

From Offensive Insecurity to Sustainable Security: The Role of Science and Technology

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<http://www.sgr.org.uk/>

Presentation at SGR conference, St Thomas Hospital, London, 16 November 2013

We will talk about...

- Current security strategies
 - ‘Offensive insecurity’
- Progressive security strategies
 - ‘Sustainable security’
- Key role of science and technology
- Focus on UK
- *Start with quick review of SGR’s work in these areas...*

Scientists for Global Responsibility research up to 2010

- 'Soldiers in the Laboratory' (2005)
 - Detailed report on military sci/tech, especially in UK (and links to US), incl. funding, lobbying, ethical & political issues
- 'Scientists or Soldiers?' (2006)
 - Ethical issues and potential for alternative careers
- 'More Soldiers in the Laboratory' (2007)
 - Assessed new UK government/ industry military programmes
- 'Behind Closed Doors' (2008)
 - Examined growing military involvement in UK university sector
- 'Science and the Corporate Agenda' (2009)
 - In-depth report including chapters on military corporate sector and fossil fuel industry
- *Chris Langley, lead researcher*



Other SGR activities include education work – including presentations to academics, peace campaigners, and students; articles in specialists media etc – and advocacy work with SGR members and other campaign groups on issues related to military involvement in R&D
Reports listed in references

Latest SGR research

- 'Offensive Insecurity' (2013)
 - Authors: Stuart Parkinson, Barnaby Pace, Philip Webber
 - Assessment of shift in recent UK security policies
 - Detailed new programme-level data on UK military R&D
 - Detailed new programme-level data on R&D on tackling the roots of conflict



- Policy shift seen in National Security Strategy and Strategic Defence and Security Review – both in 2010
- Detailed military R&D data using freedom of information (FOI) requests
- Detailed civilian R&D data from publicly accessible databases and FOI requests
- Parkinson et al (2013)

The UK's offensive military capability

UK is major military power

- UK military budget is world's 4th largest
- UK is one of 5 'declared' nuclear weapons states
- UK forces active in recent major conflicts
 - e.g. Afghanistan, Iraq, Libya
- UK is home to world's 3rd largest arms company
 - BAE Systems
- UK is 6th largest arms exporter

- UK military budget was \$60.8 bn in 2012 – world's 4th largest behind USA, China and Russia
- UK military spending per person: more than 2 times that of Russia; more than 10 times that of China
- UK spending per person/ per unit GDP is much larger than EU average
- UK nuclear weapons stockpile being reduced to 180 warheads (see later)
- UK is home to world's 3rd largest arms company – BAE Systems
- UK is 6th largest arms exporter behind USA, Russia, Germany, France and China

Main references: Stockholm International Peace Research Institute (2013); Parkinson et al (2013)

Approach to national security

- Government military/ defence strategy based on:
 - High technology, especially 'networked' technologies
 - Prominent role for 'offensive' weapons systems
- Major role of military corporations
 - Often monopoly suppliers
- Involvement of scientists/ engineers essential
 - Large budgets for Research and Development

Parkinson et al (2013)

Offensive capability

- Defined by...
 - Destructive area/ capability
 - Range
 - Mobility
 - Use in overseas operations
- 'Force projection'

Destructive area/ capability

- especially if very little ability to discriminate between soldiers and civilians
- nuclear weapons especially high

Range

- ability to strike outside UK or NATO's borders
- Typhoon's recently modified to carry out long-range ground strikes

Mobility

- ability to be easily deployed effectively outside UK's borders
- aircraft carriers especially mobile

Use in overseas operations

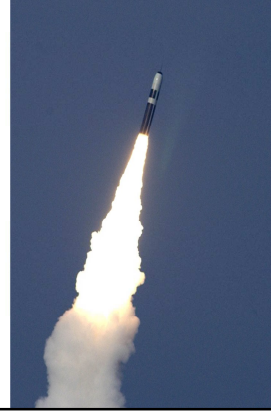
- plays an integral role in active overseas conflict
- includes specialist long-range transport such A400M's

Some allowance can be made for limited use in peace-keeping operations

Parkinson et al (2013)

Key offensive systems

- Nuclear armed submarines (current)
 - 4 submarines armed with Trident missiles
 - 180 nuclear warheads
 - 1 submarine deploys explosive power of 4,000,000 tonnes TNT
- Nuclear armed submarines (future)
 - 3 or 4 submarines armed with Trident missiles
 - Final decision in 2016



Nuclear armed submarines

- Each warhead has explosive power of 100 kilotonnes TNT (8 times Hiroshima bomb)
- Each submarine can carry up to 40 warheads (4 million tonnes TNT)
- Final decision on replacement of Trident system ('main gate' decision) to be taken by Parliament in 2016

Parkinson et al (2013)

Key offensive systems

- Aircraft carriers
 - 2 Queen Elizabeth-class being built
 - Largest ships ever to be deployed by Royal Navy
- Long-range strike planes
 - Tornado: over 100 deployed
 - Typhoon: over 100 deployed
 - F-35/ Lightning II's being introduced

Aircraft carriers

- 1 aircraft carrier (Illustrious) shortly to be decommissioned; no current capability for carrying planes
- 2 QE to be the largest ships ever deployed by the UK Navy (3 times the size of the previous carriers); only 1 QE to be deployed

Strike planes

- Tornado slowly being phased out
- Typhoon (Eurofighter) recently modified for ground attack; numbers being increased
- F-35 Lightning II being phased in as Tornados retired

Parkinson et al (2013); DASA (2013)

Key offensive systems

- 'Hunter killer' submarines
 - 2 Astute class; 5 more to be commissioned
 - Major weapons system: Tomahawk cruise missiles
- Armed drones
 - MQ-9 Reaper (made in US)
 - UK armed drones under development
- Some other aircraft, warships

Hunter killer submarines

- 2 Astute class (5 more to be commissioned) – long-range; major weapons systems, including Tomahawk cruise missiles
- 5 Trafalgar class being phased out

Drones also known as UAVs/ RPASs

Attack helicopters

- including Lynx, Apache; Future Lynx/ Wildcat being introduced
- Current force has significant offensive capability, including deployment on aircraft carriers

Other warships

- 19 destroyers and frigates; type 26 'Global combat ship' under development to replace frigates
- Current force has significant offensive capability

Parkinson et al (2013); DASA (2013)

Defence Equipment Plan 2012/13

- £160,000,000,000 over next 10 years
- Increase over current annual spending
- Against major government spending cuts elsewhere

MoD (2013)

Defence Equipment Plan 2012/13

	10 year budget (£ bn)
Submarines & nuclear weapons - incl. Trident replacement nuclear-armed subs; 5 more Astute Class conventionally-armed subs	35.8
Combat planes - incl. Lightning II & Typhoon fast jets; UAVs (drones)	18.5
Warships - incl. 2 Queen Elizabeth Class aircraft carriers; Type-45 destroyers; Type-26 Global Combat Ship	17.4
Long-range support aircraft - incl. Voyager & A400M for heavy lift, air-to-air refuelling	13.9
Armoured fighting vehicles - incl. Warrior, Scout	12.3
Helicopters - incl. Chinook, Apache, Puma and Wildcat	12.1
Weapons - incl. missiles, torpedoes and bombs	11.4
Contingency funds	8.0
Other	30.6
Total	160.0

- Ring-fencing of the military equipment budget while other MoD (and civilian) spending contracting
MoD (2013)

UK Military R&D

- £1.8 bn per year
 - Approx 1/6 of UK Gov R&D spending
 - One of the world's largest funders of military R&D
- Main research arm is Defence Science and Technology Laboratory (DSTL)
- Most of the budget is spent within industry

- Spending figures from DASA (2013) & BIS (2012) – R&D figures are 2008-11 average

MoD R&D: Top 6 programmes

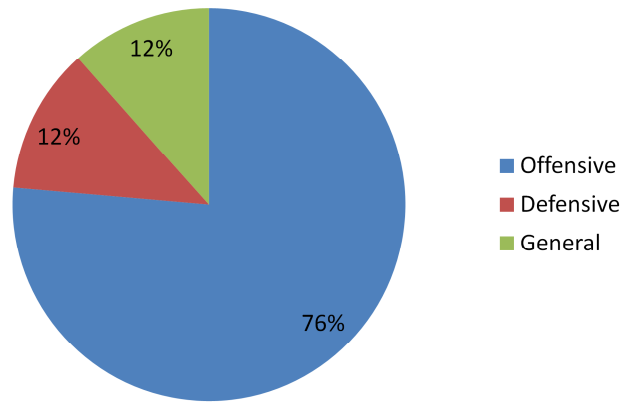
		Public R&D spending 2008-11
1.	Strike planes <i>Typhoon, F-35 Lightning II, Tornado</i>	£771m
2.	Attack helicopters <i>Mainly Future Lynx/ Wildcat</i>	£599m
3.	Long-range submarines <i>Conventionally-armed and nuclear-armed</i>	£392m
4.	Nuclear weapons (<i>mainly warheads</i>)	£317m
5.	Nuclear propulsion (<i>for submarines</i>)	£282m
6.	Unmanned aerial vehicles ('drones')	£195m

Parkinson et al (2013)

- All have major role in 'force projection', i.e. offensive
- These are minimum figures due to incomplete MoD data

- Other areas of interest include missile systems, communications systems, warships, cyber-security, body armour, chemical/biological/radiological/nuclear defence, emerging technologies etc
- These are minimum figures – 1/4 of MoD R&D spending not clearly documented at programme level
- In public relations, the 'life-saving' contribution of military R&D projects is often emphasised, e.g. soldier armour, although in practice this is a small proportion.

UK military R&D: main roles



Parkinson et al (2013)

Total military R&D spending, 2008-11: £5.4 billion

- Classifications based on military/ academic literature (more discussion of this later)

UK nuclear warhead R&D

- Atomic Weapons Establishment (AWE), Aldermaston
- Major expansion, involving new research facilities
 - Supercomputers; Orion Laser etc
- Collaboration with USA and France
 - New joint research centre with France
- Concern that these undermine nuclear weapons treaties
- R&D spending £100m per year
 - from total budget of £1 bn+



New facilities installed in recent years – details:

- Supercomputers (Blue Oak, Larch etc) – simulation of nuclear explosion
- Orion Laser – small-scale simulation of nuclear detonation, e.g. fusion and boosting
- Materials testing laboratory – to study behaviour of nuclear weapons components

New joint research centres with France – as part of 2010 Teutates agreement

- Joint radiographic/ hydrodynamics facilities – Teutates EPURE at Valduc, France, and Teutates Technological Development Centre at AWE, UK
- Claimed not to be connected to development of new nuclear warheads, but major doubts remain, especially regarding whether they undermine the Nuclear Non-proliferation Treaty and Comprehensive Test Ban Treaty.

Sources:

AWE annual reports and other related documents. <http://www.awe.co.uk/>

Parkinson et al (2013); Nicholls (2011)

Photo: Trident nuclear missile (Crown copyright)

Robotic aircraft/ Drones R&D

- Rapidly developing technology globally
- UK situation:
 - Armed drones first deployed in 2007
 - Collaboration with Israel to develop and deploy
 - BAE Systems: Mantis, Taranis
 - FLAVIIR: R&D involving 10 UK universities, inc. York
- Numerous concerns
 - e.g. civilian casualties



UK situation

- Drones initially deployed for reconnaissance, but from 2007 the UK began deploying (US-made) armed 'Predator' drones in Afghanistan. By 31 October 2012, the RAF had carried out 349 drone strikes.
- UK collaboration with Israeli military and arms industry to deploy and develop drones
- BAE Systems developing two armed drones: Mantis and Taranis
- 10 UK universities, inc. York, involved in R&D on drones (FLAVIIR programme) – ran from 2001-06 leading to test flight in 2010

Ethical concerns

- Armed drones kill more civilians per strike than manned warplanes

Sources: Drone Wars UK (2012, 2012b); Langley et al (2008); The Guardian (2013)

Photo: BAE Mantis (Mike Young)

Military & UK universities

- Numerous paths for military funding of R&D in universities
 - About £200 million a year, but figures very uncertain
- Government schemes
 - Through military labs, civilian Research Councils etc
- Corporate schemes
 - Large programmes run by Rolls Royce, QinetiQ
- Joint government-industry schemes in recent years
 - e.g. Defence Technology Centres (DTC)

- Government schemes run in conjunction with: Defence Science and Technology Labs (DSTL); Engineering and Physical Sciences Research Council (EPSRC)
- References: Langley (2005); Langley et al (2007, 2008)

International comparison of military R&D

Country	Proportion of total public R&D spending for military purposes	Public R&D spending for military purposes (\$bn)
USA	57%	76.7
UK	17%	2.2
South Korea	16%	2.1
France	15%	2.4
Japan	5%	1.4
Germany	5%	1.3

OECD (2012)

Public funding of military R&D in 2010: comparison of six major nations in the OECD (OECD, 2012)

Base year of 2005, purchasing power parity

Fuelling insecurity and supporting
unsustainable development:
the UK role

Consequences of UK military action

- UK military action – as part of international coalitions – has resulted in huge negative effects
- Civilian casualties
 - e.g. Iraq War: 128,000 (violent death only)
- The invasion of Iraq “substantially” increased the terrorist threat to the UK

Eliza Manningham-Buller

Director General, MI5 (2002 to 2007)

Iraq war casualties from IBC (2012)

Manningham-Buller quote from BBC News (2010)

UK arms exports

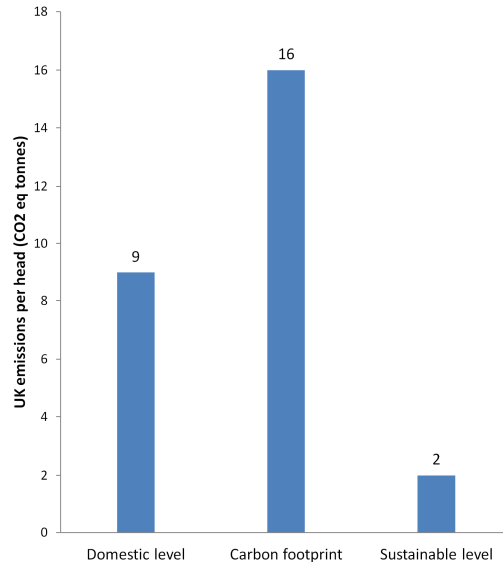
- UK is 6th largest arms exporter
- 2012: Gov figures suggest large expansion
- Recent recipients include:
 - Algeria, Bahrain, Libya, Saudi Arabia, Tunisia, Yemen
 - UK export licenses for Libya (2005-09): €119m
- Host of major arms fair
 - Defence and Security Equipment International (DSEi)

- UK is 6th largest arms exporter behind USA, Russia, Germany, France and China

References: Stockholm International Peace Research Institute (2013); Parkinson et al (2013); Committees on Arms Export Controls (2011); Official Journal of the European Union summarised in The Guardian (2011)

Climate change: UK emissions

- UK domestic greenhouse gas emissions 26% down from 1990 level
- Carbon footprint = domestic + imported – exported emissions
- Greenhouse gas emissions per head much higher than sustainable level



- Domestic GHG emissions – within UK borders – total: 2012 provisional figures from DECC (2013)
- Domestic UK level per head: 2011 figures from DECC (2013); Office of National Statistics (2013)
- Adjustment to calc total carbon footprint is 80% increase: CCC (2013). Carbon footprint estimate has greater uncertainty.
- Sustainable level per head: Hillman (2004)
- These figures are in carbon dioxide equivalent tonnes and are rounded (e.g. domestic per head level to 1 decimal place is 8.7 tonnes.)

Climate change and conflict

- Pressure on resources, including:
 - Water: more droughts; sea level rise
 - Food: falling crop yields; fisheries comprised; ecosystems vulnerable
 - Other land issues: flood risk; storms risk; droughts
- Environmental refugees
 - Projection: 150 million by 2050
- All can lead to conflict

e.g. Houghton (2004)

Fossil fuels & energy

- 88% of UK's primary energy from fossil fuels
- Fossil fuel/ energy industry very powerful
 - e.g. BP, Shell, 'Big Six'
- Very large fossil fuel subsidies
 - Estimate: £4.3 bn per year
- 43% of UK's energy use from imports
 - Including unstable parts of the world
- New oil/ gas exploration, including 'fracking'
- ..and then there's the nuclear issue...

- Energy stats for 2012 from DECC (2013)
- Subsidy estimate is calc from Overseas Development Institute (2013) which estimates \$6.8 bn for 2011

Broader environmental impacts

- Ecological footprint
 - Area required if all economic 'services' were provided by natural world
 - 6 categories:
 - Carbon; cropland; grasslands; forests; fisheries; built-up land
- UK is consuming resources equivalent to 2.65 planet Earth's
 - Need 60% cut

Ecological footprint is made up of:

- Forests needed to soak up carbon emissions
- Cropland to grow crops for food, fibre etc
- Grazing land for raising farmed animals
- Forests for timber, pulp and fuel
- Fisheries for seafood
- Built-up land for housing and other human infrastructure

Reference: WWF (2012)

Economic Injustice

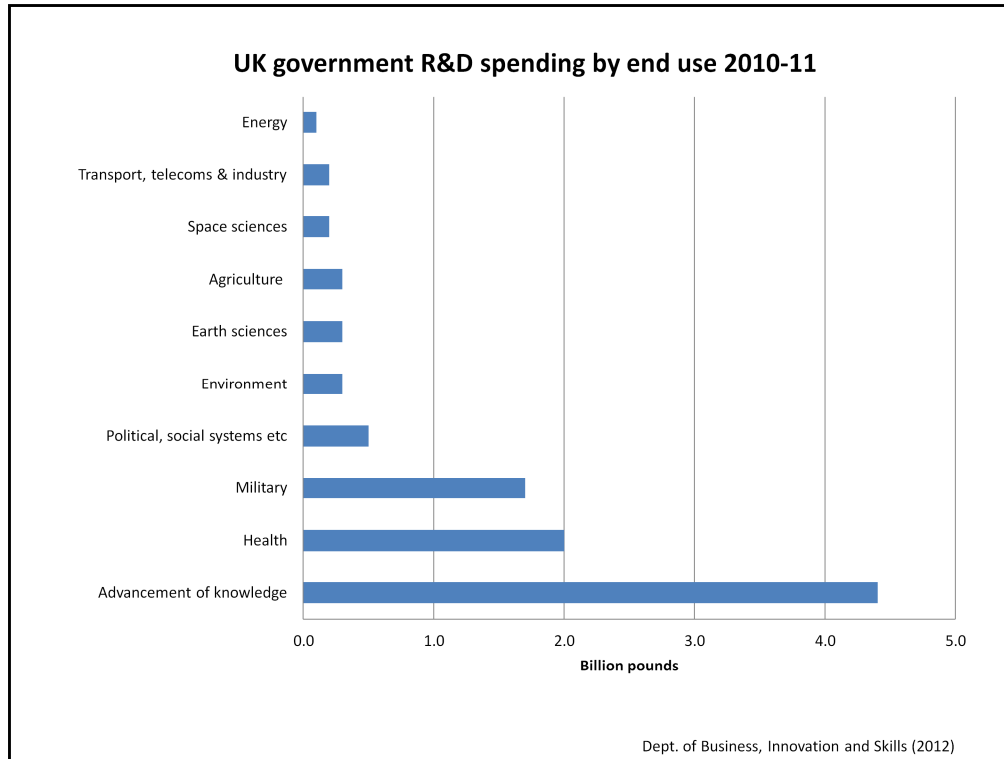
- UK government/ finance sector supports an unjust international economic system:
 - 1.4 billion people live in extreme poverty
 - Richest tenth of the world own 84% of wealth; bottom tenth own 1%
 - Unfair trade rules
- Growing unrest about this system

Parkinson et al (2013).

Unsustainable R&D

- UK fossil fuels R&D
 - Public spending
 - £20m per year and increasing
 - Industry spending: incomplete figures
 - Major oil companies each spending \$100m's per year
 - Industrial involvement in UK universities
 - £10m's per year
- But research councils only fund fossil fuel R&D on carbon capture and storage

References: IEA (2013); Langley et al (2009); Platform London et al (2013)



- Military R&D is spending by Ministry of Defence.
 - In the last year, health R&D spending has risen above military R&D for the first time on record.
 - Private R&D spending (by arms companies) is smaller and less certain – around a few hundred million pounds (Langley, 2005)
 - Further analysis is given later
- BIS (2012). Tables 2.4 & 2.2.

Moving to sustainable security

Defining sustainable security

- Security-related policies orientated towards tackling roots causes of major threats
- Four drivers of growing importance
 1. Competition over resources
 2. Global militarisation
 3. Marginalisation of the majority world
 - Economic inequality/ poverty
 4. Climate change

Reference: Abbott et al (2006)

UK National Security Strategy

- Published in 2010
- Government approach is starting to change
- Assessed wider range of security concerns than just military threats
 - Including environmental and resource problems, international development problems
- However, 'force projection' remains prominent

Source: HM Government (2010)

Non-Offensive Defence

- Important step in reducing militarism
- Focus military forces on narrowly-defined defence
- Cut the 'offensive' arsenal, especially:
 - Nuclear weapons
 - Aircraft carriers, long-range warships and submarines
 - Long-range 'strike' aircraft, missiles etc
- Eliminate/ minimise arms exports
- Shrink the military industry
- Some peace-keeping activities would be retained

- Under a Non-defensive defence policy, the armed forces retain the capability to defend national territory (and contribute to peacekeeping), but not to invade or mount a major attack
- The case for Non-offensive defence (although known under a variety of titles) has been made for decades.
- Can reduce arms races, international tensions and thus armed conflict

References: Parkinson et al (2013); Webber (1990)

Benefits from UK NOD policy?

- Nuclear weapons
 - UK cuts galvanise international efforts on nuclear ban treaty
- Arms exports
 - Exports to authoritarian regimes cut
 - UK drives other international arms control/disarmament efforts
- Defence equipment budget cut
 - £6-8bn/y extra to spend in other areas of economy

Speculative but possible!

International development

- UK aid budget has grown to £8.7bn/y
- Main areas
 - Health; governance and security; education; wealth creation
- Also
 - Climate change; humanitarian aid; poverty and hunger; water and sanitation
- However
 - Economic injustice, including unfair trade is key

Figures and details from UK Aid Network (2013)

Sustainable energy in the UK

- Major increases in home insulation over last 5y
- 11% of electricity now supplied by renewables
- Total energy supplied by renewables 3.5 times level in 2000
- World leader in offshore wind deployment
- Subsidies for renewable energy about £3bn/y
 - Reform underway...

- Increases in home insulation since 2008: 59% increase in loft insulation; 33% increase in cavity wall insulation
- Figures from DECC (2013); Oxford Energy (2013)

Sustainable security R&D

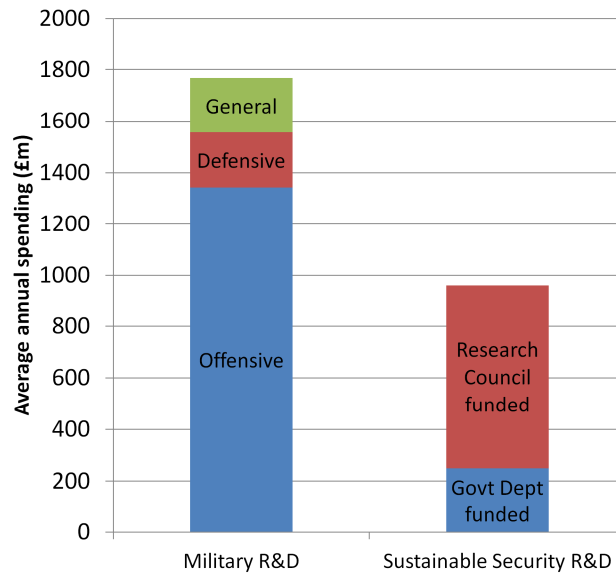
UK public funder	Annual average spending (£m) (2008-11)
Dept for Energy and Climate Change Incl. renewable energy, climate science, energy efficiency	20
Dept for Environment, Food and Rural Affairs Incl. flood management, non-energy GHG emissions	19
Dept for International Development Incl. conflict prevention, poverty alleviation, malnutrition	209
Engineering and Physical Sciences Research Council Incl. energy, climate change, sustainability	236
Natural Environment Research Council Incl. env./climate change, env. hazards, biodiversity, pollution	433
Economic and Social Research Council	11
Biotechnology and Biological Sciences Research Council	34
Total	961

- ESRC includes international relations, env. change, green economy
- BBSRC includes bioenergy
- Public spending on R&D for renewable energy about £60m per year

Parkinson et al (2013)

From offensive insecurity to
sustainable security:
a summary

Comparing UK security-related R&D



Parkinson et al (2013)

- Annual average figures over the period, 2008-11
- We estimate over £1 bn per year could be saved from offensive military R&D, some of which should be shifted to sustainable security R&D

A change in R&D priorities

- UK public R&D spending 2008-11
 - 2 to 7 times more spent on military than on 'sustainable security'
- New R&D priorities should be:
 - Arms control/ disarmament
 - Tackling environmental problems
 - Economic reform
 - Energy security
 - Food/ water security etc

Parkinson et al (2013)

A shift in direction for the UK

- Steps towards sustainable security
 - Cut main offensive weapons (incl. R&D): £6-8bn
 - Cut fossil fuel subsidies: £4bn
- Extra finance for energy conservation, renewable energy, disarmament, poverty alleviation etc
- International work to push for global change
- **A major UK/ international spending shift towards sustainable security is urgently needed**

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