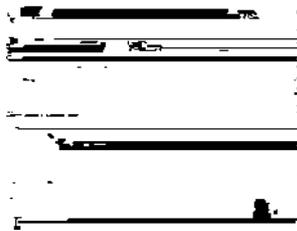


The Road to 2010

Addressing the nuclear question in the twenty first century



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Addressing the nuclear question in the twenty first century

Presented to Parliament by the Prime Minister, by Command of Her Majesty

July 2009

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Foreword by the Prime Minister

In recent months we have seen a growing determination to confront the strategic threat posed by the proliferation of nuclear weapons. Our objective remains the reduction and eventual elimination of all such weapons. But this cannot be achieved overnight. We must in the meantime develop a more coherent global strategy to harness peaceful nuclear power, and to establish the conditions where we can consider a world free of nuclear weapons.



The UK is playing a leading role in tackling the nuclear challenges we face today. And the momentum for concerted action is building. President Obama has announced plans for a nuclear security summit in Spring next year. And next May, the world will gather to review the Non-Proliferation Treaty, the key global agreement on the nuclear question.

We need to prepare ourselves for these critical moments. I hope that this report will lay the foundations to:

- establish the right conditions for nuclear power to play its part in combating climate change, global poverty, and energy shortages;
- ensure that nuclear material is held securely, to prevent it falling into the hands of terrorist groups or hostile states;
- take urgent action to address the proliferation of nuclear weapons; and,
- make progress in building the international partnerships needed to deliver a world free from nuclear weapons.

We must make urgent progress in all these areas. The UK has been both a civil and military nuclear power for several decades. We want to use this expertise to work with our international partners to shape this crucial international debate

If we do, I am confident that we can deliver in 2010 a renewed and enduring grand bargain on nuclear power, that can underpin our security and prosperity in the decades to come. It is a huge prize.



Rt Hon. Gordon Brown MP

Chapter 1

Executive Summary

The Strategic Context

1.1 Nuclear power is a proven technology which generates low carbon electricity. It is affordable, dependable, safe, and capable of increasing diversity of energy supply.

1.2 Nuclear power is therefore an essential part of any global solution to the related and serious challenges of climate change and energy security. Combating climate change, the single greatest threat to humanity this century, requires a much greater role for low carbon fuels in the global energy supply than before. Rising global energy demand, which is forecast to increase by more than 40 per cent by 2030, means that secure, sustainable energy supplies will be key to global security and prosperity in the century ahead. Nuclear energy is therefore vital to the challenges of sustaining global growth, and tackling poverty.

1.3 That is why the United Kingdom Government believes not only that there is a recognised right for all sovereign states to the peaceful use of nuclear power, but that it is necessary to expand access to civil nuclear energy.

1.4 The issue of nuclear power cannot, however, be looked at in isolation from the hostile use of nuclear technology: nuclear weapons. In expanding the use of nuclear power in the twenty first century we must not enhance the risk of further proliferation of nuclear weapons. We must not allow the spectre of nuclear war, the greatest security

threat for much of the second half of the twentieth century, to re-emerge.

1.5 Therefore we must ensure that the first pillar of the Nuclear Non-Proliferation Treaty (NPT) framework – preventing further proliferation, is strengthened. We must also ensure that terrorists groups, some of whom have the intent to acquire and use nuclear devices, do not acquire that capability. This requires a much stronger emphasis not just on preventing further proliferation of weapons and nuclear weapons technology, but also on securing existing stocks of fissile material¹ and denying access to relevant expertise.

1.6 But the challenge of our age is not just about preventing further proliferation, either to other countries or non-state terrorist organisations. The issue of nuclear disarmament must be addressed. Nuclear weapon states, including the UK, have a duty to work to create the conditions where further reductions in levels of nuclear weapons can take place.

1.7 The UK has taken significant steps towards disarmament by reducing the explosive power of its nuclear arsenal by three quarters since the end of the Cold War and maintaining a minimum strategic deterrent based on no more than 160 operationally available warheads. The UK Government remains committed to the principle of irreversibility in these reductions.

¹ Fissile material is defined for the purpose of this paper as high enriched uranium and plutonium

1.8 The UK's policy on its nuclear deterrent was set out in the 2006 White Paper 'The Future of the UK's Nuclear Deterrent'². Given the certainty that a number of countries will retain substantial nuclear arsenals for the foreseeable future and the continuing risk of further nuclear proliferation, it is premature to judge that a nuclear threat to UK national security will not arise in the future, and the Government therefore judges that our minimum deterrent remains a necessary element of our national security, as well as forming part of NATO's collective security.

1.9 Ultimately, we need to work to create the conditions for a world free of nuclear weapons. This means we must together renew and re-invigorate the global 'grand bargain' at the heart of the NPT. For non-weapon states, it is about continuing to forego nuclear weapons, whilst realising, if they wish, access to nuclear power. For nuclear weapon states, it involves tough responsibilities to show leadership on the question of disarmament, and to assist in framing a global solution that allows wider access to nuclear power.

1.10 The nuclear question we must address is how we ensure expanded access to nuclear power without risking further proliferation of nuclear weapons. Linked to this is how we move forward on global disarmament in respect of existing nuclear weapons.

The May 2010 Non-Proliferation Treaty Review Conference.

1.11 The run up to the 2010 NPT Review Conference represents a historic window of opportunity to recognise the global commitment to deliver on the three pillars of that treaty:

- preventing further proliferation of nuclear weapons;
- nuclear disarmament; and
- ensuring access to nuclear power.

1.12 The NPT, which has 189 signature states, including the UK, was last reviewed in 2005. That review conference was not as productive as we had hoped. It is essential that the next conference delivers renewed movement across this critical agenda. This paper sets out the UK's approach to this vital conference, and beyond, and describes a vision of how we can create the world envisaged by those who drafted the NPT in 1968.

1.13 The UK has shown global leadership across the three pillars of the NPT and has generated significant momentum leading up to the NPT Review Conference, notably through the Prime Minister's speech in March 2009. A successful Review Conference will build on this momentum and agree a clear way forward for each of the three pillars. But the process leading up to the conference, the conference itself, and concerted effort beyond it can also address fundamental questions such as how the UK can make international oversight and enforcement of the grand global bargain most effective, and how we can make nuclear security a fourth 'pillar' of the international framework.

The United Kingdom's approach

1.14 The UK believes these complex, long-term and fundamental issues require a comprehensive and multilateral approach across four key areas:

- **civil nuclear power:** to build confidence in the safe expansion of civil nuclear power, the UK itself needs to demonstrate that, as a long established nuclear energy producer and consumer, we can act as an exemplar in managing our nuclear fuel cycle. The UK and others can also take the lead in promoting proliferation resistant nuclear technology to enable the safe expansion of civil nuclear power globally;

² 'The Future of the United Kingdom's Future Deterrent', Cm 6994, December 2006

- **security** of nuclear material: the UK believes that greater assurance is required to secure fissile material against the risks from nuclear terrorism. We believe more work, coordinated globally, is required to address these challenges and secure international consensus for making nuclear security the fourth pillar of the multilateral nuclear framework;
- **non-proliferation and disarmament:** the UK sees the threat from the proliferation of nuclear weapons as a potentially major driver of global instability. Whilst some proliferation has taken place since the NPT was signed, this has not been as great as some feared. We need to take urgent action to address current nuclear proliferation concerns and establish a global framework to prevent further proliferation. The UK is striving for a safer world free of nuclear weapons. This is a long path, requiring us to create the conditions that will allow countries to feel secure without nuclear weapons and establish mechanisms to prevent their re-emergence. But that is all the more reason for pushing ahead. All states have a responsibility established in the NPT to work together for this aim. Much has been achieved, but more effort is required to map out and deliver a route map to that objective; and
- **international governance:** if a revitalised framework covering these pillars is to be effective, it will require new rules, and, in particular, a strengthened International Atomic Energy Agency to monitor and help enforce their implementation.

1.15 The Road to 2010 Plan sets out the UK's vision for progress in each area, what has been achieved to date, what more can be done, and the key next steps.

Civil nuclear power in the United Kingdom and worldwide

1.16 The Government's 2008 White Paper on nuclear power³ set out the extensive action the Government is taking to facilitate investment in civil nuclear power in the UK, and plans have now been announced to build over 12 Gigawatts (GW) of new nuclear capacity. To address the legacy of half a century of nuclear power, the UK Government has also set up the Nuclear Decommissioning Authority. In the Road to 2010 the Government also lays out its approach to handling the relatively small amount of waste generated by the UK's defence nuclear programmes.

1.17 Alongside the Road to 2010, the Government is publishing a discussion document setting out the relevant factors when judging the options for long-term management of stocks of separated plutonium, such as long-term geological disposal, or reuse. A second discussion document later this summer will set out the process for final decisions.

1.18 The Government will also strongly support work to further develop **proliferation resistant nuclear technology** that will improve international access to the peaceful use of nuclear energy. To this end, the Government will **establish a Nuclear Centre of Excellence** to enable the UK to be at the forefront of international efforts to prevent nuclear proliferation and reduce the costs, environmental-impact and carbon-footprint of civil nuclear power. This centre will have initial funding of £20 million over the first five years, with the development of the best structure and model for the centre to be discussed in detail with academic, industry and potential international partners. The UK will seek the widest possible international collaboration to take forward this work.

³ 'Meeting the energy challenge: A White Paper on Nuclear Power', Cm 7296, January 2008

Nuclear security

1.19 The global spread of nuclear power and advances in nuclear technology mean that nuclear security is a vital fourth pillar of any strengthened nuclear regime. We need to act now to prevent terrorist groups gaining access to nuclear devices. If we do not act now these threats will grow as the use of nuclear power expands globally.

1.20 This requires concerted international action, in which the UK will play a leading role. To this end we have agreed with France to strengthen our joint work on reducing the threat of nuclear terrorism. We strongly support the initiative of the United States Government in proposing an international conference on nuclear security.

1.21 In advance of this, as part of the Road to 2010 process:

- the UK is extending an offer of assistance to any country that wants it to help secure stocks of vulnerable nuclear material, building on our long experience as a nuclear nation;
- the Government has also laid before Parliament the necessary motion for UK ratification of the Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM) and will work over the coming months with countries that have not yet ratified to persuade them to do so; and,
- the Government has also allocated an additional £3 million next year in support of the UK Atomic Weapons Establishment's world leading nuclear forensics work.

Non-proliferation and Disarmament

1.22 Since the NPT was signed in 1968, progress has been mixed across the non-proliferation and disarmament pillars. There has been some proliferation of nuclear weapons: India and Pakistan have both tested and developed significant nuclear

weapons capabilities: Israel is widely assumed to possess nuclear weapons; North Korea has announced two nuclear tests; and other states, most notably Iran, continue to seek nuclear weapons capabilities. However, today the number of countries with nuclear weapons is in single digits and global holdings of nuclear weapons are at their lowest since the 1950s. South Africa and Libya have ended weapons programmes; Belarus, Kazakhstan and Ukraine returned nuclear weapons inherited from the former Soviet Union; and the US, Russia, France and the UK have all made significant reductions in their capabilities. That said, with the NPT under unprecedented pressure, we need to respond purposefully and with determination to the challenges of the new century.

1.23 The international community must unite to take strong steps to prevent nuclear proliferation. We must work purposefully towards the universality of the NPT and take robust action against those states, like Iran and North Korea, which seek to develop nuclear weapons.

1.24 The Government is committed to working with international partners to create the conditions that would give all countries that possess nuclear weapons the confidence to take further, bolder steps consistent with their commitments under Article VI of the NPT and, ultimately, achieving a world free of nuclear weapons. The Road to 2010 sets out a three stage process to enable further progress. This involves:

- **transparency and control:** those steps that must be taken to reduce and prevent any further expansion of global nuclear weapon capabilities and to enhance transparency of existing and future capabilities;
- **arms reductions:** highlighting and addressing the challenges and mechanisms through which further verifiable multilateral disarmament can occur; and,

- **steps to zero:** establishing the security conditions and overcoming the technical challenges associated with taking the final steps to a world free of nuclear weapons, including how they can be safely withdrawn and dismantled.

1.25 Each of these strands involves complex challenges. This paper addresses the key difficulties and the progress required. Some of the main elements include:

- **dealing with states of concern:** working with the international community to ensure that Iran and North Korea comply with their obligations;
- **the challenges of verifiable disarmament:** these apply not just to the five nuclear weapon states recognised in the NPT (US, Russia, China, France and the UK), but also countries that have developed nuclear capabilities and remain outside the NPT regime. This involves significant scientific and technical challenges;
- **continued strengthening of multilateral agreements:** this includes how, working with the US and others, we plan to increase momentum for ensuring entry into force of the Comprehensive Test Ban Treaty, making further progress on a Fissile Material Cut-Off Treaty, and tackling proliferation through financial sanctions and export controls; and,
- **building shared security confidence:** working with international partners to remove underlying causes of insecurity in key regions, notably the Middle East and South Asia, to allow those nuclear armed states outside the NPT to gain, over the long term, the confidence to disarm.

International Governance

1.26 Renewing the grand global bargain requires renewed and strengthened international governance, to ensure the most effective global nuclear framework. The International Atomic Energy Agency (IAEA), the main international institution charged with delivering a safe, secure and proliferation free nuclear future, itself acknowledges that it needs to reform if it is to be in a position to carry out its remit more effectively and to tackle credibly challenges in the vital area of nuclear security.

1.27 The UK has long been a committed member of the IAEA. We are the fourth largest contributor to its budget and make significant voluntary contributions to its Technical Cooperation Fund and Nuclear Security Fund.

1.28 To take this further in the short term, the UK will:

- work with the incoming Director General and international partners to develop robust plans for organisational reform of the Agency; and
- host a meeting of the main financial donors to the IAEA (the so-called 'Geneva Group') to discuss future funding and staffing issues.

1.29 In the medium and longer term, the Road to 2010 plan presents specific points for agreement at the NPT Review Conference which will help develop more fully the key role the IAEA needs to play in fissile material security, and how nuclear energy can assist in delivering sustainable energy development as part of the internationally agreed Millennium Development Goals⁴ for international poverty.

4 UN Millennium Development Goals – www.un.org/millenniumgoals

The Road to 2010 and beyond

1.30 The Road to 2010 plan offers a realistic and achievable programme across the entire nuclear agenda. Next year's NPT Review Conference is a major opportunity, and so between now and then the Government will help lead international efforts to secure the necessary consensus for reform. As well as hosting a conference of the recognised nuclear weapon states on confidence-building measures towards disarmament and convening the main donors of the IAEA, we will also play a full part in the US-hosted conference on nuclear security and press for greater action in tackling nuclear security challenges. This is consistent with our overall view that the international community must recognise nuclear security as a fourth pillar of the global nuclear framework.

1.31 It is equally vital that, beyond the NPT Review Conference, there is sustained momentum in facing up to the nuclear challenges of the modern age. The UK is committed to a sustained long-term effort and will use its experience as a nuclear nation, and our scientific expertise – notably through the new Nuclear Centre of Excellence – to make progress on safe, proliferation resistant nuclear technology and techniques. We will also continue to work with our international partners to build the improved global security and create the conditions required for a world free of nuclear weapons.

Chapter 2

The nuclear question: the UK Government's strategic objectives

Strategic overview – nuclear power in the 21st century

2.1 The Government believes that nuclear energy must play a vital role in meeting the challenges of the twenty first century. Nuclear power will have to be an integral part of any successful response to the interlinked challenges of climate change and security of energy supplies. But nuclear power can only play this role if there is international confidence that its expansion does not exacerbate the risk of further proliferation of nuclear weapons, or of shortcomings in security that would leave the world increasingly vulnerable to nuclear attacks from terrorism. In combating what is arguably the single biggest threat of this century – climate change – we must not risk reviving the great concern of the second half of the last century: the use of nuclear weapons.

Climate change

2.2 Combating climate change will require the expanded use of nuclear energy. As the Government's White Paper on nuclear energy⁵ in 2008 demonstrated, nuclear energy is currently one of the cheapest, low carbon electricity generation technologies. The complete life cycle emissions from nuclear power, from uranium mining to waste management, are between 2 and 6 per cent of those from gas for every unit of electricity generated. The International Energy Agency estimates the world will need to build 32 new reactors each year in order

to halve global carbon dioxide emissions by the middle of the century.

Security and sufficiency of energy supply

2.3 The International Energy Agency also estimates that, on the basis of governments' existing policies, global energy demand will increase by more than 40 per cent between 2006 and 2030. Although the world is far from running out of oil and gas, significantly increased exploitation of these resources would not be consistent with the urgent action needed to reduce carbon emissions. In any case, output from mature oil fields is declining, and remaining resources are harder to find, reach or access. They are also generally concentrated in areas of environmental sensitivity and/or potential political instability. So there are compelling reasons beyond tackling climate change for encouraging an expansion of the role of nuclear power.

The right to peaceful use of nuclear technology

2.4 At present, nuclear power accounts for around 15 per cent of global energy supply, and around 15 per cent of the UK's supplies.⁶ Currently, around 30 nations generate power through civil nuclear programmes. Over the next ten years, we can expect around a further 20 countries to pursue civil nuclear programmes to meet their energy needs.

⁵ *Meeting the energy challenge: A White Paper on Nuclear Power, Cm 7296, January 2008*

⁶ IAEA

2.5 The UK Government strongly supports the rights enshrined in Article IV of the Nuclear Non-Proliferation Treaty (NPT), which declares the right of states party to the Treaty to use nuclear technology for peaceful purposes. Nuclear power is a proven technology that is low carbon, affordable, dependable, safe, and capable of increasing diversity of energy supply. So it is not only key to tackling climate change and energy security, but also central to reducing the potential for competition for energy resources to act as a driver of instability and insecurity across the world.

2.6 As the NPT framework recognises, this inalienable right must be exercised in a way that is consistent with global security. Specifically, increased access to civil nuclear power globally must not lead to further proliferation of nuclear weapons or nuclear weapon technology.

Nuclear security

2.7 It is fundamental that, as civil nuclear power expands across the world, fissile material is held securely. We know that terrorist groups, principally Al Qa'ida, aspire to gain access to nuclear devices for use in a terrorist attack.⁷

2.8 Large quantities of nuclear material around the world require greater security. Between July 2007 and June 2008, the IAEA received almost 250 reports that small quantities of radiological or nuclear material had either gone missing or had been stolen, and that some of this material had not been recovered. This is a timely reminder that in some countries, the security provided for nuclear material needs to be improved so that it is effective.

2.9 The existing framework of the NPT is founded on three 'pillars' – non-proliferation, disarmament, and the right to peaceful use of nuclear technology. The Government believes it is vital that nuclear security becomes an integral part of the global nuclear framework – a new, fourth 'pillar' of the global agenda.

Nuclear weapons

2.10 Nuclear weapons cannot be disinvented. But collectively, the international community can and must create the confidence that would enable countries possessing nuclear weapons to disarm and avoid other states from seeking to develop new nuclear weapon capabilities.

2.11 This requires continued strategic and moral leadership from the five nuclear weapons states, including the UK. But other NPT signatories also have obligations to work for disarmament and to reduce the risk of nuclear proliferation. The disarmament and non-proliferation elements of the NPT are linked, in that reducing the risk of further proliferation is essential to enable nuclear disarmament. The goal of a world free from nuclear weapons faces no greater threat than the emergence of new nuclear-armed states. It is essential for the states possessing nuclear weapons to make progress on disarmament if the pressure for proliferation is to be contained. The UK will work energetically with its friends and allies to tackle these two agendas. That means taking tough action against proliferators. And it means continuing to ensure we retain only the minimum deterrent capability we require, developing policy ideas to enable further reductions and ultimately to establish the conditions in which there is no requirement for the continued existence of nuclear weapons.

⁷ Part 2, Section 12 of 'Pursue, Prevent Protect Prepare – The United Kingdom's Strategy for Countering International Terrorism', Cm 7547 March 2009

The key challenges ahead

2.12 The ‘nuclear question’ of our age is, therefore: how do we, collectively, ensure that access to civil nuclear power can be securely enhanced without risking further proliferation, whilst, at the same time, moving forward to reduce, ultimately to zero, nuclear weapons?

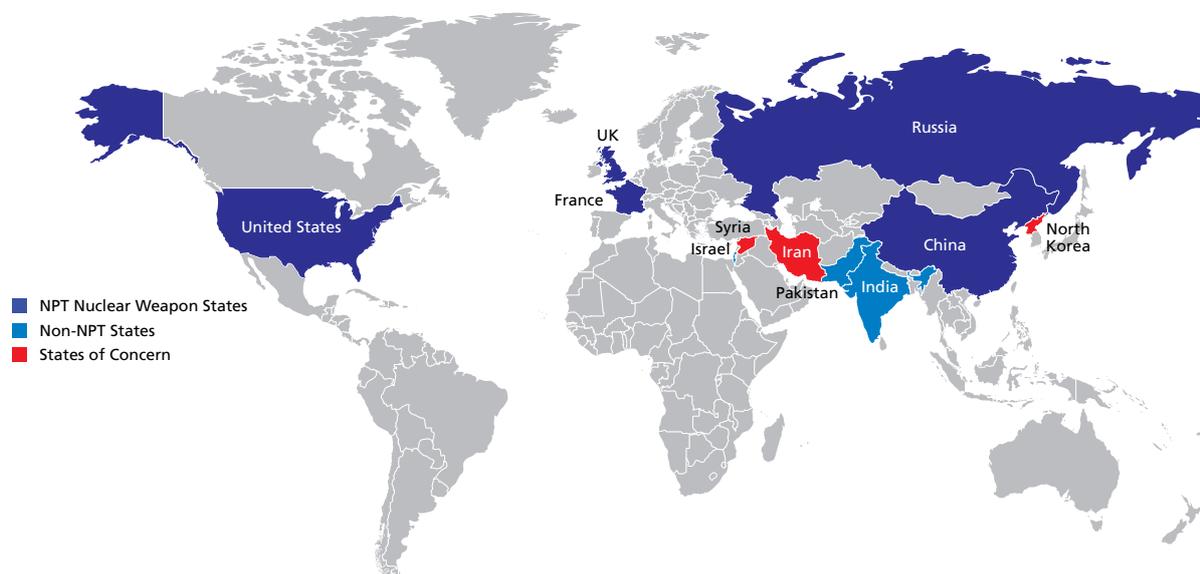
2.13 Addressing this question is fundamental. The world needs to reaffirm the global bargain at the heart of the NPT, setting out the rights and responsibilities of both nuclear weapon and non-nuclear weapon states. For non-weapon states, it is about continuing to forego nuclear weapons, whilst realising, if they wish, access to civil nuclear power. For nuclear weapon states, it involves tough responsibilities to show leadership on the question of disarmament, and to assist in framing a global solution that allows wider access to nuclear power.

2.14 Specifically, meeting the challenge of the nuclear agenda for the twenty first century requires:

- urgent progress in nuclear science to help develop **proliferation resistant nuclear technology**, to increase confidence across the globe that access to nuclear power can be expanded safely. This requires much more research

into the nuclear fuel cycle and a central role both for academic research and partnership with industry;

- **security of nuclear material** to become one of the key priorities of the renewed global bargain on nuclear energy;
- enhanced confidence in this drive for enhanced nuclear security, countries such as the UK, with a long history of both civil nuclear use and as a nuclear weapons state, need to lead by example in nuclear safety and the responsible management of **existing stocks** of fissile material;
- reaffirmation from all states of their commitment to **prevent nuclear proliferation**, and to take robust and united action against those who seek to obtain nuclear weapons;
- all states, but in particular the nuclear weapon states, making further progress to enable **weapons reductions and disarmament**; and,
- **strengthened multilateral governance** of nuclear issues. This is important because:
 - it is essential to prevent proliferation;
 - a coherent international approach is required to enhance fissile material security;
 - addressing some of the very



- significant obstacles towards eliminating nuclear weapons requires a multilateral approach which commands international confidence; and,
- over the long term, delivering proliferation resistant nuclear technology will require rethinking and reshaping of the way multilateral mechanisms for global nuclear security work.

The 2010 NPT Review Conference – and beyond

2.15 The UK's approach is a multilateral one: renewing and modernising the grand bargain on nuclear energy will require us to seek international goodwill and cooperation.

2.16 Following the lack of progress at the 2005 NPT conference, a successful Review Conference in May 2010 must build on the momentum delivered by this year's NPT Preparatory Committee and agree a clear way forward for each of the three pillars. Nuclear and non-nuclear weapon states must be prepared to work together in good faith to prevent proliferation and achieve the general and complete disarmament envisioned by the NPT. It will also require action on a new, fourth pillar: nuclear security.

The role of the UK

2.17 The UK is well placed to contribute to multilateral action. We will seek to:

- present the UK as a model for effective management of civil and military nuclear stockpiles, and to use the UK's scientific expertise in nuclear power in both the public and private sectors, developed over more than half a century, to drive forward the necessary development of nuclear technology;
- push for a new international effort to strengthen nuclear security worldwide

- and play a leading role in addressing existing security concerns through technical assistance;
- continue to work with international partners to prevent proliferation, resolving the immediate challenges posed by Iran and North Korea;
 - play a full part in the leading the global debate on, and research into, overcoming the obstacles to eliminating the need for nuclear weapons; and,
 - use our position as one of the largest contributors to the IAEA and a permanent member of the UN Security Council to drive the debate on enhanced multilateral governance.

The structure of this paper

2.18 This paper sets out specific and detailed measures to advance the debate on a renewed global bargain at the 2010 NPT Review Conference, and beyond. It includes:

- a process for managing the UK stockpiles of both **civil and military nuclear material and waste**, as well as setting out proposals for how the necessary scientific advancements for **safe expansion of access to civil nuclear power globally** can be developed (Chapter 3);
- plans to strengthen UK and wider global action on **securing fissile material security** (Chapter 4);
- the position of the UK Government on how the **non-proliferation and global disarmament agenda** can be advanced (Chapter 5); and,
- how the **multilateral regulatory and enforcement framework** can be strengthened in the short, medium and long term (Chapter 6).

Chapter 3

Safe expansion of civil nuclear power in the UK and globally

Strategic Challenges

3.1 The UK Government recently published a White Paper – ‘The Low Carbon Transition Plan’⁸ – which sets out the Government’s vision for a low carbon UK. That paper sets out policies and proposals to cut carbon emissions by 34 per cent by 2020 and at the same time, ensure the security of energy supplies. The 2008 White Paper on Nuclear Power indicates the key role nuclear power can play in meeting the UK’s future low carbon energy requirements and its commitment to facilitating civil nuclear power, which currently generates about 15 per cent of the UK’s electricity. The Government has taken steps to allow energy companies to build new nuclear power stations to replace existing nuclear power stations, which are due to close in the next two decades.

3.2 The earliest point that investors believe they could have new nuclear power stations operational is around 2018. The Government will look to accelerate any processes under its control in order to assist in shortening those timescales.

3.3 The safe and secure management of waste and decommissioning of nuclear plants needs to be a central part of any civil nuclear programme. The UK has been involved in the development of civil nuclear power for more than fifty years. Over this time a great deal of technological experimentation took place, leaving a legacy of reactors and other facilities which are very different to modern reactors. As a

result the UK has a significant quantity of legacy waste from its past nuclear activities and has substantial volumes of separated plutonium and uranium. The UK also has a quantity of military radioactive waste for disposal. The Government is committed to dealing with those legacies, and learning from past experience to ensure that effective arrangements are put in place for the management and disposal of the waste produced by new nuclear power stations.

3.4 At a global level, tackling the twin challenges of climate change and security of energy supply cost effectively is likely to require an expansion of nuclear power. The UK has concluded that those states in possession of civil nuclear technology have an obligation to assist the safe provision of civil nuclear power to others. Article IV of the Nuclear Non-Proliferation Treaty (NPT) enshrines the right of all signatories to develop, research, produce and use nuclear energy for peaceful purposes, in conformity with Articles I and II of the Treaty on non-proliferation. Multilateral approaches to the fuel cycle can help reduce costs involved with developing indigenous nuclear programmes, and in so doing reduce the need for states to develop the more sensitive aspects of the fuel cycle which lead to an increased proliferation risk.

3.5 There are also significant opportunities associated with a global expansion of civil nuclear power as set out in Box 3.1.

Box 3.1 – The Civil Nuclear Power Global Market

Current capacity: nuclear energy currently provides approximately 15 per cent of the world's electricity⁹. There are currently around 440 nuclear plants, across 30 countries, with a total capacity of over 370 GW¹⁰.

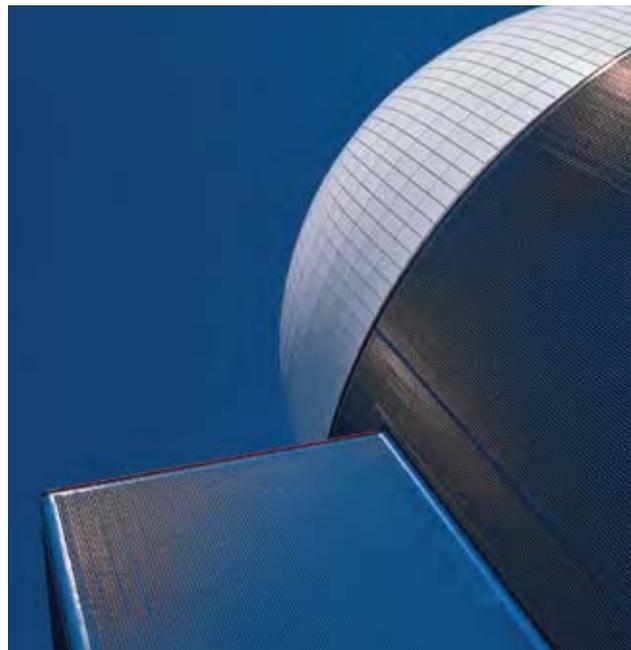
Future Capacity: there may be a global build rate of up to 12 nuclear reactors per year between 2007-2030 and this is expected to rise to 23-54 reactors a year between 2030-2050¹¹.

Market value: A recent assessment by Rolls-Royce estimated that the global civil nuclear market is currently worth around £30 billion a year. By 2023 it could be worth around £50 billion per year. Of this, approximately £20 billion will be new build, £13 billion in support to existing nuclear plant, and £17 billion in support for new reactors¹².

1 Developing Civil Nuclear Power in the UK

Progress to Date

3.6 The 2008 White Paper on Nuclear Power set out the actions the Government would take to enable investment in building new nuclear power stations. This has resulted in real market interest, with companies announcing plans to build over 12 GW of new nuclear capacity. New nuclear power also presents new economic opportunities: each new power station has the potential to offer up to 9000 jobs during construction. The UK nuclear industry also has the opportunity to support new build programmes domestically and around the world. The progress made since publication is detailed in Box 3.2.



Sizewell B Nuclear Power Station, Suffolk, UK

9 World Nuclear Association (WNA)

10 <http://www.world-nuclear.org/info/reactors.html>

11 The Nuclear Energy Agency (OECD)

12 NAMTEC (2008). The Supply Chain for a UK Nuclear New Build Programme

www.dius.gov.uk/reports_and_publications/~media/publications/N/Nuclear_Supply_Chain_Report

Box 3.2 – Progress since the 2008 White Paper on Nuclear Power

Planning:

- The Government legislated, in the Planning Act 2008, to streamline the planning system for nationally significant infrastructure, including nuclear power stations. Under the Act, the Government will produce National Policy Statements (NPS), which will set out the national need for infrastructure, and establish a new independent Infrastructure Planning Commission, which will deal with applications for development consents. The Government intends to consult on the Nuclear Power Generation NPS in Autumn 2009. The Infrastructure Planning Commission will start work in the October, and will be ready to receive applications from March 2010.
- In March this year the Government received nominations for sites for new nuclear energy power stations as part of its Strategic Siting Assessment (SSA). The public had the opportunity to comment on those nominations. The Government will assess sites against the set SSA criteria, drawing on advice from the independent nuclear regulators and other specialists, to produce a list of strategically suitable sites which can be included in the Nuclear NPS.

Process of Generic Design Assessment

- Historically, the UK civil nuclear industry has been constrained by the use of unique 'one-off' plant models. The UK's nuclear regulators are pursuing a process of Generic Design Assessment (GDA) of industry preferred designs of nuclear power stations to complement the existing licensing processes. This comprises an assessment of the generic safety, security and environmental implications of new nuclear power station designs and will require close working with international regulators to reach standardised solutions wherever possible. This process will provide greater regulatory certainty and enable developers to take advantage of the opportunities provided by the global markets for new nuclear deployment. The regulators aim to complete GDA in June 2011.

Progress since the 2008 White Paper on Nuclear Power *continued*

Developing the nuclear supply chain

- The UK maintains significant capability in the construction and operation of plants, decommissioning and nuclear waste management. More needs to be done to ensure that UK suppliers develop capability and capacity to play a major role in new nuclear build. The Low Carbon Industrial Strategy¹³, published earlier this month, announced the establishment of the Nuclear Advanced Manufacturing Research Centre. This facility will enable around 30 manufacturing companies to work together on the development and production of high quality nuclear components and achieve the necessary nuclear accreditation. The Government also announced its intention to strengthen the Manufacturing Advisory Service (MAS) to support potential UK-based suppliers for the civil nuclear industry.

Waste and Decommissioning

- The Energy Act 2008 includes powers which protect the taxpayer by ensuring that operators of new nuclear power stations securely accumulate the funds needed to meet the full costs of decommissioning and their full share of waste management and disposal costs.
- The Government has set up the independent Nuclear Liabilities Financing Assurance Board (NLFAB) to provide independent scrutiny and advice on the suitability of the Funded Decommissioning Programmes (FDP) submitted by operators of new nuclear power stations.
- Later this year the UK Government will consult on a model to estimate the costs of decommissioning, waste management and waste disposal for new nuclear power stations, to include a methodology to estimate a fixed unit price for waste disposal.

¹³ www.hmg.gov.uk/lowcarbon

Objectives for 2010 and beyond

3.7 The Government will continue to work with industry to facilitate energy companies' investment in new nuclear power stations in the UK. An indicative timeline for the first new nuclear power stations is available on the Office for Nuclear Development website¹⁴.

3.8 Progress on the UK's new nuclear programme demonstrates that an expansion of civil nuclear power can be transparent with adequate public consultation and due regard for safety, and in partnership with private industry.

3.9 To support these objectives the UK Government will:

- publish a public Consultation on the National Policy Statement on Nuclear Power in autumn 2009. This will be subject to Parliamentary scrutiny;
- publish a public Consultation document on a model for estimating the costs of decommissioning, waste management and waste disposal for new nuclear power stations, including a methodology to establish a fixed unit price for waste disposal;
- run a process of Regulatory Justification (in accordance with the Justification of Practices Involving Ionising Radiation Regulations 2004).¹⁵ The Government will consult on its draft Regulatory Justification decision later this year. The draft decision will set out an assessment of whether the benefits of a new nuclear class or type of practice (an individual reactor design) outweigh any detriment to health; and
- work with the National Skills Academy for Nuclear, Cogent (the sector skills council responsible for nuclear issues), the NDA, the Engineering

Construction Industry Training Board (ECITB) and Construction Skills to develop a high level skills and capability plan for the UK's civil nuclear skills base.

2 Addressing UK Nuclear Material Stocks and Waste

Progress to Date

3.10 The UK Government is committed to dealing with the UK nuclear legacy. In 2005, we set up the Nuclear Decommissioning Authority to decommission and clean up civil nuclear sites across the UK.

3.11 In 2006 the Government accepted the recommendation from the independent Committee on Radioactive Waste Management that geological storage is the best available approach to the long term management of the UK's higher activity radioactive waste, and that this should be coupled with a robust programme of safe and secure interim storage. The Government also believes that it would be technically possible and desirable to dispose of both new and legacy waste in the same geological disposal facilities.

3.12 In June 2008 the Government published the 'Managing Radioactive Waste Safely' White Paper¹⁶ which provides a framework for implementing geological disposal. Since then, three local authorities in the UK, Copeland Borough Council, Allerdale Borough Council and Cumbria County Council, have entered into discussions with the Government, without commitment, about the possibility of hosting a geological disposal facility.

3.13 More recently, the Government has decided to review the arrangements for the safe management of plutonium in the medium and long term. Plutonium is created

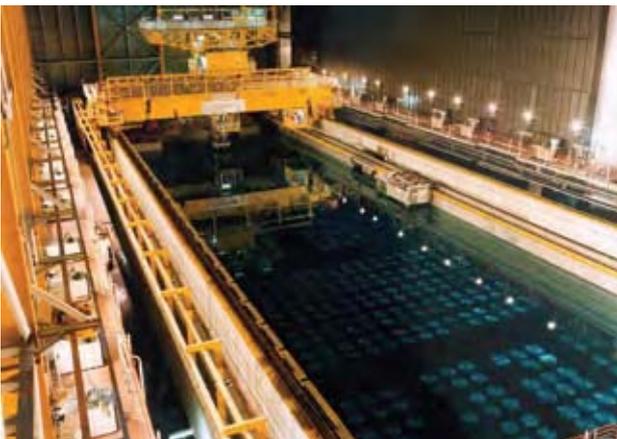
¹⁴ www.berr.gov.uk/energy/sources/nuclear/index.html/sources/nuclear/index.html

¹⁵ www.opsi.gov.uk/si/si2004/20041769.htm

¹⁶ 'Managing Radioactive Waste Safely,' Cm 7386, June 2008

in nuclear reactors as a result of irradiating the uranium in nuclear fuel. Like uranium it can be extracted by reprocessing from the spent fuel after it leaves the reactor. The majority, like spent fuel, is not currently classified as waste, because it can be reused, for example in the manufacture of some reactor fuels. The Government will decide, in conjunction with the radioactive material owners, whether any of these holdings should be declared as waste. As a contingency the NDA has factored possible inclusion of all these materials into the design and development of the geological disposal facility for radioactive waste. Whether declared as waste or not, the Government will continue to ensure that provisions are in place for safe and secure storage.

3.14 The Government has decided, in light of the security and proliferation risks around plutonium, to develop further our medium and long term strategy for this material. The UK Government wants to do so in a way which engages stakeholder groups and the public, and balances the need for action with the need to ensure that the correct provisions are put in place. Box 3.3 sets out the main options.



Storage Pond in (THORP) Thermal Oxide Reprocessing Plant Receipt and Storage at Sellafield

Box 3.3 – Dealing with Plutonium

In January 2009 the NDA published a paper assessing credible options for plutonium. The three main options for plutonium can be summarised as follows:

- **Reuse** – The plutonium could be reused in the manufacture of Mixed Oxide (MOX) fuel, burnt in a reactor and put in interim fuel storage before eventual disposal as spent MOX fuel. This option would require a new MOX fabrication plant which could raise a number of issues. New nuclear build in the UK will deliver reactors that are able to burn MOX but it is not known whether the ability to use MOX in the future would be sought by potential operators. There is also the potential to sell MOX fuel to overseas utilities.
- **Treat as waste.** The plutonium could be immobilised in a safe and secure form before disposal as waste material. However, immobilisation techniques have yet to be demonstrated outside the laboratory. Putting plutonium into a safe and secure form will produce material with at least three times the volume requirements of current plutonium storage. New interim stores would be needed before the immobilised plutonium which are likely to require the highest security standards with very high costs.

- **Indefinite storage.** Safe and secure storage is the only option available for the short term while thinking around the reuse or waste options is developed. A new storage facility is currently under construction. Storage beyond 30 to 50 years is likely to require a new plutonium store and probably a new treatment plant. It is known that the plutonium and the storage container will degrade over time and will need to be reconditioned to allow continued safe storage.

3.15 This is a vital long term decision. The Government is keen to develop a comprehensive multilateral strategy and explore the options for proliferation-resistant fuel cycles, including ones which do not involve reprocessing and the separation of plutonium.

Objectives for 2010 and beyond

3.16 As a first step to reviewing its long term plutonium strategy the Government will publish **two discussion documents this summer**, responding to concerns that there is currently insufficient information available on which to consult on such an important decision:

- one document¹⁷, published alongside this document, sets out the relevant factors that are important when judging options, such as long-term geological disposal or reuse, against each other; and,
- a second sets out the process and timing for making a decision.

Box 3.4 UK military Radioactive Waste

The Defence Nuclear Programme comprises the nuclear submarine programme, the nuclear weapon programme and the naval nuclear propulsion programme. Radioactive waste is generated during development, construction, operation, maintenance and decommissioning of elements of this programme. The total waste from the Defence Nuclear Programme represents less than 1 per cent of the UK's total national radioactive waste inventory as measured by radioactivity, and less than 5 per cent measured by volume. Most of that is low level waste, although significant quantities of intermediate level waste are also produced. The Ministry of Defence (MoD) has arrangements for the disposal of low level radioactive waste at the national Low Level Waste Repository near Drigg and for storage of used nuclear reactor cores at Sellafield in Cumbria.

There is no high level waste generated by the Defence Nuclear Programme. However, there are materials particular to defence. Used fuel from the naval nuclear propulsion programme is of a different composition to civil fuel and cannot be re-processed through either the Sellafield MOX Plant or the THORP facility.¹⁸

¹⁷ http://decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/nuclear/ossies/plutoium/plutonium.asp

¹⁸ THORP – Thermal Oxide Reprocessing Plant

3.17 The Government will use the debate generated by those discussion documents to feed into a formal consultation document, to be published in the autumn. A final decision on the strategy for handling separated plutonium is likely to be made in early 2010 which will inform the NDA's approach to prioritising decommissioning and waste activities across the nuclear estate.

3.18 The UK is committed to complying with national policy and legislation for the handling of radioactive waste arising from the Defence Nuclear Programme. Alongside the broader policy on civil nuclear waste and decommissioning, the MoD is developing a strategic framework for decommissioning and disposal of nuclear liabilities across the Defence Nuclear Programme. The MoD is working closely with the NDA, and with other Government Departments, to ensure a consistent approach for the management of all nuclear liabilities across the UK. The MoD will continue to contribute to, and benefit from, best practice in the civil nuclear programme.

3 Developing Civil Nuclear Globally

Progress to Date

3.19 The UK actively assists states to utilise their rights under Article IV of the NPT by providing technical assistance and cooperation to ensure the safe, secure and economically viable development of civil nuclear power. Through Nuclear Cooperation Agreements the UK builds effective partnerships with prospective civil nuclear states, and it provides substantial funding through the IAEA Technical Cooperation Fund to ensure that the ultimate aim of "Atoms for Peace", as laid out by President Eisenhower in 1953, is translated into reality.

3.20 The NPT requires non-nuclear weapon states to enter into comprehensive safeguards agreements with the IAEA, aimed at detecting any diversion of nuclear material to weapons purposes. The discovery in the early 1990s that Iraq had a nuclear weapons programme, despite having a comprehensive safeguards agreement in place, led to a strengthening of the safeguards regime. This included the development of the 'Additional Protocol', which requires States to provide the IAEA with greater information on its nuclear fuel cycle, and increased powers of access, to provide greater assurance of the absence of undeclared nuclear material and activities. The UK Government believes that all states should sign up to Additional Protocols, which are an important contributor to regional stability and security.

3.21 In recent years, there have been a number of proposals suggesting multilateral approaches to the fuel cycle. The mechanics and potential audiences for these proposals vary, but most are aimed at ensuring that countries developing new nuclear programmes can reliably access the fuel they need to generate power. Building on this, the UK hosted an International Nuclear Fuel Cycle Conference in London in March 2009, which served to continue the dialogue between those states who have civil nuclear programmes, and those who seek to develop one. Most recently, the IAEA Board of Governors met in June to discuss detailed studies into the development of three of the proposals; the IAEA Fuel Bank, the Russian Angarsk Fuel Bank and the German Multilateral Enrichment Sanctuary Project.

Objectives for 2010 and beyond

3.22 In encouraging the debate on civil nuclear power, and taking practical steps such as Nuclear Cooperation Agreements, the UK believes that it is possible to tackle climate change and energy shortages whilst strengthening the international non-proliferation regime. As such, the development of civil nuclear energy should take place within the framework of recognised international standards for safety, security and safeguards, in such a manner that reduces the fear of proliferation, nuclear accidents or security incidents, and actively reassures both neighbouring states and the international community that all possible steps are being taken to proactively prevent such occurrences.

3.23 But we must go further. There are fundamental and scientifically difficult challenges to address to enable the worldwide growth of civil nuclear power in a way that is proliferation resistant. These obstacles include:

- global scientific expertise is not yet sufficiently advanced to provide the necessary level of assurance across the board on proliferation resistance; and
- the need to rethink and strengthen multilateral governance regimes, including inspections, in a world with enhanced access to civil nuclear power.

3.24 It is the nuclear fuel cycle associated with any reactor systems that sits at the heart of the expansion of sustainable growth of nuclear energy and contributes the most to nuclear energy's environmental impact and sustainability. Although nuclear energy can be deployed solely for peaceful purposes, it is via the fuel cycle that materials could be diverted covertly from a civil programme to weapons programme. To address that challenge, the UK will establish a **Nuclear Centre of Excellence**, an innovative partnership between industry, academia, government and international partners to improve the access to the peaceful use of nuclear energy by further developing proliferation resistant nuclear technology. The UK has a long and well established history of being at the forefront of developing the nuclear fuel cycle and the UK has the opportunity to play a significant role helping other countries learn from past experience.

3.25 It is vital that there is a coordinated international effort to take forward this agenda and to this end the UK will seek to collaborate as widely as possible.

3.26 As a first step, we are engaging with academia, industry and potential international partners on the best structure and operating model for the Centre. We believe that industry partners will be keen to work with the centre because of the benefits to their business such a fuel cycle will bring, and we are already in discussions to this effect. In the future the new Centre may also play a role in developing the verification mechanisms needed to support a future fissile material cut-off treaty.

Box 3.5 A UK Nuclear Centre of Excellence

The Government is launching a Nuclear Centre of Excellence that will focus initially on the development of an economic, low carbon, proliferation-resistant fuel cycle. In the longer term, the centre might also be used to conduct work on verification to support any future fissile material cut-off treaty.

The centre will coordinate scientific research efforts both nationally and tap into research overseas. The aim is to create a centre which will bring the best out of academia, industry and government. The development of the centre will be overseen by a group chaired by the Government Chief Scientific Advisor and including the Technology Strategy Board. The Government will commit £20 million over the first five years to get the centre up and running. The Technology Strategy Board's role to drive business benefit where there is UK strength and capability, will be critical in engaging UK industry and enabling potential business benefits from the development of such a fuel cycle to be captured.

Developing multilateral approaches to the fuel cycle

3.27 Developing regional perspectives that build trust between those who have and those who seek nuclear power is absolutely crucial to the development of multilateral approaches. Over the coming year the UK will support a number of international conferences to allow countries to explore future options for collaboration on a regional basis within the framework of the IAEA.

3.28 The UK is working with partner nations to develop nuclear co-operation agreements. Most recently, the UK and Jordan signed an agreement in London which committed the UK to assist Jordan in addressing its very real energy concerns in the most safe, secure and economical manner possible, whilst working towards a mutual understanding of the issues surrounding the development of nuclear energy in the Middle East.

3.29 Over the last five years a number of multilateral approaches to the nuclear fuel cycle have been put forward, which would give customer countries attractive and robust options for assured supply of nuclear fuel and related services without the need to invest in expensive and technologically complex enrichment and re-processing technology. The UK has and will continue to play a leading role in this important area. The UK will put its Nuclear Fuel Assurance proposal to the IAEA Board of Governors in September. The UK's Nuclear Fuel Assurance is complementary to other proposals put forward and provides a guarantee that export licences for nuclear fuel enrichment services would only be withheld in the event of non-compliance with non-proliferation obligations. We also strongly supported the French Presidency's initiative for conditional €25 million of EU funding for an IAEA nuclear fuel bank.

3.30 The UK's new Nuclear Centre of Excellence will demonstrate UK leadership in tackling the problems countries face in gaining access to civil nuclear power safely. As such access is expanded, the UK will also need to demonstrate leadership in securing the increasing amount of fissile material generated. This programme of work is the subject of the next chapter.

Chapter 4

Fissile material security and nuclear counter-terrorism

Strategic challenges

4.1 With the global spread of nuclear power and advances in nuclear technology, the security of nuclear material and expertise required to prevent access by proliferators and terrorists must be addressed. Nuclear security must be seen as the fourth pillar of any nuclear regime, alongside non proliferation, disarmament and the right to peaceful uses of nuclear technology.

4.2 Large quantities of nuclear material around the world require greater security. Between July 2007 and June 2008, the IAEA received almost 250 reports that small quantities of radiological or nuclear material had either gone missing or had been stolen, and that some of this material had not been

recovered. These cases illustrate why, for some countries, the security provided for nuclear material needs to be improved so that it is much more effective.

4.3 The UK Government aims to work towards a future where high standards of physical protection, nuclear material accounting and security are accepted by all states for use on necessary civil and military nuclear programmes. To achieve all of this, countries must first be prepared to adhere to and uphold existing standards of nuclear security to protect against access to nuclear materials and expertise, and be committed to improving and expanding these in the long term.

Box 4.1 – What do we mean by ‘nuclear security’?

The term nuclear security encompasses three main elements:

Physical security covers the security of nuclear sites and material via:

- the use of physical barriers such as fencing and secure entry systems, and the use of security personnel and vetting systems;
- the security of nuclear material during transportation by using deterrents to attempted hijacks/thefts; and,
- national regulatory bodies and agreements to ensure security standards are adhered to country-wide.

Material accounting and control covers the standards and accounting systems used to ensure that states know where and how much nuclear material they possess.

Information, knowledge and expertise security covers the procedures that ensure the security of nuclear information and expertise by guarding against the ‘insider threat’ and preventing information from reaching open source channels, either through availability on the internet, academic channels or covert means of intelligence collection.

Progress to date

4.4 There are a range of conventions and groups on physical security of nuclear material that have been set up over the years to which the UK contributes.

4.5 At the core of this framework is the **Convention on Physical Protection of Nuclear Material** (CPPNM), which entered into force in 1987. It imposes a legally binding obligation on states with respect to the physical protection of nuclear material. However, it only covers the protection of material in international transport. That leaves a large gap where material could be vulnerable, on site and during transportation within countries. There is now an amendment to this convention that aims to cover the security of material at all times.

4.6 The **Proliferation Security Initiative** (PSI), which was agreed in 2003, is focused on making easier interdiction of shipments (whether the shipments are by land, sea, or air) of weapons of mass destruction (WMD), their delivery systems and related materials to state and non-state actors of proliferation concern (see paragraph 5.22 for further details).



A soldier, of the Joint Nuclear, Biological & Chemical Regiment, taking an air sample from a contamination site during a simulated training exercise

United Nations Security Council Resolutions

4.7 The UK was one of the leading proponents of UN Security Council Resolution (UNSCR) 1540, which established legally binding obligations on all UN Member states to take steps to combat proliferation of WMD through national legislation, cooperative action, development of effective export controls and physical protection of WMD related materials. In September 2004, the UK was one of the first states to comply with the national implementation reporting requirements of UNSCR 1540.

4.8 In addition, UNSCR 1373 calls upon all states to “find ways of intensifying and accelerating the exchange of operational information regarding the threat posed by the possession of WMD by terrorist groups”, and notes with concern the close connection between international terrorism and the illegal movement of chemical, biological, radiological and nuclear (CBRN) materials.

IAEA Standards and Guidance

4.9 The International Atomic Energy Agency (IAEA) has set out, under the auspices of Information Circulars, a number of important guidelines and standards relating to nuclear security:

- the IAEA’s **Recommendations for the physical protection of nuclear material**¹⁹ has provided a positive way of introducing standards of physical protection to nuclear sites and the material held in them around the world. Although the recommendations are not enforceable, they are a means of providing nuclear security recommendations to all states, even those which are not monitored in other ways by the IAEA; and,

¹⁹ IAEA document INFCIRC/225

- guidelines for the **Management of Plutonium**²⁰ were published in 1998. These were drawn up in the mid-1990s by several parties to the NPT involved in the civil reprocessing and use of plutonium. These guidelines stipulate that the parties commit themselves to applying the requirements of the CPPNM and the IAEA Recommendations for the Physical Protection of Nuclear Material, and to store holdings of separated plutonium in excess of 15 grams only at reprocessing plants, fabricating plants, or sites authorised by the Government.

4.10 In addition, the **Comprehensive Safeguard Agreements**²¹ required by the NPT provide for the application of IAEA safeguards to all of a state's nuclear material; including a requirement that States establish a system of accounting and control for all their nuclear material. This contributes indirectly both to its physical protection and the detection of any failure of physical protection arrangements.

4.11 In response to the illicit trade in nuclear materials the IAEA set up the Illicit Trafficking Database in 1995 to facilitate the exchange of information with states about reported incidents of nuclear trafficking. Funding for this and many other IAEA nuclear security initiatives, including the provision of security training and publishing guidelines, is sourced from the IAEA's Nuclear Security Fund.

4.12 The Nuclear Security Fund is part of the IAEA's Office of Nuclear Security *Nuclear Security Plan* (NSP). The IAEA approved a new NSP in 2005 to cover 2006-09 and are presently in the process of producing the 2010-13 NSP. The UK has made two voluntary contributions to the Nuclear Security Fund (£2 million in 2006 and £4 million in 2009) and also provides expert advice to the IAEA's Office of Nuclear Security from the UK's Office of Civil Nuclear Security.

Nuclear Security – the UK's response

4.13 A major part of the UK's contribution to global nuclear security is through the Global Threat Reduction Programme (GTRP) which delivers our contribution to the G8 Global Partnership against the spread of weapons and materials of mass destruction, and other international initiatives.

Box 4.2 – the Global Threat Reduction Programme

The GTRP is the UK's largest programme of non-proliferation assistance, with a current annual budget of £36 million, around 90 per cent of which is devoted to nuclear and radiological security and safety improvements. In line with Global Partnership priorities, the UK's efforts have to date been focused on Russia and the former Soviet Union, but as programmes in Russia complete the UK is widening the geographic spread of GTRP in order to ensure that assistance remains directed where it will make the greatest impact on reducing vulnerabilities. GTRP works bilaterally and in partnership with other donors, including both the US and the IAEA. In March this year, GTRP made a £4 million contribution to the IAEA's Nuclear Security Fund (a doubling of our 2006 contribution) to support a range of priority physical protection and security training projects. GTRP has also made a similar contribution to the US Global Threat Reduction Initiative to support projects to reduce the distribution of highly enriched uranium, and to irreversibly close down former Soviet Plutonium producing reactors.

4.14 Since 2003 we have spent more than £70 million on improving security at Sellafield. We are committed to spending a

²⁰ IAEA document INFCIRC/549

²¹ Based on a model agreement described in IAEA document INFCIRC/153

further £220 million on the construction of a state of the art storage facility there.

Objectives for 2010 and beyond

4.15 Global cooperation is the key to tackling nuclear security successfully. We have agreed with France to strengthen joint work on reducing the threat of nuclear terrorism. In addition, President Obama has announced his intention to hold a Global Nuclear Security Summit in March 2010 at which the UK is committed to participate.

4.16 The Government assesses that there has been much welcome progress in international efforts to tackle nuclear security. However:

- some of the current framework is based on non-binding guidance and recommendations;
- as technology advances, there are opportunities to increase our ability to detect material, but also risks that those with malign intent can use technology more effectively; and,
- as access to civil nuclear power expands, the need to ensure material security increases.

4.17 Over the long term, we will work towards reducing stockpiles of highly enriched uranium and plutonium as a means to reduce proliferation risks associated with nuclear power, and a spur towards nuclear disarmament.

4.18 Achieving this requires a step change in our multilateral approach. Material security must be recognised as a key pillar of the multilateral framework for nuclear power, and, as Chapter 6 of this paper makes clear, we believe that the IAEA's powers and organisation should formally be strengthened in this respect.

4.19 Advancing this argument is a key priority for the 2010 NPT Review Conference. But over the coming months in the run up to

the Review Conference the UK intends to take a leading role in advancing measures to enhance global nuclear security.

4.20 As part of the Road to 2010 process, the UK will:

- offer assistance to any country that requests it to improve the security of their most vulnerable nuclear material, along the lines of that already being implemented through the Global Threat Reduction Programme. We will continue to support the US in recovering any nuclear material that a state can no longer confidently secure;
- continue to work, through the Global Threat Reduction Programme, and in conjunction with the IAEA, the US and other donors, to improve nuclear security at the most vulnerable sites worldwide;
- continue to work with the US to help meet their four year target for stopping nuclear smuggling;
- play an active part in the revision of the latest IAEA recommendations for the physical protection of nuclear material. This revision will reflect both experience since the last revision and the existing threat environment;
- alongside the publication of this plan, lay before Parliament a motion to ratify the Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM). Once ratified we will work with other countries who have not yet ratified to persuade them to do so. We will also ratify the Convention on the Suppression of Acts of Nuclear Terrorism; and,
- maintain our world leading forensics detection capability at the Atomic Weapons establishment (AWE), for which funding has now been increased, with an additional £3 million allocated this year as an immediate response to this key requirement.

4.21 This programme of action, in partnership with other countries, demonstrates how the UK can use its expertise as a nuclear state in support of wider global security. Addressing nuclear security is important in its own right, but also for enhancing global confidence in a renewed global bargain. This renewed global bargain means addressing all major nuclear challenges, including non-proliferation and disarmament, the subject of the next chapter.

Chapter 5

Non-proliferation and disarmament

Strategic Challenges

5.1 Addressing the twin challenges of nuclear non-proliferation and disarmament represent the core of the Nuclear Non-Proliferation Treaty (NPT). The interdependency of these issues is captured in the NPT: all states have agreed not to seek or proliferate nuclear weapons and work for complete disarmament of those weapons that do exist. This remains as relevant today as when the Treaty was opened for signatures in 1968.

5.2 Moving towards, and eventually achieving, a world free of nuclear weapons presents great political and technical challenges. It will require a multilateral approach that brings together all nuclear and non-nuclear weapon states to deliver on their commitments under the NPT. This will need states to commit to solving the regional disputes and tensions that have led to states obtaining or seeking nuclear weapons. Underpinning that must be a robust verification process with the tools and techniques that will ensure that obligations are fulfilled. Solving the problems associated with verifying issues such as warhead dismantlement or fissile material control must be tackled internationally.

5.3 After what has been referred to as the 'Decade of Deadlock', positive developments involving the nuclear weapon states and others have reinvigorated the global debate on disarmament. The concerted efforts by the UK Government over the last two years, and in particular the Prime Minister's speech on the 17 March 2009, have brought a new emphasis to this topic, leading to a growing consensus of states that are committed to

tackling nuclear proliferation and taking further steps on disarmament. This has been galvanised by the agreement between the US and Russia to negotiate a successor to the Strategic Arms Reduction Treaty. The recent commitment by the G8 countries to seek a safer world for all and to create the conditions for a world without nuclear weapons, in accordance with the goals of the NPT, highlights the progress made over this period.



The Prime Minister meets delegates following his speech on non-proliferation at Lancaster House on 17 March 2009

5.4 Achieving a world in which there is no requirement for nuclear weapons is a long journey. This is a strong argument for losing no time in setting out down that path. There remain many difficult issues to be resolved on both non-proliferation and disarmament, but there are more opportunities to make progress than has been the case for many years. The UK wishes to use the roadmap presented in this chapter to influence the debate, exploring points of convergence

between the nuclear and non-nuclear weapon states.

Box 5.1 – UK’s Counter-Proliferation Strategy

The UK’s counter-proliferation strategy is based around four inter-linked strands:

Dissuade states from seeking to acquire, develop, or spread Chemical, Biological, Radiological or Nuclear (CBRN) weapons, materials, technology and expertise;

Detect attempts by states, and terrorists, to develop or acquire these capabilities;

Deny access to CBRN weapons and the necessary materials, equipment, technology, and expertise to develop them, while promoting commerce and technological development for peaceful purposes; and,

Defend our country, our citizens, our Armed Forces and our strategic interests from the threats posed by proliferation.

Progress to Date

5.5 The UK has taken some of the most significant steps forwards towards disarmament and have pursued a multilateral approach to countering proliferation, as laid out in Box 5.2

5.6 Significant progress has also been made in the international community:

- the US and Russia have signed a Joint Understanding that commits them to further reductions of their strategic warheads and strategic delivery vehicles through a replacement to the Strategic Arms Reduction Treaty (START);
- agreement has been reached to expand the G8 Global Partnership to facilitate

wider engagement in threat reduction work outside Russia and Ukraine;

- the United Nations Security Council Resolution 1540 established the national implementation measures states should take with regard to nuclear, biological and chemical weapons, related materials and their means of delivery. It also set up the ‘1540 Committee’ in order to report to the Security Council on progress in implementation of the resolution;
- the agreement of UNSCR 1810 in 2008 gave a strengthened 3-year mandate to the United Nations Security Council Committee on Non-Proliferation;
- the international community responded to North Korea’s announcement of a second nuclear test by unanimously passing UNSCR 1874 on 12 June, showing a united front against their continued proliferation activities;
- 5 UNSCRs²² have been passed to make the suspension of Iran’s enrichment related and heavy-water activities mandatory;
- under the French Presidency in 2008 the 27 EU Heads of Government have committed to a wide-ranging and comprehensive eight-point plan addressing the most urgent nuclear and other disarmament issues facing the international community; and,
- the Conference on Disarmament, which has been blocked for several years, has recently reached consensus on a programme of work for 2009.

The Nuclear Non-Proliferation Treaty Review Conference

5.7 Since its signature by 62 countries in 1968, the NPT has achieved near-universality with 189 states now party to it including North Korea. Despite widespread doubts that it could achieve its primary non-proliferation goal, it has served the

²² UNSCRs 1696, 1737, 1747, 1803 and 1835

Box 5.2 – the UK's Record on Disarmament and Non-Proliferation

Disarmament

The UK has:

- reduced the explosive power of our nuclear arsenal by 75 per cent since the end of the Cold War, reducing the number of operationally available warheads to no more than 160;
- moved to a minimum strategic deterrent based on one system with an alert status held on several days notice to fire and weapons that are not targeted at any country;
- taken the decision to reduce the number of missile tubes on future submarines from 16 to 12;
- carried out ground-breaking work on verification, building the UK's expertise in order to become a 'disarmament laboratory';
- increased transparency, declaring historical records of our defence holdings of fissile material and placing excess military stocks under international safeguards; and,
- ratified the Comprehensive Test Ban Treaty, being amongst the first to do so. The UK continues to maintain a moratorium on testing following a final nuclear test explosion in 1991.

Non-proliferation

The UK has:

- pushed hard for early engagement on a new IAEA-led system to help states secure fuel for new civil nuclear power programmes, including through a Nuclear Fuel Assurance, in return for compliance with non-proliferation obligations. To progress this agenda, the UK hosted a conference on multi-lateral approaches to the fuel cycle in March 2009;
- continued to seek agreement on tougher controls to reduce weapons and prevent proliferation, particularly focusing on the Fissile Material Cut-off Treaty and the Comprehensive Test Ban Treaty (CTBT). We welcome in particular President Obama's commitment to seek ratification of the CTBT and call on other states to ratify the treaty as soon as possible;
- played a key role in the process that led to Libya renouncing its chemical, biological and nuclear weapons programme in 2003. This uncovered the extent of AQ Khan's nuclear technology proliferation network which led to its eventual dismantlement;
- taken the lead in developing tools to counter the financing of proliferation, in the UN, EU and the Financial Action Task Force; and,
- committed up to \$750M from 2002 to 2012 to the G8 Global Partnership against the Spread of Weapons and Materials of Mass Destruction, which has financed crucial nuclear and other risk reduction activities in respect of the vast WMD legacy of the former Soviet Union.

international community well over the last four decades. Some states, such as South Africa and Libya have abandoned clandestine nuclear weapons programmes. Others, such as Belarus, Kazakhstan and Ukraine, have renounced nuclear weapons inherited from the former Soviet Union. Forty-one years on, the number of countries with, or believed to have, nuclear weapons remains in single digits. The NPT has however come under unprecedented stress in recent years and there are issues of serious concern. There remain three states that have not joined (India, Israel and Pakistan) and one state that is a signatory has sought to leave the treaty (North Korea).

5.8 Since 2000, progress on strengthening the NPT to meet the challenges of the new century has been limited. There is however cause for optimism as the international community focuses on the 2010 Review Conference. For the first time in fifteen years the May 2009 NPT Preparatory Committee agreed an agenda, the rules of procedure and successfully nominated a Chairman, which will provide a solid foundation for next year's Review Conference.

5.9 A successful Review Conference in May 2010 would build on the momentum delivered by this year's Preparatory Committee and agree a clear way forward for each of the three pillars. Our priority for the Conference is for a real operational impact on reducing proliferation risks and on enabling further progress to be made on disarmament. We will also seek to establish nuclear security as, in effect, a fourth pillar of the NPT.

5.10 Sustained political engagement at the highest level will be required before the 2010 Review Conference and in delivering its conclusions to maximise the chance of success at the 2010 Review Conference.

Objectives to 2010 and Beyond

5.11 Making progress on non-proliferation and disarmament can only be achieved if the international community moves forward together across a spectrum of initiatives and treaties, recognising that all states have responsibility in ensuring progress and that disarmament cannot be achieved in one step and cannot be achieved alone. Taking forward non-proliferation and disarmament can be divided into three phases.

1. Transparency and Control – the steps which must be taken to prevent expansion of global nuclear weapon capabilities, to prevent further proliferation and to increase transparency on current capabilities and future plans.

2. Arms Reductions – highlighting the challenges, and identifying mechanisms through which verifiable multilateral disarmament can occur.

3. Steps to Zero – establishing the security conditions and overcoming the technical and policy challenges associated with the complete abolition of nuclear weapons.

1 Transparency and Control

5.12 To establish the conditions for further arms reductions, a number of legally binding, verifiable measures must be in place to control the proliferation of nuclear technologies and materials, and to limit and eventually reduce the activities related to nuclear weapons development and production. For these measures to be successful, there must be transparency amongst both nuclear and non-nuclear weapon states. That requires a coordinated approach across a range of complex issues.

Transparency Framework

5.13 A series of measures to improve the transparency of nuclear weapons holdings and posture will be an important element of any credible plan to secure the global elimination of nuclear weapons.

5.14 Many of the established nuclear weapons states have taken significant steps to enhance the transparency of their defence nuclear programmes. The UK has led on this front (as laid out in box 5.2). France, the US and Russia have taken similar steps. Further progress is required, including by those states possessing nuclear weapons who are not signatories of the NPT. The UK will work with international partners to develop proposals on how transparency might be increased. This may include the development of a basis agreed by the P5 states template for the release information into the public domain. We will then work to expand such an approach to all states possessing nuclear weapons.

5.15 In the longer term it will be important to consider how to verify these declarations. In doing so, we will need in particular to ensure we continue to meet our responsibilities under Article I of the NPT on non-proliferation of weapons technology, as well as respecting national security requirements.

Dealing with States of Concern

5.16 The issue of proliferation is a great and immediate threat to global security, especially in the light of the recent attempted nuclear explosion by North Korea and continued efforts by Iran to develop nuclear weapons. The international community, working through the UN Security Council and the IAEA has rightly condemned this activity in the strongest terms. These events have highlighted the importance of the 2010 NPT Review Conference to re-energise global efforts on non-proliferation.

The Entry into Force of the Comprehensive Test Ban Treaty (CTBT)

5.17 Opened for signatures in 1996 the CTBT seeks a global ban of nuclear weapons test explosions in order to limit a state's capacity to develop nuclear weapons. The UK and France were the first two nations to sign and ratify this treaty; however it will only enter into force when ratified by the remaining nine so-called 'Annex 2' states, namely: China, Egypt, India, Indonesia, Iran, Israel, North Korea, Pakistan and the US. Three of these are non-signatories of the NPT. The CTBT, and other treaties like the Fissile Material Cut-Off Treaty (FMCT), provide unique opportunities to engage these states, and bring them closer to global non-proliferation and disarmament efforts.



A Comprehensive Test Ban Treaty Organisation Radionuclide monitoring station

Box 5.3 – Iran and North Korea

Iran

- Iran has yet to respond to either the E3+3 (France, Germany, the UK, China, Russia, the US) proposals or the offer of dialogue from the US. The generous E3+3 offer contains everything Iran needs to pursue its stated aim of a modern civil nuclear power programme, its stated aim. Iran has a window of opportunity, but they need to understand this is not open-ended. The latest IAEA report on Iran (5 June) indicates that Iran is continuing to enrich uranium, and building its capacity to do so in defiance of UN Security Council Resolutions. They are failing to cooperate fully with the IAEA. The UK Government will continue to work closely with international partners to persuade Iran to suspend enrichment and to engage in substantive negotiations. This will include preparatory work on a new, tougher sanctions regime – whether it be via the UN or EU, if Iran fails to properly respond to the E3+3 offer.

North Korea

- North Korean actions that breach UN Security Council Resolutions and NPT obligations have received a strong and united international response. We continue to urge North Korea to refrain from further provocative actions that undermine regional security, and to re-engage in dialogue with the international community. UNSCR 1874, adopted unanimously after the nuclear test announced on 25 May, is absolutely clear in condemning that attempt and demanding that North Korea does not conduct any further nuclear tests or launches using ballistic missile technology. It shows that the international community is united against North Korea's continued proliferation activities. The UK wants to see the new measures implemented swiftly and we will be working closely with partners in the UN and EU to do so.

Syria

- Following the revelations that Syria was covertly developing a reactor at Dair Alzour with North Korean help, the IAEA visited the suspected site in June 2008. The IAEA Director General's subsequent reports have criticised Syria for the failure to cooperate with their investigation. The UK and EU partners continue to support the IAEA's call for greater transparency by Syria, both in providing further access at Dair Alzour and other locations and in answering the IAEA's questions.

5.18 The entry into force of the CTBT is a key milestone in the disarmament process and we will therefore continue our diplomatic efforts to encourage its ratification. This effort will be enhanced by the recent commitment of President Obama to urgently pursue the treaty's ratification and the Conference on Facilitating the Entry into Force of the CTBT in September 2009. The UK fully supports both these initiatives and hopes that the other non-signatories will see

the US position as a spur to hasten their own national plans to ratify the treaty.

Towards a Fissile Material Cut-off Treaty (FMCT)

5.19 Progress towards disarmament can only occur if there is a verifiable end to the production of fissile material for use in nuclear weapons. This would establish a finite amount of fissile material which would

in turn set an upper limit on the size of the global nuclear weapons stockpile.

5.20 After many years of effort a significant step towards establishing a Fissile Material Cut-off Treaty has been taken, with the Conference for Disarmament agreeing a package of work that will enable negotiations to start. This work needs to be taken forward as a matter of urgency. In the meantime, we urge all states concerned to implement a moratorium on the production of fissile material for nuclear weapons. Of the P5, the UK, France, Russia and the US have already declared such a moratorium.

5.21 The successful entry into force of an FMCT will require significant work on the technical challenges associated with verification. The technological developments required to verify a FMCT could be developed through the UK's new Nuclear Centre of Excellence in the future (see box 3.5).

The Proliferation Security Initiative

5.22 The Proliferation Security Initiative (PSI) aims to stop the trafficking of WMD, their delivery systems, and any related materials to and from states and non-state actors who present a proliferation concern. It plays a key role in the global non-proliferation effort, and the UK supports global participation in this initiative. It has grown enormously since its launch in 2003: it now has 95 members and undertakes outreach and exercises with many more.

5.23 The UK Government welcomes President Obama's recent commitment to the initiative and were encouraged by the Operational Experts Group's unanimous endorsement of the move to institutionalise it. But more also needs to be done to strengthen it.

5.24 The UK is taking a lead in exploring how the PSI could become a truly effective vehicle for disrupting proliferation. There is still a long way to go to combat proliferation

effectively. But the moves to institutionalise the PSI, to start substantive discussion on some of the difficult legal and practical issues, and to explore ways of strengthening it, suggest that there is now a real prospect that PSI could become of even greater significance in the fight against would-be proliferators.

Tackling the Financing of Proliferation

5.25 Proliferation networks need financial services to operate. We aim to make financial measures a powerful tool against proliferation, just as they have become an essential part of countering terrorism.

5.26 The UK is developing new measures to detect and disrupt financing linked to proliferation threats to the UK, and to support diplomatic pressure against countries of concern. At the end of last year, the Counter-Terrorism Act 2008 gave the Treasury new powers to respond when the development of nuclear weapons overseas poses a risk to the UK. The Treasury can now impose financial safeguards, including reporting requirements, additional due diligence, or it can require the cessation of business, with entities posing a threat of proliferation.

5.27 The international response to Iran's nuclear programme has also shown the value of financial measures as a support to diplomatic pressure on states seeking to develop WMD. The UK is taking the lead in developing further international controls against the financing of proliferation, with the Financial Action Task Force (the inter-governmental body for combating money laundering and terrorist financing) working on how to bring proliferation finance safeguards into the system of internationally agreed standards against illicit financing.

The Role of Export Controls

5.28 To deliver key measures against nuclear proliferation, there is a need to implement effective export controls in accordance with UNSCR 1540, and to implement universally the IAEA's Additional Protocol.

5.29 As set out in UNSCR 1540, export controls on nuclear items and nuclear related dual-use items are an important feature of the overall nuclear non-proliferation regime, and as such, the effective implementation of such export controls in line with the 1540 requirements remains crucial. The UK will support these goals by strongly supporting the work of the 1540 Committee, implementing the 1540 requirements, and assisting other states to implement fully the resolution.

5.30 The IAEA's Additional Protocol, through the expanded powers for access it imparts to the IAEA, plays a key part in strengthening the safeguard measures in place to ensure that states are abiding by their international commitments. Additional Protocols are currently in force in only 91 countries. The UK will therefore continue to press for universal adoption, recognising the importance this plays in the global counter-proliferation regime.

The Role of the Nuclear Suppliers Group

5.31 With the recent addition of Iceland there are now 46 participating governments represented on the Nuclear Suppliers Group (NSG). The UK is currently working with other participating governments within the NSG to make the guidelines on the transfer of sensitive enrichment and reprocessing technologies more rigorous. This would reduce the risks associated with the spread of enrichment and reprocessing facilities, equipment and technology while enabling peaceful nuclear trade.

5.32 Good progress has been made through 2009, with the Budapest Plenary issuing the first substantial public statement from the NSG for several years. This included references to the activities of North Korea and Iran. There remains work to do before consensus can be achieved and revised guidelines put in place. To support this, the UK, together with other states, has supported holding a further extraordinary meeting of the Consultative Group to take this work forward this year.

5.33 The UK will continue to press for more robust guidelines on the transfer of sensitive enrichment technologies to be agreed by consensus as soon as possible. An important aspect of the UK position is working with partners to make the Additional Protocol a condition of supply as part of a further tranche of measures designed to make the NSG stronger.

A P5 Conference on Confidence Building Measures

5.34 As announced by the Prime Minister in March 2009 the UK will host a conference of the recognised nuclear weapon states on 3-4 September 2009 to discuss confidence-building measures required to enable further disarmament. The conference will examine the verification and compliance challenges associated with achieving further progress on nuclear weapons reductions and non-proliferation, and the steps required to address those challenges.

5.35 This conference demonstrates a shared recognition between the recognised nuclear weapon states of their commitments under Article VI and the need to work together in the run-up to the 2010 NPT Review Conference.

2 Arms Reductions

5.36 Since the end of the Cold War the number of warheads worldwide has dropped

dramatically. There is however a significant global stockpile and its continued reduction must be pursued.

US/Russia

5.37 95 per cent of the global stockpile of nuclear warheads is held between the US and Russia. Under START, the two states have made significant reductions in both their strategic warhead stockpile and strategic delivery vehicles. The UK welcomes the commitment of the US and Russia to negotiate a new legally binding agreement to replace START, ensuring that progress on disarmament for these two states will be maintained once the treaty expires in December 2009. The signing of a Joint Understanding on 6 July between President Obama and President Medvedev, committing each state to reductions of strategic warheads to a range of 1500-1675 and their strategic delivery vehicles to a range of 500-1100, represents a significant step towards that goal.

UK

5.38 The Government's policy on the future of the UK's strategic nuclear deterrent was set out in the 2006 White Paper²³. That continues to be the basis on which we consider those capabilities. Whilst there have been encouraging developments internationally, it remains the case that large nuclear stockpiles are likely to continue to be sustained around the world, and a risk of further nuclear proliferation remains. The road to zero requires multilateral disarmament. A decision not to renew our strategic deterrent would commit the UK Government to unilateral disarmament in still uncertain circumstances. The Government continues to judge, as in 2006, that a minimum nuclear deterrent remains an essential element of our national security.

As was made clear in the 2006 White Paper, the UK will retain only the minimum nuclear deterrent capability necessary to provide effective deterrence. We would only consider using nuclear weapons in self-defence (including the defence of our NATO allies), and even then only in extreme circumstances.

5.39 The process of reviewing the UK's nuclear deterrent requirements will continue into the future. We do this against a complex international security situation. In part due to the leading role played internationally by the UK, there is an increased sense of urgency and commitment to continue to make progress on nuclear disarmament, an agenda which the Obama Administration has made a high priority. There is also a strong international consensus around the need to take urgent steps to cease the proliferation of nuclear weapons. However, this commitment is not universally held as we have seen in respect of North Korea and Iran.

5.40 Looking ahead, once the strategic conditions are established that allow the US and Russia to make substantial reductions beyond those being currently negotiated of their warhead stockpiles, we believe that it is likely to be appropriate for the UK to reconsider the size of its own stockpile of operationally available warheads.

5.41 The UK is fully committed to the principle of irreversibility of nuclear disarmament, as was enshrined in the Thirteen Practical Steps for systematic and progressive efforts to implement Article VI of the NPT²⁴, which were agreed at the 2000 NPT Review Conference. We will consider options for strengthening this commitment, both nationally and with our allies and friends, to lock-in previous and future disarmament steps.

²³ 'The Future of the United Kingdom's Future Deterrent', Cm 6994, December 2006

²⁴ Final Document of 2000 NPT Review Conference – <http://www.un.org/disarmament/WMD/Nuclear/2000-NPT/pdf/FD-Part1and2.pdf>

NATO

5.42 The UK places great importance on the nuclear role of NATO, as reaffirmed by the Declaration of Alliance Security issued at the 2009 NATO Summit. As announced at that Summit, over the next twelve months, the Alliance will review its Strategic Concept. This is an important process in which the UK will play a full part. As part of that process, the Alliance will review its approach to nuclear issues. We believe this should include a review of NATO's nuclear doctrine and capabilities, as the Alliance considers how best to respond to the security challenges of the twenty first century and the potential role of nuclear weapons in deterring those threats. We will continue to contribute our strategic nuclear deterrent to NATO's collective security.

3 Steps to Zero

5.43 It has been widely recognised that the final step to eliminate nuclear weapons will be the most challenging. The measures previously described in this chapter would, if fully implemented, lead to a world with greatly reduced nuclear stockpiles, with all those states still retaining nuclear capabilities signed up to a tough regime of transparency and verification, with a well-established treaty regime to prevent any reversal of the disarmament measures already implemented. That world would also have robust and comprehensive internationally agreed structures to prevent any further proliferation.

5.44 A wider set of issues will need to be tackled to move from that world to one in which there are no nuclear weapons, posing severe political, technical and financial challenges. Ultimately, states will only give up these weapons if they feel confident and secure they are no longer required. That would need to be preceded by further moves to reduce the relevance of nuclear weapons to each nation's defence and security plans.

New structures will need to be developed and proven to manage international crises so that all states can be confident any further conflict can be defused before a state's vital national interests are threatened. Existing crises that threaten international peace and security will need to be resolved. Some countries hold nuclear weapons in part to counter conventional imbalances. We would not want the absence of nuclear weapons to unleash a conventional arms races, so renewed dialogue on conventional arms control will need to be an element of any global agreement to remove nuclear weapons. And states will need to have complete confidence that if nuclear weapons are eliminated, no state would or could subsequently regenerate those capabilities.

South and East Asia

5.45 Of the three declared nuclear weapons states in this region, namely China, India and Pakistan, only China is a recognised Nuclear Weapon State and a signatory of the NPT. None of these states have ratified the CTBT and all continue to develop their nuclear weapons capabilities. All capabilities will need to be addressed as part of any plan to create a world in which there is no place for nuclear weapons. As such the UK will continue to press for universal application of both the NPT and CTBT.

5.46 It is in the long term interests of regional and global security for India and Pakistan to commence a process that will enable them to engage in the global disarmament framework. Initial steps might be to increase transparency on current and future programmes, and a joint commitment to cease to develop new nuclear weapon capabilities and to work with the international community to further enhance the security of their respective nuclear installations. Entering into the NPT framework would lead to them receiving the same inalienable rights to have secure

access to nuclear power that other states party to the NPT enjoy, without undermining provision for their national security.

The Middle East

5.47 In the Middle East there are serious challenges on both non-proliferation and disarmament. In particular, Iran continues to pose a serious proliferation concern (as discussed in Box 5.3).

5.48 Israel remains outside the NPT. Its nuclear capability must be addressed as part of any process to eliminate nuclear weapons. The UK will, therefore, work to bring Israel into the non-proliferation mainstream and encourage Israel to sign the NPT. This must be underpinned by progress towards a comprehensive Middle East Peace settlement.

5.49 The UK strongly supports the establishment of a **Middle East Weapons of Mass Destruction Free Zone** and will work with Russia and others on measures to build confidence and to urge all states in the region: to sign the relevant conventions on chemical and biological weapons; to ratify the Comprehensive Test Ban Treaty; and to participate in the negotiation of a FMCT. A WMD Free Zone can only be agreed amongst the states in the region if all countries have a shared feeling of security. Making headway will require Iran to cease its current programme to enrich uranium and to enter into negotiations with the E3+3.

Verification of Dismantlement

5.50 Verification will be a critical element of the final process to eliminate nuclear weapons. This will require both transparency into all states' nuclear activities (both civil and military) and a properly resourced intrusive inspection regime. That will pose significant technical, financial and policy challenges.

5.51 The UK established a research programme almost a decade ago to develop the techniques required to address the issues associated with verifying any future disarmament regime. The UK has since become a 'disarmament laboratory' with world leading research on both the technical and non-technical aspects of verifying disarmament.

5.52 Work has been undertaken at the UK's Atomic Weapons Establishment (AWE), focused around the following four technical areas:

- **Managed Access to Nuclear Sites** – abolishing nuclear weapons will require all states to provide inspectors with the access required to their nuclear facilities without compromising national security. This will underpin the issue of verifying disarmament. The UK is developing procedures to provide this access and has tested a number of them in a joint exercise with Norway, where Norwegian officials played the role of a Nuclear Weapon State being inspected by UK experts playing representatives of a Non Nuclear Weapon State;
- **Warhead authentication** – to prevent states having to reveal classified design information as part of an inspection regime, the UK is developing techniques aimed at allowing certain attributes of a nuclear warhead to be measured without the release of sensitive information;

- **Chain of custody** – inspectors will need assurance that the separate components of a dismantled warhead did in fact come from a nuclear device. The UK is investigating how technologies such as tags and seals can be applied to the tracking of components in the warhead dismantlement process; and,
- **Monitored Storage** – once dismantled, inspectors will need to ensure that components will be securely stored under conditions where they cannot be removed without the knowledge of inspectors.

5.53 Ultimately, as with other parts of the Road to 2010 plan, confidence in the multilateral enforcement system is key to making progress. We must ensure there is a proper, robust system of detection of non-compliance and verification of compliance. So, as in expanding access to civil nuclear power, and enhancing nuclear security, we need to look strategically at the framework for international governance. The last substantive chapter of this paper looks at international governance of nuclear issues in general, and the role of the IAEA in particular.

Chapter 6

International governance and the IAEA

Strategic Challenges

6.1 The nuclear question in the twenty first century is a global one. Each of the three main subjects in this paper: access to civil nuclear power, nuclear material security, and non-proliferation and disarmament, raises significant questions about the role and nature of international efforts to address the challenges.



A scene from the regular session of the IAEA Board of Governors meeting in Vienna, Austria.

The role of the International Atomic Energy Agency (IAEA)

6.2 The IAEA is at the forefront of international efforts to deliver a safe, secure and proliferation-free nuclear future. Its work cuts across most of the issues relevant to the Road to the 2010 NPT Review Conference. But, as the Agency itself acknowledges, it needs reform if it is to carry out its existing remit more effectively and to credibly tackle challenges in new areas, such as security, where its role has hitherto been limited. The UK welcomes the appointment of Ambassador Amano of Japan as the next IAEA Director General (subject to the approval of the General Conference). The incoming Director General faces a wide range of challenges:

- unifying and refocusing the Agency's wide membership on a set of shared goals and priorities;
- strengthening the safeguards regime. The Agency has repeatedly indicated that it does not have the powers it requires to police members' non-proliferation obligations effectively. The Comprehensive Safeguards Agreement (CSA) has not been universally adopted by non-nuclear weapons states and is in any case not effective in detecting undeclared nuclear materials and activities. The Additional Protocol (AP), intended to help address these shortcomings, has only been signed by around half the IAEA's members. And the Iran nuclear case has highlighted the critical importance of the early discussion and promotion of some additional transparency measures;

- strengthening its role in relation to civil nuclear security;
- extending the impact of the Agency's work by increasing synergies and partnerships with UN and other international organisations, in particular the World Health Organisation, the Food and Agriculture Organisation and bodies such as OECD's Nuclear Energy Agency; and,
- completing ongoing managerial and structural reform, including the introduction of a modern resource planning system and the identification of possible solutions to the Agency's growing difficulty in recruiting and retaining staff.

Box 6.1 – The International Atomic Energy Agency

The IAEA is the world's nuclear safeguards inspectorate, with more than four decades of experience in verifying that safeguarded nuclear material and activities are not used for weapons purposes. The IAEA advises on nuclear safety and security, and assists countries to prepare for and respond to nuclear emergencies. The IAEA also co-ordinates cooperation in the peaceful application of nuclear science and technology, contributing to sustainable development in many fields including energy, environment, health, food and agriculture. The use of nuclear power and other nuclear applications is increasing, and the IAEA is in the midst of reviewing the nature and scope of its programme of work up to 2020 and beyond. A report by an independent Commission of Eminent Persons is currently being considered by the IAEA's member states.

The UK's objectives

6.3 The UK wants the IAEA to maintain and strengthen its position as the lynchpin of the international community's efforts to ensure a safe and secure nuclear future. We must continue to work with international partners and the Agency to:

- address the new challenges it faces. Reform must ensure the Agency has the credibility, expertise and legitimacy required to help manage the necessary global expansion of nuclear energy; and,
- find and report promptly to the UN Security Council (UNSC) any instance of non-compliance. This would be part of a wider strategy to build international consensus for ensuring that any non-compliance with IAEA safeguards agreements or the notified withdrawal from the NPT triggers strong UNSC action. The UK would like to discuss with the Agency and Member States, at the earliest possible opportunity, past practices in exposing and addressing non-compliance by the Agency, with the aim of reaching a common understanding on the definition of non-compliance.

6.4 We recognise that reform of the Agency will need political commitment and broad agreement among the Member States that make up the IAEA. But we believe there is consensus in most countries about the importance of the IAEA, the need to maximise its effectiveness and the measures required to achieve that.

Progress to Date

6.5 The UK has long been a committed member of the IAEA and vocal advocate of the importance of its work. We are the fourth largest financial contributor. We make significant voluntary contributions to the Technical Co-operation Fund and in March made a £4 million contribution to the

Agency's Nuclear Security Fund (doubling our previous contribution).

6.6 Since 1981, the UK has assisted IAEA safeguards through the provision of a Support Programme (UKSP), which helps maintain and further develop the IAEA safeguards regime. We are ideally placed to provide such support, since we have a range of facilities and expertise that covers most of the nuclear fuel cycle. Through the UKSP, we have trained thousands of IAEA inspectors and provide a wide-range of courses which we continue to update and improve.

6.7 The UK also plays a key role in the IAEA's growing work on nuclear security, chairing the Working Group which is driving a revision of the IAEA's Recommendations for the Physical Protection of Nuclear Material (known as INFCIRC/225).

6.8 The UK has been a member of the IAEA's Board of Governors since its creation. Together with our partners in the Geneva Group of Major Donors, the UK has consistently encouraged the Agency in its efforts to drive forward change management.

Objectives to 2010 and Beyond

6.9 We want the Agency to be fit for purpose. As a contribution to the debate on how that should be achieved and the IAEA's own 2020 review process, we set out below the UK's vision for the future and the steps we plan to take to help realise it.

1 Towards a Stronger Organisation

6.10 The UK believes that the IAEA needs strong leadership which champions change and is able to unify the Agency. It requires effective and efficient management, which is able to make the most of the Agency's resources, and it needs structures, systems, staff and funding, which are fit for the security challenges of the twenty first

century. Reform will need to recognise the increasing demands being placed upon the Agency, and this may need to be reflected in further resourcing of the Agency. But it will be essential that this leads to clear prioritisation, increased accountability and ensuring that any additional resources are used in an effective and efficient manner.

6.11 We believe member states should agree in 2010 that the IAEA should:

- continue to focus principally on its activities in relation to safeguards, safety and security, and the promotion of the peaceful and safe use of nuclear energy, including sustainable energy development;
- have clear and realistic priorities, focusing on the areas where the Agency can add the most value, and be accountable for their delivery;
- be properly resourced, in both budgetary and personnel terms, to meet the demands we expect it to face in all these areas; and,
- be effectively and efficiently managed to make the most of those resources.

6.12 The UK will support these objectives by:

- promoting at every opportunity a vision of an IAEA re-energised for the twenty first century. We will do this during discussions on the existing IAEA Medium Term Strategy and on future planning and strategy documents, as well as ongoing discussions about the future of the Agency. UK Ministers and Ministers from other Member States will have an opportunity to give the reform process political impetus at the IAEA General Conference in September;
- engaging with the new Director General. The Director General should be the most powerful force for change and should have ownership and leadership of the reform process;

- working with the IAEA and international partners to develop robust plans for organisational reform of the Agency, identifying priorities and ensuring transparency and accountability;
- hosting a meeting of senior representatives from capitals of the Geneva Group to discuss future funding and staffing requirements of the IAEA;
- proposing that this Group also recommends to the IAEA an independent and wide-ranging Efficiency Review carried out by external consultants, alongside the creation of an Audit and Risk Committee which reports to Member States; and,
- continuing to call on all member states to pay their contributions in full and on time and press for mechanisms to encourage them to do so.

2 Towards a verification regime that ensures detection of non-compliance

6.13 The IAEA's work to safeguard nuclear power programmes and ensure that safeguarded nuclear material is not used for weapons purposes is critical. Enhancing the Agency's safeguards capabilities should therefore be a priority in the coming period. We believe that Member States should agree in 2010 that:

- states that have not yet done so should work with urgency to bring into force Comprehensive Safeguards Agreements, Revised Small Quantities Protocols, and Additional Protocols. All states should support the development and use by the Agency of improved safeguards technologies to implement these agreements;
- the IAEA should implement agreed safeguards thoroughly and effectively, reporting instances of non-compliance without fear or favour. And states, in addition to fully meeting their

safeguards obligations, should make clear that they will – to the fullest extent possible – provide the IAEA with any additional access to information, locations and individuals that the Agency deems necessary; and,

- there should be a structured international discussion of what additional powers of inspection the Agency should be given in the future, both in specific cases where states have been found by the Board to be in non-compliance with their safeguards obligations and more generally to provide even stronger assurance of compliance.



An IAEA verification training exercise

6.14 The UK will support these objectives by:

- pressing for political commitment in 2010 to bring relevant safeguards agreements into force, sharing best practice and expertise wherever requested;
- proposing that the new Director General presents to the Board of Governors plans on what further powers the Agency might be given for its next generation of safeguards verification;
- pressing for a strengthened and more transparent Safeguards Implementation Report;
- seeking a discussion with the Agency and the broad membership at the

earliest possible opportunity on the Agency's past practices in exposing and addressing non-compliance, with the aim of reaching a common understanding on the definition of non-compliance;

- encouraging the IAEA to make greater use of the UK Support Programme, including increased training of existing and new safeguards inspectors; and,
- encouraging well-qualified UK personnel to seek positions in the Department of Safeguards at senior level and in the inspectors ranks.

3 Creating a central role in the security of fissile material

6.15 The IAEA already plays a role in advising on civil nuclear security issues – including through its Nuclear Security Programme and standards on physical protection – but its recommendations are not mandatory or enforceable. While there is widespread understanding that the responsibility for nuclear security rests with individual states, it is the UK's view that the international community should encourage states to consider, over the long term, a radical change in the role of the IAEA in relation to civil nuclear security. This should be with a view to giving the IAEA a mandate to verify that future mandatory nuclear security standards are met. We believe member states should commit to:

- an extension and expansion of the Nuclear Security Programme for 2010-13, and ensuring that the IAEA has the funds and expertise to underpin its advice and assistance activities on security;
- completion of the revision of IAEA's Recommendations for the Physical Protection of Nuclear Material (INFCIRC/225);
- bringing into force the Amendment to the Convention on the Physical

Protection of Nuclear Material (CPPNM); and,

- in the longer term, going beyond existing physical protection arrangements and giving the IAEA a mandate to verify that mandatory standards are being met.

6.16 The UK will support these objectives by:

- working to ensure that an effective Nuclear Security Programme for 2010-13 is agreed at the IAEA's September 2009 Board;
- continuing to work as chair of the relevant working group to secure early revision of INFCIRC/225 and, in the coming months, ratify the amended CPPNM that ensures the protection of nuclear material at sites, encouraging others to do so too; and,
- developing with key partners a paper which sets out how physical protection arrangements might be developed over the long term and what the IAEA's role might be in such arrangements.

4 Promotion of the Peaceful and Safe Use of Nuclear Power

6.17 We value the IAEA's current role in promoting the benefits of safe, secure and peaceful uses of nuclear power as widely as possible to its members. In recent years the Agency has, in particular, made a valuable contribution to tackling the global challenges of poverty, access to healthcare, nutrition, energy, food and water through a wide range of Technical Co-operation projects. This work supports the achievement of the Millennium Development Goals.

6.18 We believe Member States should agree in 2010 that:

- the Agency must continue to play a major role in promoting the peaceful and safe use of nuclear energy, including through promoting and facilitating discussion of new multinational

- approaches to the most sensitive parts of the nuclear fuel cycle;
- the IAEA should play a greater role in achievement of the Millennium Development Goals. In doing so the IAEA should work in partnership with other development organisations and the private sector. It should increasingly focus on sustainable energy development, while maintaining those technical co-operation activities where there is demonstrable impact, and where the Agency is the international organisation with the key expertise and primary responsibility; and,
 - to achieve those objectives efficiently and effectively the role of the Agency should predominantly be that of advisor, not implementer. It should focus on activities such as assisting states in the implementation of the highest international safety standards, capturing and spreading best practices relating to the introduction of new nuclear power programmes, facilitating the exchange of expertise and best-practice on nuclear safety and security, encouraging the development of partnerships between Member States, carrying out safety and security reviews and appraising national legal and regulatory infrastructure.

Immediate Next Steps

6.19 The UK will support these objectives by:

- announcing details of our proposal for a Nuclear Fuel Assurance to the IAEA Board of Governors in September 2009 and providing advice to other states on how it might work in practice;
- committing to an ongoing voluntary contribution to the Technical Cooperation Fund and working to persuade others to make similar pledges, as well as continuing to provide support for IAEA activities to spread best practice

- assessing how the UK could strengthen its support of the Agency's work on the Millennium Development Goals and its assistance to developing countries on sustainable energy development.

Working with other multilateral bodies

6.20 The UK will work to ensure that a reformed and re-energised IAEA works closely with other international bodies committed to a safe, secure and proliferation free nuclear future. This will include our work with the Nuclear Suppliers Group and our work with European partners through Euratom. The Euratom Treaty requires the European Commission to apply safeguards to make certain that nuclear materials in Europe are not diverted to purposes other than those intended. We will continue to work to ensure that safeguards are implemented in an effective and efficient manner within Europe, enabling both Euratom and the IAEA to meet the goals of their respective safeguards regimes.

6.21 The role the UN can play in curbing the proliferation of nuclear weapons is unique and indispensable. The UK will therefore also seek to ensure that a reformed and re-energised IAEA works closely with the UN Security Council and receives the support that it needs.

6.22 As underlined above, the IAEA's legal authority to carry out its verification mission in countries of concern is limited, especially where those countries have not brought the Additional Protocol into force. The limited authority to verify the peaceful nature of nuclear programmes is lost if a country withdraws from the NPT.

6.23 In that regard, we note the recommendation in the Report of the Commission of Eminent Persons on the 'Role of the IAEA in 2020 and beyond'²⁵ that:

"the UNSC should go beyond its Resolution 1540 by: passing a new resolution making clear that the proliferation of nuclear weapons is a threat to international peace and security; legally prohibiting any state that withdraws from the NPT from using for military purposes any nuclear facility, materials or technologies that it received for a peaceful purposes while a Party to the NPT; and legally imposing safeguards obligations, going well beyond the Additional Protocol, on any state that substantially violates its safeguards obligations"

6.24 In the past, the Security Council has taken action on a case by case basis to respond to non-compliance cases reported to it by the IAEA and notices of withdrawal from the NPT:

- The Security Council addressed the limitations in the Agency's legal verification authority and in its Resolutions 1737 (2006) and, 1747 (2007) adopted under Chapter VII of the UN Charter, backed the request of the IAEA for the implementation by Iran of additional transparency measures, providing the Agency with access to individuals, documentation, equipment and facilities extending beyond those provided in the Additional Protocol. The Security Council did the same with regard to North Korea in the recent unanimously adopted Resolution 1874. However, both countries have still to comply with their obligations.
- The Security Council deplored North Korea's announcement of withdrawal from the NPT and decided that the North Korea should return at an early

date to the NPT and IAEA safeguards. Again, North Korea has yet to comply with this obligation. More broadly, there is no common understanding yet within the community of NPT states parties on the consequences of withdrawal from the Treaty and the role the Security Council should play in addressing and policing this issue.

- In both the Iran and North Korea cases, the UNSC has adopted a set of sanctions in response to serious instances of non-compliance.

6.25 As suggested in the recommendation of the Commission of Eminent Persons and given the record to date, more needs to be done to ensure that non-compliance cases and notices of withdrawal from the NPT, (in particular by countries which have – or are suspected to have – violated their non-proliferation obligations before leaving the Treaty), trigger strong action by the Security Council.

6.26 We therefore believe Member States should agree in 2010 that:

- compliance with non-proliferation obligations, including safeguards obligations and cooperation with the IAEA, is critical; and,
- existing enforcement mechanisms should be supported by all NPT parties and strengthened, in particular with a view to developing a set of possible actions, including sanctions, to be decided by the UNSC in response to proliferation cases and notices of withdrawal from the NPT.

6.27 In addition, the UK believes that Member States should reaffirm the responsibility of the UN Security Council in enforcing non-proliferation rules.

²⁵ 'Reinforcing the Global Nuclear Order for Peace and Prosperity: The Role of the IAEA to 2020 and Beyond', May 2008, www.iaea.org/NewsCenter/News/PDF/2020report0508.pdf

6.28 The UK will support these objectives by:

- considering and seeking discussion with partners on the adoption by the Security Council of a “generic”, country-neutral, resolution dealing preventively with non-compliance with non-proliferation obligations. This would strengthen the IAEA’s verification authority in countries which have violated their safeguards obligations and are not cooperating with the Agency to the extent it deems necessary; and,
- further engaging with NPT partners on the European Union paper on Article X of the Treaty, which it tabled in 2007 to address the issue of the consequences of withdrawal. Without reopening the Treaty, the EU proposal sets out clear measures that make plain the extreme gravity of withdrawal and raise the cost for any State Party seeking to pull out of the NPT.

6.29 The environment in which the IAEA, and the wider multilateral arrangements, operate will not remain static as nuclear power develops. We will therefore need to ensure that the mechanisms are responsive and adaptable to the challenges of the decades ahead. The UK will continue to take a leading role in developing ideas for multilateral control of the fuel cycle, more effective nuclear security, preventing proliferation, and building confidence for further disarmament, and work with our partners to deliver them.

Summary: UK activity up to the 2010 NPT Review Conference

On ensuring the safe expansion of civil nuclear power we will:

- establish the UK's Nuclear Centre of Excellence to promote the development of cost-effective and proliferation resistant nuclear technology;
- set out the factors for assessing the options for long-term management of the UK's separated plutonium stocks and follow this with another discussion document later in the summer which will set out the process for making final decisions; and,
- complete the development of the UK's Nuclear Fuel Assurance and present our proposals to the IAEA in September 2009.

On ensuring a strengthened response to the challenges of nuclear security, we will:

- work to establish nuclear security as a fourth pillar of the global nuclear regime;
- ratify the amendment to the Convention on the Physical Protection, starting this process by immediately laying the relevant motion in Parliament, and work to encourage other countries to do the same;
- provide an additional £3 million in funding to further develop the forensics detection capability at the Atomic Weapons Establishment; and,
- work with the US and other partners to make a success of the Global Nuclear Security Summit in March 2010.

On preventing proliferation and creating the conditions for multilateral disarmament we will:

- host a conference of the recognised nuclear weapon states on 3-4 September 2009 to discuss the confidence-building measures required to enable further disarmament;
- promote the EU's Action Plan on disarmament together with our partners;
- continue to pursue the entry into force of the Comprehensive Test Ban Treaty;
- work to take forward as a matter of urgency negotiations on a Fissile Material Cut-Off Treaty; and,
- work with Russia, and other international partners to make progress on a Middle East Weapons of Mass Destruction Free Zone.

To support all of this work we will work to strengthen international governance and the role of the International Atomic Energy Agency in particular. We will:

- engage with the new Director General, and international partners to develop robust plans for the organisational reform of the Agency;
- host a meeting of the major donors to the IAEA – the so-called 'Geneva Group' – to discuss future funding and staffing requirements of the Agency;
- encourage the IAEA to make greater use of the UK Support Programme, including increased training of existing and new safeguards inspectors; and,
- assess how the UK could more effectively support the Agency's work on the Millennium Development Goals.



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