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REPORT



Arms deals, whether with foreign buyers or the UK Ministry of Defence, are justified to the public on the grounds that they safeguard UK security and jobs. Steven Schofield demonstrates the fallacies of these arguments, showing that UK arms production has little to do with security or defence and much more to do with supporting US force projection and exporting to whoever can buy. Furthermore, arms industry jobs comprise only a tiny proportion of the UK workforce and numbers are shrinking, not least as a result of the industry's internationalisation.

Some critics of government policy have called for reduced arms expenditure, cancellation of individual projects such as the new aircraft carriers and controls on arms exports to particular

countries with poor human rights records. Schofield sets out a broader vision, calling for a 'radical political economy of arms conversion and common security.' He suggests that the UK's genuine security needs require a significant reduction in arms expenditure and arms exports, with the investment of a large proportion of the released resources in alternative civil technologies, including renewable energy. This would contribute to international stability and disarmament, rather than to a dangerous arms race, by bringing to an end the UK's militarist and US-focused approach to security. Developing new civil industries will also enhance our long-term security while creating opportunities for skilled work that offer better employment prospects than arms production.

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CAAT was set up in 1974 and is a broad coalition of groups and individuals working for the reduction and ultimate abolition of the international arms trade, together with progressive demilitarisation within arms-producing countries



Making arms, wasting skills

Alternatives to militarism and arms production By Steven Schofield

Steven Schofield completed a doctorate on arms conversion at the University of Bradford and was co-founder of the Project on Demilitarisation. He has published widely on disarmament and on economic regeneration issues.

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Executive summary

Arms production is now an international military-industrial network, dominated by US-based corporations including Boeing and Lockheed Martin, the essential function of which is to support the United States in maintaining its military supremacy and its geo-strategic goal of continued access to energy supplies. The leading European arms companies, BAE Systems, EADS and Thales, have pursued aggressive acquisition programmes in the USA to gain access to the lucrative American market. BAE, which already had an effective monopoly position in UK arms manufacture, is now one of the largest suppliers to the Pentagon, generating more sales in the US than the UK.

Various trends are clear, including the increasing use of foreign subsidiaries and subcontractors by these corporations and the rationalisation of the traditional, domestic arms manufacturing bases in the USA and Europe, with significant job losses. For example, since the early 1980s, UK arms-related employment declined from 740,000 to 315,00 by 2006.

A hierarchy of production exists, with the United States maintaining clear supremacy in first-tier sophisticated military platforms based on its massive procurement and R&D programmes, including the most advanced fighter aircraft and weapons such as satellite-guided missiles. This ensures its domination of the global arms trade and provides a form of technological leverage with client states to gain support for its over-arching strategic goals. Second-tier suppliers include the UK, France, and Russia offer other large platforms and weapons but with lesser capabilities. However, there are emerging nations including South Africa, South Korea, Brazil and India that have used their role as subcontractors in the international structure to modernise their own manufacturing capacity and now seek to challenge existing second-tier suppliers in their export markets. Below this is a much larger group of countries supplying basic, mass-produced weapons including sub-machine guns and rifles.

The arms trade is characterised by an intense supply-side dynamic to sell high-technology weapons into areas of regional tension like the Middle East and there are widespread allegations of corruption and bribery around these contracts, such as the Al Yamamah deal between BAE and Saudi Arabia to supply Typhoon/Eurofighter. At the same time, the diffusion of arms production has made it increasingly difficult both to monitor and control the arms

trade when regional arms races are an increasing threat and may trigger the outbreak of major conflicts.

The UK has accepted a subsidiary role to the US in the latter's broader strategy of global military force projection not least because it seeks to retain access to leading edge military technologies, including nuclear weapons. But the cost of this subservience is continued multi-billion pound expenditure on a range of sophisticated equipment that offers no contribution to the country's real security needs; a significant and shameful role in a corrupt and dangerous arms trade; and no real commitment to support efforts at international disarmament, including nuclear disarmament.

Supporters of the military economy and the arms trade argue that, despite the massive job losses in the sector, they provide the UK with internationally successful, high technology niches in aerospace, engineering and electronics, as well as skilled work and spin-offs beneficial to the civil sector. But the real cost has been the diversion of resources from other forms of manufacturing activity that, if provided with similar long-term government investment, could actually have generated greater employment and direct benefits to the civil economy through improved technologies and industrial processes.

The dominance of BAE as a systems integrator for military aircraft, nuclear submarines and surface vessels is clear. However, the decline in arms employment has left only a handful of local economies with a residual dependency on military R&D and production, including Preston, Barrow-in-Furness, Yeovil, Brough and Glasgow. These reflect the pattern of regional concentration in the North West, South West and South East, although the latter is not as significant as it was. Even at these sites, there have been considerable job losses since the 1980s and there is continued vulnerability to further rationalisation.

The military aircraft sector is particularly dependent on arms exports, with the BAE Brough site in East Yorkshire facing closure because of the lack of follow-on orders for the Hawk trainer aircraft. The Warton site in Lancashire is also heavily dependent on the Saudi Arabian contracts for Typhoon aircraft, and is vulnerable to regime change should the corrupt Al Saud absolute monarchy be overthrown.

Overall, because arms-related employment constitutes such a small proportion of national employment, the adjustment

from a further restructuring based on deep cuts to military expenditure, is a minor one. Only in these small pockets of local dependency would further assistance be required to help diversify the local economies. This would be the sort of restructuring that many local areas have experienced after the loss of a staple industry and can be done successfully through support to regional and local economic development agencies in order to create a diversified and robust economic base.

More ambitiously, central government has a vital role to play in developing a radical, political economy of arms conversion and common security. By moving away from military force projection and arms sale promotion, the UK could carry out deep cuts in domestic procurement including the cancellation of Trident and other major offensive weapons platforms, as well as adopting

comprehensive controls on arms exports, including the suspension of weapons exports to the Middle East. The substantial savings in military expenditure could help to fund a major arms conversion programme.

Here the emphasis would be on environmental challenges, including a multi-billion pound public investment in renewable energy, particularly offshore wind and wave power, that would substantially cut the UK's carbon emissions and reduce dependency on imported oil, gas and uranium supplies. These new industries will also generate more jobs than those lost from the restructuring of the arms industry. In this way, the UK would be taking a leading role in establishing a new form of international security framework based on disarmament and sustainable economic development.

Chapter 1: The internationalisation of the arms industries

Introduction

Arms production has become increasingly internationalised, building on both government and industry led policies of national consolidation and international collaboration that can be traced back to the 1960s. The United States emerged from the Cold War as the dominant military-industrial power, with giant arms corporations that benefited from its large procurement and Research and Development (R&D) budgets, as well as clear leadership of the global arms trade. Companies in the UK and Europe have been actively pursuing US acquisitions to take advantage of this lucrative market, with BAE Systems becoming a major supplier to the Department of Defense.

Other influences on internationalisation include the role of IT/Communications for 'network-centric' warfare, involving the buying in of civil technologies and expertise for systems integration; the role of private companies in activities traditionally performed by national armed forces; and the growth of global subcontracting by the leading corporations. These trends add to the complexity of analysing arms production using models of nationally based industries and compound the serious difficulties faced in attempts to control the arms trade.

Background

The arms industries of the major arms producing countries, broadly defined here as those involved in the research, development, manufacture and maintenance of weapons material, have experienced a similar pattern of domestic consolidation and internationalisation and it can be traced back many decades.¹ As early as the 1960s, the UK government was encouraging its leading private sector companies to take advantage of economies of scale through merger and acquisition. For example, Rolls Royce was supported by the Labour government in its takeover of Bristol Siddeley in 1966 (itself the result of a previous merger between the Armstrong and Siddeley companies) to become the sole manufacturer of military jet engines in the UK.²

At the same time, new forms of international network were developing, both through government-led and company-led initiatives. The Tornado fighter aircraft was developed by a tri-nation consortium of the UK, Germany and Italy (British

Aerospace in the UK, MBB in Germany and Alenia Aeronautica in Italy) with the intention of pooling orders for a new generation of aircraft and to take advantage of longer production runs that would reduce costs for participating countries. A similar rationale was also made by governments for supporting arms exports, while, of course, providing increased profits to the companies themselves.³

Company initiatives took many forms, ranging from mergers and acquisitions to joint ventures, strategic alliances and co-production agreements. The joint venture on jet engines between General Electric of the United States and the French company, SNECMA, is one long-standing example, beginning in 1974 and continuing to the present day. Here, the main motivations were to build transnational networks that helped share costs, particularly R&D, and to provide access to larger, international markets.⁴

The end of the Cold War

The end of the Cold War saw a marked intensification of these trends, led mainly by the companies themselves in the face of cutbacks on arms expenditure. While the reductions varied, from 25% in the USA to 15% in the UK, they were very modest in comparison to the potential for deep cuts and structural changes to the economy that had been carried out at the end of the Second World War. Given the political will, a similar disarmament policy could have been carried out by the major Western states following the disintegration of the Soviet Union.⁵ This time, however, the essential objective of the Western military powers, led by the United States, was to maintain the capacity for global power projection through high-technology weapons and platforms, and in the expectation of future increases to arms expenditure.⁶ Nevertheless, there were major job losses as corporations used the temporary downturn to carry out rationalisation of the manufacturing base. (See Table 1)

United States procurement at this point was dominated by giant corporations that benefited from the still massive DoD budget and the growing global arms trade. Mergers between Lockheed and Martin Marietta, Boeing and McDonnell Douglas and Raytheon and Hughes were the culmination of a process that reduced the number of major arms contractors from over fifty in the early 1980s to five by the end of the century.⁷

Table 1: Arms industry employment after the Cold War

Country	1991	1996	1998
USA	3,045,000	2,210,000	2,180,000
UK	510,000	415,000	355,000
France	248,000	185,000	175,000
Germany	39,000	19,000	20,000

Source: SIPRI Yearbook 2003, p. 404

Table 2: The major international arms companies – 2006

Company	Arms sales US\$m	Total sales	% arms sales	Employment
Lockheed Martin (USA)	36,090	39,620	91	135,000
Boeing (USA)	30,800	61,530	50	153,000
BAE Systems (UK)	25,070	26,976	93	100,000
Northrop Grumman (USA)	23,649	30,148	78	123,600
Raytheon (USA)	19,500	20,291	96	80,000
General Dynamics (USA)	18,769	24,063	78	72,200
EADS (Europe)	13,202	52,018	25	113,210
Thales (France)	6,997	13,598	51	53,370

Source: Defense News, Top 100, 2007, defensenews.com/index.php?S=07top100; SIPRI Yearbook 2007, p. 376.

In the UK, British Aerospace acquired the military interests of the GEC/Marconi company in 1999, as well as other major arms companies including the nuclear submarine manufacturer VSEL, giving it an effective monopoly position in UK arms procurement (see Chapter 2). Europe's other leading companies were carrying out similar programmes through cross-border mergers and takeovers. EADS (European Aeronautic Defence and Space) was created in 1999 through the merger of Germany's Deutsche

Aerospace with France's Aerospatiale, followed by CASA of Spain.⁸

Although the process was led by industry, it had been given strong support by EU political leaders, to help overcome the fragmentation in European arms production and to create a globally competitive industry that could challenge the major American corporations. The other leading European company to emerge from this process was Thales, originally

Table 3: The top ten largest national military budgets in 2006 (\$bn)

Country	Spending	% of global expenditure
USA	528.7	46
UK	59.2	5
France	53.1	5
China	[49.5]*	4
Japan	43.7	4
Germany	37.0	3
Russia	[34.7]*	3
Italy	29.9	3
Saudi Arabia	29.0	3
India	23.9	2

Source: SIPRI Yearbook 2007, p. 270. (*Estimated)

Thomson CSF, the French electronics company that acquired Racal to become a very strong presence in UK procurement (see Table 2).

Post-2000 restructuring

By the end of the century then, arms production was firmly in the control of giant, specialist companies that had rationalised their domestic military-industrial bases and cut back significantly on employment. It was at this stage that the United States began a major expansion of arms expenditure under the Bush administration, from \$295m in 2000 to \$375m in 2003, taking it back to the average levels at the time of the Cold War and before the Reagan build-up of the 1980s.⁹ By 2006, US expenditure had grown to \$528.7m out of a total world figure of \$1,159bn, with the USA accounting for about 80% or \$26bn of a total increase of \$33bn from the previous year. (See Table 3)

Similarly, in relation to the arms trade, the USA was also the largest exporter of major conventional weapons between 2002–2006, accounting for 30% of total transfers of major

equipment. Total arms transfers were also nearly 50% higher than in 2002, reflecting the intensification of the arms trade in recent years.¹⁰

Recognising the importance of the American market and the restrictions on overseas companies when tendering for DoD contracts, European companies began a further phase of major US acquisitions. British Aerospace, under the new name of BAE Systems (to symbolise its international rather than national status), was particularly active, conducting takeovers of several leading companies including the \$4bn acquisition in 2005 of United Defence Corporation, makers of Bradley fighting vehicles. EADS and Thales were both engaged in similar activity, albeit at lower levels of acquisition.¹¹ BAE was, by then, the sixth largest contractor to the DoD and actually generated more sales through it than the UK market, even though it was dominant there.¹²

Compared to the US market, there was still a high level of industrial fragmentation in Europe, despite the cross-border mergers and collaborative programmes, as EU countries attempted to maintain their indigenous industrial bases, either for reasons of national security or job protection. For

example, in the EU there were 4 different main battle tanks and 23 national programmes for armoured fighting vehicles in 2005 and, in total, there were 89 major weapons programmes in the EU compared to 27 in the US.¹³

The EU has been active in trying to break down what are seen as protectionist policies through shared procurement and R&D programmes, setting up the European Defence Agency (EDA) in 2004 as well as opening up national markets to competition.¹⁴ The process has been a difficult one, because the original Treaty of Rome provided exemptions to normal competition rules on the grounds of national security, but there now seems genuine commitment to creating a unified market for arms procurement, even though many political obstacles remain before the EU can hope to emulate the United States.

The arms sector, then, represents something of a special case compared to the broader pattern of transnational industrial restructuring. Multinational corporations dominate major civil industries including chemicals, pharmaceuticals, automobiles, etc, with global R&D and manufacturing capacity, whereas arms production is still characterised by a variety of national government restraints against foreign ownership or control and continued protectionism.¹⁵ Nevertheless, the trend toward 'normal' internationalisation, driven mainly by industry itself and supported, to some extent by governments, is set to continue.

There are, however, a complex mix of strategic and industrial/technological factors that may influence decisions on the future direction of the arms industries. Much is made of the Revolution in Military Affairs (RMA) and network-centric warfare, where the emphasis is on strategic superiority through the integration of information technology, command and control and high-technology weaponry. The United States clearly enjoys supremacy in large-scale military operations, leading to concerns that other states, experiencing structural disarmament, are subject to growing strategic and political dependency, as they seek access to US military technology:

The fixed costs of R&D for major systems continue to grow, both for platforms and for infrastructure (e.g., satellites and strategic air assets), and information systems needed to support network-centric warfare. All states but the USA thus face structural disarmament in the sense that they cannot afford to provide a comprehensive range of their own weapons systems because of the fixed costs of replacing conventional military capability with modern systems comparable to those of the USA.¹⁶

The acquisition of US companies is one method by which overseas corporations can maintain access to the leading-edge technologies provided by US procurement, but the

political costs may be significant in terms of the influence that the US government can bring to bear in pursuit of its broader foreign policy goals.

For European arms producers, then, entrance into the US military market for sales and collaborative programs is critical for both the economic viability of their defense industries and technological sophistication of their armed forces... from the perspective of other governments, the cost of entry into the US market is increased dependence for them and greater political leverage for the U.S.¹⁷

Not only does industrial and technological supremacy, therefore, provide direct military advantage to the United States, but also reinforces a hierarchy of strategic power and influence through which the United States can bring pressure to bear on other countries for broader strategic support. The UK represents the starkest example of this. As a major, second-tier arms producer, it has attempted to maintain R&D and procurement across a range of high-technology armaments sectors. While nominally providing 'independence' for national security purposes, the real result is to confirm the UK's continued commitment to the US as a junior partner in its over-arching strategy for global military power projection and, therefore, to ensure participation in key high-technology sectors such as advanced fighter aircraft (see Chapter 2).

In the EU, the political context is more fluid. Historically, attempts to develop a stronger European security identity have met with resistance from member states. However, the establishment of the European Defence Agency (EDA), with responsibility for coordinating military R&D and procurement, signifies growing industrial and political support for an emerging EU security framework. Influential trade groups like the Aerospace and Defence Industries Association (ADIA) and EU lobby groups like the New Defence Agenda (NDA), now renamed the Security and Defence Agenda (SDA), have been instrumental in calling for increased arms spending on new weapons, raising the spectre of the EU's increased technological dependency on the United States without such a programme.¹⁸ There is no doubt that these groups look to the EU as a global military power like the United States, with a comparable military-industrial base and unified market, but serious obstacles exist and progress in overcoming national preferences remains slow.

However, some analysts are highly critical of the dominant strategy of both the United States and the EU and argue that terrorism and other 'asymmetrical' threats require a radical re-orientation away from traditional forms of military preparation. In this new security environment, the emphasis should be on intelligence gathering, the use of special forces and urban warfare/security operations. Continued Western

overstretch on redundant, Cold-War systems preparing for old threats will result in a limited and inefficient response to new ones.¹⁹

Of course, there have been significant expenditures on counter-terrorism and other 'homeland security' technologies. But this has been additional to, rather than at the expense of, traditional military preparations and procurement. US military planning still emphasises the potential threat from regional powers like China and Russia and the need to be able to respond with superior conventional (and nuclear) forces.²⁰ To some extent, this reinforces the special status of the United States, as it alone can incorporate two essentially different forms of operational preparedness, even if it is at the cost of overstretch and systems redundancy.

Finally, three other factors also need to be taken into account when assessing the complexities of the industrial/technological networks for arms production.

First, roles normally carried out by armed forces are increasingly being taken by private firms, including protection of overseas bases and of military and civil personnel. Private military contractors like Halliburton act as major subcontractors to the US Department of Defense (DoD) and other departments as integrators of military services, including security and reconstruction programmes. What could be described as 'mercenary' companies like Blackwater directly provide a private force, usually for the protection of key personnel or facilities, as in Iraq. The stated intention in the use of private firms is to allow the armed forces to focus on their key war-fighting roles, while efficiency savings are claimed to ease pressure on overall arms spending. However, despite the growing role of these companies, very little is known about their own supply networks for weapons and other, arms-related equipment.²¹

Secondly, the divisions between civil and military technologies are increasingly blurred, particularly in the area of IT services that are essential for network-centric capabilities. Civil sector companies, not normally considered part of the military-industrial base, have become major military suppliers thanks to their specialist systems integration skills. Specialist arms companies have also acquired smaller high-technology companies that may serve both military and civil markets.

The third factor is the growth in international subcontracting. Many of the components in a major weapons systems will be outsourced by the leading US and European contractors. One important trend has been the growth in developing countries offering improved quality of manufacturing facilities and promoting themselves as assemblers of high-technology equipment.

Traditional offset agreements, whereby governments have purchased arms from Western suppliers on the basis of some form of domestic production arrangement and the sharing of technologies, have helped develop these capabilities. More recently, the larger Western arms corporations have been investing directly in these lower-tier companies.²² As networks of subcontracting become more extensive and their advanced industrial and technological capabilities increase, the attractions to Western manufacturers of locating more production capacity abroad with skilled, relatively low-wage workforces, will grow.

Conclusion

Arms production has evolved into a hybrid form of internationalisation, led mainly by the major corporations themselves, but also influenced by governments intent on maintaining their domestic, military-industrial bases. From these potentially divergent and conflicting pressures has grown the consolidation of national leaders and an increase in international linkages to maintain high-technology capabilities. Access to advanced technologies through corporations with an international presence is seen by governments as the best means of sustaining key elements of an indigenous base. Since the end of the Cold War, the inevitable result has been the rationalisation of capacity and massive job losses, coupled with an intensification of competition in the arms trade between the leading suppliers like the USA and the UK, as well as Russia and more recent entrants including China.

In broad terms, there has evolved an international hierarchy of arms production led by US corporations that dominate major sectors of high-technology equipment based on a massive domestic procurement budget.²³ Other major arms-producing states have responded with different strategies that essentially demonstrate their second-tier status in the military-industrial hierarchy.

There are complex historical and political reasons for the UK's Atlanticist international security policy, but its dependence on the US for key military technologies is a powerful if rarely acknowledged factor in the UK's role as a loyal, even supine, ally. In contrast, other European countries, led by France and Germany and heavily influenced by their arms industry lobbies, have led the demand for a more integrated EU arms procurement system and increased EU military expenditure, as a counterbalance both to US-dominated security policy and the threat of technological dependency. However, this has not restricted European corporations in their US acquisition programmes.

The debate over geo-political strategies and the priorities for future arms procurement is set to intensify, with a growing

critique of the West's continued reliance on traditional approaches in the face of new 'asymmetric' threats like terrorism. But the likelihood is a continued demand for traditional force projection through large-scale sea and air platforms, not least because of the vested institutional power of vested military-industrial interests, allied to additional capabilities for anti-terrorist operations.

If this proves to be the case, there will be further adaptation of civil IT/electronic technologies to support network-centric warfare, an extension of the trends towards

international ownership and further sub-contracting of manufacturing to developing countries, leaving the prime contractors in the role of systems integrators. Not only do these trends make the analysis of arms production increasingly difficult, it reinforces the problem of controlling the arms trade. However, the relocation of production and the continued 'hollowing-out' of the domestic arms-production bases, as manufacturing capacity is directed to cheaper but advanced facilities in developing countries, will clearly lead to further rationalisation and job losses in the Western arms industries.

Chapter 2: UK military industry and employment

Introduction

The UK arms industry is assessed here in the context of internationalisation, technological subservience to the USA and the continued budgetary crisis resulting from the commitment to Cold-War military platforms. A particular focus is on the structure of the main companies, the pattern of employment both national and regional, and future trends based on the MoD's Defence Industrial Strategy (DIS). The monopoly position of BAE in UK procurement and its development as a global arms corporation is highlighted, as is the long-term decline in arms-related employment. Despite this decline there remain small pockets of local dependency on arms production, both for MoD contracts and arms exports.

Background

The UK is a post-imperial state that, under successive governments, faced the dilemma of attempting to maintain international status through military power against the constant pressure of limited resources. Even from the onset of the Cold War when arms expenditure was increased by the Attlee government at the cost of reducing some social programmes, there were serious budgetary strains. Various defence reviews resulted in reductions to overseas commitments such as 'East of Suez' and the size of conventional forces.²⁴ But the UK also maintained domestic production of the full range of military equipment, including fighter aircraft, helicopters, jet engines, nuclear submarines and frigates. As a result, the UK consistently spent a higher proportion of its GDP on armaments than other medium-sized industrial economies.²⁵

In the 1960s this dependency on arms research and production was recognised as a weakness under Harold Wilson's Labour government and it looked to utilise the state's laboratories to support civil R&D and production in a new 'white heat' of technology.²⁶ As Tony Benn, then Minister of Technology, put it at the time:

Having inherited the finest complex of research facilities available anywhere in the Western world, it has been my object to bring about a shift from the almost exclusive concentration of government support on defence research to more general support for civil industry... There is no reason why in education or some other similar field of civil

*expenditure there should not be similar stimulation by means of public procurement in technologies associated with areas other than defence.*²⁷

However, at the same time, Dennis Healey, the Defence Secretary, set up the Defence Sales Organisation – subsequently renamed the Defence Exports Services Organisation (DESO), to promote UK arms sales abroad, while officially denying that it contradicted efforts at disarmament and controlling the arms trade:

*The stimulation of an arms race is directly contrary to everything the government is striving to do. All we intend by the creation of a head of Defence Sales is to assist British industry to obtain its share of the existing trade in defence equipment without adding to the total volume of that trade and without in any way jeopardizing efforts to reduce it.*²⁸

In practice, the efforts to re-orientate government research to new civil missions proved of limited value as they lacked real political commitment. The expansion of DESO since the 1960s reflects much more accurately the militarism of the British state and the institutional power and influence of the arms industries.

UK arms companies had already embarked on the first stage of national consolidation during this period, through takeovers and mergers, in the belief that efficiencies and economies of scale could be achieved. During the 1970s there was also a short period when much of the industry was brought under public ownership through the nationalisation of British Aerospace and British Shipbuilders – again the underlying philosophy of the Labour government being that efficiencies could be achieved through economies of scale.²⁹ However, the Conservative government reversed this policy as part of its general programme of privatisation in the 1980s. In particular, great play was made on the introduction of competition into arms procurement and the budgetary savings that could be made through efficiency and productivity improvements in the private sector.³⁰

Most significant in terms of UK procurement and internationalisation has been the consolidation of the industry around BAE Systems. During the 1980s GEC/Marconi and BAE emerged from aggressive programmes of acquisition as the two leading private-sector companies. In the late 1990s GEC, under new management, decided to divest from arms production and BAE took over

Table 4: Companies paid £500m or more by the MoD, 2006/7

AWE Management Ltd

BAE Systems Electronics Ltd

BAE Systems Operations Ltd

EDS Defence Ltd

NETMA

Qinetiq Ltd

Source DASA 2007.⁴¹ AWE Management is a consortium that runs the Aldermaston complex responsible for the design and manufacture of nuclear warhead for the Trident missiles – jointly owned by BNFL, SERCO and the American corporation Lockheed Martin.⁴² NETMA is responsible for the joint development and production of the Typhoon and Tornado programmes and includes BAE and EADS.

much of the company. Other major BAE acquisitions included VSEL, responsible for the UK's nuclear submarine production, to add to the Clyde shipbuilding yards where frigates and destroyers were built. BAE became the dominant force in UK procurement with an effective monopoly position not only in aircraft, but also nuclear submarines and larger, surface vessels.³¹

For some years, in the 1980s, while acquiring other arms companies, it had also pursued a form of civil, corporate diversification, most significantly through purchasing the Rover car company and through property development. However, these efforts in the civil market proved relatively unsuccessful and Rover was sold to BMW in 1994.³² Instead, BAE management's clear strategy was to concentrate exclusively on the company's core military business, firstly by securing its dominant position in the UK, secondly by extending its ownership of overseas companies, particularly in the vital US market, and last but by no means least, pursuing an aggressive export strategy supported by the UK government. Crucial to this has been the Al Yamamah programme, worth an estimated £40bn to the company through three tranches of fighter aircraft sales since the 1980s, and its recent successor, Al Salam, for seventy-two Typhoon-Eurofighters.³³ The final, and perhaps most symbolic act in this long-term consolidation around arms production was to divest even its core civil aerospace business, selling on its 20% share of the Airbus consortium to EADS in 2006.³⁴

Speculation has been on-going that BAE might merge with one of the leading US military corporations. But, following the acquisitions of United Defense for \$5billion and Armor Holdings for \$4.1bn, the company is now well established as

one of the major suppliers in the US market (see Chapter 1) and, indeed, generates greater revenue in the US than in the UK.³⁵

BAE's management has carefully positioned it as a global military corporation (reflected in the change of name from British Aerospace) that is progressively less dependent on the home UK market, despite its monopoly position here. But the company still plays a skillful domestic public relations exercise, projecting itself in the UK as the national champion in strategically important and high technology industries. Here, the strong institutional links it has with the UK government reinforce its position. Senior management is heavily represented in both lobby organisations and government advisory bodies and employed through the 'revolving door' in senior posts with DESO and in the MoD. (For example, three of the last five heads of DESO were BAE managers and the last incumbent returned to BAE in 2007.)³⁶

Not surprisingly, despite BAE's dominance, there are several other companies with a major role in UK procurement. These include the curiously named Qinetiq, established when the MoD sold the main part of its research facilities, the Defence Evaluation and Research Agency, (DERA).³⁷ Privatisation was intended to develop a more commercial approach to the exploitation of its research funding, including civil spin-off, but 80% of revenue is still generated through the MoD, which is tied into long-term contracts with the company. Like BAE, Qinetiq has been actively acquiring US-based military technology companies but with a focus on research expertise.³⁸ Similarly, Smiths Industries, a leading UK-based avionics company expanded its US interests through acquisition. As a result of its expansion, Smiths itself became a prime target for acquisition and its

Table 5: MoD industrial expenditure at current prices (£m, 2002/03 and 2003/04)

Expenditure	2002/2003	2003/2004
Aircraft and spacecraft	2,380	2,090
Shipbuilding and repairing	1,070	1,170
Precision instruments	810	710
Weapons and ammunition	790	670
Electronics	640	510
Data processing equipment	170	180
Other electrical engineering	170	180
Motor vehicles and parts	130	170
Manufacturing, excluding the above	1,470	1,440
Services	6,190	7,100
Rounding adjustment	-10	—
Total	13,810	14,220

Source – DASA, 2005. The introduction of resource accounting means that DASA can no longer track military spending by sector, as was normally the case, but basic expenditures have been compiled for this table. Services cover a range of non-manufacturing expenditure, such as electricity, fuel and financial services.

aerospace interests were taken over by the US corporation GE in 2007.³⁹

Overseas-based companies also have an important role in UK procurement, particularly Thales and General Dynamics. Thomson, the French military electronics company acquired Racal the leading UK military electronics company in 2000, as well as other UK arms companies, to provide a range of electronic equipment for missiles, sensors, aircraft avionics, etc. Renamed Thales, it now has a major international presence, including acquisitions in the US. Like BAE, most of its revenue is generated outside its domestic base. General Dynamics United Kingdom Ltd is a subsidiary of the US General Dynamics corporation and is responsible for the Bowman communication system and for the new Defence Information Infrastructure project,

intended to provide a global communications system for all MoD personnel.⁴⁰ (See Table 4)

UK arms expenditure and employment

The UK remains the leader of the second-tier arms producing countries clustered behind the United States. In real terms, military expenditure has remained fairly constant over the last five years, now standing at £30bn and expected to rise to £36bn by 2012.

Table 5 provides a recent breakdown of procurement expenditure allocated to various sectors. There are year-on-year fluctuations but the pattern is fairly consistent, with

Table 6: UK arms exports

Year	Contracts signed (£m)	Global market (% total)	Estimated deliveries (£m)
1992	5,324	19	3,118
1993	7,074	17	2,969
1994	4,608	16	2,946
1995	4,970	19	4,723
1996	5,080	25	6,177
1997	5,540	23	6,684
1998	6,049	26	6,030
1999	5,044	22	4,250
2000	4,737	13	4,406
2001	4,160	19	4,216
2002	5,041	22	4,120
2003	4,882	—	4,545
2004	4,546	20	5,162
2005	3,989	—	4,527
2006	5,527	—	4,697

Source, DASA 2005, 2006 and 2007

aerospace a clear leader, followed by shipbuilding and various forms of electronic equipment. Within the overall budget, military equipment procurement is worth, on average, between £7–8bn a year.

The MoD also continues to fund over £2.5bn of research and development, predominantly with the largest UK manufacturers. Nearly 65% of all military R&D spending in 2004 was provided by central government.

As with overall arms expenditure, the UK is a leading second tier arms exporter (See Table 6). Although there can be sharp

year-on-year fluctuations, the proportion has remained fairly constant at about 20% of global market share.

Arms-related employment

According to the MoD's figures (see Table 7), between the early 1980s and 2005, employment declined from over 740,000 to 315,00. To some extent, that steep decline has leveled off and there was even an increase of 20,000 between 2001 and 2005, but the general trend is downwards, with the expectation of further losses in the medium to long term.

Table 7: Direct and indirect employment in the UK armaments industry					
	MoD expenditure		Export orders		Total
	Direct	Indirect	Direct	Indirect	
1994/1995	145,000	125,000	45,000	45,000	360,000
2000/01	125,000	105,000	30,000	35,000	295,000
2005/06	140,000	120,000	25,000	30,000	315,000

Source: DASA, 1999, 2005 and 2007. 'Direct' employment is that generated in those companies providing the product or service directly to the MoD, or the exporter. 'Indirect' employment is that provided through the supply chain by subcontractors or suppliers.

All major arms programmes require considerable subcontracting, with hundreds (if not thousands when taking into account smaller subcomponents) of companies involved in the UK supplier chain. According to some studies, a small proportion is heavily dependent on arms work while the majority has a more diversified customer base. However, tracking the value of contracts and their importance further down the chain is extremely difficult. Similar problems exist for international subcontracting but the level of overseas acquisition is an indicator that the international supplier chain is becoming increasingly important to UK procurement.

One facet that deserves further consideration is the regional distribution of employment. There are statistical problems in collating data that eventually led to the MoD suspending publication of any regional breakdowns after 2001. However, a further study was published by the MoD in April 2007, using a different methodology to provide provisional figures.⁴³ There are limitations with these statistics in that they do not provide regional employment figures for arms exports, and they under-represent some regions, e.g. BAE has a large factory in Brough, Yorkshire. However, the figures are still useful as a guide to the regional distribution of employment and are consistent with findings from previous MoD analysis and also from independent research on regional distribution. Table 8 provides the national context of both direct and indirect employment dependent on MoD equipment expenditure, while the regional element in Table 9 relates to direct employment in the regions. This indicates that the majority of employment is located in three regions, the South East, South West and North West.

Table 10 provides a regional breakdown of direct MoD equipment employment in relation to regional manufacturing employment.

Clearly, arms-related employment is small as a proportion of overall manufacturing employment. However, these figures can mask local concentrations where military production and R&D are significant in terms of employment both on UK programmes and exports. Various locations can be highlighted including those with dependency on UK procurement and arms exports: Yeovil (Agusta-Westland), Preston (BAE); those with dependency on UK procurement and R&D: Barrow-in-Furness (BAE), Aldermaston (AWE); and those heavily dependent on arms exports: Brough (BAE).

There have been studies of some of these sub-regional economies, identifying the importance of arms manufacture to overall employment and production. But even in this small number of locations, arms-related employment had fallen considerably, and other forms of new economic activity, particularly work in the service sector, have provided some compensation. This has implications for arms conversion policies and will be a main focus of Chapter 3.

The Defence Industrial Strategy

What are the likely trends in the future of UK arms-related production and employment, given the broader context of internationalisation in which the arms industries now operate? The government's Defence Industrial Strategy (DIS), published in 2005, provided a comprehensive assessment of the MOD's longer-term priorities for industry and, while the MoD has supported industry-led restructuring, it has also insisted on maintaining what it describes as an indigenous capability in key industries and technologies considered essential for national security.⁴⁴

Table 8: Estimated UK employment dependent on MoD equipment expenditure		
	MoD equipment expenditure	
	Direct	Indirect
1997/98	70	75
2000/01	75	85
2004/05	80	70
2005/06	85	75

Source DASA, 2007

The DIS identified the design of complex ships; nuclear submarines; armoured fighting vehicles; fixed-wing aircraft; helicopters; general munitions; complex weapons; command and control; chemical, biological, radiological and nuclear protection; and test and evaluation, as key areas. All involve high-technology capabilities and a commitment by the government to support UK military R&D and procurement. UK ownership is not essential but the MoD must be satisfied that overseas-based companies like Thales that have an important role to play in UK procurement demonstrate a commitment to maintaining these key capabilities here.⁴⁵

The inevitable logic is to consolidate the hold of BAE on procurement, since the MoD's emphasis on strategic requirements closely fits the company's range of monopoly production in the UK. Although no breakdown is provided by the MoD other than to identify companies with contracts of £500m or more, it is reasonable to assume that over 50% of major MoD contracts by value was placed with BAE in the last financial year. The government, despite the continued rhetoric on the importance of competition in procurement, and the ritual criticism of BAE for cost overruns on major contracts, seems comfortable with this position because of BAE's perceived importance to the UK manufacturing base and as a global industrial and technological player.⁴⁶

At the same time, the DIS called for further rationalisation of industrial capacity to help control costs on major programmes. Particularly in the shipbuilding sector, the MoD has supported further consolidation, with Babcock Naval Services emerging as the leading company in nuclear submarine refit through its acquisition of the Devonport dockyard to add to its ownership of the Rosyth yard and the

Faslane submarine base.⁴⁷ BAE and VT have also entered into a joint venture for the major surface vessel programmes including the Type 45 destroyers and the two new aircraft carriers.⁴⁸ Although, in the short-term, the combined order book for the next batch of nuclear submarines, frigates and aircraft carriers will see a temporary increase in demand for workers, further rationalisation of capacity will lead to job losses from 2010 onwards.

Indeed, the MoD has made it clear that the era of building new generations of complex military platforms may be coming to an end. In future, the emphasis will be on upgrades and continuous improvement to technologies, as existing platforms are adapted to new capabilities and even possibly new roles, without the need for major procurement programmes. Clearly, then, the UK military-industrial base will see a further reduction in both capacity and manufacturing employment over the medium to long term and the government would look favourably on further overseas subcontracting of basic manufacturing to cut costs as long as core 'strategic' high technology capabilities are maintained in the UK.

What is most striking about the DIS, however, is not its long-term vision for an indigenous capability, but its implicit acknowledgement of the UK's subordinate industrial and technological role to the United States. The UK cannot hope to emulate the US in every area of R&D and procurement and has therefore sought to complement it in fighter aircraft, aircraft carriers, nuclear submarines, etc, albeit at lower levels of capability or through participation in US-led programmes, but sufficient to maintain its position as a junior partner in global power projection.

Table 9: Provisional estimates for UK regional employment dependent on direct MoD equipment expenditure

(Thousands)	2002/03	2003/04	2004/05	2005/06
United Kingdom	85	85	80	85
England	75	75	73	78
East	9	7	6	6
East Midlands	2	2	2	3
London	3	4	3	3
North East	2	3	2	2
North West	13	15	14	13
South East	21	20	21	24
South West	19	20	21	22
West Midlands	4	4	3	4
Yorks & Humberside	1	1	1	1
Scotland	7	7	6	5
Wales	1	1	1	1
Northern Ireland	1	1	1	—

Source: Defence Statistics Bulletin No 7, p. 7. (DASA, March 2007), DASA, 2007. The information is distinct from Table 7 in that it considers MoD equipment only, rather than equipment and services.

Inevitably, the UK will be faced with continued pressure on the arms budget, not least from the replacement Trident programme, in order to maintain this peculiarly dependent independence. The simple solution would be to buy equipment directly from the United States or purchase cheaper if less sophisticated alternatives off-the-shelf from other overseas suppliers. Such a radical departure would shatter the illusion of technological and industrial independence and would also be vigorously resisted by UK-based manufacturers. But the DIS can do nothing to prevent the technological gap with the United States widening as it adds new capabilities to existing equipment and to new

generations of major systems such as the stealth capabilities of fighter aircraft.

This growing disparity makes arms exports for second-tier suppliers like the UK even more tricky. The United States jealously guards its most advanced technologies but still offers highly capable alternatives in the arms market.⁴⁹ US companies also have the added advantage that their government provides major aid programmes to certain allies, especially in the Middle East, in order to purchase US military equipment. Some UK-based companies are positioned as subcontractors who can participate in these US-led exports, but as the number of new platforms to be

Table 10: Regional employment dependent on direct MoD equipment expenditure as a proportion of regional manufacturing employment 2004–5

	Manufacturing Employment	MoD equipment Employment	Percentage
United Kingdom	2,961,000	80,000	2.7
England	2,488,000	73,000	2.8
East	127,000	6,000	4.7
East Midlands	296,000	2,000	0.7
London	203,000	3,000	0.9
North East	159,000	2,000	1.2
North West	340,000	14,000	4.1
South East	462,000	21,000	4.5
South West	248,000	21,000	8.5
West Midlands	344,000	3,000	0.8
Yorks & Humberside	309,000	1,000	0.3
Scotland	223,000	6,000	2.6
Wales	163,000	1,000	0.6
Northern Ireland	87,000	1,000	1.1

Source: Nomis data on manufacturing employment, <http://www.nomisweb.co.uk>

purchased in the UK tails off, there will be intense pressure to find new markets for second-tier equipment used by UK armed forces like the Typhoon fighter aircraft.

Despite the controversy surrounding the Al Yamamah deal and the closure of DESO, the UK remains firmly wedded to maximizing the potential for arms sales in the face of intense pressure from the United States, from other second-tier suppliers like France, and from emerging competitors.⁵⁰ This is the classic environment for a supplier-led arms race, with relatively advanced military equipment flooding countries in areas of serious regional instability, and for continued large-

scale corruption of the type that has always characterised the arms trade.⁵¹

Conclusion

The UK is a second-tier state in the hierarchy of arms production, having attempted to 'punch above its weight' militarily since the end of World War Two, with the result that it continues to spend proportionately more of its GDP and government R&D on armaments than other medium-sized economies. There has been long-term consolidation and rationalisation led by industry, coupled to successive

governments' determination to maintain an indigenous capability for key military industries and technologies as most recently defined in the DIS.

BAE is now in a highly advantageous position. Not only is it a leading international arms corporation, it also enjoys an effective monopoly in many areas of UK procurement like aircraft and surface vessels, although it does face serious competition in other sectors. The DIS may be presented by the government as a long-term industrial and technological strategy to secure the UK's 'national security' but what it really does is conflate the interests of a private company with the interests of the country, even if this means that the UK has a very narrowly defined concept of advanced technologies and that the government continues to pour billions of pounds into specialised military R&D and procurement that has little application to the broader civil, industrial and technological base.

The UK is also locked into a form of dependency on the United States, partly in order to maintain access to higher-level technologies for advanced weaponry and support systems. Yet, the technological gap will continue to grow between the USA and second-tier states like the UK. Inevitably, there will be increased pressure to sell advanced equipment abroad, exacerbating regional security tensions.

From the perspective of the UK's long-term security and industrial needs, this is the worst of all possible worlds. It will continue with redundant platforms like aircraft carriers as a contribution to the United States global military posture; be a major contributor to a dangerous and corrupt arms trade that adds to regional insecurity; and spend billions on arms procurement and R&D that diverts vital industrial and technological resources from civil investment. Inevitably there will be a further hollowing out of domestic arms manufacturing and increased unemployment as the leading corporations look to international subcontracting, especially from overseas subsidiaries.

There is a need for a radical rethink of both security and industrial policies based on broader concepts of sustainable security and disarmament that encompass environmental, social and economic dimensions such as global warming, where the UK could make a major contribution to a new political economy of common security. This would require significant restructuring of the armed forces and the military-industrial base. The next chapter will focus on these issues, including alternative security policies, arms conversion and effective controls on the arms trade.

Chapter 3: The economics of military expenditure and arms conversion policies

Introduction

Here, the focus is on the economics of arms expenditure and the arms trade, as well as policy options for arms conversion. A brief review highlights the main critiques of military spending, followed by more detailed consideration of the various proposals for arms conversion, operating at the national, regional and sub-regional levels.

Emphasis is placed on alternatives scenarios that would lead to a radical restructuring of the military-industrial base, and substantial reductions in arms expenditure and arms exports. Funds could then be released for investment in a range of new civil technologies, like renewable energy systems, to address the real security challenges of climate change and environmental degradation, while also providing new employment opportunities, including those for workers previously in the arms industries. The few sub-regional economies with a residual dependency on arms production could be given support in the form of regeneration programmes that had, as their objective, the creation of a more diversified local economic base.

The economics of arms expenditure

It is the case that military expenditure is now less significant to the economy because of structural changes during the post World War Two era. Overall growth has led to a reduction in the proportion of GDP devoted to arms expenditure from an average of around 6% in the early 50s, to 2.2% in 2006.⁵² But, as highlighted in Chapter 1, the UK is second only to the USA in absolute terms and continues to spend proportionately more than any other medium-sized nation state on armaments (the nearest equivalent being France).

The main critique, then, remains one of the accumulated and ongoing opportunity costs of the UK prioritising scarce technological and industrial resources for armaments, rather than other productive uses in the civil sector, either in related areas of manufacturing or, more broadly, in other areas of public expenditure such as transport infrastructure or housing.⁵³ As long as the UK continues with the course pursued by successive governments of supporting the United States, there is no prospect other than continued real-term

increases to arms expenditure. Even then, serious strains on the MoD's budget are unavoidable.

Supporters of the military economy argue that it provides the UK with internationally successful, high technology niches in aerospace, engineering and electronics, as well as skilled jobs and spin-offs beneficial to the civil sector.⁵⁴ But the real cost has been the diversion of resources from other forms of manufacturing activity that, if the government has shown a similar long-term investment, could have generated greater employment and direct benefits to the civil economy through improved technologies and industrial processes.⁵⁵ Research and development represent a good example of this diversion, with the government spending £2.6bn a year on armaments, about 30% of total central government R&D expenditure in 2004/05. In contrast, the government spent only £37m on renewable energy R&D in 2005, or about 2% of gross military R&D.⁵⁶

The privileged position of the military economy is also revealed in government support for the arms trade both through direct promotion and through hidden subsidies that mask the true costs. Since 1966, the government has had a specialist unit, DESO, operating in the Ministry of Defence and employing over 400 staff to promote arms exports.⁵⁷ DESO's role has become increasingly controversial, with criticism of its special status compared to government support for other export-oriented industries. After a strong campaign led by Campaign Against Arms Trade (CAAT) and other Non-Governmental Organisations (NGOs), the government recently announced the decision to close DESO, but some of the staff will be transferred from the MoD to the Department for Business, Enterprise and Regulatory Reform (formerly the DTI) and the promotion of the arms trade will be maintained as part of the general support for exports.⁵⁸

Other forms of hidden subsidy continue, including the Export Credit Guarantee (ECG), predominantly taken up by companies in the arms trade, through which the government provides security for contracts should companies not receive payment from the overseas purchaser. Allied to this subsidy are failures with the commercial licence agreements between the MoD and private contractors. In recognition that R&D support from the government contributes to the profits on export deals, companies agree to pay a licence fee, but in practice the payments are small and do not reflect the full value of this support. According

to a recent critique, the combined cost to the government of these forms of direct and hidden support amounted to between £453m and £936m per year.⁵⁹

Similar arguments are made for the arms trade as are made generally for arms expenditure: that it represents an important source of revenue and employment to UK companies. An added benefit from arms exports is said to be the reduction of unit costs of equipment through longer production runs, providing savings to the MoD. But this view takes no account of hidden subsidies, nor of the pressure that can be put on UK governments to support the procurement of domestically produced equipment when less expensive alternatives are available abroad.

In the 1990s, a clear example was the decision to split the purchase of a major helicopter contract between the UK-based Westland company and the American Boeing company, despite the fact that the latter's was acknowledged to offer much the better deal:

The costs of introducing an additional helicopter type into service and creating a mixed fleet are inevitably higher than those of an all-Chinook fleet. In reaching this decision, the Government have also taken full account of the wider implications for the aircraft industry. They have invested some £1.5bn in the development of the EH101 family, which is central to Westland's comprehensive design and manufacture capability...and it will help to secure the future of the United Kingdom helicopter design and manufacturing capability and so strengthen the United Kingdom's aerospace industry.⁶⁰

The decision to purchase the BAE Hawk trainer aircraft in 2003 was driven both by concerns over the industrial base and also potential loss of export orders. BAE was awarded the contract worth £800m for production and £2.7bn for future servicing, despite being in competition with Aermacchi, part of the Italian, Finmeccania group that offered a cheaper and more capable alternative. In a rare example of public dispute between civil servants and politicians, the permanent secretary at the MoD, Sir Kevin Tebbit, refused to sign off the contract until directed to by the Defence Secretary, Geoff Hoon, who cited broader technological and industrial issues as the reasons for abandoning competitive tendering in this case.⁶¹ The future of BAE's Brough plant in East Yorkshire was uncertain, and the loss of the MoD contract would, according to the government, have seriously damaged prospects for exports. Indeed, Mr. Hoon treated the securing of an export contract for Hawk with India as a vindication of his decision.⁶²

The government argues that these are exceptional cases but they reflect the close identification between the MoD and leading manufacturers on what constitute strategically

important industrial and technological assets that must be preserved, even if it means the UK purchases more expensive and/or less capable equipment on the basis of supporting arms exports.

Finally, the government, despite assertions to the contrary, never takes into serious consideration the wider impact of the arms trade in exacerbating regional tensions; the propping up of authoritarian and anti-democratic regimes; the mire of corruption that surrounds these deals (as with Al Yamamah); and the opportunity costs to countries, particularly developing countries, of prioritising military expenditure against the pressing needs for other social and welfare spending.

Arms conversion and alternative security policies

Any serious programme for arms conversion must begin with the assumption that it is possible for the UK to adopt a radically different concept of security, involving substantial reductions in overall arms expenditure and strong restrictions on the arms trade. Because this may seem unrealistic, many proposals for reform tend to focus on particular elements such as the campaign to cancel the follow-on Trident nuclear or to curb the arms trade with 'countries of concern', i.e., those with a very poor human rights record whose governments might use military equipment for internal repression.

However, all too often, the terms of reference are set in such a way as to leave the essentials of the UK's military-industrial base and the commitment to high levels of arms expenditure unchallenged. For example, many advocates of nuclear disarmament argue that the savings from the cancellation of Trident could be used to enhance conventional forces, in the hope of persuading mainstream opinion that the UK will retain strong defences without a nuclear element. Nor do proposals for restrictions on the arms trade with individual countries usually address the broader international context, where the purchase of sophisticated military equipment adds to regional tensions and draws more countries into dangerous and expensive arms races. If domestic procurement remains at high levels then there will be a strong supply-side dynamic to continue as a leading arms exporter.⁶³

Arms conversion should be seen, rather, as the economic dimension to a radical programme of disarmament and common security. Instead of proceeding with the next generation of large-scale military platforms, both nuclear and conventional, the UK could adopt a range of alternative policies, such as a refocusing of its international role towards

UN peacekeeping.⁶⁴ While certain basic defence functions could be maintained, including protection of domestic borders and territorial waters, the security context would be one that prioritised broader concerns of environmental and economic security, using the savings from reduced military expenditure to support civil programmes of R&D and production. These could include a major expansion of renewable energy and energy efficiency programmes with the objective of reducing carbon emissions and dependency on oil and gas imports, while also stimulating new industries and employment opportunities.

A recent analysis of the savings alone from the cancellation of Trident and the aircraft carriers suggests that these could be £5.3bn a year over the expected lifetime of the two programmes, translating into a potential cut of 1.25 pence in the basic rate of income tax, or increased capital investment in schools and hospitals.⁶⁵ Such analysis is useful in highlighting the long-term commitments inherent in maintaining the operational infrastructure. But the critique of global power projection could be extended to the bulk of UK major projects, with potential savings of 40% in procurement expenditure by 2012 – allowing for compensation claims in the earlier years.

Obviously, there are serious debates about future priorities and options, even within this radical framework, and the following is intended only to illustrate one potential way forward. If the UK decided to enhance its role in UN peacekeeping, it might want to invest more resources in conflict resolution and peacekeeping with greater emphasis on post-conflict reconstruction through support for infrastructure programmes, education, effective civil security and judiciary systems, etc.⁶⁶ Some new programmes might be required, including military transport aircraft for international peacekeeping and conventional submarines for continued territorial defence.

Here, the objective would be to adopt an EU-wide procurement policy that provided for a significantly reduced military equipment requirement. For example, if diesel-electric submarines were chosen for coastal patrols, production could be focused at one site. In this case, the German company HDW, now part of the Thyssen-Krupp group, is best placed to carry out the work. Other naval production sites in Europe would be closed down. A similar process could be carried out for other specialist requirements.

This military-industrial capacity would represent only a very small proportion of the EU's manufacturing base. For other general peacekeeping and conflict prevention activities, it will be possible to utilise the EU's broader, civil, industrial and technological capacity, so that the vast majority of companies supplying the EU corps would manufacture arms

only as a small proportion of their overall activities and not in a specialist capacity.

In the longer term, then, the EU would have what could be described as a normalized, peace-time industrial structure, with only a small niche of specialist arms manufacturers, themselves geographically dispersed rather than concentrated in particular countries and regions, and where civil R&D and production would dominate all sectors. The institutional power of the military-industrial networks would have been broken and the supply-side pressures on governments to support artificially high levels of military expenditure, specialist military R&D and production, and the arms trade, brought to an end.

Approaches to arms conversion

Assuming a 40%–50% cut in military R&D, procurement and arms exports, the UK's military industrial base could see the loss of between 130,000 – 150,000 arms-related jobs over a five-year period. As emphasised in Chapter 2, these are relatively small numbers, both in the context of overall UK employment, and also in comparison to the restructuring that took place in the 1980s and early 1990s when arms employment fell by over 200,000.

Recent research initiatives provide further evidence on how these losses can be absorbed. The most detailed was a joint study carried out by independent academics and MoD economists assessing how a reduction in arms exports would affect employment. According to this, halving arms exports from 1998–99 levels would result in the loss of nearly 49,000 jobs in the arms sector, many at relatively high wages, but these would be offset by the creation of around 67,000 jobs over a five-year period as normal market adjustments led to investment in other sectors of the economy. The overall net costs to the economy from unemployment and reduced output in the early years would be between £0.9bn and £1.4bn, but as investment shifted, overall net income would be substantially the same by the end of the period.⁶⁷

This supports the general case made here that overall employment losses would be relatively small, that these sorts of employment adjustments are continually taking place in a modern economy and that after a short time lag, the impact of reduced arms expenditures is either, at worst, neutral or, at best, positive. However, the report does acknowledge that some sub-regional and local economies, dependent on arms production, face more severe adjustment problems. Here, various arms conversion approaches might be used to maximise the benefits of reduced military expenditure while

providing particular assistance to these arms-industry-dependent communities.

One approach is to use government expenditure to maintain macro-economic demand by matching the savings from military cuts with increases in other areas. If overall demand is sustained then employment prospects can be enhanced through a range of potential improvements to overall employment, since the ratio of job creation to expenditure is higher in many areas of civil work than in military production.⁶⁸

While macro-economic conversion helps to maintain overall demand in the economy, it does not directly bear on those workers affected by the decline in arms production. Here, arms conversion models focus on the specialist, military niches of the economy and on local concentrations of employment. The traditional, 'swords into plowshares' approach has been to support programmes for alternative civil production on site, and owes its continued popularity to the successful experience at the end of World War Two, when a much larger transition from military work to civil production and employment, involving millions of people, was achieved.

However, this was mainly a reconversion exercise, back to the civil manufacturing carried out prior to the outbreak of war. Since then, across the range of military production,

specialist companies have evolved whose expertise lies in the integration of systems that must operate under extreme performance conditions and also satisfy the MoD's almost byzantine bureaucratic requirements. It may be possible to identify associated areas of civil production, e.g. civil telecommunication satellites for military aerospace and electronics companies but, even here, the trend has been towards acquisition and what could be described as company diversification rather than conversion on site. Government support for site-based conversion risks expensive failure, given the inevitably high transition costs of turning specialist military production facilities to civil work, especially in the face of competition from existing companies with civil expertise.⁶⁹

Instead the focus should be on support for new forms of economic activity at the sub-regional or local level to compensate for the run down or closure of arms industries. This is a familiar scenario, played out on many occasions, when a staple industry faces rationalisation. Normally, a regeneration package will include retraining, incentives for new industries and for the employment of workers made redundant, land reclamation and new business parks, etc.⁷⁰

As arms employment has declined significantly at the national level, there are now only a handful of sub-regions with what could be described as a residual dependency and where significant reductions in UK procurement and arms

exports would have some impact. Specifically, these are Barrow-in-Furness, Cumbria (BAE shipyard – manufacture of nuclear submarines); Plymouth, Devon (Babcock Naval Systems, Devonport Dockyard – refits of nuclear submarines and surface vessels); Preston, Lancashire (BAE Systems, fighter aircraft); Yeovil, Devon (Finmeccania (Agusta/Westland), helicopters); Brough, East Yorkshire (BAE, military-trainer aircraft) and Glasgow (BAE shipyards, surface vessels). Not surprisingly, these reflect the concentrations of production and employment in the North West and the South West as identified in the national statistics, as well as the dominance of BAE in arms production (See Table 11).

There are other large sites such as Atomic Weapons Establishment (AWE) at Aldermaston near Reading, but these are in areas of relatively high employment and growing skills shortages, reflecting the generally buoyant state of the economy in the South East and where a range of opportunities already exist for alternative work. Also discounted are areas where arms employment was traditionally important but has now declined to a point that it is no longer significant to the local economy as in Newcastle and Manchester.

A complicating factor is the employment impact further down the supply chain. For example, Rolls Royce is a key player in nuclear power systems for submarines and jet engines for fighter aircraft, with sites in Derby and Bristol respectively. Also, there can be local specialisms, such as the concentration of military electronics in parts of London and Edinburgh. But these facilities are smaller than the main 'systems integrator' sites, tend to be located in prosperous regions, and are, therefore, relatively less important to the local economy. At the lower levels of the supply chain there are some specialist arms suppliers, but the majority of subcontractors provide equipment for both military and civil products and local sub-contractor dependency does not seem to be a significant factor, although more research is needed on supply chain issues.

It must be stressed that even in these remaining arms-dependent sub-regions, the pattern has been one of significant job losses during previous periods of restructuring, a subsequent reduction in the value of arms production to the sub-regional economies and continuing uncertainties about future employment.

Various studies have been carried out during the last twenty years that identify the scale of this decline. For example, three studies were carried out of the Devonport dockyard and the naval base since the early 1990s, assessing their contribution to both the local economy of Plymouth and also to the sub-region of Devon and Cornwall in the immediate surroundings of the city.

In 1991 both facilities generated about £520m of income for Devon and Cornwall, representing 5% of regional income. By 1998, after a series of redundancies, this had declined to £376m, or 2.7% of regional income, while providing 10% of all local employment in the Plymouth area. The latest study for 2005 showed a further fall from 2.7% of regional income to 2.0% and from 10% to 8% of all local employment. While these local studies may use different methodologies for calculating the indirect employment and economic activity generated by the local multiplier effect, they all consistently demonstrate a pattern of long-term decline in both direct and indirect employment in the local economy.⁷²

Yet, because these sites represent a remaining core of manufacturing, they figure highly in regional and sub-regional economic strategies. Various elements are emphasised, including the continued importance to the overall regional economy, the gross value added (GVA) of skilled employment and the relationship between prime contractors and local subcontractors etc. In the case of military aerospace in Lancashire, for example, much is made of its high-technology status, with a 'world-class' manufacturing capability.⁷³ While this devotion to continued sub-regional dependency on arms production is predictable, serious questions exist about the future prospects for these local economies in the face of international restructuring.

At issue is how far regions should adopt a cluster model or a diversification strategy. The cluster model has achieved a high profile, especially in these arms-dependent sub-regions, because it provides a case for specialising in a particular sector of the economy, building on what are considered to be existing strengths.⁷⁴ Broadly, under a cluster approach, regional economic agencies look to support what they consider to be key, high technology industries, usually centred on a large prime contractor, and encourage the development of a local network of specialised sub-contractors. International recognition as a high-technology industry in military aerospace, or naval shipbuilding, etc, helps re-inforce this image and is attractive to both public and private stakeholders as a high-profile example of successful economic development.

Critics of the cluster model argue that specialisation can lead to vulnerability, including exposure to changing market conditions. Rather than reliance on one sector of the economy, the objective should be to support the ongoing development of a broader manufacturing and service-sector base. Not only can this prove more robust to changes in market conditions, it can also offer more opportunities for cross-fertilisation and innovation between sectors leading to improved productivity and new start-up industries.

Table 11: Major arms projects and local dependency⁷¹

Site	Contract	MoD/export	Numbers	Value	Peak years	Employment
BAE Warton, Lancashire	Eurofighter 3rd TRANCHE Eurofighter	MoD Saudi Arabia	Up to 88 72	£6bn £4.3bn	2009–2016 2008–2016	5,000
BAE Samlesbury, Lancashire	JSF Unmanned aircraft	MoD MoD	Up to 150 Development	£10–15bn £142m	2010–2020	4,300
Westland Yeovil, Somerset	Lynx Merlin	MoD USA	70 23	£1bn	2006–2012	3,800
BAE Barrow, Cumbria	Astute submarine Aircraft carrier	MoD MoD	6–8 1	£5–8bn	2004–2012 2010–2016	3,400
BAE Yarrow/ Scotstoun, Glasgow	Type 45 Destroyer Aircraft carrier	MoD MoD	6–8 1–2	£6bn	2005–2012	3,200
BAE Brough	Hawk Hawk	MoD India	28 66	£800m £800m	2006–2009 2006–2009	2,200
Devonport Plymouth	Trident refits	MoD	4	£1bn	2004–2012	2,000

These issues are complex, since most regional economic strategies seek to strike a balance between supporting existing strengths and encouraging the development of new industries, so the two approaches need not be mutually exclusive. But diversification does signify a very different set of parameters for gauging success over the medium to longer term. For example, the emphasis might be on Small and Medium Sized Enterprises (SMEs) and the potential to build new businesses, rather than on giant corporations and their supplier networks. Alternatively, it might be on attracting public sector employment by working with central government to disperse civil servant jobs from London and the South East to areas of higher unemployment. It might even focus on developing cooperatives and community enterprises with the objective of generating a local multiplier to keep earnings in the local economy, rather than on gross value added, when much of the income generated can be spent outside the local area by commuters or external suppliers.

Of course these alternatives are simply not as 'sexy' as a high-technology cluster model and can be viewed with suspicion by agencies that are already under pressure to raise their economic performance towards that of the more successful regions like the South East, using traditional performance indicators of regional GDP.

At its most acute, this pressure can lead to economic agencies being captured by particular interests. The attempts to attract inward investment during the 1980s and 1990s as compensation for the loss of staple industries in areas like the North East, Scotland and South Wales, led to intense competition between UK regions. Various bidding wars took place, including one for new television assembly and computer chip factories, planned by LG, a Korean-based electronics company, employing up to 6,000 people directly, while supporting a range of local subcontractors. South Wales put together a package involving £247m of Regional Selective Assistance (RSA) and other public funding, which was successful against smaller bids by other regional agencies.⁷⁵

However, because of intense global competition, the semiconductor plant never opened, and the television factory employed a much smaller workforce than anticipated, peaking at 1,200 in 2001 before eventually closing in 2003. Criticism centred on how the Welsh Development Agency (WDA) neglected other potential types of regeneration, especially support for local SMEs, in the attempt to secure LG's investment.

Various forms of regional and industrial aid have been used to support arms manufacturers, including grants for upgrades of equipment and for training, infrastructure investment in terms of business park facilities and transport

links, as well as funding overseas trips to promote armaments at various international business fairs. It should be stressed that this use of state funds fulfills the criteria for grant support focusing on creating or sustaining manufacturing employment in areas of relatively high unemployment. But when support reaches a certain level, it runs the risk of excluding or neglecting options that might generate greater economic benefit because they do not fit the cluster model.

Therefore, sooner rather than later, it is essential to recognise the vulnerability of these residual arms production sites and the need for effective regional and sub-regional policies to support diversification. BAE's factory at Brough in East Yorkshire faces an uncertain future with the probability of serious job losses and even closure. The MoD contract for twenty Hawk jet trainers will have been completed by the end of 2008 and while the numbers involved in the Indian export order appear to provide sustained work, the reality is very different. Of the sixty-six aircraft to be delivered, forty-two are being built in India by Hindustan Aeronautics Ltd in a generous offset agreement that was negotiated by BAE to secure the deal. Work on the earlier export order with South Africa is due for completion this year and the work on Indian Hawks being built in Brough, will also run out by the end of 2008.⁷⁶

Employment is heavily dependent on securing future export orders but those prospects look increasingly bleak, as reflected in the recent decision by the United Arab Emirates to drop the Hawk from its competition for a future replacement trainer aircraft in favour of cheaper alternatives from South Korea and Italy. Hawk will inevitably face similar pressures on future export orders.

Previously, BAE has secured Hawk contracts with Saudi Arabia as part of the Al Yamamah deals, but there is no indication that the recently negotiated extension based on the purchase of the Eurofighter/Typhoon aircraft even includes an option for future Hawk orders. The company could be left in the position of building Hawks without any firm export orders after 2008. If the only Hawk-related work available in the future is refits and upgrades, then the company would have major over-capacity and the closure of the Brough plant would be inevitable.

The prospects for Warton and Samlesbury are more complicated but also uncertain. Typhoon/Eurofighter is the UK's most expensive arms programme, currently estimated at £19bn for 232 aircraft. In many ways it represents the classic Cold-War white elephant since its original purpose was for air-to-air combat against Soviet MIG jets and it has had to be repackaged as a multi-purpose aircraft for air and ground attack roles.⁷⁷ None of the participating countries seem particularly enthusiastic about fulfilling their original

production quotas, with continued speculation that order numbers will be substantially reduced. It has also been markedly unsuccessful in export markets apart from a sale to Austria and the Al Salam deal with Saudi Arabia.

In the UK's case, the final tranche of the MoD contract for eighty-eight aircraft should have been confirmed in 2007 but the contract details are still to be announced. The MoD seems to be considering a delay to production and/or a reduction in the final tranche number, given the budgetary pressures of continuing with such an expensive programme, even though BAE could activate penalty clauses for compensation. This would make the Al Salam contract essential for continuity of production, particularly at the Warton site, which has been most heavily involved in previous Al Yamamah programmes.⁷⁸ What appeared to be a relatively secure period involving the production of one hundred and sixty Typhoon aircraft could turn into a highly uncertain one, almost totally dependent on an authoritarian regime in a highly unstable region.

Compared to aerospace and its dependency on arms exports, the shipbuilding sector is almost completely reliant on UK MoD contracts. In the short to medium term, there are several major contracts, including the Type 45 destroyers, the Astute Class nuclear submarines and the aircraft carriers that will sustain production at the BAE Clyde shipyards and in Barrow, which will possibly require some increased employment to deal with the bulge in production. But this should not disguise the long-term trend of declining employment, as the MoD has made it clear that it sees any future naval orders being based on upgrades rather than the building of expensive new platforms.⁷⁹

Further rationalisation of production capacity is inevitable, especially as BAE will want to utilise cheaper overseas facilities and concentrate its UK work on the added-value elements of upgrades such as electronic equipment. One of the Clyde yards, therefore, faces run down and probable closure by 2015 as BAE will look to consolidate its surface vessel capacity at one facility.

Both Barrow and Devonport are heavily dependent on the MoD for nuclear submarine production and repair and, if a decision were taken not to proceed with the Trident replacement, it is doubtful if BAE would keep the Barrow yard open beyond 2015 unless other conventional nuclear submarine work was provided in compensation. Devonport would continue with a reduced workforce for refit work on the remaining conventional nuclear submarine fleet and surface vessels. Of all the larger sites, the Westland Yeovil operation seems relatively secure since it has both a long-term contract with the MoD for seventy Super Lynx helicopters and export orders with Oman and the USA amongst others.

Clearly, the regional economic development agencies in these areas need to recognise the dangers in relying on an inappropriate cluster model. Central government, likewise, needs to support them on long-term regeneration planning through retraining and restructuring programmes that can lead to a diversified local economic base and be resilient to changing economic circumstances. As with many other areas of the country that have faced the loss of a staple industry and a period of readjustment, it is entirely feasible for these arms-dependent areas to achieve a successful transition to a diversified economic base that offers enhanced employment prospects.

A political economy of common security

The economic restructuring for local economies may be relatively straightforward and manageable but arms conversion has a much more ambitious and radical agenda than to simply smooth the transition process for existing arms-dependent areas. Traditionally, peace research has included an economic dimension that can be traced back to the founding of the UN and to calls for international disarmament and development. As early as 1950, the UN's 'Peace Through Deeds' resolution urged efforts to:

...reduce to a minimum the diversion for armaments of its member nations human and economic resources and to strive towards the development of such resources for the general welfare, with due regard to need of the underdeveloped areas of the world...and to devote part of the savings achieved through such disarmament to an international fund, within the framework of the UN, to assist development and reconstruction in underdeveloped countries.⁸⁰

Similarly, in the early 1980s, the Independent Commission on Disarmament and Security Issues, under the Swedish Premier, Olof Palme, argued that the military basis of relations between countries was increasingly irrelevant in a world that faced a series of growing economic and social crises. What was needed was a new common security approach that prioritised international development issues and the Commission called for a graduated programme of cuts in nuclear and conventional forces leading to general and complete disarmament as a longer-term but achievable objective.⁸¹ Extending the concept of common security, the World Commission on the Environment and Development under Gro Harlem Brundtland, the Norwegian Prime Minister, focused on the growing environmental crisis that needed concerted international action:

Nature is bountiful but it is also fragile and finely balanced. There are thresholds that cannot be crossed without

*endangering the basic integrity of the system. Today we are close to many of these thresholds.*⁸²

While generally recognised as a seminal report in its advocacy of sustainable development, particularly to tackle global warming and ozone depletion, it also stressed the importance of disarmament in releasing resources that could be used for new forms of renewable energy production and energy efficiency programmes.

The major elements of a common security framework were now clear: military preparations fed insecurity rather than creating the conditions for a stable international peace; the very concept of security needed a complete overhaul in order to incorporate environmental, economic and social dimensions; Western societies had to embark on a new sustainable economic development path; and a proportion of savings from military spending had to be redirected to international aid and development.

Since the publication of these reports the gap between rich and poor nations has increased, arms budgets have expanded and the environmental crisis is even more acute, with dire warnings of environmental breakdown and severe disruptions of normal economic conditions, including the possibility of conflict over natural resources. The need for national and international action within a common security framework becomes ever more imperative.

In the UK, an important international lead could be made through adopting a political economy of common security by matching cuts in military expenditure with ambitious environmental programmes. For example, the UK could adopt a programme of renewable energy investment to provide R&D funding and investment for a new generation of offshore wind and wave power equipment. Since the 1970s it has been recognised that this offshore capacity could satisfy as much as 50% of overall electricity generation – in turn significantly reducing the UK's carbon emissions, and dependency on overseas supplies of oil, gas and uranium.⁸³

The contrast can be made with Denmark during the same period, which made a commitment not to build nuclear power stations and instead pursued renewable energy options, particularly wind power. Over twenty years, through various incentives including guaranteed linkage to the national grid, the Danish industry followed what could be considered a classic technological trajectory. From fairly small-scale turbines, the industry developed the expertise to move towards larger and offshore systems that collectively now provide over 25% of Denmark's electricity generating requirements, as well as developing into a global export industry. Overall, some 25,000 – 30,000 people are now

employed in the sector and there are plans for a further expansion of capacity.⁸⁴

If the UK government invested a similar sum, small in comparison to military R&D, to pursue technological innovations for deep-sea, offshore wave and wind power, it would form the basis of a new industry, creating manufacturing employment in the construction of platforms, turbines and wave power machinery, electricity cabling, etc. The government could offer regional incentives to locate some of these industries in areas facing the closure of arms factories

Unlike macro-economic conversion that emphasises overall aggregate demand, a common security approach puts greater emphasis on government as a catalyst for new industries to satisfy a broader framework of security in the face of serious environmental and associated economic threats. This could see skilled, civil manufacturing work replace arms-related work in those military-dependent localities. Indeed, there may even be skill shortages and a requirement to attract an increased workforce to those areas as new industries expand.

Conclusion

The UK has carried a heavy burden of military spending for a medium-sized state, with serious opportunity costs in the form of lost investment for other areas of civil R&D and production that could have delivered greater economic value and increased employment. While arms companies and their supporters attempt to legitimise the contribution of arms expenditure to the economy in terms of technological innovation, skilled manufacturing employment, etc, the reality is a diversion of scarce resources from more productive uses, an array of hidden subsidies that hide the true costs, and corrupt practices to support a trade that adds to regional tensions and potential conflict while damaging the prospects for real development.

Rationalisation of the arms industries has been an ongoing process through the 1980s to the present day. Arms related employment makes up a tiny proportion of overall national employment and there are now only a small handful of local areas with a residual dependency on arms production. Arms conversion policies, in their various forms, attempt to address these issues by offering viable alternatives in the event of reductions in military expenditure and the run down or closure of arms industries. At the macro-economic level, the adjustment required from a 40% cut in the arms procurement budget is relatively straightforward over a five-year period, assuming that the government provides compensatory expenditure in the form of other civil investment and maintains aggregate demand.

The main policy dilemma is how to deal with the local concentrations of production and employment. A traditional 'swords into plowshares' approach underestimates the structural problems of transforming a specialist arms manufacturing facility into one geared for the very different demands of civil production. The alternative is to support programmes that help diversify the local economic base, a familiar strategy for areas facing the loss of staple industries.

An added difficulty is how regional and sub-regional agencies have been captured by the arms industries and embrace a cluster model that emphasises the importance of a particular specialism, whether military aerospace or naval shipbuilding. The focus of economic strategies becomes how to build local-industry expertise in supporting this specialism, however vulnerable the sub-regional economy might be to the loss of a major contract, rather than to build a diversified economic base.

So, for all the boosterism around world-class, high technology industries, the fact remains that there have been considerable job losses at these specialist arms firms and the cluster strategy has become incredibly dependent on the fate of either large UK arms contracts and/or arms export deals that now look vulnerable. These include Barrow's reliance on a replacement for Trident, Brough's lack of follow-on orders for Hawk aircraft, and Warton's dependency on the Eurofighter contract with Saudi Arabia.

Just as the Shah of Iran's grip on power looked unshakeable in Iran during the 1970s and Western arms companies

seemed set to secure long-term contracts through the time-honoured fashion of bribery and corruption, a similar pattern is unfolding in Saudi Arabia where the Al Saud monarchy could be overthrown in the face of growing internal opposition. Is it either economically prudent or morally acceptable to base a major plank of a regional economic strategy on an arms deal with a corrupt and authoritarian regime that itself looks increasingly vulnerable?

A more radical model of arms conversion, based on a political economy of common security, would require a fundamental re-orientation from dependency on the USA and long-range power projection, towards territorial defence and international peacekeeping. Where demand for specialist military equipment remains, this can be satisfied through an EU-wide procurement policy and the rationalisation of capacity. Savings from arms expenditure would be transferred into a common security programme that, in the face of threats from global warming and resource depletion, prioritises environmental and economic security, especially through renewable energy programmes that reduce the UK's carbon emissions and increase security of supply.

Overall, the economic benefits of conversion far outweigh the short-term adjustment costs that would be incurred by the run-down in arms expenditure. These consist of a normalised, peace-time industrial structure, a range of opportunities for skilled manufacturing work, and diversified local economies no longer dependent on arms production or the arms trade.

Conclusion

Arms production in the 21st Century is structured as a military-industrial network dominated by the United States through its giant arms corporations and supported by loyal but minor allies like the UK. Massive increases in American military expenditure under the Bush administration are intended to extend its acknowledged global supremacy, from full-scale invasion to precision attacks against localised targets, in order to secure what are considered to be strategic necessities, mainly energy resources and raw materials.

In support of global reach, the USA has constructed a web of overseas military bases and has sold advanced weaponry to client states like Saudi Arabia, no matter how authoritarian, and corrupt the leaders of those countries might be and no matter how such sales might destabilise regional security. The terrorist attacks of September 11th 2001 may have provided the ideological justification for 'permanent war' based on pre-emption, but both the strategy and the global infrastructure for 'full-spectrum dominance' were already in place well before then. While it may be viewed, therefore, as the product of an extreme and unrepresentative neo-conservative junta in temporary control of the White House, the reality is that the main tenets are shared by both the major political parties and reflect the institutional power of the dominant military-industrial elites.

Supplying the arms for permanent war provides US-based corporations with a multi-billion dollar market based on domestic demand and the international arms trade, ensuring a continuous stream of R&D and procurement for advanced systems. European arms corporations have recognised that their future rested on access to US arms contracts and there has been a growing trend for US acquisition, led by BAE Systems. The company is now one of the largest in the USA and generates most of its profits and employment from US-based operations. Other European giants like EADS and Thales have followed a similar course. At the same time they have all pursued increased arms exports as an essential support to their growing presence in the United States. Alongside this, BAE has consolidated its domestic base with an effective monopoly position in UK arms procurement.

The Bush administration is comfortable with foreign ownership of arms companies as long as it does not disturb the supremacy of US corporations in sophisticated, first-tier military technologies and because these companies are required to maintain key capabilities in the USA in order to gain access to DoD contracts. A similar hierarchy exists in

the arms trade and is tolerated by the USA because it enjoys a clear lead in providing advanced weapons systems to the major importing states, including the most recent contracts, worth \$20bn, with Saudi Arabia, and the other five members of the Gulf Co-Operation Council: Kuwait, Qatar, Oman, Bahrain and the United Arab Emirates.

The arms sales of second-tier European companies like BAE in Saudi Arabia, India and South Africa may be seen as competitive, but, taken in the context of the international military-industrial network, can be viewed as complementary since they help tie key regional allies into the US security framework. By extending the orbit of countries willing to increase their military expenditures, they also enhance the prospects for the sale of more sophisticated US equipment in the future. These recipient countries do have some leverage in return for lucrative contracts and are given offset and licensing agreements which allow them to upgrade production facilities and capacity for indigenous arms production, making them attractive as lower cost subsidiaries or subcontractors to the giant arms contractors, therefore re-inforcing the network.

The internationalisation of arms production, then, is characterised by a hierarchy of military-industrial firms dominated by US-owned giant corporations and supported by second-tier companies led by European contractors, offering less-sophisticated military equipment; the extension of US-dependent, military-industrial networks across the globe and the growing significance of foreign subsidiaries and subcontractors for the giant corporations, as arms manufacturing is hollowed out in its traditional locations in the USA and Europe and arms-related employment declines there.

The political leverage that the US can apply through its technological supremacy is rarely acknowledged but it best exemplified by the UK's subservient, even supine role. While various influences shape policy and, in the UK's case, there is an Atlanticist consensus across the main political parties, the fear of structural disarmament and the determination to maintain access to US technologies has been a potent factor in the long-standing policy to support the US in global power projection.

This subsidiary role is symbolised by the purchase of two new aircraft carriers, the biggest surface vessels ever constructed in the UK, but ones that can be only used

effectively as part of a much larger US battle group. These military behemoths are one-part post-imperial delusion, maintaining the semblance of world-power status, and another-part calculated signals of strategic support, ensuring access to the range of sophisticated arms technologies only available in the United States. The price is subservience to US foreign policy and a multi-billion pound waste of resources on equipment that provides no real security for the UK, serving only to promote an international arms race and regional instability.

Somehow, the international community has to break out of this increasingly dangerous cycle of militarism and arms trading if we are to avoid regional conflicts and create the conditions for disarmament and development. In this context, the UK could play a pivotal role in forging a new and independent policy that looked to address the real security challenges of the 21st Century.

Initially, the focus of military preparations could shift to territorial protection through border and coastal defences, complemented by an enhanced role for peacekeeping operations with the emphasis on civil reconstruction programmes. For example, the UK could form part of a broader EU peacekeeping/civil reconstruction force that could provide support for UN-mandated operations.

A new security framework would mean that many of the major procurement programmes, including replacements for Trident, the aircraft carriers, and conventional nuclear submarines, are no longer required. There would be a similar radical impact on arms exports since severe restrictions would be placed on the types of military equipment available for sale and the suspension of all arms exports to areas of regional tension like the Middle East and the Persian Gulf. Where specialist military equipment was still required, it would be possible to adopt an EU procurement approach that ended over-capacity. For general peacekeeping and civil reconstruction the objective should be to utilise the much broader civil manufacturing base.

Compared to most proposals for reform, these may seem idealistic, but it is imperative that a radical alternative is offered to the present policies of renewed militarism and the threat of war. At present, 'realistic' alternatives look to the cancellation of Trident, with savings re-allocated to other conventional programmes and to modest controls on the arms trade with reference to internal conditions of democracy in the recipient countries.

But leaving the main structures of the military-industrial network intact in the hope of incremental reform simply reinforces the UK's subsidiary role to the United States and hopelessly underestimates the scale of the UK arms industries' institutional power. No more depressing example

could be made than the perversion of democracy over the corrupt Al Yamamah deal when any last vestiges of political accountability were trampled underfoot as the government and BAE colluded to prevent the completion of a criminal investigation by the Serious Fraud Office (SFO).

Inevitably, the adoption of a radical security framework would lead to an outcry from the arms industry with its ritual incantations that disarmament would lead to economic meltdown and massive job losses. This is only to be expected and needs to be kept in perspective. Pursuing a combination of territorial defence, an enhanced peacekeeping role and significant reductions to the arms trade would lead to further restructuring of the military-industrial base in the UK with the loss of 130,000-150,000 jobs over a five year period. This is small as a proportion of overall employment at the national level and research supported by the MoD's own economists demonstrate how new employment opportunities will compensate for lost arms industry jobs. Put simply, this is the sort of transition that normally takes place as people move from one sector of employment into another.

Only in certain sub-regions would there be a more serious adjustment problem, where the workforce is still dependent on military programmes, either for MoD contracts, arms exports or a combination of both. These military-industrial sites are very few in number and even at these sites employment has already fallen considerably during the last twenty years, as part of the longer-term restructuring of the arms industries.

Rather than focus on alternative civil work on site, the traditional approach of swords into plowshares, which faces serious structural obstacles, the emphasis should be on a diversification programme for the local economy to provide alternative work. This is a familiar scenario for areas facing the loss of a staple industry, and, if carried out effectively, can lead to the creation of a broader manufacturing and service sector base that is no longer dependent on any one industry.

Many institutional barriers presently exist to a radical arms conversion programme, not least the military-industrial network that promotes arms research and production at the national level and the regional economic development agencies' promotion of arms production as a 'world-class' manufacturing capability. What is desperately needed is the sort of strong political leadership the country enjoyed at the end of the Second World War, when millions of workers successfully transferred from military to civil production; or the political vision shown by the first Wilson government in the 1960s when there was at least the recognition of the need for civil reconstruction and modernisation of the manufacturing base, utilising the government's military research establishments for civil purposes.

In the face of growing environmental threats, a political economy of common security would look to the UK making a massive investment in renewable energy as a contribution to international efforts at combating global warming, while reducing dependency on overseas energy supplies and providing significant new employment opportunities that would more than compensate for the loss of arms work.

None of this looks remotely possible at present. Under New Labour, the nearest attempt to an arms conversion programme was the setting up of the Defence Diversification Agency (DDA). Contrary to the hopes of some reformers who saw the Agency as supporting attempts by arms manufacturers to diversify their product base, the DDA was never intended to be more than a modest technology transfer programme for the MoD's research establishments. It is now set for closure, its last remnants submerged in what is known as the 'Plowshare fund', a suitably Orwellian perversion of the language since the objective is not to convert military technologies to peaceful purposes but to sell licence agreements that can generate an income stream to fund further arms research.

The trends of increased military spending and the proliferation of conventional and nuclear weapons looks set to continue and, like the grim period of militarism prior to

the First World War, a cycle of action and reaction will lead to increasing international tension. Indeed, Boris Zaharoff, the leading salesman of the Vickers armaments company in the 1900s, would have felt entirely at home in the modern world. Providing naval equipment to both Germany and Britain in the run-up to World War One; building a major subsidiary in Russia after its defeat by Japan in 1905; fomenting an arms race between Greece and Turkey – these were just a few of the ways Vickers promoted arms sales, and all fuelled by bribes and other forms of corruption.

The parallels with today's arms trade are obvious but the opportunities are, if anything, now even greater. Vickers entered a period of unprecedented profitability, making Zaharoff an immense personal fortune along the way. He was feted by the government as the head of a world-class British business, prior to the bloodbath of World War One.

The UK is entering a critical period where it can continue to feed the arms machine and the Zaharoffs of this world or take a leading role in forging a new era of international disarmament and a political economy of common security. Rather than an economic threat, disarmament represents a real economic opportunity. All that is required is the political will to achieve it.

Notes

- 1 There are difficulties in defining arms industries and production. Weapons range from large systems to small arms, while numerous other general commodities like fuel are supplied to the military. Companies that make up the military-industrial base will also differ, both in the degree of their dependence on military production and in their importance to the military-industrial base. Key contractors are increasingly systems manufacturers integrating a variety of subsystems into a complete final product and it is this prime contractor level that is the focus of the report.
- 2 Trevor Taylor and Keith Hayward, *The UK Defence Industrial Base – Development and Future Policy Options* (Brassey's Defence Publishers, 1989) for an overview of UK arms industry restructuring during the post-war period.
- 3 The Panavia consortium was established in 1969, with the United Kingdom and Germany each having 42.5% stake and the remaining 15% going to Italy. Collaboration proved to be a highly bureaucratized process, with inefficiencies and extra costs due to negotiations over work sharing, changes to specifications and incorporation of different subsystems to suit national requirements. See John Birkler, Mark Lorrell, Michael Rich, *Formulating Strategies for International Collaboration in Developing and Producing Defence Systems* (Rand Corporation, 1997) for a general critique of international collaboration.
- 4 CFM International supports a range of jet engines jointly developed by the companies.
- 5 *SIPRI Yearbook 2001*, p. 236. (Stockholm International Peace Research Institute, OUP, 2001)
- 6 See Project on Demilitarisation, *The Triumph of Unilateralism – The Failure of Western Militarism* (Prodem, 1993).
- 7 John W. Dowdy, 'Winners and Losers in the Arms Industry Downturn', *Foreign Policy*, Vol 104, 1997, pp 88–101. The US government had encouraged this process with Les Aspin, the Defense Secretary convening the 'Last Supper' meeting in 1993 with leading arms industry managers, but by 1998 there were concerns that concentration had reached the stage where the larger corporations could achieve monopoly power. As a result, Lockheed's bid for Northrop Grumman in 1998 was blocked.
- 8 See Chapter 2.
- 9 *SIPRI Yearbook 2003*, p. 2004.
- 10 *SIPRI Yearbook 2007*, pp. 388–89
- 11 <http://news.bbc.co.uk/1/hi/business/4324733.stm>. The Iraq and Afghanistan occupations increased US demand for fighting vehicles and BAE has positioned itself as an international leader in this sector.
- 12 The \$4bn purchase of ARMOR Holdings, responsible for the HUMVEE military-vehicle fleet has also been approved, further extending BAE's market position in the United States. http://www.baesystems.com/Newsroom/NewsReleases/2007/autoGen_107631191035.html
- 13 Important issues here were the continued public ownership or part-ownership of arms companies such as the DCN shipbuilding company in France and the difficulties of agreeing shares of production, etc. See Michael Broszka and Peter Lock (eds), *Restructuring of Arms Production in Western Europe* (OUP, 1992).
- 14 Prior to setting up the EDA, the Organisme Conjoint de Cooperation en matiere D'Armement (OCCAR) set up by France, Germany, Italy and the UK in 1996, had been working to enhance cooperation on defence procurement. The EDA is intended to extend that on an EU-wide basis. See, European Defence Agency, *An Initial Long-Term Vision for European Defence Capability and Capacity Needs* (EDA, 2006) Competition is emphasised in various EU reports including, *Towards a European Union defence equipment policy*, adopted by the European Commission in 2003 (COM (2003) 113 final).
- 15 The market for major weapons systems would probably have become more highly concentrated, like that for civil aircraft or pharmaceuticals, if national governments had not inhibited the growth of multi-national firms to protect their military-industrial bases.
- 16 Paul Dunne and Eamon Surry, 'Arms Production', p. 393, *SIPRI Yearbook 2006*, pp. 387–448 (OUP, 2006).
- 17 Stephanie Neuman, 'Defence Industries and Global Dependency', p.439, *Orbis*, Vol 50, No 3, pp. 429–452.
- 18 Frank Slijper, *The Emerging EU Military Industrial Complex: Arms Lobbying in Brussels* (TNI Briefings 2005/1, Transnational Institute, 2005) www.tni.org/reports/militarism/eumilitary.pdf. The NDA changed its name to the Security and Defence Agenda (SDA) in 2006.
- 19 International Institute for Strategic Studies, 'Complex Irregular Warfare – The Face of Contemporary Conflict', pp. 411–420, *The Military Balance – 2005–2006* (IISS/Routledge, 2005)

- 20 David Isenberg, *Budgeting for Empire: The Effect of Iraq and Afghanistan on Military Forces, Budgets and Plans* (Independent Institute, 2007) www.independent.org. Highlights both the increase in US arms expenditure of 27% up to \$439bn but the real figure could be as high as \$567 if the budget included elements not normally counted such as the Dept of Energy's expenditure on nuclear weapons. While the plans include an enlarged cadre of special forces, the DoD is also planning to increase the number of major platforms including the doubling of submarine production.
- 21 See Peter Singer, 'Outsourcing War', *Foreign Affairs*, pp. 119–133, Vol. 84, No. 2, March/April 2005. KBR (formerly Halliburton's Kellogg, Brown & Root subsidiary) currently provides supplies for troops and maintenance for equipment under a contract thought to be worth as much as \$13bn.
- 22 For example, BAE agreed offsets with S. Africa on a major arms deal that included the sale of 24 Hawk trainer aircraft and 28 Gripen fighters (jointly with SAAB of Sweden) but has now created a jointly-owned company with Denel, the State-owned South African company that specializes in fighting vehicles. *Financial Times*, 31/05/2007
- 23 See Keith Krause, *Arms and the State – Patterns of Military Production and Trade* (CUP, 1996)
- 24 After the failure of the Suez invasion in 1956, a major defence review was carried out by Duncan Sandys, the Conservative Minister of Defence. Conventional forces would be reduced from 690,000 to 375,000, to be compensated by the development of nuclear weapons. Malcolm Chalmers, *Paying for Defence – Military Spending and British Decline*, pp. 66–67 (Pluto Press, 1985). The decision to purchase Polaris nuclear missiles from the United States marked the beginning of the UK's dependency on American military technology, heavily influencing its future strategic relationship as a junior partner.
- 25 The White Paper noted that military expenditure absorbed 10% of Britain's gross national product over the previous five years, that an undue proportion of qualified scientists and engineers was engaged in military work and that financing overseas commitments placed a heavy strain on the balance of payments. *Ibid.*
- 26 Richard Coopey, 'Restructuring Civil and Military Science and Technology: The Ministry of Technology in the 1960s', in Richard Coopey, Matthew Uttley, Graham Spinardi, *Defence Science and Technology Adjusting to Change* (Harwood Academic Publishers, 1993). Labour was also committed to cancelling the Polaris nuclear weapons programme but it was subsequently retained because the costs of cancellation were judged to be too high.
- 27 Tony Benn, *Speeches by Tony Benn* (Spokesman Books, 1974).
- 28 National Peace Council, *The Arms Salesman* (NPC, 1966). This sort of Orwellian doublespeak is all too common in support of the arms trade.
- 29 The Aircraft and Shipbuilding Industries Act 1977 nationalised large parts of the UK aerospace and shipbuilding industries and established two corporations, British Aerospace and British Shipbuilders.
- 30 Steven Schofield, 'The Levene Reforms: An Evaluation' *Defence Analysis Vol. 11*, No. 2. pp. 147–74, 1995.
- 31 In 1999 GEC demerged Marconi Electronic Systems and sold this on to British Aerospace, subsequently renamed BAE Systems. The remaining Marconi company focused on telecommunications but suffered a massive financial crisis at the height of the dot com collapse.
- 32 The government was heavily criticised for selling Rover to BAE as the preferred bidder for only £150m when the company was independently valued at over £800m. There was speculation that the government had only wanted the purchase to go ahead in order to avoid selling Rover to a foreign company and that BAE had no long-term commitment to the company. The subsequent sale to BMW for £800m in 1994 was, itself, highly controversial, http://news.bbc.co.uk/1/ontoday/hi/dates/stories/february/1/newsid_2523000/2523129.stm
- 33 *Financial Times*, 11/6/2007.
- 34 EADS is under pressure from the British government to maintain Airbus composite wing work in the UK, with the MoD threatening to withdraw from a contract for a tanker fleet (using a military variant of the Airbus) worth £12bn. *Western Daily Press*, 27/01/2007.
- 35 US sales in the last financial year were up from 36% to 42% of total sales and the company employs 36,000 people in the United States. There is even a possibility that BAE might be floated on the US stock market. *Financial Times*, 08/05/2007
- 36 *Times*, 04/05/2007
- 37 The process of privatisation has been controversial, with the initial investors expected to receive massive windfall profits from the full flotation. *Guardian*, 13/1/2006. The government retained control of the Defence Science and Technology Laboratory with partial flotation of Qinetiq, in 2002 and 'full' privatisation in 2006. The Carlyle Group – An American-based corporation with several military-related subsidiaries took the majority interest, although the state has retained a 25% stake.
- 38 Qinetiq's US takeovers include Apogen Technologies in 2005 for £160m and the ITS Corporation in early 2007.
- 39 Smiths was taken over by GE in May 2007 for \$4.8m as it offered both avionics and landing gear specialisms to contribute to the GE's strength in engine design and

- production. <http://www.oligopolywatch.com/2007/01/22.html>
- 40 *Aviation Week and Space Technology*, 12/09/2005.
- 41 The Defence Analytical Services Agency (DASA), publishes an annual Defence Statistics report which is the standard reference here, unless otherwise stated: www.dasa.mod.uk
- 42 http://www.awe.co.uk/aboutus/the_company_eb1b2.aspx
- 43 AJW Turner, NJ Bennett and BL Nolan, *Estimated UK Regional Employment Dependent on Ministry of Defence Expenditure*, pp. 4–6 for an explanation of the approach (*Defence Statistics Bulletin*, No. 7, March 2007, DASA)
- 44 *Defence Industrial Strategy*, Cm 6697 (House of Commons, December 2005), also builds on the MoD's *Defence Industrial Policy*, MoD Policy Paper No. 5 (MoD, 2002)
- 45 How seriously the MoD takes this can be gauged from the recent dispute with Halliburton over the role of its subsidiary, Brown and Root, responsible for nuclear submarine refits at the Devonport naval yard. When Halliburton decided to sell Brown and Root without prior consultation, the MoD invoked its 'golden share' clause and intervened to guarantee that the future of the yard was secured. Devonport was eventually sold to Babcock International, already responsible for the Rosyth naval yard and for the Clyde submarine bases in Scotland.
- 46 National Audit Office, *Ministry of Defence, Major Projects Report 2006*, p. 13 (HC 23–I, 2006–07). In 2003 the Astute contract was renegotiated to separate the design, development and build of the first of class from the follow-on submarines, with the MoD paying an extra £430m and the company contributing an extra £250m. As of 2006, the cost of the three submarines had increased to £3,656m from the original £2,578m, and the in-service date for the first-of-class had been put back from 2005 to early 2009.
- 47 *Financial Times*, 10/4/2007
- 48 It has developed a Maritime Industrial Strategy, (MIS) as part of the broader DIS, in which the leading corporations are expected to carry out a radical restructuring that tackles what the MoD sees as wasteful duplication of facilities in the industrial base. BAE and VT's new alliance will probably mean the latter ceding its manufacturing role to concentrate on its specialism as a systems integrator.
- 49 For an overview see Michael Brzoska, 'The Economics of Arms Imports after the End of the Cold War', *Defence and Peace Economics*, Vol 15, No 2, pp. 45–64.
- 50 There are serious allegations of corruption surrounding the Al Yamamah deal and although the UK investigation was dropped by the Serious Fraud Office, the United States authorities have instigated their own

- under the 1997 Foreign Corrupt Practices Act. *Guardian*, 27/06/2007.
- 51 Robert Neild, *Public Corruption – The Dark Side of Social Evolution*, pp. 139–143 (Anthem Press, 2002) estimates that one tenth of all arms sales turnover is in the form of bribes.
- 52 See Malcolm Chalmers, *Paying for Defence – Military Spending and British Decline*, p. 44 (Pluto Press, 1985) and Economic Intelligence Unit, *UK Profile 2006* (EIU, 2007).
- 53 Steve Chan and Alex Mintz, *Defence Welfare and Growth* (Routledge, 1992) and Seymour Melman, *Pentagon Capitalism: The Political Economy of War* (McGraw Hill, 1970)
- 54 Oxford Economic Forecasting, *The Economic Contribution of BAE Systems to the UK and Implications for Defence Procurement Strategy* (OEA, 2004)
- 55 Lloyd J. Dumas, Marek Thee (eds), *Making Peace Possible – The Promise of Economic Conversion*
- 56 Chris Langley, *Soldiers in the Laboratory – The Militarisation of Science and Technology, and Some Alternatives*, p.34 (Scientists for Global Responsibility, 2005).
- 57 *Financial Times*, 10/07/2007.
- 58 *Financial Times*, 15/07/2007.
- 59 Paul Ingram & Roy Isbister, *Escaping the Subsidy Trap: Why Arms Exports are Bad for Britain* (BASIC, 2004).
- 60 *Hansard*, 9th March 1995, cols 461–468.
- 61 *Guardian*, 10/12/2003.
- 62 http://www.caat.org.uk/caatnews/Issues/2003_10/hawking-for-india.php
- 63 For more ambitious proposals on curbing the arms trade see Ed Cairns, *Arms Without Borders: Why a Globalised Trade Needs Global Controls* (2006), www.controlarms.org. Also, David Isenberg, *From the Frying Pan Into the Fire: US Arms Sales and Military Assistance to the Persian Gulf and Middle East* (2007), www.basincint.org/pubs/Papers/BP55.pdf.
- 64 Steven Schofield, *The UK and Non-Offensive Defence*, Security Studies Network (2002), also see Ian Davis & John Gittings (eds), *Britain in the 21st Century: Rethinking Defence and Foreign Policy* (Spokesman, 1996).
- 65 Paul Dunne & Sam Perlo-Freeman, *The Opportunity Cost of Trident Replacement And The Aircraft Carriers* (Greenpeace, 2007), <http://carecon.org.uk/Users/paul/Greenpeace%20draft.pdf>.
- 66 For an historical perspective on peacekeeping see Michael Harbottle, *What Is Proper Soldiering? A Study on New Perspectives For The Future Use of The Armed Forces*. (Centre for International Peacebuilding, 1991). Dan Plesch and Jack Seymour, *A Conflict Prevention Service For The European Union* (British American Security Information Council, 2000) provides an overview of how the force might be structured.

- 67 Malcolm Chalmers, Neil Davies, Keith Hartley and Chris Wilkinson, *The Economic Costs and Benefits of UK Defence Exports* (Centre for Defence Economics, York University, 2001) The underlying economic framework for this analysis is a general equilibrium model of the economy with variable time lags. The study took into account all defence-related exports including products and services. (Lack of adequate data on arms imports was one serious finding of the research, since with the changing structure of the industry, import-content of equipment based on aerospace statistics would be not less than £2bn.)
- 68 Terry Barker, Paul Dunne & Ron Smith, 'Measuring the Peace Dividend in the UK', *Journal of Peace Research*, Vol. 12, No. 4, 1991, pp.359–375.
- 69 Peter Southwood, *Disarming Military Industries – Turning an Outbreak of Peace Into an Enduring Legacy*, pp. 9–15 (Macmillan, 1991).
- 70 N. Cox and N. Hooper, The European Konver Programme, *Defence and Peace Economics*, Vol 7, 1996, pp. 75–94.
- 71 These figures are based on a variety of sources including journals, national and local media and government reports. Further information is available from the author.
- 72 Paul Bishop, *The Economic Impact of Devonport Dockyard and Naval Base* (South West Economy Centre, University of Plymouth, 2005), www.devonport.co.uk/images/economic-impact-study.pdf. See Also Stuart Dunlop, Fraser of Allender Institute, Strathclyde University 2005, for an analysis of the economic impact of the Govan and Scotstoun shipyards. http://www.lancashire.gov.uk/office_of_the_chief_executive/lancashireprofile/misc/baesystems.asp, provides an overview of the role of the Warton and Samlesbury sites in Lancashire.
- 73 See <http://www.nwda.co.uk>
- 74 Paul Bishop & Peter Griapos, 'Explaining Spatial Patterns of Industrial Diversity: An Analysis of Sub-regions in Great Britain.' *Urban Studies*, Vol. 44, No. 9, pp. 1739–1757, August 2007.
- 75 Nicholas Phelps, John Lovering and Kevin Morgan, 'Tying the Firm to the Region or Tying the Region to the Firm', *European Urban and Regional Studies*, Vol. 5, No. 2, 1998, pp.119–137. About £30m of the regional aid was eventually repaid by the company.
- 76 *Hull Daily Mail*, 18/10/2007.
- 77 Ian Davis and Emma Mayhew, *What Happens When a White Elephant Meets a Paper Tiger? – The Prospective Sale of Eurofighter/Typhoon Aircraft to Saudi Arabia and the EU Code of Conduct on Arms Exports* (British American Security Information Council, 2004)
- 78 *Financial Times*, 17/9/2007.
- 79 See Chapter 2 of the *Defence Industrial Strategy*
- 80 Marek Thee, 'The Establishment of an International Disarmament Fund for Development', *Bulletin of Peace Proposals*, p. 52, Vol. 12, No. 1, 1981, pp. 52–100.
- 81 Olof Palme, *Common Security – A Programme for Disarmament, Report of the Independent Commission on Disarmament and Security Issues* (Pan Books, 1982).
- 82 Gro Harlem Brundtland, *Our Common Future, The World Commission on Environment and Development* (Oxford University Press, 1987).
- 83 Department of Energy, *Energy Research and Development in the UK*, Energy Paper, No 11 (Department of Energy, 1976).
- 84 Bara Douthwaite, *Enabling Innovation – A Practical Guide to Understanding and Fostering Change* (Zed Books, 2002) and <http://www.scandinavica.com/culture/nature/wind.htm>