of climate change, with coastal sites and the Atomic Weapons Establishment Burghfield nuclear warhead assembly plant likely to face an increased risk from flooding and severe weather events.

Conclusions and recommendations

The paper concludes that greater transparency is needed on the costs of nuclear weapons if public money is to be used effectively in addressing the real security threats facing the country, and recommends that a full review of the UK's defence needs is undertaken at the beginning of the next Parliament before the final decision is made to commit to replacing Trident.

Even under the best of circumstances the programme to replace Trident nuclear weapons will be a risky project, given that it is highly expensive and must be delivered to a tight timescale, yet has a long lead-in time. If things go badly wrong, there is a danger not just of wasting large sums of public money, but of forcing defence and foreign policies in directions that may prove to be dead ends in years to come. This creates the risk that the UK will be less able to focus on the diverse and changing security challenges that it faces over the next half century.

When the future security needs of the UK and the kinds of threats that we are likely to face (as identified in the National Security Strategy), the projected roles and missions for our armed forces, and the procurement timelines involved are considered alongside the economic issues, it becomes hard to

justify investment in an expensive nuclear weapons system that will tie up resources for the next forty or more years but will not meet the nation's defence requirements in a clear and obvious way.

The report's recommendations are as follows:

1. A detailed budget showing a breakdown of project costs for the programme to replace Trident should be published, covering all aspects of the programme including infrastructure replacement as well as the obvious costs of building new submarines and warheads. In order to aid the public in understanding the consequences of the decision to replace Trident, the government should also give some indication of how it might otherwise use the same sums of money by means of comparison. The costs should be reported to Parliament and the estimates and assumptions behind them should be examined by the House of Commons Public Accounts Committee.
2. As well as publishing a detailed budget for replacing Trident, the government should also report regularly on expenditure on the project. The National Audit Office should report annually to Parliament on the programme's progress.
3. Increased clarity and detail on defence costs are needed across the board, and the Ministry of Defence should publish clear accounts which meet transparent and universally adopted accounting requirements.
4. The 'Initial Gate' milestone in Autumn 2009, when a choice will be made on which concept to pursue to the design stage, should be used as an opportunity for a detailed review of the whole Trident replacement programme. Affordability should be a key criterion for considering whether the UK should renew its nuclear weapons.
5. A strategic defence review should take place at the beginning of the next Parliament with a broad remit. One of the specific objectives of the review should be to consider whether the UK is still justified in retaining its nuclear weapons, and if so, for what precise reasons.

“Of late Gordon Brown reminds one of a chap whose wife has informed him that there is a massive hole in the family budget. She will watch with a raised eyebrow as he finds a temporary VAT cut down the back of the sofa, and presents it to her with an imploring look. She will sigh in exasperated sympathy as he remembers £700m worth of supertax in an old post office account. And then she will point gently at the utterly undiminished hole in the balance sheet, and say: "I don't mean to state the bleeding obvious, love, but there is a sports car sitting in the garage, and I can't help feeling this might be the moment to let it go".

“His beloved Trident! Not a scratch on it, of course, and so adoringly maintained. Oh, he knows it's irrational, and an indulgence, and a throwback to when his life was completely different. And it's been murder to get the parts down the years. It's stupidly self-regarding to be worrying what the neighbours would say, and it would solve so many of their problems in a single swoop. But must it really go?”¹

Introduction: We've been here before

Reading through the newspaper headlines is a gloomy business. The world's financial markets are losing confidence in the British economy as it stumbles into recession. The value of sterling is slipping downwards, and the Treasury can no longer stick to its established rules or balance the books. The Labour government's economic response to the crisis banks heavily on maintaining high levels of public spending – but it is clear that this spending cannot be paid for from current revenues.

The parallels with the credit crunch of 2008 are depressingly similar, but in fact these events happened more than three decades earlier. It is the winter of 1976, and James Callaghan's government is in crisis talks with the International Monetary Fund to prevent the UK's economy from going into free-fall.

On December 5th 1976, on the eve of an exhaustive two-day cabinet meeting to secure the backing of ministers for an IMF bail out deal, Sir John Hunt, the then Cabinet Secretary, passed a highly confidential briefing paper to the Prime Minister. The paper laid out a set of options for cutting military spending to help meet reductions in public spending demanded by the IMF.^{2,3}

Sir John's memo advised Callaghan to take a step which under any other circumstances would have been unthinkable: to scrap the UK's Polaris nuclear deterrent to prevent a break-down in negotiations with the IMF, even if it meant "the definitive disappearance of Britain as a major military power".

¹ 'Call me a killjoy, but £70 bn seems a lot for a sports car'. Marina Hyde, *The Guardian*, 29th November 2008. <http://www.guardian.co.uk/commentisfree/2008/nov/29/gordon-brown-trident-defence-nuclear> Accessed 14th December 2008.

² 'IMF crisis forced Labour to consider scrapping Polaris'. Alan Travis. *The Guardian*, 29th December 2006. <http://www.guardian.co.uk/politics/2006/dec/29/uk.past1?gusrc=rss&feed=fromtheguardian> Accessed 1st November 2008.

³ 'Crisis threatened nuclear weapons'. Dominic Casciani. *BBC News Online*, 29th December 2006. http://news.bbc.co.uk/1/hi/uk_politics/6212557.stm Accessed 1st November 2008.

The Cabinet Secretary's view was that abandoning Britain's nuclear deterrent as part of a package of defence savings was preferable to drastically cutting the British Army of the Rhine – the British troops stationed as part of the NATO garrison in Germany. "Abandoning our deterrent or at least scrapping its improvement would cause much less concern to our allies," wrote Sir John. "It would leave France as the only nuclear power in Europe, which would be unwelcome to most members of the alliance: and it would be seen as proof of Britain's definitive disappearance as a major military power. But it would be preferred by all our partners to a withdrawal of BAOR."

Sir John's advice came after he had had a "very private" talk with Sir Frank Cooper, Permanent Under Secretary at the Ministry of Defence, who told him that if the government was forced to make £100m of defence cuts as part of the IMF package "the view would probably be taken that we should scrap (or at any rate abandon the improvement of) the deterrent rather than reduce our NATO conventional commitments further". Withdrawing the troops in Germany would mean that the "process of unravelling NATO would have begun".

In the event Callaghan was able to negotiate more flexible terms for the loan with the IMF. The deepest of the cuts in public spending were avoided, and it never became necessary to implement the recommendations in Sir John Hunt's paper. The proposal to abandon Britain's nuclear weapons was quietly shelved, and did not see the light of day again until the 1976 Cabinet Papers were released to the public in 2006 under the Thirty Year Rule.

Forty years later, we are facing a similar dilemma. The economic outlook has changed drastically since March 2007, when Parliament voted to replace the UK's Trident nuclear weapons system. The crisis in the banking sector which unfolded so dramatically towards the end of 2008 has presented the government with an economic challenge at least as great as the difficulties of the 1970s. The United Kingdom's net debt will reach a 40 year high at 60% of national income in 2012-3 and government borrowing will reach a 63 year high – the highest in the post World War 2 period - at 8% of national income in 2009-10⁴. Treasury officials are reported to have begun asking Whitehall departments for lists of their long-term spending priorities with a view to making cuts in their budgets⁵, and ministers have acknowledged that the recession has raised questions about expensive, high profile politically sensitive projects. Tessa Jowell, the Olympics minister, has admitted that the government would probably not have bid to stage the 2012 Olympic Games in London if the decision had come in the midst of the current economic downturn⁶. Yet, on current cost estimates, the capital costs of replacing Trident would be half as much again as the costs of hosting the Olympics. Should we renew the Trident nuclear weapons system during what looks likely to be a period of considerable financial difficulty? In 1976 the British establishment was prepared to abandon its nuclear weapons if the economic realities forced it to. Would a similar course of action make sense now?

This report considers such questions, and asks whether the United Kingdom can afford to replace its arsenal of nuclear weapons as the country enters uncharted economic waters. The imminent recession looks likely to be the most severe in living memory, and may herald the beginning of a period of long-term economic uncertainty. The first part of the report looks at some of the risks and uncertainties that

⁴ 'PBR 2008 and the fiscal rules.' Gemma Tetlow. Presentation at the Institute of Fiscal Studies. 25th November 2008. <http://www.ifs.org.uk/budgets/pbr2008/fiscal.ppt> Accessed 15th December 2008.

⁵ 'Darling to scrap Brown's fiscal rules'. Chris Giles and Alex Barber. Financial Times, 26th October 2008. http://www.ft.com/cms/s/0/4d2a240a-a3aa-11dd-942c-000077b07658.html?nclink_check=1 Accessed 8th November 2008.

⁶ 'We would not have bid for games during recession, says Jowell'. Patrick Wintour. The Guardian, 13th November 2008. <http://www.guardian.co.uk/uk/2008/nov/13/olympics2012-recession> Accessed 15th December 2008.

have traditionally plagued major defence projects and which may add to the costs of replacing Britain's nuclear weapons. It highlights the difficult choices that will have to be made on spending priorities, especially at the Ministry of Defence, and asks whether nuclear weapons are able to address the country's security needs. The second part of the paper considers the implications of the credit crunch and the predicted economic downturn on government spending and the impact that this will have on a decision to replace the UK's nuclear weapons. Deductions are based on the government's own view of how the recession will play out, and indicate that the medium term impacts of the recession over the next decade are likely to have an impact upon the affordability of the UK's nuclear weapons programme. Finally, the impact of long term economic trends on the nuclear weapons programme is discussed. The paper concludes that greater transparency is needed on the costs of nuclear weapons if public money is to be used effectively in addressing the real security threats facing the country, and recommends that a full review of the UK's defence needs is undertaken at the beginning of the next Parliament before the final decision is made to commit to replacing Trident.

1. Costs, risks, and opportunities

1.1 Affordability – the key test

The Trident programme is “unacceptably expensive, economically wasteful and militarily unsound” - *Gordon Brown MP*.⁷

“We have always sought to preserve our deterrent at an affordable cost.” - *Kevin Tebbit, Permanent Under Secretary at the Ministry of Defence, 1998 – 2005*.⁸

The affordability of remaining a nuclear weapons state has always been an issue for the UK. Historical archives and testimony from the decision-makers of the time show that the very high costs of building nuclear weapons and maintaining the infrastructure to support them have always been at the margin of what the country can afford. Sir John Hunt’s “very private” talk with defence officials is not the only time that the financial viability of British nuclear weapons has led to soul-searching at the highest levels within the defence establishment.

At the end of the 1970s it became apparent that the secret Chevaline warhead design programme had placed huge demands upon the defence budget. A review of the programme concluded that future UK nuclear weapons programmes should be based on US technological capabilities and systems instead of British know-how, and the Civil Service was forced to abandon the notion of an independent nuclear warhead programme for the UK. Professor Sir Ronald Mason, Chief Scientific Advisor at the Ministry of Defence at the time, recalled that: “I began to be determined that that was the last of a truly national missile programme. The reason I came to that view was not so much concerned with costs and programme over-run on Chevaline, although there were clearly lessons to be learnt. I was also Chairman of the Defence Equipment Policy Committee, and I therefore had an overall view of the conventional defence equipment programme. I could take a view on the enormous demand on technical resources that Chevaline was making, and I felt that was a poor bargain and not an auspicious precedent.”⁹ Chevaline was clearly neither affordable nor good value for money, and as a result of Sir Ronald’s review, the design and production of UK nuclear weapons made the quantum shift from being fully independent to being ‘independent’ only for operational purposes, relying on American design and manufacturing expertise for their production.¹⁰

A decade later, more agonising took place in the upper echelons of Whitehall. Up until the 1990s Britain maintained a deterrent posture that was based on more than one delivery system, with its submarine-launched ballistic missiles complemented by around 300 air-launched WE177 nuclear free-fall bombs¹¹. As the WE177 approached the end of its life and the costs of a replacement were considered, it became obvious that there was no affordable way of replacing the bomb. According to

⁷ Official Report (Hansard), House of Commons, 19 June 1984; Vol 62, c188.

⁸ Comments to workshop on 'Cabinets and the Bomb', British Academy, 27th March 2007. <http://www.britac.ac.uk/pubs/review/perspectives/0703cabinetsandbomb-2.cfm> Accessed 18th December 2008.

⁹ Comments to workshop on 'Cabinets and the Bomb', British Academy, 27th March 2007. <http://www.britac.ac.uk/pubs/review/perspectives/0703cabinetsandbomb-2.cfm> Accessed 18th December 2008.

¹⁰ UK nuclear weapons had been dependent on American missile systems for delivery since 1968, when the Polaris system came into operation, purchased from the USA under the terms of the Nassau Agreement.

¹¹ Nuclear Weapons: A guide to British nuclear weapon projects. Brian Burnell. <http://www.nuclear-weapons.info/vw.htm#WE.177> Accessed 18th December 2008. Figures include nuclear depth bombs assigned to the Royal Navy for anti-submarine warfare.

Sir David Omand, responsible for recasting British nuclear weapons policy at the end of the Cold War as Deputy Under Secretary of State for Policy at the Ministry of Defence: “That decision loop we went through with genuine reluctance ... We examined carefully the possibility of develop [sic] an air-launched missile jointly with the French. It came to nought and would have in fact proved far too expensive.”¹²

No doubt in part because of these bitter experiences, there seems to be a consensus within government that any replacement for Trident must be affordable. The government’s view, stated in the Defence Industrial Strategy, is that: “Cost-effectiveness will clearly be a key factor in any consideration of potential options, both submarines based and non-submarine based. For submarine-based options it will be very important that MoD and industry are able to demonstrate an ability to drive down and control the costs of nuclear submarine programmes.”¹³ This position was echoed by the House of Commons Defence Committee, which concluded: “Affordability must be a fundamental consideration in any new submarine programme. The Government is right to emphasise that orders for a Vanguard successor will be contingent on industry driving down and reducing costs and ensuring value for money throughout the submarine programme. Industry must deliver on this requirement.”¹⁴

Affordability will therefore be a key test in determining whether the government will be able to proceed with its plans to replace Trident. The new system’s affordability will depend both on factors under the control of the Ministry of Defence – whether the Ministry is able to deliver the system within available cost limits – and broader economic factors which are beyond its control, such as the general state of the country’s economy and the money available for the defence budget. In a demanding economic climate, these factors may combine to confound plans for developing a replacement to Trident.

1.2 How much will the bill come to?

The UK’s Trident nuclear weapons system has four key elements: four Vanguard class ballistic missile submarines (SSBNs); a pool of Trident D5 missiles shared with the United States; a stockpile of nuclear warheads manufactured at the Aldermaston Atomic Weapons Establishment (AWE); and a wide collection of onshore support infrastructure. Expenditure will be required on each of these elements if the UK’s nuclear weapons system is to be replaced.

The government’s White Paper ‘The Future of the United Kingdom’s Nuclear Deterrent’ estimated that the overall procurement costs of a replacement for the Trident nuclear weapon system would be between £15 and 20 billion at 2006-7 prices.¹⁵ Of this, replacing the submarine delivery platform will

¹² Comments to workshop on ‘Cabinets and the Bomb’, British Academy, 27th March 2007.

<http://www.britac.ac.uk/pubs/review/perspectives/0703cabinetsandbomb-2.cfm> Accessed 18th December 2008.

¹³ ‘Defence Industrial Strategy. Defence White Paper’, paragraph B2.63. Secretary of State for Defence, December 2005. Cmnd 6697. The Stationery Office. http://www.mod.uk/NR/rdonlyres/F530ED6C-F80C-4F24-8438-0B587CC4BF4D/0/def_industrial_strategy_wp_cm6697.pdf Accessed 6th November 2008.

¹⁴ ‘The Future of the UK’s Strategic Nuclear Deterrent: The Manufacturing and Skills Base’. House of Commons Defence Committee. Fourth report of session 2006-7. December 2006.

<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/59/59.pdf> Accessed 3rd November 2008.

¹⁵ ‘The Future of the United Kingdom’s nuclear deterrent.’. White Paper by the Secretary of State for Defence and the Secretary of State for Foreign and Commonwealth Affairs. Cmnd. 6994, December 2006. The Stationery Office. http://www.mod.uk/NR/rdonlyres/AC00DD79-76D6-4FE3-91A1-6A56B03C092F/0/DefenceWhitePaper2006_Cm6994.pdf Accessed 3rd November 2008.

cost between £11 and 14 billion (assuming that four submarines are required, as is currently the case); a warhead refurbishment / replacement programme will cost between £2 and 3 billion, and submarine infrastructure will cost between £2 and 3 billion.

In-service costs (including capital and running costs) are estimated to be in the order of £1.5 billion per year at 2006-7 prices by the House of Commons Defence Committee¹⁶, based on an estimate in the White Paper that in-service costs will be similar to today at around 5-6% of the defence budget.

Assuming a life of 25 years, the same as the design life for the Vanguard class submarines currently in service, the total operating cost over the life of the programme amounts to £37.5 billion. The in-service costs quoted by the Ministry do not include the costs of participating in the Trident D5 missile life extension programme (£250 million at 2006-7 exchange rates) or of purchasing a new missile system if necessary when the life of the Trident D5 missile ends in the 2040s.

In addition to these costs, the government is currently funding the Nuclear Warhead Capability Sustainment Programme at the Atomic Weapons Establishment to ensure that its existing nuclear stockpile remains reliable and safe. This programme entailed expenditure of around £350 million per year over the period 2005-8 and will result in further additional expenditure at AWE over future years^{17,18}. Although this investment is geared to maintaining the capability of the UK's current nuclear arsenal, new facilities and the improved skills base gained through the programme would subsequently be used in manufacturing a new generation of warheads for future British nuclear weapons.

The National Audit Office has commented that the costs produced to date by the Ministry of Defence are initial estimates, and that there are major areas of uncertainty in the budget for replacing Trident.¹⁹ In addition, the distinction between capital and revenue costs has been blurred, with costs reported by the Ministry of Defence as 'procurement costs' and 'in-service costs' (for the purposes of this report we assume, where necessary, that procurement costs equate to capital costs and in-service costs relate to revenue costs). Accurate cost estimates are expected to be announced by the Ministry of Defence at the end of the concept study phase for the project in autumn 2009, and the National Audit Office has stressed the need for these to be robust estimates of whole-life costs.

Cost estimates for replacing the UK's nuclear weapons are said to have been based on the costs of the current Trident system. However, Trident has not yet reached the end of its life, and the Ministry of Defence apparently has no usable information about the full life costs of its previous nuclear weapons systems. In response to a Parliamentary Question from Norman Baker MP asking for total life cycle costs of the Polaris / Chevaline and Trident systems, the Secretary of State for Defence conceded that "no recent estimate has been made of the costs of Polaris and the information requested is not held

¹⁶ 'The Future of the UK's Strategic Nuclear Deterrent: The White Paper'. House of Commons Defence Committee. Ninth Report of Session 2006-7. March 2007. Chapter 7.

<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/225/225i.pdf> Accessed 3rd November 2008.

¹⁷ Written Ministerial Statement, Official Report (Hansard), 19th July 2005, Column 59WS.

http://www.publications.parliament.uk/pa/cm200506/cmhansrd/vo050719/wmstext/50719m03.htm#50719m03.html_sbhd0 Accessed 12th January 2009.

¹⁸ Written answer, Official Report (Hansard). 11th December 2007, Column 399W.

<http://www.publications.parliament.uk/pa/cm200708/cmhansrd/cm071211/text/71211w0012.htm>

Accessed 12th January 2009.

¹⁹ 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Paragraphs 4.5-4.6 and Box 8, page 26.

http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

centrally and could be provided only at disproportionate cost”²⁰. The Ministry of Defence’s estimates of in-service costs for Trident do not appear to account for any increase towards the end of the system’s life, when operating and maintenance costs rise dramatically as equipment gets older. The Ministry of Defence notes that: “the Resolution class submarines, for example, were maintained in-service for from 25 to 28 years and experienced serious loss of availability and significantly increased maintenance costs towards the end of their lives. We have no wish to repeat that experience.”²¹

Other sources have estimated the costs of replacing Trident as considerably higher. A whole life replacement cost (procurement costs plus in-service costs) of £76 billion has been estimated by the Liberal Democrats²². Another estimate of the replacement costs based around expenditure at a rate of 5-6% of the defence budget has put the total costs of replacement at between £90 and £110 billion²³. This report uses the government’s White Paper estimate of costs as the basis of its assumptions and estimates, but regardless of the approach used to calculate the cost of replacing the UK’s nuclear weapons, it is clear that these costs will be extremely expensive and will place substantial strain on the defence budget at a difficult time.

1.3 Competing demands: the defence procurement programme

Even the most optimistic civil servant in the Ministry of Defence would concede that the UK’s defence procurement programme is in a precarious situation. Every year the National Audit Office presents a report on the Ministry of Defence’s performance in managing procurement of the largest defence equipment projects in its annual ‘Ministry of Defence Major Projects Report’. Each year the report shows clearly the difficulties that the Ministry is experiencing in delivering an expensive and complex programme for providing new equipment to the armed forces. No easy solutions are sight. The aspirations of the armed forces significantly exceed both the money available and the ability to spend it effectively, and rapidly inflating costs in the defence sector have conspired with delays and cost increases during project delivery to create a tangled knot which has so far defied all attempts to unravel it.

The National Audit Office’s report for 2008 provides some eye-watering statistics showing the scale of the problem. The total forecast cost for the 20 largest defence equipment projects (excluding costs of the Typhoon aircraft programme, which are said to be commercially sensitive²⁴) is currently £27.55 billion. This represents an increase of 12 per cent (£3 billion) when compared with the budgeted cost

²⁰ Written Answer, Official Report (Hansard). 13th November 2008, Column 1301W.

<http://www.publications.parliament.uk/pa/cm200708/cmhansrd/cm081113/text/81113w0004.htm#081113102000667>
Accessed 15th December 2008.

²¹ ‘Response to the House of Commons Defence Committee’s request for further information in the Clerk’s letter of 17 January.’ Memorandum from the Ministry of Defence, 1st January 2007.

<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/uc225-iv/uc225m02.htm>
Accessed 9th November 2008.

²² ‘New Trident system may cost £76 bn, figures show’. Richard Norton-Taylor. The Guardian, 21 September 2006.
<http://www.guardian.co.uk/uk/2006/sep/21/military.armstrade> Accessed 3rd November 2008.

²³ ‘Replacing Trident system to cost £100bn’. Rob Edwards. Sunday Herald 11th February 2007
http://www.sundayherald.com/news/heraldnews/display.var.1185412.0.replacing_trident_system_to_cost_100bn.php
Accessed 6th November 2008.

²⁴ The UK is contractually obliged to purchase a further tranche of 88 Typhoon aircraft, with the price of each aircraft conservatively estimated at £58.6 million. ‘Minister furious over £20 bn bill for Eurofighter’. Neil Tweedie, Daily Telegraph, 25th November 2006. <http://www.telegraph.co.uk/news/uknews/1535019/Minister-furious-over-andpound20bn-bill-for-Eurofighter.html> Accessed 21st January 2009.

when the main investment decision for projects in the programme was taken. In aggregate the projects are now predicted to achieve their in-service dates 483 months later than predicted when first approved. This slippage represents a 36 per cent increase in their expected timescales since the main investment decision²⁵.

According to some sources, the defence procurement budget is now underfunded by a sum of £15 billion²⁶. There are two underlying reasons for this. Firstly, the programme is packed with competing demands and has become too large and expensive to fund – especially in the current economic climate. It is also prone to high cost inflation driven by rapid technological advances in the defence sector, with defence equipment costs rising at around 10 per cent per year in real terms, representing a trend of doubling every decade²⁷. Further pressure on costs has been added by the immediate demands posed by UK military involvement in Afghanistan and Iraq.

The government's response to this crisis has been two pronged. Firstly, the Treasury has given the Ministry of Defence greater flexibility in how it spends money, allowing it to break one of its main accounting rules to free up hundreds of millions of pounds in funds²⁸. Under the deal with the Treasury, defence officials are now able to move some funds between the three years of the Comprehensive Spending Review and use money allocated for annual capital spending for resource spending, making it easier to delay, cancel or reconfigure commitments. This has allowed Ministers to give the go-ahead (albeit later than originally planned) for two new aircraft carriers for the Royal Navy at a cost of £3.9 billion²⁹.

In return, the Ministry of Defence embarked upon a short "examination" of its defence equipment programme aimed at prioritising frontline needs and squeezing savings from industry³⁰. The first fruits of this initiative appeared in December 2008, when Defence Secretary John Hutton announced a package of measures designed to reduce spending demands by paring down and delaying a number of major defence equipment projects. Construction of the prestigious new aircraft carriers for the Royal Navy has been postponed for up to two years and new Royal Fleet Auxiliary fuel tankers have also been delayed; the numbers of Future Lynx helicopters on order has been trimmed; and approval for the army's Future Rapid Effect System utility vehicle has been withdrawn. Mr Hutton's willingness to delay as significant a programme as the aircraft carriers is said to underline the severity of the cash crisis facing the Ministry of Defence³¹.

²⁵ 'Ministry of Defence Major Projects Report. Report by the Comptroller and Auditor General.' HC64-1 Session 2008-9. National Audit Office, 18th December 2008. Paragraphs 3 and 4, page 5.

http://www.nao.org.uk/publications/0809/mod_major_projects_report_2008.aspx Accessed 23rd December 2008.

²⁶ 'Defence Equipment'. Uncorrected transcript of oral evidence, House of Commons Defence Committee, 25 November 2008. To be published as HC 1198-ii. Question 166 from Adam Holloway MP.

<http://www.publications.parliament.uk/pa/cm200708/cmselect/cmdfence/uc1198-ii/uc119802.htm> Accessed 27th December 2008.

²⁷ 'The economics of UK nuclear weapons policy'. Keith Hartley. *International Affairs* Volume 82(4) (2006), pp675-684.

²⁸ 'Procurement: MoD in conflict with suppliers'. Sylvia Pfeifer. *Financial Times*, 14th July 2008.

<http://www.ft.com/cms/s/0/19b6e688-4ede-11dd-ba7c-000077b07658.html>. Accessed 19th January 2009.

²⁹ 'MoD gets go-ahead to free up funds'. Alex Barker and Sylvia Pfeifer. *Financial Times*, 16th May 2008.

<http://www.ft.com/cms/s/0/e00d35dc-22bd-11dd-93a9-000077b07658.html> Accessed 9th November 2008.

³⁰ 'Procurement: MoD in conflict with suppliers'. Sylvia Pfeifer. *Financial Times*, 14th July 2008.

<http://www.ft.com/cms/s/0/19b6e688-4ede-11dd-ba7c-000077b07658.html>. Accessed 19th January 2008.

³¹ 'Armed Services take first big hit in public spending'. Michael Evans. *The Times*. December 12 2008.

<http://www.timesonline.co.uk/tol/news/politics/article5327865.ece> Accessed 15th December 2008.

These measures have bought the Ministry of Defence some breathing space, and will bring “the defence equipment programme more closely into balance” according to the Defence Secretary, although more tough choices are still waiting on the horizon. Decisions about other aspects of the procurement programme are to be taken through the Ministry of Defence’s regular planning round, which will conclude next March³².

With the defence procurement budget substantially underfunded, the need to obtain value for money from procurement projects assumes even more importance. If approved, the replacement for Trident would be likely to become the single most expensive scheme in the defence procurement programme, tying up huge sums of money, so questions about its purpose and value become particularly pertinent. In particular, the implications for the Royal Navy, which has had to bear the brunt of the recent cost-saving exercise, would be significant. Spending on aircraft carriers and new fuel tankers has already slipped, on top of a previous decision to reduce the number of Type 45 destroyers on order, and the addition of a replacement for Trident to the defence procurement programme can be expected to place substantial further pressure on naval projects.

A prominent example of the risks involved in procurement of defence systems with long lead-in times is the Eurofighter Typhoon aircraft, by far the most costly weapons project ever undertaken by the UK. Originally designed and ordered to meet Cold War security requirements for a fighter aircraft able to counter Soviet aircraft, the Typhoon is less suitable for the ground-attack role that has been important in recent conflicts and thus has little relevance today. As a result the Ministry of Defence is currently wrestling with the dilemma of what to do about 88 Typhoon aircraft that it is contractually obliged to buy but no longer has an operational need for. The lifetime of Trident’s replacement will span around half a century from conception to obsolescence, and there is a big risk that, like the Typhoon, the programme will have far less relevance by the time the new submarines and weapons systems have entered into service.

Back in the 1970s Sir Ronald Mason concluded that investment in the Chevaline programme had become an enormous demand on financial resources and represented a poor bargain. Given the challenges facing the defence procurement budget, if the same proves true for the next generation of Britain’s nuclear weapons, the costs are likely to be high not just in financial terms but also in terms of impact on our national defence capability.

1.4 The risk of cost increases: lessons for the submarine sector

The obstacles experienced during the delivery of the Royal Navy’s new Astute class submarines demonstrate the difficulties of managing complex defence procurement projects and expose problems that the Ministry of Defence cannot afford to repeat if Trident is to be replaced without compromising its prized doctrine of continuous at sea deterrence. To date, problems with the Astute programme have led to a delay of 41 months in delivery and a cost overrun of £1,220 million³³.

³² ‘MoD faces difficult choices on spending.’ Sylvia Pfeifer, Alex Barker and Chris Tighe. Financial Times, 11th December 2008. <http://www.ft.com/cms/s/0/dfe1423a-c784-11dd-b611-000077b07658.html> Accessed 19th January 2009.

³³ ‘Ministry of Defence: The United Kingdom’s Future Nuclear Deterrent Capability’. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Box 3, page 11. http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

The Defence Industrial Strategy, published in 2005 to identify the industrial capability the UK needs to procure and operate its military equipment, shows an acute awareness of the risk of escalating equipment costs. The strategy highlights the maritime sector as an area of particular concern, stating that “the sector has failed consistently to deliver satisfactory performance, with several high-profile maritime projects encountering delays and cost increases.” The current situation is described as “unsustainable”, with issues in the submarine sector identified as particularly acute³⁴.

Insiders in the submarine sector share this view. Rear Admiral Andrew Mathews, Director General Submarines at the Ministry of Defence, warned a conference at the Royal United Services Institute (RUSI) in January 2008 that: “Unless we get a grip on costs there is a danger that submarines may become an endangered species”.³⁵ Gavin Ireland, seconded to RUSI from BAE Systems Submarines Solutions, voices similar concerns in a review of the UK’s submarine industrial base, observing that “The work on pricing of Astute Boats Two and Three was criticized by the House of Commons Defence Committee for placing MoD at unlimited financial risk until pricing was completed” and concluding: “It must be accepted that nuclear powered submarines are a major cost to the UK.” Ireland quotes John Coles, former Director of the Defence Logistics Organisation’s Warship Support Agency, as giving the opinion that: “The UK submarine industry is unsustainable in the long term unless it restructures”.³⁶

Many of the difficulties in the submarine sector arise because the firms which construct them and supply their specialist components are monopoly suppliers, with the Ministry of Defence as their sole customer³⁷. There are real difficulties in providing the right incentives for these suppliers to deliver to time and budget³⁸. The cost of procured parts, which constitutes more than 50 per cent of the value of the Astute class, is also said to be rising because specialist suppliers are considering an exit from the submarine market due to infrequent orders and poor returns³⁹.

Admiral Mathews has also made the point that the overhead costs of operating the submarine fleet have risen because, as the cost of nuclear submarines has outstripped inflation, the Royal Navy has responded by reducing the size of its fleet. Although hull numbers have drifted down, the onshore infrastructure needed to support the fleet has not experienced similar downsizing. Admiral Mathews concludes that “if we do not solve the conundrum of increasing platform costs and fewer numbers – we will slip below critical mass” and so “we must drive down infrastructure costs, if we are to have an

³⁴ ‘Defence Industrial Strategy. Defence White Paper’, paragraphs B2.47 and B2.48. Secretary of State for Defence, December 2005. Cmnd 6697. The Stationery Office. http://www.mod.uk/NR/rdonlyres/F530ED6C-F80C-4F24-8438-0B587CC4BF4D/0/def_industrial_strategy_wp_cm6697.pdf Accessed 6th November 2008.

³⁵ ‘Showing the US the way’. Rear Admiral Andrew Mathews. Speaking notes for presentation at RUSI, 14th January 2008. <http://rusiresources.com/submarines2007/Adm%20Matthews%20speaking%20note.rtf> and <http://rusiresources.com/submarines2007/Mathews.pdf> Accessed 5th November 2008.

³⁶ ‘Beyond Artful: Government and Industry Roles in Britain’s Future Submarine Design, Build, and Support’, pages 14, 7, and 6. Gavin Ireland. Royal United Services Institute Whitehall Report 3-07, 2007. http://www.rusi.org/downloads/assets/WHR3_Final_Report.pdf Accessed 6th November 2008.

³⁷ ‘Beyond Artful: Government and Industry Roles in Britain’s Future Submarine Design, Build, and Support’, page 4. Gavin Ireland. Royal United Services Institute Whitehall Report 3-07, 2007. http://www.rusi.org/downloads/assets/WHR3_Final_Report.pdf Accessed 6th November 2008.

³⁸ ‘Press release: Ministry of Defence: The United Kingdom’s Future Nuclear Deterrent Capability’. National Audit Office. 5th November 2008. http://www.nao.org.uk/whats_new/0708/07081115.aspx Accessed 4th January 2009.

³⁹ ‘Beyond Artful: Government and Industry Roles in Britain’s Future Submarine Design, Build, and Support’, page 2. Gavin Ireland. Royal United Services Institute Whitehall Report 3-07, 2007. http://www.rusi.org/downloads/assets/WHR3_Final_Report.pdf Accessed 6th November 2008.

affordable future”.⁴⁰ Given that key infrastructure sites at Devonport, Faslane, Barrow, Derby and Aldermaston all have unique capabilities, this will be a formidable task.

One assumption underlying the viability of the future deterrent programme is that the United Kingdom’s submarine industry will be sustainable and that the costs of supporting it will not fall directly on the future deterrent programme⁴¹. The National Audit Office has already allowed the Ministry of Defence to allocate some additional costs against the Astute programme to help in sustaining the industry through to the future deterrent programme⁴², but creative accounting will not on its own be enough to address the problems in the submarine sector and the knock-on implications for replacing the Vanguard class vessels without a determined effort to drive down costs.

Following its scrutiny of the Government White Paper on Trident replacement, the House of Commons Defence Committee concluded: “In the event of Parliament voting in support of the renewal of Trident, industry and the MoD must work together to drive down and control costs in order to deliver an affordable submarine programme”.⁴³ However, although there has been a lot of discussion about the prospects for increased collaboration between the MoD and industry and improvements in partnership working between prime contractors and subcontractors, few concrete measures for ensuring that the Trident replacement programme delivers value for money are apparent at the present time. Gavin Ireland has highlighted the need for the MoD to clearly establish incentives for the submarine build sector to design for through-life cost reduction but concludes that “the means by which this is to be achieved are unclear at present”.⁴⁴ The National Audit Office report on the risks to the programme observed that: “As it stands, there is no single document which sets out convincing evidence of how the Department intends to assure value for money from its suppliers throughout the life of the project”⁴⁵.

The National Audit Office concludes that “making certain that its suppliers deliver on time and at an acceptable cost is a major challenge for the Department”⁴⁶, and recommends that the Ministry of Defence works with industry to develop a commercial strategy which will provide a clear picture of how the performance of suppliers will be incentivised. Nevertheless, highlighting the scale of this challenge, the Audit Office notes that the combination of monopoly suppliers, a tight project deadline,

⁴⁰ ‘Showing the US the way’. Rear Admiral Andrew Mathews. Speaking notes for presentation at RUSI, 14th January 2008. <http://rusiresources.com/submarines2007/Adm%20Mathews%20speaking%20note.rtf> Accessed 5th November 2008.

⁴¹ ‘Ministry of Defence: The United Kingdom’s Future Nuclear Deterrent Capability’. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Paragraph 5.3, page 28. http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁴² ‘Showing the US the way’. Rear Admiral Andrew Mathews. Speaking notes for presentation at RUSI, 14th January 2008. <http://rusiresources.com/submarines2007/Adm%20Mathews%20speaking%20note.rtf> Accessed 5th November 2008.

⁴³ ‘The Future of the UK’s Strategic Nuclear Deterrent: The White Paper’. House of Commons Defence Committee. Ninth Report of Session 2006-7. March 2007. <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/225/225i.pdf> Accessed 3rd November 2008.

⁴⁴ ‘Beyond Artful: Government and Industry Roles in Britain’s Future Submarine Design, Build, and Support’, page 17. Gavin Ireland. Royal United Services Institute Whitehall Report 3-07, 2007. http://www.rusi.org/downloads/assets/WHR3_Final_Report.pdf Accessed 6th November 2008.

⁴⁵ ‘Ministry of Defence: The United Kingdom’s Future Nuclear Deterrent Capability’. Report by the Comptroller and Auditor General, HC1115, Session 2007-8. National Audit Office. The Stationery Office. 5th November 2008. Paragraph 5.7. http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁴⁶ ‘Ministry of Defence: The United Kingdom’s Future Nuclear Deterrent Capability’. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Recommendation f, page 7. http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

and the public disclosure of forecast acquisition costs gives the Ministry little room for manoeuvre in contractual negotiations with its suppliers.⁴⁷

Cost escalation, programme delays, and poor value for money therefore remain key areas of risk in the programme to replace Trident, as recognised by submarine industry insiders and the National Audit Office. If these risks cannot be managed adequately, the costs of the programme will increase, possibly to the point at which, like the Chevaline programme, it ceases to become an affordable and politically acceptable item of expenditure.

1.5 Risks to the replacement programme

The National Audit Office identified five principal areas of risk to the programme to replace Trident in its November 2008 report on the programme. These risks, discussed in detail in the Audit Office report, are as follows⁴⁸:

- Meeting a challenging timetable.
- Making decisions about the design on time.
- Ensuring effective governance arrangements.
- Developing a robust budget and exerting financial control.
- Applying effective procurement practices.

Although these risks are interdependent, issues relating to a robust budget and financial controls are particularly relevant to the programme's affordability. The National Audit Office concluded that current cost estimates "are not yet robust enough to support the future deterrent programme throughout its planned life"⁴⁹, and a number of areas of uncertainty are identified. These are as follows⁵⁰:

Inflation: Cost estimates for the programme to replace Trident are based on 2006-7 prices, but these prices will increase over the life of the programme. The rate of increase will affect costs, and inevitably, it is difficult to estimate long-term inflation rates with certainty. In some areas, costs may be lower than initially anticipated because of depressed commodity and labour prices resulting from the recession.

Value Added Tax: Cost estimates are based on the assumption that Value Added Tax relating to submarine construction costs will be recoverable, but as yet the tax treatment of the programme has yet to be determined.

⁴⁷ 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Paragraph 5.6 page 28.
http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁴⁸ 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Box 1, page 6.
http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁴⁹ 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Paragraph 9, page 5.
http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁵⁰ 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Box 8, page 26.
http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

Comparability of Vanguard costs: Current cost estimates are based on the cost of the existing Trident system and Vanguard class submarines, but the new system will be different and some costs will have changed since the Vanguard class submarines were built.

Design specification and assumptions: The current cost estimates are based on a design specification and assumptions which may change as the project develops.

Exchange rates: The price of components purchased from the USA will depend on the exchange rate between the dollar and the pound, and a weak pound over the medium term will increase the costs of the programme. The original Trident programme is heralded by the Ministry of Defence as having been completed at lower than estimated costs, but interestingly one of the main reasons for this was a favourable change in exchange rates over the course of the programme.

Contingency: There is a risk that existing cost estimates do not allow sufficient contingency to account for underestimates and uncertainties.

Several of these factors are linked to the general health of the economy, and so the predicted downturn can be expected to have direct impacts on the costs of the UK's future nuclear weapons programme (see Chapter 2 below).

A further risk to the programme highlighted by the National Audit Office is a shortage of nuclear-related skills in industry and within the Ministry of Defence, which will potentially be aggravated by competition from civil nuclear projects⁵¹. Other areas of skills shortage are submarine building expertise within the industrial supply chain, and financial, commercial, and programme management experience within the Ministry of Defence. As well as skills shortages, potential component bottle necks also pose risks to the programme.

In conclusion, the National Audit Office warns that: "The risks identified in this report will need to be managed carefully if value for money is to be achieved over the life of this programme"⁵². Managing these risks is likely to be a harder challenge than either the Audit Office or Ministry of Defence originally anticipated as a result of the rocky economic climate within which the programme will be implemented.

1.6 What else could we do with the money?

With an annual military expenditure totalling \$59.7 billion (£35.2 billion - 2007 figures), the United Kingdom ranks second only to the USA in global spending on defence⁵³. Among European nations we

⁵¹ 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Paragraph 5.15, page 30.
http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁵² 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Paragraph 12, page 6.
http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁵³ 'SIPRI Yearbook 2008. Armaments, Disarmament, and National Security. Summary.' Stockholm International Peace Research Institute. November 2008. Page 11. <http://yearbook2008.sipri.org/files/SIPRIYB08summary.pdf> Accessed 4th January 2009.

spend the highest proportion of our GDP on defence (2.51% in 2006)⁵⁴. However, the rapidly rising costs of military technology place a substantial burden on even the most generous defence budgets. There must always be a limit to the resources available, and as a result programmes within the defence budget will be in competition with each other. A decision to give the go-ahead to one programme means that the opportunity to proceed with a different programme must be delayed or lost.

The United Kingdom's nuclear deterrent programme therefore has opportunity costs. The considerable sums of money required to replace and operate nuclear weapons could be spent in other ways to address security concerns, or even outside the defence budget to support social or environmental programmes.

The United Kingdom's National Security Strategy identifies a number of potential threats to the nation, including terrorism, weapons of mass destruction, civil emergencies, climate change, and energy competition.⁵⁵ The strategy also states the government's view that, "for the foreseeable future, no state or alliance will have both the intent and the capability to threaten the United Kingdom militarily, either with nuclear weapons or other weapons of mass destruction, or with conventional forces." Nuclear weapons appear to have little, if any, role to play in addressing many of the threats identified in the National Security Strategy, so it is legitimate to consider whether the resources needed to maintain the nuclear deterrent could be used to greater effect elsewhere.

Some might prefer to use some of these resources on more troops with better pay, conditions, and personal equipment. Others might feel that the UK's role as the USA's principal ally in guaranteeing global security should be protected by purchasing the aircraft carriers and airlift capability necessary to maintain an expeditionary strike capacity. Looking away from direct military threats, resources allocated to global and regional conflict prevention initiatives, domestic counter-terrorism initiatives, or measures to mitigate the impacts of climate change such as improved flood defences might have a greater impact in addressing the broader security challenges faced by the nation. The decision on how to allocate resources between these conflicting priorities is, of course, a political decision, but as a measure of the impact which the resources needed to replace Trident could have if used elsewhere, we have prepared a comparison of some of the alternatives which could be funded instead (see Appendix).

Evidence from polling suggests that most Britons would reject replacing Trident if they knew the costs involved and had an understanding of what else might be purchased at the same cost⁵⁶. As a consequence of the credit crunch, public appreciation of value for money is likely to be sharpened. Given that replacing Trident is a potentially risky project with ambiguous benefits, the government can expect to have to work hard to persuade taxpayers that the scheme is more important than other pressing defence and social spending priorities.

⁵⁴ 'Trends in European Defense Spending, 2001–2006'. Wan-Jung Chao, Gregory Sanders, and Guy Ben-Ari. Center for Strategic and International Studies, April 2008. Table 5, page 10. <http://www.csis.org/media/csis/pubs/080424-chao-europeandefense.pdf> Accessed 4th January 2009.

⁵⁵ 'The National Security Strategy of the United Kingdom. Security in an interdependent world'. Cabinet Office, March 2008. Cm7291. http://interactive.cabinetoffice.gov.uk/documents/security/national_security_strategy.pdf Accessed 4th January 2009.

⁵⁶ 'Public would reject new Trident if they knew huge costs, poll shows'. Terry Kirby. The Independent, 25th October 2005. <http://www.independent.co.uk/news/uk/politics/public-would-reject-new-trident-if-they-knew-huge-costs-poll-shows-512440.html> Accessed 16th December 2008.

2. The credit crunch and economic downturn

2.1 Where will the money come from? The credit crunch and its implications

The banking crisis of October 2008 and the economic slow-down which is expected to follow the crisis will have a number of medium to long term consequences that will reshape patterns of public expenditure in the United Kingdom over the next decade, and will therefore influence the affordability of a new nuclear weapons system.

Sharp falls in the volume of housing transactions, the declining fortunes of many financial companies, and rises in unemployment resulting from the crisis have caused damage to the economy that will have a lasting impact. In addition, the medium term economic picture will also be influenced by the need to recover the costs of the short-term spending stimulus which the government is applying in the hope of limiting the force of the recession.

The Financial Times believes “a long period of pain – potentially including real cuts in public services – is in prospect: not today or tomorrow but in the medium term as the government moves to balance the books from 2011 onwards”.⁵⁷ “What has happened recently will leave a permanent scar on the economy, with the economy smaller than we thought it would be,” according to Ray Barrell, a senior research fellow at the National Institute of Social and Economic Research. “After the dust has settled, all governments, and not just in the UK, will have to give serious thought to the level of public services that they want. If GDP is going to be lower than they thought, they will have to spend less, even if public spending still takes 40 per cent of GDP.”⁵⁷

The recession which follows the banking crisis is expected to last at least two years, with several more years until a full recovery is seen⁵⁸. This recovery period will coincide with the period of expenditure on constructing the new submarines and warheads scheduled to replace Trident. Economic trends over this timeframe will influence our ability to pay for the new weapons system in a more pressing way than was the case when previous governments decided to purchase the Polaris, Chevaline, or Trident nuclear weapons systems.

“We are going to be poorer as a country than we thought, so it is reasonable to lower our aspirations for health and education,” according to Carl Emmerson, deputy director of the Institute of Fiscal Studies⁵⁹. Over the medium term period when spending on new nuclear weapons will be required, a combination of the fallout from the banking crisis and longer term economic pressures look set to lead to a “continuing crunch” which will severely constrain government spending. The need to limit spending on economic regeneration and social welfare but at the same time continue with an expensive nuclear weapons programme is unlikely to be easy to justify to the public.

⁵⁷ ‘Pain of cuts to be felt after election’. Nicholas Timmins. Financial Times, October 20th 2008.

<http://www.ft.com/cms/s/0/df72f5c4-9ecf-11dd-98bd-000077b07658.html> Accessed 9th November 2008.

⁵⁸ ‘The Financial Crisis and Sustainable Security’. Paul Rogers. International Security Monthly Briefing, September 2008. Oxford Research Group. http://www.oxfordresearchgroup.org.uk/publications/monthly_briefings/pdf/Sept08En.pdf Accessed 9th November 2008.

⁵⁹ ‘Pain of cuts to be felt after election’. Nicholas Timmins. Financial Times, October 20th 2008.

<http://www.ft.com/cms/s/0/df72f5c4-9ecf-11dd-98bd-000077b07658.html> Accessed 9th November 2008.

2.2 The government's response to the credit crunch

The government's response to the credit crunch and the banking crisis was presented by the Chancellor of the Exchequer in his November 2008 Pre-Budget Report⁶⁰. The analysis which follows is based on the government's view of how the recession will play out, as presented in the Pre-Budget Report and interpreted by independent commentators such as the Institute of Fiscal Studies.

The Treasury believes that the credit crunch will punch a permanent £60 billion hole in the capacity of the economy, and this will cost the government about £40 billion in lost tax revenues and higher social security spending. The Chancellor announced a short-term fiscal stimulus designed to limit the depth and duration of the recession, followed by a long-term fiscal contraction from 2010-11 designed to recover the costs of the stimulus and repair the deterioration in the underlying health of public finances.

Most of the longer term squeeze will come in the form of spending cuts as a share of national income, rather than tax increases. The Treasury expects to see the tax burden increase by 1.4% of national income between 2010-11 and 2013-14, but to cut spending by 2.5% of national income. In 2012-13 the Government will raise around £4 billion net from tax increases compared to almost £19 billion from spending cuts. These cuts will fall principally on capital spending⁶¹.

The Institute of Fiscal Studies has calculated that the Chancellor's plans would represent a cut in government spending of £37 billion in today's terms. To put this into context, during the 2005 general election campaign Alistair Darling highlighted the impact of a slightly smaller (and more gradual) cut in public expenditure by warning that: "The Conservative Party is committed to making cash cuts of £35 billion from Labour's public spending plans – cuts so large they could only be found from cutting deep into front-line public services, including schools, hospitals and the police." (17th March 2005)⁶².

Where the spending axe will fall will be a decision for the government of the day. However, the Institute of Fiscal Studies points out that if we assume that all departments experience a conservative 1.5 per cent lower growth rate in spending over the next Comprehensive Spending Review period compared with the current one, then spending on defence, the Home Office and local government would all be cut in real terms. Health and education spending would fall as a share of national income, although budgets would still grow in real terms⁶³.

The Institute has investigated likely public spending scenarios in more details in its 2009 Green Budget, which predicts that the UK will need to raise taxes or introduce spending cuts worth an extra £20bn annually by the end of the next parliament if it is to repair public finances to the level forecast in the November 2008 Pre-Budget Report⁶⁴. This means that government spending will face real cuts in

⁶⁰ 'Pre-budget Report 2008'. HM Treasury, 24 November 2008. http://www.hm-treasury.gov.uk/prebud_pbr08_index.htm Accessed 16th December 2008.

⁶¹ 'Opening remarks for post PBR briefing'. Robert Chote. Presentation at the Institute for Fiscal Studies, 25th November 2008. <http://www.ifs.org.uk/budgets/pbr2008/chote.pdf> Accessed 15th December 2008.

⁶² 'PBR 2008 and the public finances' Carl Emmerson. Presentation at the Institute of Fiscal Studies, 25th November 2008. <http://www.ifs.org.uk/budgets/pbr2008/pubfin.ppt> Accessed 15 December 2008.

⁶³ 'The big squeeze'. Gemma Tetlow and Carl Emmerson. Public Finance, 9th December 2008.

http://www.publicfinance.co.uk/features_details.cfm?News_id=59363 Accessed 15th December 2008.

⁶⁴ 'The IFS Green Budget: January 2009.' Robert Chote, Carl Emmerson, David Miles, and Jonathan Shaw. Chapters 2 and 9. Institute of Fiscal Studies, January 2009. <http://www.ifs.org.uk/publications/4417> Accessed 8th February 2009.

the medium term, and if the methods used to apportion spending between departments in the previous spending round were repeated, defence spending would face a 4 per cent reduction over the period 2011-12 to 2013-14. Spending on replacing Trident would be competing with flagship government goals to halve child poverty, raise the state pension in line with earnings, and keep education spending growing as a share of national income, which now appear to be out of reach as a result of the credit crunch.

The UK's national debt is also increasing dramatically, partly as a result of government packages to shore up the capital of the banks and partly because of borrowing necessary to increase public spending over the short term. Net debt is predicted to head to well beyond £700 billion in the next few months, equivalent to around £14,000 per adult in Britain or around 50 per cent of national income, and it is likely to take around 20 years for pre-crisis levels to be restored. We have not seen a figure that big since the last Labour government was forced to borrow from the International Monetary Fund in the 1970s – the crisis point which caused the Cabinet to secretly consider whether to abandon Britain's nuclear weapons⁶⁵.

2.3 Can spending on Trident's replacement help insulate us from the crunch?

The government has expressed a wish to bring forward or increase capital expenditure to re-inflate the economy. The Chancellor of the Exchequer has argued that continuing to fund major projects is an effective way of keeping the economy afloat, and has called on government departments to bring forward billions of pounds of capital expenditure to invigorate the economy ahead of the expected recession⁶⁶. A comment by Mr Darling that "defence spending is also a big employer" has been interpreted by some commentators as an indication that spending on the replacement of Trident will be accelerated⁶⁷.

This is highly unlikely to be the case, as work on replacing Trident is still at the feasibility stage. Contracts to build new submarines will not be placed until after Parliament has voted to proceed with a replacement programme, expected sometime around 2012-2014⁶⁸. Other Cabinet Ministers have acknowledged that the extensive planning and consultation required for major capital projects means that the vast majority of them are locked into rigid timetables⁶⁹, and the programme to replace Trident is no exception to this.

⁶⁵ 'Financial Crisis: Someone will have to dig us out of all this debt'. Robert Chote, Daily Telegraph, 8th October 2008. <http://www.telegraph.co.uk/finance/comment/3161595/Financial-Crisis-Someone-will-have-to-dig-us-out-of-all-this-debt.html> Accessed 20th January 2009.

⁶⁶ 'Alistair Darling turns to Keynes as he looks to spend his way out of recession'. Patrick Hennessey. Sunday Telegraph, 20th October 2008. <http://www.telegraph.co.uk/finance/economics/article3223224.ece> Accessed 2nd November 2008.

⁶⁷ 'Financial crisis: Alistair Darling will spend his way out of recession'. Patrick Hennessey and Mark Kleinman. Sunday Telegraph, 19 October 2008. <http://www.telegraph.co.uk/finance/financetopics/financialcrisis/3224890/Financial-crisis-Alistair-Darling-will-spend-his-way-out-of-recession.html> Accessed 23rd December 2008.

⁶⁸ 'Trident: The deal isn't done. Serious questions remain unanswered'. Nick Ritchie. Bradford Disarmament Research Centre, University of Bradford. December 2007. http://www.brad.ac.uk/acad/bdrc/nuclear/trident/trident_deal_isnt_done.pdf Accessed 2nd November 2008.

⁶⁹ 'Transport offers little to help stimulate economy'. Jean Eaglesham and Robert Wright. Financial Times, 30 October 2008. http://www.ft.com/cms/s/0/b826a28c-a621-11dd-9d26-000077b07658.html?nclink_check=1 Accessed 2nd November 2008.

On a more general note, the United Kingdom has seen a steady downward trend in the number of arms-related jobs since the early 1980s, and the number of jobs created through military spending is far fewer than popularly supposed. Although military industry is often said to represent a major part of the UK manufacturing base, it actually accounts for a small proportion of national employment, and most jobs in the manufacture of arms are located in areas with relatively low unemployment⁷⁰. There is also convincing evidence to demonstrate that spending on personal consumption, health care, education, mass transit, and construction for home weather-proofing and infrastructure repair all create more jobs relative to the same expenditure on defence⁷¹. Bringing forward spending on defence projects is unlikely, therefore, to provide much effective protection against the credit crunch.

2.4 Project finance issues

The capital costs of replacing Trident will require up-front investment in constructing new submarines and rebuilding onshore infrastructure. These costs can be paid in one of three ways: the contractor undertaking the work pays the costs from its own reserves; the contractor borrows from a bank to pay the investment costs; or, less likely, the Ministry of Defence pays the investment costs up front before the project is delivered.

The main contractors who will be involved in the procurement and construction work to replace Trident (BAE Systems, who will build the submarines; Rolls Royce Marine Power Operations Ltd, who will build the nuclear reactors to power the submarines; and the AWE consortium of Lockheed Martin, Jacobs, and Serco, who run the Atomic Weapons Establishment) are well established international companies. Before the credit crunch such companies could be expected to find the cash needed to finance most projects with little difficulty from their own reserves. However, as a result of the crunch even the largest companies are now facing financial headaches. In October 2008 the multinational General Electric was forced to raise \$15bn in capital to stabilise its financial position, despite its triple A credit rating⁷².

If the principal contractors are not sufficiently solvent to absorb the costs and economic risks of projects of this scale they can borrow on the financial markets to raise the necessary funding. However, one of the consequences of the credit crunch is that banks can be expected to scrutinise projects they lend money to far more rigorously than in the recent past. This means they will be reluctant to fund projects that they see as risky. As we have seen, submarine construction has proved to be a high risk business area in recent years, and BAE Systems has not been immune to these risks, having to pay an increased contribution of £250 million and agree revised payment arrangements to bail out the Astute programme⁷³. Construction of facilities for handling nuclear materials, such as new manufacturing plants at the Atomic Weapons Establishment and Rolls Royce's Derby factory, is also

⁷⁰ 'Making Arms, Wasting Skills: Alternatives to Militarism and Arms Production'. Steven Schofield. Campaign Against The Arms Trade, April 2008.

<http://www.caat.org.uk/publications/economics/MakingArms2008.pdf> Accessed 10th February 2009.

⁷¹ 'The US Employment Effects of Military and Domestic Spending Priorities'. Robert Pollin and Heidi Garrett-Peltier. Department of Economics and Political Economy Research Institute, University of Massachusetts, Amherst. October 2007. <http://www.ips-dc.org/reports/071001-jobcreation.pdf> Accessed 10th February 2009.

⁷² 'Credit crunch's reach grows even wider.' Nicole Bullock and Michael Mackenzie. Financial Times, 2nd October 2008. http://www.ft.com/cms/s/0/c0148242-90ab-11dd-8abb-0000779fd18c.html?nclink_check=1 Accessed 2nd January 2009.

⁷³ 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Box 3, page 11.

http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

demanding because of difficulties in delivering technically challenging components whilst meeting exacting nuclear safety standards. The National Audit Office has highlighted such concerns in its report on cost overruns in the D154 project to upgrade nuclear facilities at Devonport dockyard⁷⁴.

At the current time even companies with strong balance sheets are finding difficulties in securing finance for mainstream projects with sound business cases^{75,76}. This may well be a short term impact of the credit crunch which will have little impact upon the submarine construction programme, due to commence in the middle of the next decade. However, major construction projects are scheduled to commence well before this at the Atomic Weapons Establishment, including work on a new warhead assembly / disassembly facility and an enriched uranium facility⁷⁷. If project finance remains tight over the medium term, complex, risky and highly technical projects such as these are unlikely to be particularly attractive to banks.

As well as having the money to invest in a project, contractors and financiers must also have the will to invest in the project. The Ministry of Defence accepts that its current cost estimates for the programme to replace Trident are not sufficiently robust to provide confidence among suppliers that sufficient funding will be available to support their investment in the programme⁷⁸. This is not an idle concern: Rolls Royce derives only £250 million of its £7.3 billion turnover from its submarine operations, while as recently as 2004 BAE Systems was considering the sale of its submarine business as a non-core activity⁷⁹. Alstom Power Steam Turbine Retrofits UK, which designs, manufactures and supplies steam turbines for the nuclear submarine programme has not hesitated to state that submarine steam turbines do not form part of its core business, with naval business representing merely 3% of company sales. The company retains its commitment to naval work as a “public duty rather than in order to make money”⁸⁰. The cost estimates for Trident’s successor due to be prepared by the end of the concept phase in autumn 2009 must therefore be sufficiently credible to guarantee industry confidence in the project.

As a very last resort, the government could ensure that up-front investment funding for the Trident replacement programme is available by providing finance from its own reserves. This is highly

⁷⁴ ‘The Construction of Nuclear Submarine Facilities at Devonport.’ Report by the Comptroller and Auditor General. HC90 Session 2002-3, 6th December 2002. http://nao.gov.uk/publications/nao_reports/02-03/020390.pdf Accessed 2nd January 2009.

⁷⁵ Comments by Paul Walsh, Chief Executive of Diageo. ‘Stories from the crunch frontline.’ The Observer, 5th October 2008. <http://www.guardian.co.uk/business/2008/oct/05/creditchunch.consumeraffairs> Accessed 2nd January 2009.

⁷⁶ ‘Slowdown hits energy investment’. Ed Crooks. Financial Times, 15th December 2008. http://www.ft.com/cms/s/0/5799eb44-cae4-11dd-87d7-000077b07658.html?nclick_check=1 Accessed 27th December 2008.

⁷⁷ Written Answer, Official Report (Hansard). 26th June 2008, Column 447W. <http://www.publications.parliament.uk/pa/cm200708/cmhansrd/cm080626/text/80626w0005.htm#08062693001389> Accessed 15th December 2008.

⁷⁸ ‘Ministry of Defence: The United Kingdom’s Future Nuclear Deterrent Capability’. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Para 4.5, page 26. http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

⁷⁹ ‘Beyond Artful: Government and Industry Roles in Britain’s Future Submarine Design, Build, and Support’, page 14. Gavin Ireland. Royal United Services Institute Whitehall Report 3-07, 2007. http://www.rusi.org/downloads/assets/WHR3_Final_Report.pdf Accessed 6th November 2008.

⁸⁰ House of Commons Defence Committee. Minutes of Evidence. Tuesday 7th November 2006. Evidence from Mr Jim Morrison, Alstom Power Steam Turbine Retrofits UK. Question 60 and Questions 68 – 72. <http://www.parliament.the-stationery-office.com/pa/cm200607/cmselect/cmdfence/59/6110706.htm> Accessed 27th February 2009.

unlikely to be in the form of a pre-delivery payment to a contractor, given that such a step would represent a radical departure from normal financial procedures and would undermine payment schemes aimed at guaranteeing affordability. A more likely scenario is a government decision to inject funds to a major contractor in return for share capital, as was the case in 2002 when the government rescued British Energy from financial collapse, and indeed in the autumn of 2009 when billions of pounds were provided to bail out the banks. Such a decision would have a political price, and the government could expect close scrutiny of the reasons for such a decision should it ever be forced into making one.

At this stage the options which the government is considering for financing the replacement of Trident remain far from clear, and this is an area where further clarification will be needed before the government makes its Initial Gate investment decision on the project in September 2009.

3. Long term trends

If the programme to replace the Trident nuclear weapons system proceeds according to schedule, the first of the planned new submarines would enter into service in 2024 and the system would remain in service until the 2050s⁸¹. Long term economic trends will therefore have an impact upon the viability of the programme, especially during the operating and decommissioning phases.

3.1 Looking to the longer term: reduced tax income

Lower tax revenues may increase the Government's difficulties in financing a successor to Trident. Pressure on tax revenues will add to pressure on government spending, in turn increasing the financial and political risks of replacing Trident.

The budget is suffering from an acute shortfall in revenues even before the predicted recession kicks in. Treasury estimates of growth in tax receipts are far short of those forecast at the start of the 2008/9 fiscal year, rising at only 1.9 per cent year-on-year instead of the 5 per cent rate that had been expected⁸².

The Chancellor of the Exchequer has pointed to a number of trends which are likely to reduce tax income over the months ahead⁸³. Tax receipts are expected to drop significantly as a result of reduced company profits and the turmoil in the financial markets, the slump in housing sales following the credit crunch, and the impact of rising unemployment on income tax revenues. Tax cuts aimed at stimulating the flagging economy and increased demand for unemployment benefits will also take their toll on government income⁸⁴. Taking a longer view, globalisation is also presenting challenges to the tax base in most advanced economies as individuals become increasingly mobile and their financial arrangements become more diffuse and complicated. Intangibles, which are hard to tax, are occupying an increasing role in the economies of developed countries.

As the Chancellor has observed: "It is clear we are facing a constellation of short and long-term challenges, placing extraordinary pressure on the tax revenues."⁸⁵ Tax income looks almost certain to decrease over the years ahead. Simon Kirby, research fellow at the National Institute for Economic and Social Research has said he expects the Treasury to revise their expectations for tax receipts downwards over the coming years, but "the question is how far down – they are going to have to be reasonably dramatic."⁸⁶

⁸¹ 'The Future of the UK's Strategic Nuclear Deterrent: The White Paper'. House of Commons Defence Committee. Ninth Report of Session 2006-7. March 2007. Table 9, Page 60.

<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/225/225i.pdf> Accessed 3rd November 2008.

⁸² 'Brown set to borrow more'. George Parker and Norma Cohen. Financial Times, 20th October 2008.

http://www.ft.com/cms/s/0/7efc3d6a-9ee6-11dd-98bd-000077b07658.html?nclick_check=1 Accessed 9th November 2008.

⁸³ 'Maintaining stability in a global economy'. Mais Lecture given by The Chancellor of the Exchequer at the Cass Business School, London. 29th October 2008. http://www.hm-treasury.gov.uk/press_110_08.htm Accessed 6th November 2008.

⁸⁴ 'UK ministers consider emergency tax cuts'. Chris Giles and George Parker. Financial Times, 7th November 2008.

http://www.ft.com/cms/s/0/f100b18a-ad18-11dd-971e-000077b07658.html?nclick_check=1 Accessed 8th November 2008.

⁸⁵ 'Maintaining stability in a global economy'. Mais Lecture given by The Chancellor of the Exchequer at the Cass Business School, London. 29th October 2008. http://www.hm-treasury.gov.uk/press_110_08.htm Accessed 6th November 2008.

⁸⁶ 'Darling banks on borrowing to rescue the economy'. Public Finance. 26th September 2008.

http://www.publicfinance.co.uk/news_details.cfm?News_id=58896 Accessed 3rd November 2008.

3.2 Looking to the longer term: the impact of oil prices

Manufacturing, transport, and the extraction and processing of natural resources are all dependent on oil in the modern global economy. Oil prices have been volatile over recent months and, looking to the longer term, are expected to rise over the next decade. This will push up the costs of building a replacement nuclear weapons system for the United Kingdom, and would also add to the costs of operating it.

Conventional wisdom states that during a recession demand for oil decreases, pushing prices down. However, the longer term picture is more complex. Investment in oil industry infrastructure and exploration also falls during a recession, and in the longer term this can drive prices up. Although oil prices tumbled during the summer of 2008, the Organisation of the Petroleum Exporting Countries (OPEC) has warned that many existing oil projects may be at risk of cancellation or delay, possibly resulting in a medium-term supply shortage⁸⁷.

The view that oil prices will remain under pressure in the medium term is supported by the US Energy Information Administration (EIA). The EIA's International Energy Outlook 2008⁸⁸ presents an assessment of the outlook for international energy markets until 2030. The Outlook points out that average world oil prices in every year since 2003 have been higher than the average for the previous year. A variety of factors have caused oil prices to increase rapidly since 2003, including strong demand growth in Asia and the Middle East; no growth in production between 2005 and 2007 from the members of OPEC; rising costs for oil exploration and development; across-the-board increases in commodity prices; and a weaker US dollar. The International Energy Outlook forecasts that oil prices will ease somewhat in the medium term as anticipated new production reaches the marketplace. Ultimately, however, markets are expected to remain relatively tight. World oil prices are predicted to be around \$70 per barrel in 2015, rising steadily to \$113 per barrel in 2030.

A more pessimistic outlook is given by the International Energy Agency, which forecasts an oil supply crunch in the middle of the next decade as spare capacity narrows to minimal levels. Oil prices are predicted to rebound from today's \$60-\$70 a barrel to trade, in real terms adjusted by inflation, at an average of more than \$100 a barrel from 2008 to 2015, according to the Agency's World Energy Outlook^{89,90}. This represents a major upward adjustment from the Agency's previous projections, reflecting higher prices for near-term physical delivery and for futures contracts, as well as a reassessment of the prospects for the cost of oil supply and the outlook for demand. "The era of cheap oil is over, although price volatility will remain", concludes the Agency⁹¹.

⁸⁷ 'The dawn of a disturbing new reality'. Carola Hoyos. Financial Times. October 31 2008. <http://www.ft.com/cms/s/0/f2abe1be-a6e0-11dd-95be-000077b07658.html> Accessed 2nd November 2008.

⁸⁸ 'International Energy Outlook 2008'. US Government Energy Information Administration. June 2008. <http://www.eia.doe.gov/oiaf/ieo/index.html> Accessed 2nd November 2008.

⁸⁹ 'Oil to bounce back with recovery, IEA warns'. Javier Blas and Carola Hoyos. Financial Times, 6th November 2008. http://www.ft.com/cms/s/0/9036348a-aba4-11dd-b9e1-000077b07658.html?nclick_check=1 Accessed 6th November 2008.

⁹⁰ 'World Energy Outlook 2008'. International Energy Agency. 12 November 2008. Executive summary. <http://www.iea.org/Textbase/npsum/WEO2008SUM.pdf> Accessed 15th December 2008.

⁹¹ 'World Energy Outlook 2008: Presentation to the Press'. London, 12th November 2008. International Energy Agency. http://www.iea.org/Textbase/speech/2008/Birol_WEO2008_PressConf.pdf Accessed 15th December 2008.

A similarly gloomy view is taken by the Industry Taskforce on Peak Oil and Energy Security⁹². The Taskforce – comprised of eight British companies representing a broad cross-industry spectrum – predicts that oil prices will rise much higher than the existing record in the near future. By 2013 it is anticipated that oil prices will be escalating rapidly, as they did in the first half of 2008, and beyond this period prices will continue to rise should the gap between demand and supply continue to widen.

High oil prices would have a number of impacts on the economy:

- Increased costs of oil-based inputs and increased production costs for raw materials and components will lead to an increase in manufacturing costs.
- Transport costs and costs throughout the supply chain will rise.
- Infrastructure operating costs will also increase.
- High oil prices will cause wider macro-economic impacts such as higher inflation, an increased balance of payments deficit, and a reduction of consumer demand.

All these factors will influence the affordability of the programme to replace Trident by adding further pressure to costs.

3.3 Looking to the longer term: climate change

In the longer term the costs of operating the UK's nuclear weapons infrastructure – and indeed all other elements of the economic infrastructure – is likely to be influenced by the increasing impacts of global climate change. The Stern Review – the most comprehensive review ever carried out on the economics of climate change – estimated that the costs of climate change would represent between 5 and 20 per cent of global gross domestic product, and concluded that costs would rise if action to tackle climate change was delayed⁹³. Lord Stern has since stated that his 2006 report underestimated the risks of climate change and should have presented an even bleaker forecast of its future impacts⁹⁴.

The government has acknowledged that climate change will affect all aspects of the economy, including defence. The former Foreign Secretary, Margaret Beckett, pointed out that: "This is not just an environmental problem. It is a defence problem. It is a problem for those who deal with economics and development, conflict prevention, agriculture, finance, housing, transport, innovation, trade and health."⁹⁵

Elements of the UK's nuclear weapons infrastructure appear to be particularly vulnerable to the impacts of climate change. AWE has identified a wide range of climate change impacts which may force changes in design work and operational practices at the AWE Aldermaston site⁹⁶. The costs of decommissioning work are likely to be particularly heavily influenced. "Potentially severe effects on

⁹² 'The Oil Crunch: Securing the UK's energy future'. First report of the UK Industry Taskforce on Peak Oil and Energy Security. October 2008. <http://www.peakoiltaskforce.net> Accessed 2nd November 2008.

⁹³ 'Stern takes bleaker view on warming'. Fiona Harvey and Jim Pickard. Financial Times, 17th April 2008. <http://www.ft.com/cms/s/0/f8e1377a-0c15-11dd-9840-0000779fd2ac.html> Accessed 3rd February 2009.

⁹⁴ 'The Economics of Climate Change: The Stern Review'. Nicholas Stern. Cabinet Office and HM Treasury. October 2006. http://www.hm-treasury.gov.uk/stern_review_report.htm Accessed 3rd February 2009.

⁹⁵ 'Tackle climate change or face deep recession, world's leaders warned'. James Randerson, The Guardian, 26th October 2006. <http://www.guardian.co.uk/uk/2006/oct/26/topstories3.politics> Accessed 3rd February 2009.

⁹⁶ 'Summary of Climate Change Effects for AWE Environment, Safety and Health.' AWE Internal Memorandum. 12th January 1999.

building integrity” will influence decommissioning strategies and working practices during the dismantling of contaminated buildings. AWE believes that wetter winters and increased temperatures will increase the costs for Care and Surveillance options in delayed dismantling strategies, and the potential for flooding could seriously increase, enhancing the spread of contamination from old buildings. Demolition work may be less safe in winter, yet heat stress caused by wearing protective ‘frog suits’ may be more extreme in summer.

In addition, soil erosion, subsidence, and corrosion are predicted to lead to an increase in maintenance costs, and the potential for more frequent weather induced insurance claims could increase insurance premiums. Climate change would also cause “potentially severe impacts” on environmental monitoring programmes, thus calling into question the effectiveness of measures to protect the environment from operations at Aldermaston.

Flood risks look likely to cause particular headaches for those running the UK’s nuclear weapons programme. Severe flooding at the Atomic Weapons Establishment in Burghfield in July 2007 is believed to have cost AWE plc and the Ministry of Defence millions of pounds⁹⁷, and another key facility in the UK’s nuclear weapons infrastructure, the Rolls Royce site in Derby where nuclear submarine reactors will be built, is also located in a flood risk area. The predicted increase in the frequency of severe weather events will generate a need for mitigation arrangements, such as flood defences, and can be expected to increase the demand for contingency measures to deal with emergencies. Of necessity, many parts of the Trident support infrastructure, including the Trident submarine jetties at HM Naval Base Clyde and BAE Systems’ Devonshire Dock Hall at Barrow-in-Furness, where new submarines would be constructed, are located on the coastline. They are therefore vulnerable to severe weather events and flooding which may take place between now and the end of the programmed life for Trident’s replacement in the 2050s.

Climate change can also be expected to reduce the availability of suitable windows for certain crucial operations, such as the road transport of nuclear warheads from production sites to the Clyde submarine base for deployment on board submarines. Although it is at this stage impossible to predict precisely how addressing these vulnerabilities will affect the costs of the programme to replace Trident, there can be no doubt that it will lead to an increase in costs.

Ironically, resources and skills which will be used to replace Trident could play a vital role in the war against climate change. Economic studies have shown how marine technology and engineering skills at the BAE Systems shipyard in Barrow⁹⁸ and the Clyde Submarine Base⁹⁹ could be used to develop and exploit renewable energy sources, and the massively powerful supercomputers used in the modelling of nuclear explosions at AWE Aldermaston could instead be employed to model global weather and environmental systems in order to help predict the impacts of climate change.

⁹⁷ ‘Flood threat to nuclear arms site’. Julian Rush. Channel 4 News, 13th October 2008.

<http://www.channel4.com/news/articles/society/environment/flood+threat+to+nuclear+arms+site/2513357> Accessed 20th January 2009.

⁹⁸ ‘Oceans of Work: Arms Conversion Revisited’. Steven Schofield. British American Security Information Council, January 2007. <http://www.basicint.org/nuclear/beyondtrident/oceans.pdf> Accessed 27th February 2009.

⁹⁹ ‘Cancelling Trident: The Economic and Employment Consequences for Scotland,’ Scottish Campaign for Nuclear Disarmament and Scottish Trades Union Congress. March 2007.

<http://www.stuc.org.uk/files/STUC%20-%20CND%20Trident%20Report%202007/STUC-CND%20Trident%20Report.pdf> Accessed 27th February 2009

4. Conclusions and recommendations

Even under the best of circumstances the programme to replace Trident nuclear weapons will be a risky project, given that it is highly expensive and must be delivered to a tight timescale, yet has a long lead-in time. If things go badly wrong, there is a danger not just of wasting large sums of public money, but of forcing defence and foreign policies in directions that may prove to be dead ends in years to come. This creates the risk that the UK will be less able to focus on the diverse and changing security challenges that it faces over the next half century.

The economic outlook has changed drastically since Parliament voted to replace Trident in March 2007. The way in which the credit crunch and the ensuing economic downturn develop will determine whether the UK's nuclear deterrent remains affordable or whether the balance of costs and benefits has shifted far enough to force a rethink of its worth to the nation. When the future security needs of the UK and the kinds of threats that we are likely to face (as identified in the National Security Strategy), the projected roles and missions for our armed forces, and the procurement timelines involved are considered alongside the economic issues, it becomes hard to justify investment in an expensive nuclear weapons system that will tie up resources for the next forty or more years but will not meet the nation's defence requirements in a clear and obvious way.

The credit crunch will force the government to make a number of tough decisions on defence procurement policy and public spending, but these decisions will become easier if the government chooses not to replace Trident. Given the status which the UK government attaches to being a nuclear weapons state¹⁰⁰, a critical failure which led to the project being dramatically delayed, scaled down, or even cancelled would represent a serious loss of face for the UK's political establishment and would have implications for national self esteem and our sense of importance as an international player. On the other hand, as well as freeing up resources, a decision not to replace Trident would support other government initiatives to tackle the proliferation of nuclear weapons¹⁰¹ and could be presented as a positive step by a responsible government in recognition of the changing international climate, rather than a humiliating climbdown for a cash-strapped nation.

Recommendations:

6. Taxpayers have a right to know how their money is being used, and it is important that the public are aware of the full costs of retaining and renewing the UK's nuclear weapons before a final decision is made to replace them. A detailed budget showing a breakdown of project costs should be published, covering all aspects of the programme including infrastructure replacement as well as the obvious costs of building new submarines and warheads. In order to aid the public in understanding the consequences of the decision to replace Trident, the government should also give some indication of how it might otherwise use the same sums of money by means of comparison.

¹⁰⁰ 'Trident and British Identity: Letting go of Nuclear Weapons'. Nick Ritchie, September 2008. Bradford Disarmament Research Centre, University of Bradford. http://www.brad.ac.uk/acad/bdrc/nuclear/trident/Trident_and_British_Identity.pdf Accessed 19th January 2009.

¹⁰¹ See, for example, Margaret Beckett's speech on 'A World Free of Nuclear Weapons' at the Carnegie Institute, 25th June 2007. <http://www.carnegieendowment.org/events/index.cfm?fa=eventDetail&id=1004> Accessed 19th January 2009.

The National Audit Office has stated that by September 2009 the Ministry of Defence should have developed more robust estimates for the project to replace Trident¹⁰². These costs should be reported to Parliament and the estimates and assumptions behind them should be examined by the House of Commons Public Accounts Committee. As Parliament will be in recess in September, measures should be taken to ensure that MPs are informed of the cost estimates and have the opportunity to debate them should they wish to.

7. As well as publishing a detailed budget for replacing Trident, the government should also report regularly on expenditure on the project. This will ensure that spending can be monitored and cost over-runs scrutinised. The National Audit Office should report annually to Parliament on the programme's progress, as it did on the original Trident nuclear weapons programme, and its reports should include a detailed breakdown of spending across all elements of the programme.
8. In more general terms, there is considerable opacity in how the Ministry of Defence uses its finances. Clear accounting is required not just for the nuclear weapons programme, but for defence expenditure across the board. Clarity and detail on defence costs are needed, and in a modern democracy the Ministry of Defence should not be exempt from meeting transparent and universally adopted accounting requirements.
9. The 'Initial Gate' milestone in Autumn 2009, when a choice will be made on which concept to pursue to the design stage, should be used as an opportunity for a detailed review of the whole Trident replacement programme. Affordability should be a key criterion for considering whether the UK should renew its nuclear weapons when Parliament debates the issue at the Initial Gate stage. The government should ensure that, before the debate takes place, a national 'conversation' takes place on the costs, benefits, and justification for replacing the nuclear deterrent. The conversation should begin from an open-minded perspective, and should allow rational examination of the cost and benefits of nuclear weapons rather than just the technical specification of the weapons system and how it would fit in with the nation's current defence doctrine.
10. The 1998 Strategic Defence Review looked at the nation's defence needs up to the year 2015, and it is now time to conduct another defence review. A strategic defence review with a broad remit should take place at the beginning of the next Parliament. This review should look in depth at the country's security needs and the means of addressing them, and should be conducted independently of industry in order to avoid becoming compromised by vested interests. One of the specific objectives of the review should be to consider whether the UK is still justified in retaining its nuclear weapons, and if so, for what precise reasons.

¹⁰² 'Ministry of Defence: The United Kingdom's Future Nuclear Deterrent Capability'. Report by the Comptroller and Auditor General. HC 1115 Session 2007-8, 5th November 2005. Recommendation c, page 6.
http://www.nao.org.uk/publications/0708/nuclear_deterrent_capability.aspx Accessed 2nd January 2009.

Appendix: Or we could spend the money on ...

Capital costs

The government states that the cost of procuring a replacement for the current Trident nuclear weapons system will total £15 billion. Assuming that this corresponds to capital expenditure, NIS has calculated that £15 billion could be used to fund the following projects if it were to be spent elsewhere. In reality the government would not shift expenditure entirely to a single one of the projects shown on this list: the money would be distributed between a selection of projects. However, the list gives an indication of the scale of the other opportunities that are forgone by spending money to replace the Trident system.

Within the defence combat equipment budget, £15 billion could purchase:

- Seven Queen Elizabeth class aircraft carriers.¹⁰³
- 620 Future Lynx helicopters.¹⁰⁴
- 13 Type 45 destroyers¹⁰⁵.
- 30,000 Panther 4x4 armoured vehicles.¹⁰⁶

Elsewhere in public sector, the capital costs of replacing the current Trident system could fund the following schemes:

- Construction of 600 city academy schools.¹⁰⁷
- Construction of 70 hospitals.¹⁰⁸

¹⁰³ Manufacturing phase costs for two new Future Aircraft Carrier vessels quoted as £3.9 billion. 'Ministry of Defence Major Projects Report. Report by the Comptroller and Auditor General.' HC64-1 Session 2008-9. National Audit Office, 18th December 2008.

http://www.nao.org.uk/publications/0809/mod_major_projects_report_2008.aspx Accessed 23rd December 2008.

¹⁰⁴ Current forecast cost of providing 80 aircraft quoted as £1,911 million. 'Ministry of Defence Major Projects Report. Report by the Comptroller and Auditor General.' HC64-1 Session 2008-9. National Audit Office, 18th December 2008.

http://www.nao.org.uk/publications/0809/mod_major_projects_report_2008.aspx Accessed 23rd December 2008.

¹⁰⁵ Current forecast cost of providing six ships quoted as £6,464 million. 'Ministry of Defence Major Projects Report. Report by the Comptroller and Auditor General.' HC64-1 Session 2008-9. National Audit Office, 18th December 2008.

http://www.nao.org.uk/publications/0809/mod_major_projects_report_2008.aspx Accessed 23rd December 2008.

¹⁰⁶ Procurement cost of Panther Armoured Vehicle programme quoted as 'just over £200 million'.

Written answer, Official Report (Hansard), 4th December 2006 : Column 86W.

<http://www.publications.parliament.uk/pa/cm200607/cmhansrd/cm061204/text/61204w0018.htm>

The contract is for delivery of 401 vehicles. 'Panther Command and Liaison Vehicle (CLV) Light Armoured 4x4, United Kingdom.' <http://www.army-technology.com/projects/future/>. Websites accessed 23rd December 2008.

¹⁰⁷ Estimated costs of constructing the first 27 city academy schools quoted as £657.2 million.

'Academy cost overruns hit £48.5m'. BBC News, 9th June 2006. <http://news.bbc.co.uk/1/hi/education/5064438.stm> Accessed 23rd December 2008.

¹⁰⁸ Total expenditure for 86 new health service capital schemes quoted as £17,896 million.

'Prioritised Capital Schemes approved to go ahead since May 1997 (England)' Department of Health.

http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4123573.pdf

Accessed 23rd December 2008.

- Rebuild the Channel Tunnel one and a half times over.¹⁰⁹
- Pay the costs of construction of the high speed Channel Tunnel Rail Link two and a half times over.¹¹⁰
- Purchase 1280 new Alstom Pendolino high speed trains.¹¹¹
- Upgrade 700 miles of motorway.¹¹²
- Pay the costs of hosting the 2012 London Olympic Games one and a half times over.¹¹³
- Fund more than 90% of the construction costs of the London Crossrail rail link.¹¹⁴
- Rebuild 1100 secondary schools.¹¹⁵
- Construction of 7500 MW of offshore wind turbine electricity generating capacity (equivalent to 7 nuclear power stations).¹¹⁶
- Construction of 350,000 affordable homes.¹¹⁷
- Provide insulation and energy efficiency improvements for 11.5 million homes.¹¹⁸

Revenue expenditure

The costs of operating the UK's nuclear weapons system are said by the government to total £1.5 billion each year. Assuming this corresponds to revenue expenditure, if allocated budgets elsewhere in the public sector the sum could fund the following alternatives:

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¹⁰⁹ Cost of construction of the Channel Tunnel quoted as £10,153 million (inflation-adjusted to 2007). http://en.wikipedia.org/wiki/Channel_Tunnel Accessed 23rd December 2008.

¹¹⁰ Completed cost of the Channel Tunnel Rail Link quoted as £5.8 billion. Discussion on 'Civil Engineering' Special Issue: Channel Tunnel Rail Link. November 2007. www.thomastelford.com/journals/DocumentLibrary/160_6.doc Accessed 23rd December 2008.

¹¹¹ Cost of purchasing 53 new trains quoted as £621million (2002 prices). 'Pendolino to Commonwealth Games'. Virgin Trains press release. 23rd July 2007. <http://www.virgintrainsmediaroom.com/index.cfm?articleid=171> Accessed 23rd December 2008.

¹¹² Cost of widening a 240 mile length of the M1 motorway quoted as £5.1billion. 'M1 widening to cost £21m per mile'. Juliette Jowit. 'The Observer', 6 May 2007. <http://www.guardian.co.uk/uk/2007/may/06/transport.world> Accessed 23rd December 2008.

¹¹³ Current estimate of construction costs for 2012 Olympics quoted as £9.325 billion. '2012 Olympics budget 'on track''. BBC News, 10th December 2007. http://news.bbc.co.uk/1/hi/uk_politics/7135824.stm Accessed 23rd December 2008.

¹¹⁴ Crossrail project costs quoted as £16 billion. 'London Crossrail gets the go-ahead'. Railway Gazette, 5th October 2008. http://www.railwaygazette.com/news_view/article/2007/10/7798/london_crossrail_gets_the_go_ahead.html Accessed 23rd December 2008.

¹¹⁵ Cost of rebuilding or refurbishing all 3500 secondary schools in England under the 'Building Schools for the Future' programme quoted as £45 billion. 'Sustainable Schools: Are we building schools for the future?'. House of Commons Education and Skills Committee, Seventh Report, session 2006-7. August 2007 <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmmeduski/140/14002.htm> Accessed 23rd December 2008.

¹¹⁶ Cost of constructing the 1000 MW London Array wind farm in Thames Estuary quoted as £2 billion. http://en.wikipedia.org/wiki/London_Array Accessed 23rd December 2008.

¹¹⁷ Housing Corporation 2006-8 Investment Programme quoted as funding 92,752 affordable homes at a cost of £3.9 billion. 'Milestone as Housing Corporation signs last funding agreements'. Housing Corporation news release, 25th November 2008.

<http://www.housingcorp.gov.uk/server/show/ConWebDoc.16157/changeNav/431> Accessed 23rd December 2008.

¹¹⁸ 'Warm Front' national energy efficiency programme quoted as assisting 270,000 households at a cost of £350 million. 'The UK Fuel Poverty Strategy. 6th Annual Progress Report. 2008'. Department for Environment, Food, and Rural Affairs, and Department for Business, Enterprise, and Regulatory Reform. Paragraph 3.2 page 9. <http://www.berr.gov.uk/files/file48036.pdf> Accessed 29th December 2008.

- Deployment of 15,800 British soldiers overseas in combat for one year – roughly double the number currently deployed in Afghanistan.¹¹⁹
- Pay the annual costs of running the Greater Manchester Police Authority nearly three times over.¹²⁰
- Employment of 52,500 NHS staff nurses for one year.¹²¹
- Employment of 12,600 NHS consultants for one year.¹²²
- Employment of 39,000 qualified classroom teachers for one year.¹²³
- Pay the annual costs of providing free NHS prescriptions in England more than three times over.¹²⁴
- Pay the annual cost of keeping 2500 post offices open more than seven times over.¹²⁵
- Fill one third of the gap between the UN target for giving 0.7% of gross national income as overseas development aid and the aid currently given by the UK.¹²⁶

¹¹⁹ Annual cost of operations per British soldier in Afghanistan quoted as £94,615. Channel 4 News, 15th February 2008. http://www.channel4.com/news/articles/politics/international_politics/poor+equipment+kills+british+soldier/1573247 Accessed 23rd December 2008. The number of British troops deployed in Afghanistan from October 2008 is “around 8000”. Ministry of Defence Factsheet: ‘Operations in Afghanistan: British Forces’. <http://www.mod.uk/DefenceInternet/FactSheets/OperationsFactsheets/OperationsInAfghanistanBritishForces.htm> Accessed 21st January 2009.

¹²⁰ Revenue budget for the Greater Manchester Police Authority for 2008/9 quoted as £544.9 million. Greater Manchester Police Authority Revenue Budget and Capital Programme 2008-2009, February 2008. www.gmpa.gov.uk/budgetreport2008final.doc Accessed 23rd December 2008.

¹²¹ Hourly cost of employing a NHS staff nurse quoted as £14.84 per hour (2005 costs). Adjusted to an annual figure assuming a 37 hour week for 52 weeks per year. ‘Department of Health: Improving the use of temporary nursing staff in NHS acute and foundation trusts’. House of Commons Select Committee on Public Accounts, Twenty Ninth Report, session 2006-7. June 2007. <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmpubacc/142/14205.htm> Accessed 23rd December 2008.

¹²² Annual cost of employing 31990 NHS consultants quoted as £3.8 billion per year (2005-6 costs). ‘Pay Modernisation: A new contract for NHS consultants in England’. House of Commons Select Committee on Public Accounts, Fifty Ninth Report, session 2006-7. November 2007.

<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmpubacc/506/50606.htm> Accessed 23rd December 2008.

¹²³ Average annual cost per regular full-time qualified classroom teacher in England quoted as £38,400 (March 2006 costs). Written answer, Official Report (Hansard), 1st September 2008 : Column 1638W.

<http://www.publications.parliament.uk/pa/cm200708/cmhansrd/cm080901/text/80901w0055.htm#08090235000062> Accessed 23rd December 2008.

¹²⁴ Income from prescription charges in England quoted as £435 million.

‘Prescription charge increases remain below rate of inflation.’ Department of Health press release, 6th March 2008.

<http://nds.coi.gov.uk/environment/fullDetail.asp?ReleaseID=358188&NewsAreaID=2&NavigatedFromDepartment=True> Accessed 23rd December 2008.

¹²⁵ Post Office Ltd quoted as making a loss of £4 million each week. Speech by Pat McFadden MP, Minister for Employment Relations and Postal Affairs. Local Government Association seminar on ‘The Future of Post Office Services’. 18 October 2007. <http://www.berr.gov.uk/aboutus/ministerialteam/Speeches/page42186.html> Accessed 23rd December 2008.

¹²⁶ In 2007, total UK overseas development aid amounted to £4,921 million, representing 0.36 per cent of gross national income ‘Statistics on International Development 2008’. Section 3, paragraph 15. Department for International Development. <http://www.dfid.gov.uk/pubs/files/sid2008/contents.asp> Accessed 23rd December 2008.

The affordability of remaining a nuclear weapons state has always been an issue for the UK. Previous governments have been prepared to abandon nuclear weapons capabilities in the past, if forced to, as a result of harsh economic realities. This report considers whether such a course of action would make sense now, and asks whether the UK can afford to replace its nuclear arsenal as the country enters the uncharted economic waters of what looks likely to be the most severe recession in living memory.

If approved, the replacement for Trident would be likely to become the single most expensive scheme in the defence procurement programme, tying up huge sums of money. Even at the best of times, the replacement programme would be a high risk initiative because of long lead-in times, financial risks created by monopoly suppliers, specialist skills, and the high overhead costs of essential on-shore infrastructure.

The credit crunch is likely to magnify the replacement programme's risks and compound the pressure on its affordability. In the medium term period, when the replacement for Trident is scheduled for construction, the economic picture will be heavily influenced by the need to recover the costs of the spending stimulus which the government is currently applying in the hope of limiting the force of the recession. Over this period, spending on a nuclear weapons replacement programme would be competing with flagship government social policy goals which are at risk from the credit crunch.

The report concludes that, as well as freeing up resources, a decision not to replace Trident would refocus attention on addressing the diverse and changing security challenges the nation faces over the next half century and also support government initiatives to tackle the proliferation of nuclear weapons.