Report on Wilton Park Conference 730

"Climate Change: What needs to be done in the North and South?"

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1 Introduction

Scientific Perspectives

Despite the widely varying approaches of the many scientists working on climate change, there is an increasing consensus that:

- it is a warming world;
- recent warming is largely anthropogenic (humanly-created);
- rising temperatures mean increasing vulnerability for ecosystems and societies and
- climate change is inextricable from other environmental concerns (e.g. biodiversity changes, desertification, water availability, air quality).

A range of future scenarios for 2050 has been constructed by the Tyndall Centre.[1] In spite of different assumptions, there is substantial agreement on the trends within the scenarios. These scenarios anticipate:

- substantial impacts on natural vegetation (particularly in regions such as Amazonia and the Sahel);
- reductions in availability of water across Middle East, Central and Southern Africa, Southern Europe;
- severe decreases in crop productivity in Africa and the former Soviet Union;
- an increase in risk of coastal flooding, particularly in South East Asia; and
- increased vulnerability to malaria in South East Asia (but some decreases in malaria prevalence in areas which become drier).

Increasingly, scientists are looking at "adaptation" and "mitigation" together. They argue that mitigation (the reduction of levels of green house gas emissions) and adaptation (decreasing the level of vulnerability of societies to the impacts of climate change) must be addressed at the same time. At national level, measures must be taken to address:

- insecurity and marginalisation of populations;
- unequal distribution of wealth and assets;
- geographical and environmental dimensions;
- demographic characteristics of societies, health threats, and social capital.

[1] For reports by the Tyndall Centre, see: http://www.tyndall.ac.uk/publications/working_papers/working_papers.shtml

Crisis in the Kyoto System?

Both advocates and critics of the Kyoto System are beginning to ask what will happen in the medium term, whether or not the Kyoto Protocol enters into force.[2] As long as the USA remains outside the protocol (as at November 2003), in spite of the 119 ratifications so far, the Protocol will not enter into force until Russia ratifies. Critics and supporters are looking for a process or dialogue on a climate change regime which is more inclusive than the current model.

The UN Framework Convention on Climate Change (UNFCCC) is wider than the Kyoto protocol alone. Beyond 2012, a wide range of types of commitment is possible. These include:

- continuation of the Kyoto type of commitment;
- use of carbon intensity targets (emissions per unit of GDP) of the type advocated by the USA;
- development of more rigorous technological standards or performance standards.

Prior to 2012, when the new UN commitment period begins, a number of key steps are needed:

- strongly encouraging ratification (without threatening Russia which is likely to be counter productive);
- improving scientific research and global monitoring;
- strengthening technological research and development.

The role of the Kyoto ratifiers could also be significant. They could:

- develop the flexibility mechanisms of the Kyoto protocol and show that they work;
- continue national efforts on controlling greenhouse gas emissions.

In the long term, a system must be developed which draws in the USA and the industrialising countries of the South.

[2] For the website of the UN Framework Convention on Climate Change, see: http://unfccc.int/

2 Arresting damaging climate change: A paradigm shift akin to the abolition of slavery?

From the prospective of small island states, particularly those in the Caribbean and Pacific islands, climate change represents a threat to their economic livelihoods, environment and, in some cases, their existence. The impacts of climate change are readily seen in these small and environmentally fragile settings. Small island states have been described as "the canary in the coal mine". Many argue that they represent an "early warning system" which shows the results of the increased damage caused by the extreme weather events associated by most experts with global warming. In the Caribbean, between 1920 and 1940, the region experienced 70 storms and hurricanes (an average of 3.5 events per year). Between 1944 and 1980, the Caribbean experienced 196 storms and hurricanes (an average of 5.5 events per year). Since 1990, there have been 13 major storms or hurricanes, one each year on average. These kill humans, livestock and wildlife; they destroy buildings and other important property; they ruin ancient forests, trees and crops; and destroy the beaches and ancient reefs that protect the shoreline. Such events fit exactly with what the Intergovernmental Panel on Climate Change (IPCC) predicts as a result of global warming.[3]

The argument of the Association of Small Island States (AOSIS), is that whilst the omissions of green house gases are overwhelmingly in the North, the damaging impacts are disproportionately felt in the South. Between 1985 and 1999, more than 560,000 people died in natural disasters worldwide (although it should be noted that exact attribution of any particular event to climate change is complex). More than 75% of deaths occurred in Asia. Only 1% were in North America and 1% in Europe, where the defences against disasters are stronger. From the perspective of AOSIS, the moral argument is that the countries which are responsible for the greatest percentage of greenhouse gases should change their damaging consumption patterns and help to pay for the defences against the damaging impact of their past action.

Technically well-resourced nations have a moral responsibility to change patterns of economic behaviour which threaten the existence of the frailest and most vulnerable environments. A parallel with the slave trade is made, based on an analogy between the human cost of slave labour which was seen as indispensable to industrialisation, and the argument that burning fossil fuels (with the inevitable emission of greenhouse gases) is essential to the prosperity of today's industrial societies. Whilst many would challenge the precision of the analogy (few would argue that burning fossil fuels is wrong *per se,* whereas there is now almost universal consensus that slave ownership is wrong and is therefore

[3] See: http://www.ipcc.ch/

rightly made illegal), the central challenge still stands. There is now substantial scientific agreement that sustainable economic development requires a transition to lessen the destructive impact of greenhouse gas emissions. The present pattern of economic wealth in the industrialised countries, achieved at least in part by the consumption of increasing levels of fossil fuels, is unsustainable. Developing countries insist on their right to development, but recognise that they cannot follow the same development path as the industrialised countries of the OECD. Representatives of countries of the South tend to stress equity arguments; that their countries have a right to development and their citizens should not be deprived of access to the energy sources which have contributed to the economic development of the North.

3 Two frameworks: "Contraction and convergence" and "Equal per capita entitlements"

The challenge of equity can be illustrated by two complimentary approaches. The first, Contraction and Convergence, provides an overall framework for negotiation to establish a sustainable level of greenhouse gasses within the atmosphere. The second, equal per capita entitlements, provides a rights-based approach beginning from the individual, which can then be aggregated up to provide a national ceiling for emissions.

Advocates of Contraction and Convergence argue that the approach provides an overall framework which provides a basis for negotiation towards solution of the climate crisis. Advocates argue that the only alternatives to a framework are guesswork and, at best, partial solutions. Contraction and Convergence seem to be consistent with the United Nations Framework Convention on Climate Change (UNFCCC). Key elements of Contraction and Convergence are:

- International agreement on "a contraction budget" establishing for a future deadline, a safe and stable level for atmospheric greenhouse gas concentrations (e.g. 450 parts per million by 2030). Proponents of Contraction and Convergence stress that the deadline and the agreed level of concentration need to be negotiated and also depend upon on scientific information. After the target date, emissions would remain proportional to population. Emissions, whether calculated nationally or by regional groups, would be proportional to population at an agreed base year of global population. From that date, maximum permitted levels of emissions would be tied to population, rather than GDP.
- Contraction refers to the process whereby all governments, or regional groupings of governments, agree to reduce global emissions to achieve targets for concentration of greenhouse gases.
- Convergence means that each year the global emissions would be reduced so that each country or group of countries progressively

converges on the same allocation per inhabitant by an agreed date (e.g. 2030).
- Emissions permit trading would be permitted, provided the overall total of greenhouse gases emitted does not exceed the target for a given year during the path to convergence. Unused allocations of greenhouse gases could be traded.

Contraction and Convergence does not specify either a recommended overall concentration level, nor does it prescribe a date by which convergence needs to occur. However, the earlier convergence occurs and the lower level of concentration of greenhouse gases at which it occurs, the better.
The proposal for **equal per capita entitlements** has received growing support from India, many African countries, China, the European Union, the Nonaligned Movement, France, Japan and Switzerland. Its advocates argue that it has the following advantages:

- It has a global appeal as the only plausible unifying principle;
- it promotes equity;
- it ensures meaningful participation as it appeals to developing countries;
- it is simple;
- it allows for trading of allocations;
- it is flexible, allowing for future adjustments of the target;
- the ultimate aim is environmental integrity;
- all countries participate;
- it incorporates a major concession from the South, namely that historical responsibility for the problem is simply ignored.

Critics question the concept's political realism, arguing that:

- equity is subjective;
- the framework provides a perverse incentive for population growth;
- it contradicts the Kyoto architecture because it deviates from the pledge-based approach;
- the atmosphere is not a divisible resource and that the data and institutional requirements necessary to make such an approach effective would be immense.

Furthermore, critics argue that the approach ignores historical responsibilities which is a weakness, rather than a strength. One of the problems with such an approach is that the sceptics about it are generally those in developed countries who are also sceptical about the Kyoto framework. Key actors (such as the USA and Russia) would also be likely to oppose a per capita system which would leave India, China, and Africa as "winners" because of their population size.

4 Alternatives to high carbon use

Towards a low-carbon energy strategy

The British government's Energy White Paper has set a number of goals with respect to reduction of greenhouse gases:

- To cut 1990 carbon dioxide emissions by 20% by 2010 and to increase this to 60% by 2050;
- To generate 10% of electricity from renewables by 2010, rising to 20% by 2020.

To assist in this process the Carbon Trust has been established to assist in the process of making alternatives financially viable.[4] In the words of the UK Energy White Paper: "liberalised and competitive markets will continue to be a cornerstone of energy policy. Where the market alone cannot create the right signals, we will take steps that encourage business to innovate and develop new opportunities to deliver the outcomes we are seeking." In the UK, there is a growing realisation by business that climate change is a major issue which affects business. The Carbon Trust has estimated that in order to meet the targets of the Energy White Paper, it is necessary to double the rate of energy efficiency improvement to move onto a "low carbon pathway". The major non-domestic carbon emitters in the UK are:

- *by industrial sector*: steel, chemicals, engineering, food and drink, paper, plastics and cement;
- *by industrial end use:* boilers, kilns and furnaces, motors and drives, drying and separation;
- *by non-domestic building sector*: industrial, retail, hotels and hospitality, education, commercial offices, central and local government, health;
- *by non-domestic buildings and use:* heating, lighting, catering and hot water.

Five times the current renewables capacity is needed to meet the 2010 target. The scale of investment required for low carbon energy sources varies depending on the stage of development: in early stage development, £1-20 million per new technology is a significant investment;

- in concept evaluation and demonstration in typical conditions, £10-20 million per demonstration is needed (and there may need to be several demonstrations);

[4] See: http://www.thecarbontrust.co.uk/TheCarbonTrust/Default.htm

- for large-scale commercial deployment, hundreds of millions to low billions of pounds per project are required;
- for power infrastructure reinforcement £1-3 billion may be necessary.

The rates of return in recent years in the power generation sector have been too low to attract oil and gas suppliers. To achieve the UK's 10% renewables target, it is estimated that £10-15 billion would be necessary for generation technologies and £1-3 billion for infrastructure reinforcement. The question remains whether government policies can be devised to spread the risk and accelerate the rate of transition to a low carbon economy.

Questions of technology transfer are important. For countries of the South, the issues of technology transfer and capacity-building, as well as the question of who pays, are important.

Meeting the financing gap for energy alternatives

In an article in the *Wall Street Journal* (30 October 2003), Senator John McCain stated that "over the next 20 years, $10 - 20 trillion dollars will be spent globally on new energy technologies". Even allowing for a significant margin of error, it is clear that there is a financing gap, an energy gap and an environmental gap. Developing countries, in particular, see a relationship between the failure by the developed world (not only the United States) to achieve multilateral solutions to international trade issues and environmental threats. Deutsche Bank calculates that energy investment required by 2030 will be $60 trillion. For developing countries, some of the key issues relating to investment in energy emphasised by the International Energy Agency are:

- weak or non-existent capital markets in developing countries, hindering investment;
- the inability of domestic savings to bridge the gap left by diminishing foreign direct investment; and
- the possible inappropriateness of developed country models of reform (liberalisation) for developing countries.
- sustainable and successful projects require political will, clear property rights, and the ability to set and recover a fair tariff for energy;
- geopolitical concerns are likely to increase as developing countries will be relied upon for a growing share of the world's low-cost energy supplies;
- access to electricity will continue to be a key issue for the world's poor (see the Johannesburg 2002 *Sustainable Development Agenda*).

To provide reliable and affordable energy in developing countries, many barriers need to be overcome; uncertainty, economic and financial barriers, clarification of property rights, a proper price framework (either full cost or operational cost recovery); and addressing the political, institutional and legislative risk. On top of

all of these barriers comes financing. National policies and programmes need to cover the following dimensions: long-term plans which recognise intersectoral relationships; the liberalisation of utilities; standardised regulation; appropriate fiscal policies, and clarity of intellectual property issues. The international capital market or major investors are only likely to provide financing when guarantees are linked by national governments to policy issues and policy frameworks are in accordance with international environmental agreements. Long-term guarantees of price are unnecessary; the key element is the formulation of private/public sector agreements. Investment in appropriate energies must be addressed through such approaches as the REEEP (Renewable Energy and Energy Efficiency Partnership).[5]

Involving the private sector in low carbon energy projects

Given that climate change threatens economic stability (with some estimates of the value of damage approaching $300 billion per year) and endemic energy poverty in Third World and transition countries, why is there so little investment in clean energy? The United Nations Environment Programme Finance Initiative Study 2003 suggested that barriers to progress lie in the following areas:

- cognitive – scepticism and lack of awareness of the economics;
- political – delays and inconsistent policies among key actors;
- analytical – lack of data and inadequate tools to quantify the needs and opportunities;
- operational – cumbersome and vague rules for responding to the crisis.

Within the finance sector there is some attention by insurers to climate change (mainly in Europe); some institutional investors are including climate change issues in socially responsible investment (although climate change projects are not central). For project finance and banking, greenhouse gas trading and climate change issues are not central. For renewable energy in the least developed countries, the private sector tends to look for an immediate return; projects in the least developed countries are often relatively small. Readiness to invest is affected by the general business problems in the least developed countries and a central issue is local capacity. Central issues to be addressed include:

- establishing long-term greenhouse gas emission targets on grounds of precaution and equity;
- establishing policies and measures to create a value for carbon (emissions trading schemes);
- increasing support for the least developed countries;

[5] See: http://www.reeep.org/

- developing viable public/private collaboration for developing countries;
- accessing capital markets, for example, catastrophe risk.

Viewed as a straight investment proposition, projects in least developed countries for greenhouse gas emissions and renewable energy are unlikely to be viable, without a supportive policy framework and a positive response by the insurance industry. Worldwide insurance payments for natural catastrophes have increased dramatically in recent decades. Whereas in the 1960s, the cumulative total for insurance payments for natural catastrophes was around $10 billion, by the 1990s, this had increased to $100 billion. Insurers need to respond both at the level of mitigation and adaptation. In terms of mitigation, policies insurers can help to encourage include: reduction of greenhouse gas emissions; encouraging the sequestration of carbon; and support for developing countries. In terms of adaptation, policies which insurers need to support are: attempting to stop building in hazardous areas (e.g. flood plains); ensuring that buildings are more resilient; and protection of livelihoods.

The insurance industry is three times larger than the fossil fuel industry and insurers control 30% of the world's stocks and shares. The UNEP insurance industry initiative (www.unepfi.net) has secured environmental commitment from 91 major insurers from 27 countries. Together these insurance firms are lobbying for reduced greenhouse gas emissions and sustainable development.

If risk is defined as the combination of hazard, vulnerability, and exposure, it is clear that insurance can assist in protecting those who are exposed. The combination of the roles of the state and private insurance can be illustrated with an example from developing countries. As David Crichton points out regarding flood defences, private insurance should be possible if the state provides:

- flood defences to a high standard of protection;
- strict planning rules;
- resilient building standards;
- flood map data;
- no state compensation;
- assistance with premiums for vulnerable people.

If the criteria expected for insurance against floods are exacting in a developed country, the situation for insurance in the least developed countries (e.g. Bangladesh) is far more demanding.

A technological approach: Major investment in renewables in the North

Major investment in renewable energy sources, is reflected in major dam projects, such as the Hoover Dam, the Aswan Dam, the Canadian James Bay Project, the Itaipu Dam, on the borders of Brazil and Paraguay and the Three

Gorges Dam in China. The James Bay Project was conceived in the 1950's, feasibility studies were conducted in the 1960's, construction began in the 1970's, and the project was fully on stream by the 1980's. It required the flooding of more than 10,000 square kilometres of territory. The James Bay Project had a profit of 1.5 billion dollars in 2002. If similar imagination and long-term commitments were dedicated to development of wind power in a country like Canada, it could become a world leader in wind power within ten years. It is estimated that the land involved would be roughly 2,000 square kilometres, one-fifth of the area flooded for the James Bay Project and 1/5000th of the landmass of Canada. It is argued that rather than provide subsidies for the fossil fuel industry, as Canada did (between 1970 and 2003 up to 44.5 billion dollars), if considerably smaller sums were invested in wind power, this could make Canada a world leader. Clean renewable energy would be less expensive than fossil fuels and could be profitable under these circumstances, it is argued.

Energy security and new technologies

Increasingly, energy security is seen as a national security issue. Properly understood, security embraces physical and economic dimensions. From the UK perspective, the Energy White Paper has stressed the need for energy security and a sustainable energy policy over coming decades. This includes dramatic reduction of dependency on carbon emissions. Increasing the proportions of renewables in the energy mix is essential, so is security of supply of energy imports. This requires diversity of supply, and competitive energy markets in the United Kingdom, the European Union, and internationally. Geo-politically, there are obvious risks to the supply chains for both gas and oil. Pipelines, for example start in, and cross, potentially or actually unstable regions. Cartel activity of the type achieved by OPEC in the early 1970s could also be a threat to supply.

Protection of energy security in terms of supply routes for oil involves the protection of installations, guarding routes, possibly pre-empting or solving conflicts. There requirements are:

- Good governance in supplying countries;
- dealing with unsavoury regimes;
- use of the power of the consumer to lessen negative impacts of cartels; and
- diversification of types of energy and sources of supplies. This includes the diversity of nations supplying and routes of supply.

To decrease energy dependency, investments in energy efficiency, non-carbon energy sources and adaptation to changes (for example, improving sea defences etc.) are essential. New technologies are a contribution to enhancing national security through strengthening energy security. There is considerable scientific

uncertainty about the impact of air travel on global warming. The Department for Environment, Food and Rural Affairs estimates that as much as 16% of carbon dioxide emissions could be related to the aviation industry by 2030. Other studies have suggested that it would be possible to make a 50% reduction in the emissions from the aviation industry; this would require breakthroughs in technology, as it cannot be achieved only through improved airframes and air traffic management.

Energy security provides a new way of thinking about security and requires assessments of how to make societies less vulnerable. Renewable energy sources are essential for future security. Wind power and solar power are de-centralised forms of energy supply, which provide higher levels of security. If one small element of the energy network is taken out (e.g. through terrorism), the rest can carry on functioning. The more highly concentrated a system is (e.g. large dams or nuclear power stations) the more vulnerable it may be to attack.

Nuclear power and global warming

Advocates of nuclear power point to prognoses that, if global emissions of greenhouse gases need to be cut by 50% during this century, industrialised countries will have to cut emissions by up to 75%, and the fact that major industrialising nations such as China and India will inevitably emit more greenhouse gases. Under these circumstances, particularly when coupled with a huge increase in demand for energy, clean energy sources are required. Those advocating nuclear power argue that to meet the vast global need for electricity, hydrogen and drinkable water, nuclear power and renewables have to be seen as “clean energy partners”. Proponents of nuclear power stress that: the fuel for nuclear power will be available for many centuries to come; the safety record for nuclear power is superior to other major energy sources; it causes virtually no pollution; use of nuclear power preserves fossil fuel resources for future generations (when the technology for cleaner exploitation may be available); costs are competitive and declining and waste can be securely managed long-term.

Proponents of nuclear power stress that a clean break can be upheld between civil and military uses of nuclear power; that safety can be assured in transit and against terrorist attack; that the cost would be competitive if fossil fuel industries had to pay for the environmental impacts of use of fossil fuels; and that storage of waste can be safely managed. These assertions are not uncontested. However, given that 31 nations (with two-thirds of the world’s population) now have nuclear power and that nations representing half of the world’s population are currently building nuclear power plants, it seems that nuclear power is assured of a place in the energy mix for decades to come. Critics of nuclear power emphasise the secrecy which has pervaded the industry in the past, the safety issues dramatised by Three Mile Island and Chernobyl, and question safety with regard

to terrorist attack and long-term storage of nuclear waste. Public opinion, particularly in western industrial democracies, has severe misgivings.

5 National and regional responses

The United States Administration

The official position of the Bush Administration is that it remains committed to the UN Framework Convention on Climate Change (UNFCCC). The Framework Convention is much wider than the Kyoto Protocol. Current US policy should be seen within this context. It is a widely held view among US political commentators, that the Clinton Administration would not have ratified the Kyoto Protocol. The Bush team, therefore decided to take a fundamentally new approach so that by 2012, emissions would be cut by 30% on the "business as usual" scenario. Rather than internationally agreed and mandatory cuts in emissions, the programme is seeking investment in science and technology to improve understanding of climate change and investment in new transformational technologies, for example, looking for the best way to build fusion reactors. Given the extent of coal supplies in the United States, a further key element is work on clean coal technologies, which would have international application. The overall goal of this programme, which emphasises a reduction of carbon intensity (defined as reducing the use of greenhouse gas emitting energy for each unit of GDP) will also mean an absolute reduction of carbon-equivalent emissions. According to the current plans, 100 million metric tonnes of carbon-equivalent emissions reductions would be achieved in 2012 alone with more than 500 million metric tonnes as a cumulative total up to and including 2012. This is the equivalent of taking 70 million cars off the road.

The United States Climate Change Policy is also committed to expanded use of clean energy and energy efficiency technologies. This includes promotion of renewable energy production, energy efficiency, clean coal technologies and nuclear power. To encourage take up of these programmes, incentives have been introduced, such as tax credits. These will encourage purchases of hybrid and fuel cell vehicles, promote domestic solar energy use, and reward investment in wind, solar and biomass energy production. The package put to Congress represents an investment of $8,000 million over the next ten years in clean energy tax incentives.

Carbon sequestration is also key to the programme. Efforts centre on increasing the amount of carbon stored in America's farms and forests. Under the Farm Bill of 2002, the United States will invest up to $47,000 million in the next decade in conservation measures on its farms and forest lands. This includes measures which will enhance natural storage of carbon. The United States Department for

Agriculture estimates that actions taken to date will sequester over 12 million metric tonnes annually by 2012.

Efforts are also being made to improve the data on greenhouse gas emissions by improving the Federal GHG Reduction and Sequestration Registry. President Bush's fiscal year 2003 budget has devoted $4,500 million to addressing climate change. This includes $1,800 million for climate change science, $1,600 million for climate change technologies and $279 million for international assistance.

President Bush has highlighted the importance of international co-operation to develop an effective and efficient global response. Since 2001, the United States has revitalised or initiated 13 formal bilateral relationships with Japan, the European Union, Italy, Australia, Canada, New Zealand and Russia, Central American countries, China, India, the Republic of Korea, Mexico and South Africa. Taken together with the United States, these countries account for approximately 75% of global carbon dioxide emissions.

The United States also sees its investment in transformation technologies, such as carbon sequestration and investment in hydrogen and advanced nuclear technologies as being an international commitment. Carbon sequestration involves removing carbon dioxide from fuel combustion emission streams and storing it permanently in deep underground formations. Given that the International Energy Agency projects a 50% increase in world wide coal use for electricity generation over the next 25 years, most of it in developing countries such as China and India, carbon sequestration could have an important role. The FutureGen Project is an initiative to design and construct the first emission-free coal fire power plant. This is a $1,000 million project in which the United Kingdom and Italy will also participate. In the next five years, the United States will also invest $1,700 million to seek to develop emission-free cars and transport systems operating on hydrogen. This will also be supported by an International Partnership for the Hydrogen Economy. The United States is also committed to nuclear energy as a clean energy source both in near and longer term.

The Bush Administration is critical of the Kyoto process, *inter alia* because it has not fully engaged the developing countries. Very little attention within the process has been devoted to adaptation (the societal changes necessary to respond to climate change). The Kyoto Framework is seen by the United States Administration as an inadequate response to a dynamic and developing situation, where huge energy demands in both the developed and developing world will have a significant impact in coming decades. The Kyoto Framework has got bogged down in discussions of emissions targets it is argued. The real challenge is the development of renewable energy, improving energy efficiency, and delivering energy to those who most need it for development. Realistic projections suggest that fossil fuels will be a major fuel source until 2050 and that developing countries will not jeopardise their development by limiting demand. Unless cleaner alternatives are provided, the emissions effect will be dramatic. Not least since the tragic events of 9/11, the issue of energy security has gone

much higher up the agenda. The security of oil supplies from the Middle East is a major preoccupation for the Bush Administration.

The US policy agenda has shifted significantly and, many would argue, irreversibly. Even if President Bush were not to be re-elected in 2004, the basic approach towards the Kyoto Protocol is unlikely to change. Many feel that the Republicans have decided that they cannot get the "environmental vote", or even more radically, that they do not think it really matters. It should also be recognised that even if the Democrats were elected that may well not make a fundamental difference, since Republicans can do things that Democrats cannot. A Democrat administration would be likely to be cautious in any steps that it took towards business.

This means that, rather than entertaining hopes that a future United States Administration will revive the Kyoto system, one has to think on a larger scale for the future. As well as the appropriate international architecture or framework, the technological and bilateral approach of the United States, must be factored in. Many would argue that neither approach on its own is sufficient. Even advocates of the Kyoto Protocol have to recognise that it is only a beginning and that it does not deal with fundamental issues of equity and sustainable development.

Internationally, many critics argue that rather than being merely the one party which has withdrawn from a flawed agreement, the United States has been the major reason for the "Kyoto coma". The withdrawal of the United States from Kyoto negotiations has reduced the process to paralysis. Many critics, particularly from countries of the South, see this as further evidence of US unilateralism in world politics, and of a refusal to accept any sacrifice of the "American way of life" for greater equity or chances of development for the South. Far from being a more satisfactory alternative, the policy of the Bush Administration is seen as a further example of putting United States' livelihood above the welfare of the planet and its people. This "go it alone" approach threatens the prospects for any effective international regime.

Advocates of the Bush approach stress that all countries negotiate in their national interest and that the United States (albeit as the largest emitter) is no exception in this regard. Most of the EU countries are failing to meet their Kyoto targets. The Kyoto arrangements show little promise of involving the major developing countries in binding targets in the foreseeable future. The US approach is therefore seen as a more honest and realistic approach. Critics of the United States should realise that serious efforts must be made to design a more universal framework, whether or not Kyoto is formally a part of it.

Russian perspectives on Kyoto

The issue whether Russia will ratify the Kyoto Protocol is now of decisive, "make or break" importance. The internal political process within the Russian Federation is complex, but declaratory statements have included:

"Russia has signed the Kyoto Protocol and now we are preparing for its ratification. This ratification we hope will take place in the near future." (N. Kasyanov, Russian Federation Prime Minister, September 3 2002 at the World Summit on Sustainable Development, Johannesburg);

"Russia is actively pushed towards urgent Kyoto Protocol ratification. We are assessing in detail the related not simple issues…the decision will be taken in accordance with the national interests of the Russian Federation." (Vladimir Putin, 29 September 2003, World Conference on Climate Change (WCCC), Moscow).

The debate is reflected in comments since the September 2003 conference; for example the statement by the Kremlin aide, Andrei Illarionov, that Moscow would not ratify the treaty, which was then contradicted by the Deputy Economy Minister, Mukhamed Tsikhanov, in early December.

Much of the comment in the West has suggested that Russia is simply raising the "asking price" for ratification. The situation, however, is not that simple. To provide a full analysis, one must assess the position of different political and economic forces within Russia. Recently, there has been a shift from economic depression to economic growth; with growth rates at almost 7% per annum and investment 12% up on a year ago. Inevitably, as a result of high levels of economic activity, carbon dioxide emissions will increase. At the same time, a quarter of the Russian population are still living below subsistence level, so the Russian Federation is not likely to do anything which will impair its economic development. The political framework is also important, with the issue of parliamentary and presidential elections also playing a role. The decision of the United States not to participate further in the Kyoto Protocol is also a factor. Finally, it is clear that there will be no huge windfall for Russia from international emissions trading.

Wider international negotiations on Russia's World Trade Organisation entry and ambitions to have a relaxation of the visa regime (for the EU) are seen as goals to be facilitated through reluctance to ratify Kyoto. The European Union, in particular, is very keen to see Russian ratification. As long as Russia has not ratified the Protocol, the European Union will not be able to engage in emissions trading with Russia.

Rational economic concerns and national interest are higher priorities than the international issues. Environmental concerns have receded behind health, access to food, security, and crime in public opinion. The environment, quite

simply, is low down on the agenda. At regional level, various political entities within Russia are keen to sell rights to greenhouse gas emissions as emissions trading starts.

In domestic, economic and political terms, there is a complicated balance of forces and cost benefit analysis. Factors favouring ratification include:

- Improving the chances of foreign investment;
- revenue from emissions trading;
- innovation in the energy field;
- the domestic environmental situation;
- enhancing the chances of the Russian Federation entering into the World Trade Organisation.

There are also unpredictable negative impacts in terms of sea level rise and the permafrost (which covers 56% of the territory of the Russian Federation) melting: disease and floods, the potentially drastic effect on infrastructure and housing. On the other side, however, global warming could lead to: a significant increase in grain production in the Volga region of Central European Asia; growth in pasture in the North West; benefits in terms of energy savings through reduced heating requirements.

Arguments against ratification of the Kyoto Protocol come from those who state that: it is not scientifically substantiated; it is not a global agreement; and important emitters are not involved in the process – primarily the United States. It is also argued that ratifying the Kyoto Protocol will limit Russian economic growth. Critics also point out that it is an illusion to imagine that the Russian Federation will benefit substantially from international emissions trading. The high economic costs of ratification are also stressed.

Within government, there is a delicate balance between the Russian regions and business communities, as well as different ministries who are competing over roles and financial flows. This involves the Ministry of Natural Resources, the Ministry of Energy and the Ministry of Trade. It is probably the 89 regions which are most interested in involvement in the Kyoto Protocol and are lobbying most actively for ratification. The regions are pressing the Federation to ratify, but it is an important question who would design the scheme for property rights on emissions trading. Corruption in the regions is generally recognised as being higher than in the Federal structures, but regional agreements are becoming more transparent. It will also be important what happens with the major energy companies (particularly Gazprom, which is a pro-Kyoto ratification). A decision to ratify would have to go to Parliament before coming back for presidential signature, a process that often takes seven to eight months.

It is important in this process that the European Union keeps its nerve, but does not seem to be pressurising or attempting to “bully” Russia into ratifying.

Third World perspectives

For many in the Third World, the climate process is a challenge for multilateralism. The current set-back with the respect to the climate change regime is part of a more general crisis of multilateralism. The developed-developing country divide is not just one of poverty against wealth, but also of youth versus aging populations. Those from the South who believed in the Kyoto process hoped that the authority of the United Nations would provide a sound basis for partnership between North and South, between governments and private sector. The rhetorical commitment to sustainable development was at least partly believed. The commitment by European Union countries to the Kyoto Process suggested that there would be real development benefits from the Clean Development Mechanism (CDM). Nobody saw the Kyoto Protocol as the full solution, but for many it was seen as a good first step.

Third World commentators are alarmed by the accumulation of scientific evidence, which suggests that the problem is getting worse. Agricultural yields are affected by extreme climates. There are early signs of instability in ocean circulation. The areas where malaria is endemic are increasing in size and malaria is spreading. Natural disasters hinder the progress of many countries which are striving to alleviate poverty. In addition, the private sector has been slow to engage with the CDM, there has been slow progress in defining the rules for the CDM. Very few countries which are committed to Kyoto are on track in terms of their commitments. Foreign Direct Investment in developing countries remains elusive and patchy; and no sound basis exists for technology transfer.

Those who have faith in the process stress that, the rules for the CDM will be complex, and have to be negotiated. Some projects and methodologies have been approved. There is increasing awareness in business circles of the need for partnerships for development. The UN Millennium Development Goals and the Johannesburg plan from the World Summit on Sustainable Development provide a plan of implementation with new targets and frameworks for the multilateral system. Even if the Kyoto Protocol itself cannot be ratified and fully implemented, there is nothing to prevent North and South pressing forward with the CDM and sustainable development. The failure to implement the Kyoto Protocol does not necessarily mean the end to attempts to address damaging climate change in the context of sustainable development. The failure of developed countries to agree emissions targets does not logically prevent North-South partnership on poverty eradication, combating diseases like HIV/AIDS, protection against natural disasters or work on food security. The success of the climate process for developing countries therefore requires mainstreaming commitment to sustainable development.

Developing countries themselves must articulate what they require. The New Partnership for Africa's Development (NEPAD) is one example of how this is

taking place. A partnership approach between developed and developing countries, particularly involving the private sector and market mechanisms, is necessary. From the point of view of the private sector, increasing a developing country portfolio could well be a rational economic response as domestic markets become saturated. If investment in clean energy is to become economic, economies of scale will have to be achieved. It is also true, that in terms of global emissions, a tonne of carbon saved anywhere in the world is equally effective. This suggests that technology transfer is an important dimension of the solution. It is important to take up linkages with other processes, which are being developed by, for example, the Food and Agriculture Organisation (FAO) and the UN Development Programme (UNDP). Such approaches could address issues like food security.

The case of China

China is a vital country for policy on climate change. It has the largest population in the world (1.26 billion in 2000). It is a developing country, in the process of industrialisation with a per capita GDP of 840 US dollars (2000). This is only the 141st country on average in the world. In terms of area, it is the third largest country in the world with multi-climate zones, some of which are very cold in winter and others very hot in summer. The energy resources are 87.4% coal, 9.5% hydropower, 2.8% oil, and 0.3% gas. In 2001, China's share of greenhouse gas emissions were 12.7% of the world total. From 1980-2001, carbon emissions from fossil fuel use grew 3.6% annually. In the same period, GDP grew at an average of 8.6%. The carbon emission intensity dropped by 52% from 1990 to 2001. At 0.65% tonnes of carbon per person, China's emissions per capita are 19% of the OECD average, and 61% of the world average.

At international level, China has played an active part in climate change initiatives. It signed the UNFCCC in 1992 and ratified the Kyoto Protocol in 2002. China is also actively involved with the Global Environment Facility and engaging in studies under the CDM. In terms of its economic policy, efforts have been made to integrate sustainable development into national, social and economic development plans. Energy conservation and improvement of the energy structure are key points. Scientific research is also being actively encouraged. Between 1980 and 2000, energy intensity related to GDP dropped by 64%. The accumulated energy saving in this period was 1020 million tonnes of coal equivalent, generating an accumulated carbon dioxide emission reduction of 643 million tonnes. In terms of actual energy use, the coal share was 75% prior to 1996, and by 2000 had been decreased to 67%. Efforts are being made to use renewable energy (solar heating, geo-thermal power, marsh gas stoves and wind power). China's future policies on climate change are:

- To promote the Kyoto Protocol entering into force;

- to implement sustainable development in all countries;
- to engage in technology co-operation;
- to safeguard the principles of the convention, by standing for a fair emissions reduction regime and per capita convergence on emissions.

At the domestic level, priorities are:

- To promote sustainable energy development;
- to increase adaptation and response capacities;
- to enhance environmental awareness and to continue scientific research.

Obviously, what happens with China's development path, and whether it is able to choose a lower carbon emissions route, is of great significance to the overall levels of greenhouse gas emissions. The involvement of China and other key large population developing countries, such as India and Brazil, in development of a sustainable climate change regime is essential.

Asian perspectives

Different continents within the Third World face different kinds of vulnerability. The small island states, primarily in the Pacific and Caribbean are threatened by sea level rises, and extreme weather events (hurricanes and cyclones). In Africa, the main threats are poverty and vulnerability to extreme weather events. In Asia, many countries are very close to the margin of tolerance for temperature and precipitation changes. Economies depend upon climate sensitive sectors, such as agriculture. Poor nutrition and health infrastructure results in high losses of human life. The coast lines are very vulnerable; of 50 countries which have to invest more than 0.5% of their GDP to protect their shores, 49 are from the less developed countries. Asia, along with other parts of the Third World, suffers from lack of technology, know-how, financial and institutional capacity and this means a lower capacity to adapt to climate shocks.

The poorest countries feel that they are in danger of being marginalized, even within the block of the developing countries. Whilst this is disputed, many poor countries feel that OPEC has skewed the G77 agenda on climate change issues because of OPEC's fossil fuel related interests. Major industrialising countries from the South, such as Brazil and South Africa, also have a different agenda from those which are not industrialising and do not have access to their own energy sources.

The renewal of faith in the multilateral system requires urgent action. The renewal of trust in a framework based on rules and principles, which will provide the opportunity for development for the poorest countries is the bottom line. Even in the current crisis where the United States have broken ranks with the other industrialised countries, there is a danger that developing country issues

will be shelved until the US is back on board. Countries living in extreme poverty feel that they cannot wait for the rich countries to sort out their own approach to the climate issue. At the Conference of the Parties meeting (CoP8) in 2002, Indian Prime Minister, Vajpayee, stated the position "we do not believe that the ethos of democracy can support any norm other than equal per capita rights to global environmental resources". This equity approach is stressed by many developing countries as integral to the right to develop.

Given the weak bargaining position of the developing countries, it is not surprising that there is a division between those who think that the issues should be solved at the level of principle (ie equity) and those who take a more pragmatic approach by suggesting that rather than arguing about blame in the past, industrialised countries should be encouraged to look at their contribution in the future. Technology transfer is therefore seen as an essential part of the answer. "Leap-frogging" to cleaner technologies could, under proper development and technology transfer regimes, be an element to a solution.

6 Sceptical voices and Kyoto

The present crisis in the Kyoto system also provides an opportunity for looking again at the arguments of "climate sceptics" of various types. Given that even the advocates of the Kyoto system are now worried whether the Kyoto Protocol will be ratified and enter into force (and indeed, even if it does, whether this will produce the benefits necessary to stabilise the climate), it is worth looking at the arguments of those with misgivings. Some scientists and commentators question whether damaging climate change is actually occurring or whether the perceived rise in global temperatures is a result of other, long-term cyclical atmospheric factors. We do not know enough about how climate change works to justify embarking on a very costly range of measures which may or may not remedy the problem. Others suggest that it would simply be too costly to change the lifestyles of industrialised countries and that the best approach is therefore to help those in poor countries adjust to the negative impacts of climate change.

Third World countries have different arguments: For example, that the industrialised countries developed by using, in an uninhibited way, large quantities of fossil fuels. The development of industrialising countries of the South should not be hampered by the rich countries denying poorer countries the same development route. Some ask who stands to benefit from "climate alarmism": scientists related to the IPCC; international and regional bureaucracies with a "global governance" agenda (such as parts of the UN system and the European Commission); scientists and companies looking for a technological solution to de-carbonisation and for markets to sell low carbon systems.

Some of the sceptics argue that the European Union is seeking to reduce its dependency on oil and gas from the Third World and Russia, by seeking to make fossil fuels universally more expensive and unattractive, by calling attention to the greenhouse gas emissions which they cause. This creates a market in alternative technologies, which the industrialised societies will be best placed to meet. The environmental, energy security, technical and innovatory entrepreneurial agendas overlap. Without interventions such as the emissions trading system and the critical evaluation of burning fossil fuels, alternatives would never be economic. Interventions by an internationalist bureaucracy are the only way in which this could occur.

One of the key issues is whether or not the consensus among climate scientists represented within the IPCC is actually borne out scientifically. Most climate scientists do indeed argue that damaging climate change is already occurring and is destined to get worse. The arguments of the climate sceptics can also be reversed. One can ask, in whose interest is it to ensure that the Kyoto system

never enters into force, to continue burning large quantities of fossil fuel and to avoid international environmental regulation? The answer is not as clear-cut as one might imagine. Obviously advocates of the free market are likely to be opposed to domestic and international regulation on greenhouse gas emission grounds. Coal and oil producers are likely to be against regulation, but it is interesting to note that major oil companies are now indicating that they accept that global warming is occurring and are trying to adapt their policies accordingly. Some of the oil companies are also investing heavily in renewable energy and alternative energy sources and some are re-positioning themselves as environmentally-conscious energy companies, which intend to survive as profitable energy suppliers through the long-term.

The key questions are about the accuracy of the science as a source for social policy. Increasingly, however, with the invocation of the precautionary principle, namely not to engage in activities with major effects that are likely to be irreversible, policymakers are increasingly incorporating elements of the climate change hypothesis into their decision making processes. A second level of arguments concerns the cost of policies designed to cut levels of emissions. For example, The Economist argues as follows:

> *You might think that a policy issue which puts at stake hundreds of billions of dollars worth of global output would arouse the casual interest of the world's economics and finances ministries. You would be wrong. Global warming and the actions contemplated to mitigate it could well involve costs of that order. Assessing the possible scale of future greenhouse gas emissions, and hence of man-made global warming, involves economic forecasts and economic calculations. Those forecasts and calculations will in turn provide the basis for policy on the issue. Yet governments have been content to leave these questions to a body – the Intergovernmental Panel on Climate Change (IPCC) – which appears to lack the necessary expertise. The result is all too likely to be bad policy, at potentially heavy cost to the world economy.* "Hot potato revisited" (The Economist, 8 November 2003, p. 96). "

What could be called the "technological optimist" scenario argues that technology transfer and increased development aid will help the poorer countries to cope with any results of global warming at a much cheaper price than the creation of a new international system of restrictions, incentives, carbon taxes, and emissions trading.

The "emerging orthodoxy" of those who are convinced that global climate change of a damaging nature is already occurring and will get worse, is to argue that both mitigation – the limiting of greenhouse gas emissions by the main emitters and the financing and organising of adaptation of vulnerable societies are both essential.

7 Responding to climate impacts: Scope for a new approach?

Beyond aid to realistic funding

A new approach argues that it is necessary to get beyond the North-South impasse and different representatives talking at cross purposes. From countries of the South, the arguments are primarily in terms of adaptation and assessment of impacts of climate change. From the perspective of the North (particularly the European Union) the focus is on mitigation. Very little has been done so far effectively on adaptation and the Southern agenda of protecting poor societies against the adverse impacts of climate change and assisting their capacity to engage in sustainable development. The twin taboos of the climate change discussion need to be addressed. The Southern taboo is the refusal seriously to enter into engagement with the mitigation debate and to ask what future limitations of emissions will be necessary for developing countries in the South. The taboo at the Northern end of the agenda is a refusal to accept responsibility for the impact of greenhouse gas emissions which have already occurred and to realistically adopt the "polluter pays" principle with respect to financing both the clean up and setting the prospects for sustainable development. There are already a number of indicators which show that the situation is dramatically worse. The insured value of losses as a result of weather related incidents have tripled between the 1960s and the 1990s. Much of this increase can be attributed to economic growth, but nonetheless, it still represents a substantial increase. Ninety percent of those affected by severe climate events are in Asia. The principle of "common but differentiated responsibilities" is accepted at the verbal level, but has not been integrated into policy. Various suggestions have been made to address such issues. Michael Meacher, former UK Environment Secretary, has floated the idea of a world environmental court based on an enforceable global environmental charter. But without statues of limitations, such an approach would be likely to get bogged down in arguments about liability. Such debates would be of great interest to lawyers on the various sides, but are unlikely to produce an enforceable environmental law, which is as rigorously applicable as criminal law at a domestic level. As has been shown in arguments based on the historic responsibility of industrialised countries for benefiting from slavery, there is little promise that this legally enforceable route would achieve ready success.

The aim would be to systematise realistic funding for adaptation to climate and extreme weather events associated with climate change. A fund for "weather related disaster relief" could be instigated with realistic funding. Rather than waiting for disasters to occur and then seeking adequate funding to address these disasters, a standing fund could be created, this could be an extension of, for example the Office for the Co-ordination of Humanitarian Affairs (OCHA)

funds within the UN system. The disaster preparedness element could be regarded as an extension of better funding for existing disaster management actors.

Such an approach would avoid getting into the "liability quagmire". The cost of disaster relief will almost certainly multiply in coming years and will need to be addressed. Such an approach would avoid the argument about either mitigation or adaptation; it would structure a response to human need where it is greatest and would ensure that action was prompt. Systematising this approach would mean that responding to climate related disasters could be incorporated with in the Financing for Development framework.

8 Beyond Kyoto

With or without Kyoto, it is essential to develop a framework which engages major emitters in the long-term effort to mitigate greenhouse gas emissions. Such an approach would need fairly and effectively to mobilise the resources and technology which are needed to protect the global climate. One effort seriously to address the long-term and global requirements of a framework adequately to address climate change, has been developed by the Pew Center.[6] Their approach addresses six major elements:

- The long-term climate target needed for climate stability;
- Climate commitments of various actors;
- Equity and climate;
- the cost;
- Development and climate;
- Trade and climate.

The long-term climate target

A long-term focus can be a driver for near-term action. However, negotiating a quantified long-term target will certainly be difficult and could possibly be counter-productive given the experience of the Kyoto negotiations. It might be better to develop a target cast in terms of the actions needed or a hedging strategy. This would take the precautionary principles seriously (i.e. the scientific evidence is already good enough to avoid damaging actions which would be in all probability damaging); and to adapt as the science becomes more precise.

[6] For relevant studies, see: http://www.pewclimate.org/

Climate commitments

The experience of attempting to negotiate binding commitments through the Kyoto process has already proved complicated. There is a tension between what could be called policy criteria and political criteria. The policy criteria focus on what is needed, the political criteria, which are often much lower, focus on what is achievable. In this area too, it is hard to see an obvious "one size fits all" solution.

Equity in climate

Equity can be framed in many different ways. Particularly advocates of sustainable development, representatives of countries of the South, and environmentalists stress that the current world political system is unjust in at least two regards. The huge disparity between the wealth of the industrialised North and the underdeveloped countries of the South, and the means used to achieve this development, namely the burning of large quantities of fossil fuels by the industrialised countries, which has already used up a significant quota of the atmospheric capacity. Equity demands can be framed in different ways. Each actor has a responsibility to its population, the future generations and the wider global society. Each country has a capacity to respond. All citizens have basic needs, which must be fulfilled. Philosophically, it is hard to argue against equal entitlements to energy. Politically, a concept of "comparability of effort" (i.e. that no one should be called upon to make unachievable sacrifices) is needed. To stand any chance of being acceptable, the long-term agreement would have to achieve some kind of balance across these different understandings of equity. It would require a level of commitment and investment in the common good which is currently not present in international agreements and negotiations. If it were possible to design such a system, full United States involvement would be necessary. Leadership would have to emerge from developing countries to take a full role in the discussions; some developing countries would have to make agreements to constrain their emissions. Technology transfer on a unprecedented scale would have to occur to provide assistance on impacts. All of this is a very tall order.

The cost

The cost of an effective system even in narrow economic terms, has at least three dimensions:

- The aggregate cost (the overall total of restraining greenhouse gas emissions);
- The relative cost (the cost to each of the participating countries);
- Cost certainty.

Businesses in particular, need to know for their profit margin calculations, what additional cost elements have to be built in as a result of actions to limit damaging climate change. There are various options which can be taken for addressing the cost issue. One is the introduction of emissions trading; sectoral targets could be introduced for various types of economic activity, as could technology standards (e.g. for cars or power generating stations). Various trade-offs need to be considered. Greater cost certainty may mean less environmental certainty, but generate stronger participation from business, in particular.

Development and climate

A shortcoming of the Kyoto framework has been to emphasise outputs (i.e. verifiable targets) rather than inputs. It is proposed that development strategies which create climate benefits need to be developed rather than an approach which just seeks to limit emissions. Such an approach would have to lead to sustained economic growth as well as environmental benefits. Development, quite simply, for many countries is a higher political goal than preservation of the climate.

Trade and climate

There are potential conflicts and synergies between The World Trade Organisation regulations and national and international climate measures. This is an area which is still largely untested but is of huge potential importance. Could national and multilateral trade measures be used to promote climate action? Potential synergies could include phasing out fossil fuel subsidies and harmonisation of rules for greenhouse gas taxes.

Common challenges for a viable regime

In all discussions of a more robust system than Kyoto, the question of **political will** is raised. It is clear that a technological revolution is needed, that only the market can deliver it and that this will happen only if governments demand it and provides the fiscal framework to encourage and enable it. This will only happen if public opinion requires a shift to cleaner energy. The generation of political will requires increased awareness, the media and politicians taking up the issue, and an understanding of the impacts of greenhouse gas emissions on, for example, extreme weather events. For negotiators, the question is what type of international approaches will best capture and motivate political will.

A major problem is that “uncertainty” is an “unsteady” motivator for action. Many climate scientists agree that the long term impacts of failure to restrain greenhouse gas emissions will lead to catastrophic impacts on human society, particularly in countries of the South. However, there is an obvious disparity

between the dramatic response to an event like 9/11, which galvanised action by the United States government and its allies against terrorism and the unfocussed and less urgent response of political leaders to climate change. There is sufficient consensus among climate scientists to sustain the thesis that immediate co-ordinated action is required on climate change, even though the uncertainties are too great to agree on a quantified level for greenhouse gas emissions. Similarly, in economic terms, the uncertainties are too great for a genuine cost benefit analysis. The policy conclusion will be drawn in political as much as economic terms. However, key figures in the insurance industry are increasingly convinced that irreversible damage to the economy is already being caused by extreme weather events, resulting from climate change. Near-term action is a more rational economic response than ever increasing levels of long-term risk. However, this is a complex political message and one which it is easy to "put off" in the face of seemingly more urgent issues such as education, health, or the pensions crisis in developed countries.

National interest is a further complication. International strategies can only succeed if they satisfy domestic needs and concerns. The case of the United States illustrates the danger of failing to align international and domestic strategies. If an effective approach is developed to climate change, this will be the result of the bringing together of economics and development. It will involve a top down approach of framework setting and legislation, and the bottom up approach of public (i.e. voter) concern.

9 Is a comprehensive international framework possible?

The Kyoto Protocol is not yet dead. There is talk of the "Kyoto coma" and disagreement whether it can be revived or whether the "life support system" is inadequate to bring it back to any effective life. It is urgent that Kyoto is not only revived, but brought to full health (i.e. ratified, fully implemented and developed further). The Kyoto system has flexibility, but only one type of mitigation commitment; that of setting targets and timetables. It is suggested that a more internationally acceptable framework, which would bring in the United States would require a broader range of commitment types and national strategies; in other contexts, this is referred to as "variable geometry". If this is brought together within a single framework, criteria will be needed to assess the comparability of different approaches than to make a judgement on the value of different levels of effort. What is unclear is what kind of forum would be needed to negotiate such an approach and what would be adequate in terms of a forum.

Most countries will insist that a fully international, UN based approach such as the UN Framework Convention on Climate Change is the fairest, most inclusive and necessary approach. However, the reality of global fora is one of frustration

and fragmentation. Designing an alternative based on bilateral, regional and multilateral approaches seems no easier. It has been suggested that twelve parties are responsible for 80% of carbon dioxide emissions (taking the EU as one negotiating entity) and they need to forge an arrangement. The experience of Kyoto has shown the EU can negotiate targets together with some effectiveness. However, an approach which separated major developing countries such as China, India, Brazil and South Africa, from the rest of the G77 would generate resistance. This would in effect, polarise the world between emitters/polluters and "victims". This could degenerate into and even more damaging form of the North-South divide, one of the haves and have-nots.

The negotiated climate regime would also have to take into account technological and economic capabilities. For example, could cost effective sequestration technology be widely diffused by 2025? Could petrol be replaced by hydrogen (to all intense and purposes) by 2050? Could zero net emissions from the energy sector be achieved by 2060?

The climate debate would also be significantly improved if there were a much greater commitment to sustainable development from countries of the North. Core development priorities must be addressed for there to be any chance that developing countries will limit their greenhouse gas emissions. In all of this, cost effectiveness and environmental certainty stand in potential contradiction to each other. The intelligent approach, through, for example, emissions trading regimes, is the development of a pragmatic system of trade-offs, with each party getting enough of their agenda through to be satisfied. All of the above criteria are difficult to fulfil, but necessary if an effective long-term climate change regime is to be achieved.

10 Conclusion: Next steps

Key themes are:

- equity in addressing climate change;
- getting beyond the North-South divide;
- the realisation that climate change is not only an environmental, but also a highly political and economic issue;
- the "Kyoto coma" and how to go beyond Kyoto with a more all-embracing international process;
- investment, technology and technology transfer;
- the US and Russia and the feasibility of the Kyoto Protocol entering into force;
- agenda is one of sustainable development;

- energy policy is a security issue, a sustainable development issue and also a question of the internal organisation of society.

By 2020, it will be essential to have a more equitable international system with multilateralism working in the climate change area. Climate and sustainable development agendas will have to be aligned on a national and global basis. Knowledge capacity and technology transfer capacity-building will have to ensure the globalisation of the most up-to date knowledge. There should be an international process on track towards a global, low carbon economy; this will require either clean fossil fuel technology or a movement away from fossil fuels. One key unknown variable is the possibilities for carbon sequestration (capture and storage). Next steps would be for the Kyoto Protocol to enter into force, which would require Russian ratification. Beyond Kyoto, it is necessary to build a consensus on approach, which was strong enough to include North and South. Mainstreaming of climate change awareness will have to occur in the major industrial sectors, such as energy, transport, security and politics. Finally, it will be essential to engage with, and fully draw in the United States into a conversation about building a robust and durable climate change regime.

Roger Williamson
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