

21 Framework for Understanding International Collective Action for Climate Change

Key Messages

Climate change mitigation raises the classic problem of the provision of a global public good. It shares some key characteristics with other environmental challenges that require the international management of common resources to avoid free riding.

International collective action is already taking place in a wide variety of forms, including multilateral, coordinated and parallel approaches.

- Multilateral frameworks such as the UNFCCC and Kyoto Protocol provide an essential foundation to build further co-operation.
- Partnerships, networks and organisations such as the International Energy Agency facilitate coordinated international action.
- Mutual understanding of domestic policy goals supports further action: the EU, China, and California are amongst those that have adopted strong mandatory initiatives that will reduce the growth of greenhouse gas emissions.

Stronger, more coordinated action is required to stabilise concentrations of greenhouse gases in the atmosphere. Successful efforts in many areas, including the protection of the ozone layer, have demonstrated that international co-operation can overcome issues of free riding. Insights from game theory help to inform the design of frameworks for international action.

Countries usually honour international commitments where they conform to shared notions of responsible behaviour, even though international law provides weak tools to enforce co-operation. **Existing multilateral frameworks can be enhanced by creating a shared understanding of long-term goals and responsible behaviour.**

The transparency and comparability of national action across a range of dimensions of effort are key to mutual understanding and recognition of what others are doing, as well as ensuring public accountability. Enhancing them will require a strong response from existing multilateral institutions, including those with expertise in monitoring economic policy.

Widespread public understanding of the climate change problem and support for action is growing rapidly. Public awareness and support is crucial for encouraging and sustaining co-operation.

21.1 Introduction

Climate change is one of the greatest challenges to international co-operation the world is currently facing. As we have described in the preceding Parts of this Review, the scale of the problem and consequences of failure to tackle it are immense. This Review has made a compelling case for action – on both mitigation and adaptation – demonstrating that the global economic costs of business as usual paths are likely to far outweigh the costs of taking action to reduce the risks. We have also explored some of the local and regional co-benefits that can act as incentives to take action. A wide range of policy tools for mitigation and adaptation are available to national governments. However, no two countries will face exactly the same situation in terms of impacts or the costs and benefits of action, and no country can take effective action to control the risks that they face alone. International collective action to tackle the problem is required because climate change is a global public good – countries can free-ride on each others' efforts – and because co-operative action will greatly reduce the costs of both mitigation and adaptation. The international collective response to the climate change problem required is therefore unique, both in terms of its complexity and depth.

This chapter sets out a framework for understanding the scale and type of international collective action required for climate change. The first section examines and applies theories and analyses of collective action that have been developed, pointing out both their insights

and limitations. The next section reviews the current arrangements for action on climate change including multilateral, coordinated and parallel action, and initiatives by the private sector that go beyond international frameworks. The final section considers how to build on these initiatives to develop an international response at the much larger scale that is now required, and how to develop an effective and transparent approach to sustaining co-operation.

21.2 Understanding international collective action

Reducing the risks of climate change is the most important example of the provision of a global public good, as explained in Chapter 2. It is also in many ways the 'purest' example of a public good in that emissions of greenhouse gases (GHGs) from any one country have the same effect on the atmosphere as those from any other. Climate change also shares some key characteristics with other environmental challenges that require the international management of common resources, including the depletion of fisheries¹, the protection of the ozone layer, and with the provision of global public goods in other areas including health and development co-operation. While the impact of climate change is much larger in scale than any of these, there is much to be learnt from the experience of tackling these other problems.

Economists seek to understand the incentives relevant to situations that require collective action, and have studied the institutional arrangements that can facilitate co-operation. The study of collective action is concerned with understanding how to overcome the market failures that lead to the under-provision of public goods where individuals or countries face an incentive to free-ride on the actions of others².

In *The Logic of Collective Action*, Olson (1965) argues that rational, self-interested individuals would not act to secure a common interest unless they were coerced, or induced to do so with incentives that were not available to those who did not participate. Collective action by independent sovereign nations is particularly challenging. In the area of climate change, there is no supranational authority to provide coercive sanctions³, so co-operation requires that nations perceive sufficient benefits that they are willing to participate in international treaties or other arrangements, and share a common vision of responsible behaviour. They must also recognise that without their involvement, international collective action may fail.

Game theory is a tool that economists have used to study the challenges of collective action, especially the problems of provision of local and global public goods.

Game theory has been used to explore the underlying structure of some common problems. The Prisoner's Dilemma Game⁴ has been used to explore a wide range of situations in which individuals act rationally in the light of their own situation and yet find themselves faced with an outcome that leaves them worse off than if they were able to co-operate.

¹ See, for example, Gissurarson (2000).

² Wicksell K. (1896) identified the problem of free-riding. He showed that the voluntary provision of public goods would lead to undersupply, because all actors hope that others will bear the cost of provision, so do not contribute.

³ In the area of international trade, for example, the rules-based World Trade Organisation exists and can exert coercive sanctions on countries. International trade – or rather, its liberalisation – has some public-good properties akin to action on climate change. The theory of comparative advantage suggests that the world as a whole can gain from the global reduction of trade barriers. However, countries may not wish to liberalise their markets fully and forswear tariffs, because of market power in international markets or distributional impacts. Impacts on the distribution of income can arise, for example, where the returns to capital and the returns to labour before liberalisation differ from the world average. There are also other potential barriers such as security - for example in food and energy production. Schelling (2002) suggests that countries are more willing to accept coercive sanctions in the area of international trade because it is a *detailed* system based on *reciprocity* - most sanctions tend to be bilateral and specific, so parties can retaliate and make penalties fit the crime. As we have noted in Chapter 2, the beneficiaries of action on climate change can't so easily organise themselves: today's poor as well as the generations as yet unborn.

⁴This is described in any standard microeconomic or game theory textbook, such as Gibbons (1992).

Box 21.1 Tragedy of the Commons?

Hardin (1968) set out an example of how private incentives might be expected to operate in the absence of co-operation to manage a common environmental resource. In *The Tragedy of the Commons*, he showed that individual farmers had powerful short-term incentives to contribute to the overgrazing and destruction of common land.

The metaphor has been criticised as oversimplified. Ostrom (1990) demonstrated that many local communities can and do co-operate to manage common resources, from irrigation networks to forests. In an article reviewing the impact of Hardin's views, *The Struggle to Manage the Commons*, Dietz, Ostrom and Stern (2003) considered how global trends that drive environmental change limit the ability of local commitments to respond to those challenges.

Global environmental issues require choices to be made between clear and immediate local incentives and diffuse, long-term global benefits. These challenges cannot be resolved through local community action. They require co-operation between governments, as well as community involvement in local implementation.

The theory of collective action now recognises that many types of games are relevant, and in particular that strategic behaviour and repeated games provide a number of important insights for understanding how to promote international co-operation⁵.

- Changing the structure of the incentives in the game can make co-operation more attractive. This can happen through increasing the shared understanding and awareness of the benefits of co-operation and making links to a wider range of benefits as well as through creating side payments (or, where costs of action are involved, sharing costs differently) to secure co-operation.
- Reciprocity plays a key role in situations where the players facing the prisoners' dilemma have the opportunity to play *repeated games* and remember the previous choices of the other player. In particular, many players adopt a strategy of *conditional co-operation*, in which they contribute more to the provision of a public good the more others contribute⁶.
- In repeated games, increasing the frequency of contact and transparency contributes to building co-operation, just as institutional structures and repeated negotiations do in international agreements⁷.
- In repeated games, options for renegotiation of the rules at key stages play an important role⁸. Compliance mechanisms that rely on harsh punishments are hard to enforce, as they often have a detrimental effect on the punisher as well as the punished and create incentives for both the punisher and the defector to seek renegotiation in the event of a breach of co-operation⁹.
- Reputation can play a significant role in influencing outcomes. A leader can create a positive dynamic by demonstrating a willingness to co-operate, and the actions of the leader have a strong influence on the beliefs that others in the game hold about the prospects for co-operation. It does not make a difference whether others in the game interpret these actions as 'rational' or 'irrational' – the point is they simply establish reputation¹⁰.

⁵ See, for example, Sandler (2004).

⁶ See, for example, Sugden (1984); Joyce *et al.* (1995); Fischbacher, Gächter and Fehr (2001).

⁷ See, for example, Axelrod (1984).

⁸ See, for example, Bernheim, and Ray (1989), Farrell and Maskin (1989).

⁹ See, for example, Pecorino (1999).

¹⁰ See, for example, Kreps *et al.* (1982), Seabright (1993); Gächter (2006).

Though extremely useful as a starting point for analysing international collective action, most of these theories tend to focus only on self-interest very narrowly defined, and so leave out perspectives on responsibility and ethical standards – for example, the views on what constitutes human decency that are expressed by the public. This does not mean the theories should be ignored – on the contrary, their conclusions are always imperative to implement correctly. However, a broader vision can acknowledge the important senses of community and shared endeavour that are evident in the history of many international frameworks for co-operation.

Game theory has been used to try to identify key criteria for the design of frameworks for international collective action on climate change.

Arrangements for global collective action exist across a wide range of issues including international trade, health, development aid, terrorism and environmental protection. Sandler (2004) identified a number of conditions that would make it more or less likely that collective action would succeed in different circumstances. He found that international collective action was more likely to succeed where there was sufficient mutual self-interest (for example, international standards for telecommunications or aviation); in response to recognition of a shared threat (for example, increased co-operation on counter-terrorism in the immediate aftermath of 9/11), and where there was leadership by a dominant nation (for example, the role of the USA in securing agreement to protect the ozone layer). The barriers to action on climate change therefore included perceptions that country-specific costs of action dwarfed the benefits of action, and that was exacerbated by considerable uncertainty over the latter.

Barrett (2005) applied the lessons of collective action and game theory to an extensive review of over 190 arrangements for environmental co-operation – from the North Pacific Fur Seal Treaty to the Montreal Protocol on Ozone Depleting Substances. From this he concluded that the most successful treaties create a gain for all their parties, and sustain co-operation by changing the rules of the game – by restructuring the incentives for countries to participate and for parties to comply. Box 21.2 provides an example. Barrett suggested this requires a combination of carrots and sticks. Compensating payments may promote wide participation (for example because they distribute the gains from co-operation equally), while penalties, that are not too high to lack credibility, may deter non-participation and non-compliance.

Box 21.2 Gaining cross-country participation to protect the ozone layer¹¹

The Montreal Protocol on Substances that Deplete the Ozone Layer is often cited as an example of successful international co-operation. Just 24 countries signed the original Protocol in 1987, but as at October 2006, the Protocol has 74 ratifications, including the major developing countries. Emissions of most depleting substances have been brought under control. There are strong signs that the ozone layer will recover within the next 100 years.

Several factors contributed to the success of the Protocol. First, there was a high degree of scientific consensus and evidence that there was a problem that required urgent political action, and public opinion galvanised politicians. The Protocol thus established targets and timetables to phase out the use of ozone depleting chemicals, based on recommendations of expert panels including government and industry representatives. Second, although developing countries initial consumption of ozone depleting substances was low, it was growing fast. Developing countries participated because of the science, and because of the financial support provided for their transition to phase out of harmful substances – albeit at a slower pace than that for developed countries. However, the flows involved were not great, and were time-limited. Third, Montreal recognised the importance of stimulating and developing new technologies so that industry could use non-depleting alternatives, and providing access to technologies in developing countries. Finally, establishing groups of like-minded countries was useful in providing a forum to examine the complex issues involved in and consequences of taking action.

¹¹ Brenton (1994).

21.3 Existing international arrangements for co-operation on climate change

International collective action to provide global public goods at the appropriate level can take place in a wide variety of ways, including specific binding treaties, arrangements embedded in other agreements, aspirational declarations, and participation in partnerships and regional coalitions. Formal multilateral agreements are at one end of a spectrum of co-operation, and can, if commitment is strong or enforcement mechanisms are credible, provide a high degree of assurance that countries will contribute to meeting shared goals. Other mechanisms allow for coordinated action even where there is no international legal instrument creating binding obligations. In some areas, where a number of actors perceive an advantage or a responsibility to adopting a leading position, parallel action is motivated by unilateral goals that may themselves be informed by an understanding of the magnitude of the climate change challenge.

The UN Framework Convention on Climate Change and the Kyoto Protocol embody the core principles of a multilateral response to climate change.

The international response to climate change dates back to 1979 when the first World Climate Conference highlighted concerns arising from the increased carbon dioxide in the atmosphere. In 1988 the UN General Assembly passed a resolution, proposed by Malta, in favour of the protection of the climate for present and future generations. In the same year, the World Meteorological Organisation and the United Nations Environment Programme jointly created the Intergovernmental Panel on Climate Change (IPCC). The IPCC issued its First Assessment Report in 1990, confirming that climate change was a real concern and that human activities were likely to be contributing to it.

In recognition of the global nature of the problem, the United Nations Framework Convention on Climate Change (UNFCCC) was agreed at the Earth Summit in Rio de Janeiro in 1992. 189 countries, including all major developed and developing countries, have ratified the Convention¹². The UNFCCC sets the overarching objective for multilateral action: to stabilise greenhouse gas (GHG) concentrations in the atmosphere at a level that avoids dangerous anthropogenic climate change. It also establishes key principles to guide the international response, in particular that countries should act consistently with their responsibility for climate change as well as their capacity to do so, and that developed countries should take the lead, given their historical contribution to greenhouse gas emissions. The Convention places a commitment to act on all countries. Whereas for developing countries this commitment is unquantified and linked to assistance from developed countries, the developed countries agreed to return greenhouse gas emissions to 1990 levels by 2000.

The Kyoto Protocol, agreed in December 1997, set out an approach for binding international action and agreed specific commitments up to 2012. It entered into force in February 2005 and has been ratified by 162 countries¹³. However, the US and Australia have declined to join the Protocol, and the Canadian administration has signalled that it is likely to be unable to meet its commitments¹⁴.

Climate change is becoming central to international economic relations, along with issues such as trade, development and energy security. A range of other institutions and arrangements support coordinated or parallel action on energy policy and land-use change.

Climate change is now a regular part of the agenda for G8 Summits, along with other aspects of international economic relations including trade and development. The Evian Summit in 2003 resulted in a statement on co-operation on various aspects of science and technology; at Gleneagles in 2005 leaders committed to an Action Plan for Climate Change, Clean Energy and Sustainable Development and launched a dialogue with other major economies; and at St Petersburg in 2006 the links between climate change and energy security were explored. Japan has asked for a report on progress from the Gleneagles Dialogue at its summit in 2008.

¹² As of October 2006.

¹³ As of October 2006.

¹⁴ Lessons from the experience gained from implementation of the Kyoto Protocol are considered in Chapter 22.

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G8 declarations are non-binding, but they have provided strong direction to a range of other international bodies (including the IFIs and the International Energy Agency (IEA)).

The IEA provides a forum for energy ministers from OECD member countries to debate energy policy and provides a wide range of technical information to support national policymaking. It now produces detailed analyses of the prospects for energy efficiency and technology to reduce greenhouse gas emissions from energy. Energy ministers at the IEA Ministerial in March 2005 considered the challenge of climate change and set out a vision of a “clean, clever and competitive” energy future. The International Energy Forum (IEF) also provides an opportunity to discuss energy policy responses to climate change, as it brings together oil producers including OPEC, and energy consumers including the IEA.

Box 21.3 Gleneagles Dialogue on Climate Change, Clean Energy and Sustainable Development

The Gleneagles Dialogue is a process that brings together 20 countries with the greatest energy consumption, including the G8 and the major emerging economies of Brazil, China, India, Mexico and South Africa, and allows them to discuss informally innovative ideas and new measures to tackle climate change outside the formal negotiations under the UNFCCC. The Gleneagles Dialogue will also monitor the implementation of the Plan of Action, to ensure delivery of the commitments made by the G8 heads. To assist with the implementation of the Plan of Action, the G8 asked the IEA to develop and advise on alternative energy scenarios and strategies aimed at a ‘clean, clever and competitive’ energy future. In addition, the G8 have engaged with the World Bank and other international financial institutions to create a new investment framework for clean energy and development, including investment and financing.

The second Gleneagles Dialogue Ministerial meeting was held in Mexico in October 2006. The meeting saw progress on the Gleneagles Plan of Action (on which the Japanese Presidency of the G8 will receive a report in 2008); discussed the progression and debated the future direction of the work undertaken by the World Bank and other International Financial Institutions; considered how the IEA’s programme of work can be utilised by governments; and debated the global economic implications of many of these policies.

Climate change is also becoming increasingly important in the work of UN and other agencies (including the UN Environment Programme, and the UN Food and Agriculture Organisation) and partnerships (including PROFOR, the collaborative programme on forests hosted by the World Bank) dealing with land use and agriculture.

In addition to formal multilateral arrangements, international partnerships launched in recent years allow interested governments, NGOs and private sector firms to co-operate in relevant areas. Some of these have been particularly successful at identifying opportunities for profitable action on climate change, including the Renewable Energy and Energy Efficiency Partnership and the Methane to Markets Partnership.

The Asia Pacific Partnership, launched in 2005, brings together energy, environment and foreign ministers and industry representatives from Australia, China, India, Japan, South Korea, and the USA – countries together responsible for around 50% of global GHG emissions, energy consumption, GDP and population. It has eight sectoral working groups, providing opportunities for networking and the development of joint public-private research and commercial projects for reducing greenhouse gas emissions. Other partnerships, such as the Carbon Sequestration Leadership Forum (CSLF) are focused on particular technologies, and will be discussed further in Chapter 24.

Many countries, regions, and cities have adopted approaches that complement and go beyond action under the multilateral framework.

National initiatives and policy measures designed to foster national and international co-operation in support of global environment issues are numerous, and rising in numbers. They

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can be found in countries at all stages of development. A comprehensive UNDP study (2005) found that more than half of these policy measures flow from national policy choices, while the others are undertaken in co-operation with multilateral organisations.

Table 21.1 Goals on climate change and clean energy adopted by 10 largest economies	
Brazil	<ul style="list-style-type: none"> ▪ National objective to increase the share of alternative renewable energy sources (biomass, wind and small hydro) to 10% by 2030 ▪ Programmes to protect public forests from deforestation by designating some areas that must remain unaltered and others only for sustainable use
China	<ul style="list-style-type: none"> ▪ The 11th Five Year Plan contains stringent national objectives including <ul style="list-style-type: none"> ➢ 20% reduction in energy intensity of GDP from 2005 to 2010 ➢ 10% reduction in emission of air pollutants ➢ 15% of energy from renewables within the next ten years
France	<ul style="list-style-type: none"> ▪ Kyoto Protocol commitment to cap GHG emissions at 1990 levels by the period 2008-2012 ▪ National objective for 25% reduction from 1990 levels of GHGs by 2020 and fourfold reduction (75-80%) by 2050
Germany	<ul style="list-style-type: none"> ▪ Kyoto Protocol commitment to reduce GHG emissions by 21% on 1990 levels by the period 2008-2012 ▪ Offered to set a target of 40% reduction below 1990 levels by 2020 if EU accepts a 30% reduction target ▪ National objective to supply 20% of electricity from renewable sources by 2020
India	<ul style="list-style-type: none"> ▪ The 11th Five Year Plan contains mandatory and voluntary measures to increase efficiency in power generation and distribution, increase the use of nuclear power and renewable energy, and encourage mass transit programmes. ▪ The Integrated Energy Policy¹⁵ estimates that these initiatives could reduce the GHG intensity of the economy by as much as one third.
Italy	<ul style="list-style-type: none"> ▪ Kyoto Protocol commitment to reduce GHG emissions by 6.5% on 1990 levels by the period 2008-2012 ▪ National objective to increase share of electricity from renewable resources to 20% by 2010
Japan	<ul style="list-style-type: none"> ▪ Kyoto Protocol commitment to reduce GHG emissions by 6% on 1990 levels by the period 2008-2012 ▪ National objective for 30% reduction in energy intensity of GDP from 2003 to 2030
Russian Federation	<ul style="list-style-type: none"> ▪ Kyoto Protocol commitment to cap GHG emissions at 1990 levels by the period 2008-2012
United Kingdom	<ul style="list-style-type: none"> ▪ Kyoto Protocol commitment to reduce GHG emissions by 12.5% on 1990 levels by the period 2008-2012 ▪ National objectives to reduce CO₂ emissions by 20% on 1990 levels by 2010 and by 60% on 2000 levels by 2050
United States of America	<ul style="list-style-type: none"> ▪ Voluntary federal objective to reduce GHG intensity level by 18% on 2002 levels by 2012 ▪ California, the largest state, in the USA, has an objective to reduce CO₂ emissions by 80% on 1990 levels by 2050. ▪ States in the North-East and mid-Atlantic have set up the Regional Greenhouse Gas Initiative to cut emissions to 2005 levels between 2009 and 2015, and by a further 10% between 2015 and 2018.

The majority of the world's largest economies now have goals in place to reduce carbon emissions, or to decrease energy intensity increase renewable energy and decrease deforestation. Countries have adopted a range of goals; if they can successfully deliver these, emissions will be reduced significantly below their 'business as usual' path. Table 21.1

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summarises some of the relevant goals adopted by countries that account for around two thirds of the global economy and emissions.

Half the world's population lives in cities and many more travel into cities to work each day. By some estimates, urban areas account for 78% of carbon emissions from human activities¹⁶. Increasingly cities are taking initiatives aiming to reduce emissions. The Clinton Climate Initiative and the Large Cities Climate Leadership Group, a grouping of 22 of the largest cities in the world, have pledged to reduce emissions and increase energy efficiency by creating a purchasing consortium to lower the prices of energy-saving products and accelerate their development. Cities in the developing world have also taken action, for example tackling local air pollution and congestion in ways that also have the effect of reducing greenhouse gas emissions.

International companies are taking a lead in demonstrating how profits can be increased while reducing emissions from industrial activities globally.

Multinational companies are accountable for their operations around the world, and a growing number of business leaders would now prefer to see a clear long-term international framework¹⁷. In many ways, large companies have longer time horizons than governments, and are making their own forecasts of where policy is likely to go, based in part on their views of current and future public opinion. For example, in an open letter to the British Prime Minister ahead of the G8 Summit, one group of business leaders said "We need to create a step-change in the development of low-carbon goods and services by rapidly scaling up our existing investments and starting to invest in new technologies. To achieve this, we need a strong policy framework that creates a long-term value for carbon emissions reductions and consistently supports and incentivises the development of new technologies."¹⁸ The World Economic Forum has also convened a round table on climate change, which included businesses from around the world. A statement from the group urged G8 governments to "establish a long-term, market-based policy framework extending to 2030 that will give investors in climate change mitigation confidence in the long-term value of their investments"¹⁹.

Businesses are motivated by opportunities to reduce costs from increased energy efficiency (as BP demonstrated through its introduction of an internal emissions trading scheme) and by intelligent forecasting of future markets – as for example with the development of hybrid cars by some auto manufacturers, the emphasis on low-carbon innovation in GE's Ecomagination campaign, and moves to explore non-fossil energy sources and carbon capture and storage by several major power and energy companies. We have discussed some of these incentives in Chapter 12. They are also motivated by opportunities to define and demonstrate responsible behaviour, including by protecting their staff and customers from the impacts of their emissions. Box 21.2 provides several examples.

Pressure from campaigners and stakeholders (including institutional investors and the general public) is also leading to increased board-level oversight of climate change risks. There have been several attempts to establish the legal liability of companies for their emissions, inspired by precedents including class action suits over tobacco and asbestos. Institutional investors are keen to see companies avoid being drawn into litigation. The US-based Ceres coalition of investors, environmental and public interest organisations regularly assesses the performance of companies in managing these and other direct and indirect risks from climate change²⁰. In the UK, the Institutional Investors Group on Climate Change (representing investors with over \$1 trillion in assets) has pledged to work with governments and companies to promote a co-ordinated international response to climate change²¹.

¹⁶ <http://www.epa.gov/oppeoe1/globalwarming/greenhouse/greenhouse16/vanguard.html>

¹⁷ See, for example Browne (2004).

¹⁸ <http://www.cpi.cam.ac.uk/bep/clgcc/>

¹⁹ http://www.weforum.org/pdf/g8_climatechange.pdf

²⁰ <http://www.ceres.org/pub/publication.php?pid=84>

²¹ http://www.iigcc.org/docs/PDF/Public/IIGCC_InvestorStatementonClimateChange.pdf

Box 21.4 Visions for a zero carbon society - private sector leadership on climate change

A number of multinational companies in several sectors, including the automotive, power, energy intensive and financial industries, have begun to identify strategies for a zero-carbon society.

Toyota aim to build recyclable cars with zero emissions by minimising the environmental impact of vehicles over the lifecycle of a car. Energy use can be reduced through efficient manufacturing and production, engine types offer potential to reduce emissions from driving, and disposal at the end of life has been part of their vision of sustainable mobility.

In 2002, **Avis Europe** introduced a scheme to allow their car hire customers to offset carbon emissions, in partnership with the CarbonNeutral company (formerly Future Forests). They state that they have become 'carbon neutral' by 2005 by using their buildings more efficiently, recycling materials, and offsetting non-reducible emissions via tree planting and support of renewable energy and technology projects to reduce GHG emissions.

Vattenfall, an energy company that operates hydro, nuclear and coal generators has been developing and implementing three main CO₂-reducing measures: optimisation of existing technology to reduce emissions per unit of energy, increased use of non-CO₂ energy sources, and a long-term project to capture and permanently store CO₂ from fossil-fuel power plants.

Alcan has an ambition to become 'climate neutral' by no later than 2020 through the full life-cycle of its aluminium products. They have sought to increase energy efficiency through continued research and development in technology and process improvements, as well as reducing GHG emissions related to energy use, and pursuing the best energy mix from available energy resources and non carbon-based energy projects.

HSBC became the world's first major bank to become 'carbon neutral' in December 2005. To meet this goal, a Carbon Management Plan has been put in place which consists of three parts: reducing direct emissions, reducing the carbon intensity of the electricity used by buying from renewable sources where feasible, and offsetting the remaining CO₂ from the bank's own operations by buying emission reductions from 'green' projects.

21.4 Building and sustaining coordinated global action on climate change

The scale of action required to reduce the risk of dangerous climate change requires both broad participation and high levels of ambition by all countries.

The existing international arrangements, national goals and business-led initiatives provide a strong foundation for action. Much has been learned in the last fifteen years, and there is growing international momentum to support moves to co-operation on a much greater scale. The UNFCCC Dialogue on Long-term Action, the Kyoto Protocol discussions on the second commitment period, and a range of partnerships and initiatives provide room to explore a range of approaches.

We have argued in Chapter 13 of this Review that there is a strong case for stabilisation between 450-550ppm CO₂e. This would require very strong action to limit and reduce global emissions, starting now and continuing over the next 50-100 years. Robust, durable frameworks for international co-operation, based on a shared understanding of long-term goals, are required to meet this challenge.

It is essential that all major developed countries participate in this action. However, this will not be enough. Figures 21.1 and 21.2 demonstrate this by showing the extent of action that might be required globally for different possible stabilisation goals, given assumptions about emissions reductions by 2050 made by developed countries on their 1990 levels of

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emissions²². For example, even if developed countries reduce their emissions by 60% on their 1990 levels by 2050, depending on the overall stabilisation goal, the remaining emissions from developing countries could not exceed an increase of 25% on 1990 levels by 2050²³.

Figure 21.1 Emissions reductions in developed and developing countries, where developed countries take responsibility for cuts equal to 60% of their 1990 emissions by 2050.

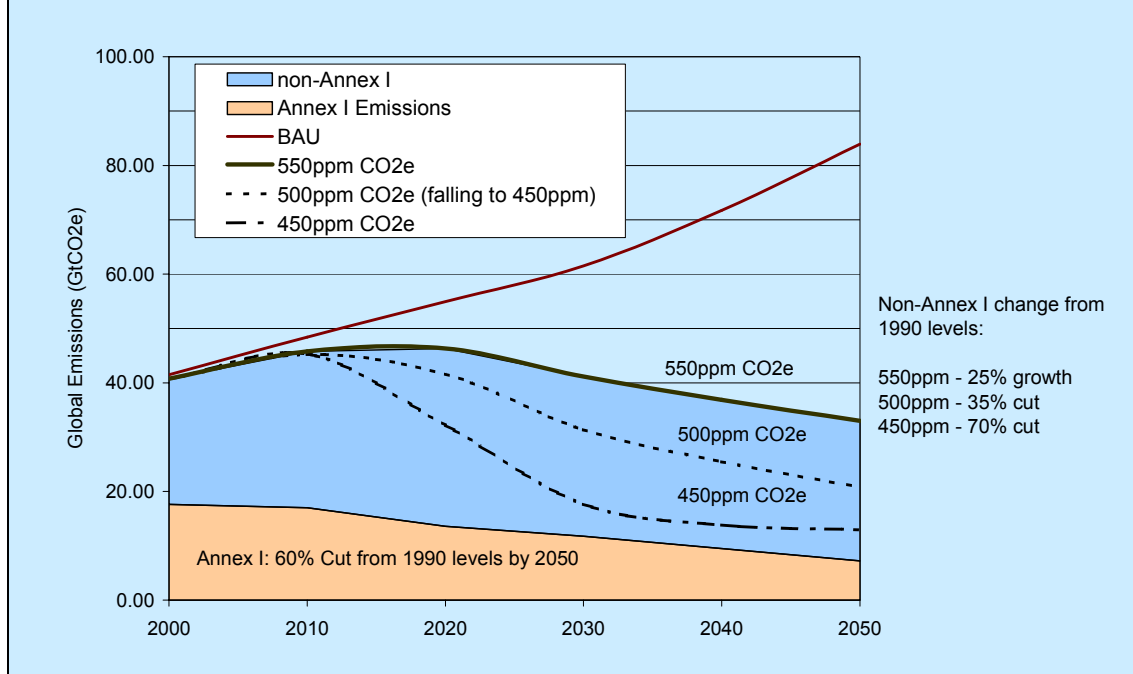
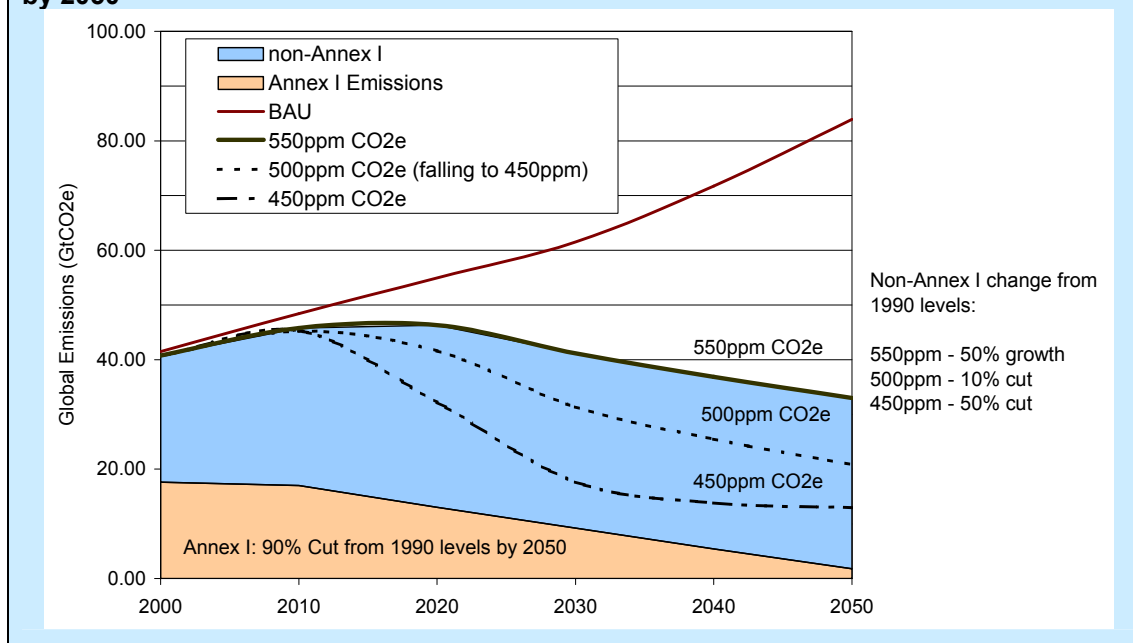


Figure 21.2 Emissions reductions in developed and developing countries, where developed countries take responsibility for cuts equal to 90% of their 1990 emissions by 2050



²² In Chapter 22, research is cited that, for developed countries, 60% to 90% cuts on 1990 GHG emissions are required to meet 450ppm and 550ppm CO₂e stabilisation goals respectively.

²³ This is in the context of the fact that developing countries' emissions as a whole have already increased substantially in recent years. GHG emissions in non-Annex I countries grew by 17% between 1990 and 2000, while they grew by 3% in Annex 1 countries over the same period.

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The distinction between developed countries taking responsibility for emissions reductions and making physical reductions within their borders is an important one. This is because the former can drive investment flows globally that can make it possible for developing countries to limit their emissions far below the levels they would otherwise be expected to reach.

For example, were developed countries to take responsibility for reducing their emissions in 2050 by 90% on their 1990 levels, but put in place frameworks that allowed at least 50% of the investment in meeting these goals to take place outside their physical borders, they could meet the rest through investment in reducing carbon emissions in developing countries. This would mean, depending on the overall stabilisation goal, developing countries would still have to reduce the emissions within their physical borders in 2050 by around 50% on 1990 levels, but we calculate that they could also have flows of up to US\$40 billion per year that could be directed towards helping achieve this²⁴. Therefore, the more that developed countries commit to taking responsibility for, the more incentives could be provided for developing countries that take on commitments to limit or reduce emissions themselves.

It remains important that developing countries do take on commitments – in suitable forms and with the appropriate support. If the investment flows that are created by the rich countries take place only through the use of project mechanisms that allow them to offset their own commitments through action elsewhere, without any responsibility on the part of the recipient countries to take appropriate steps to constrain other sources of emissions themselves, there is a substantial risk of moral hazard²⁵.

Reductions on this scale are likely to be achieved only within frameworks that reduce the costs of action as far as possible, and that support an equitable distribution of effort. The following chapters will consider how global carbon markets can be mobilised to create the appropriate price signals and channel investment towards a low-carbon economy in both rich and poor countries, and how these frameworks apply to technology co-operation and reversing emissions from land use change.

The key challenge is to devise an agreement or a set of arrangements that attracts wide participation including all countries with significant sources of emissions, and achieves deep and lasting reductions in emissions from all sectors.

Countries are motivated to participate in international co-operation on climate change for a number of reasons, including the extent to which co-operation supports a range of short-term goals as well as the long-term goal of reducing the risks of climate change. For example, Chapter 12 discussed local co-benefits of mitigation.

Designing arrangements that are compatible with the underlying incentives of the participants is an effective way to ensure their continued adherence to the rules of the game and therefore a credible, lasting framework. Box 21.5 provides one illustration of the national short and medium term policy considerations that are relevant to international co-operation on climate change.

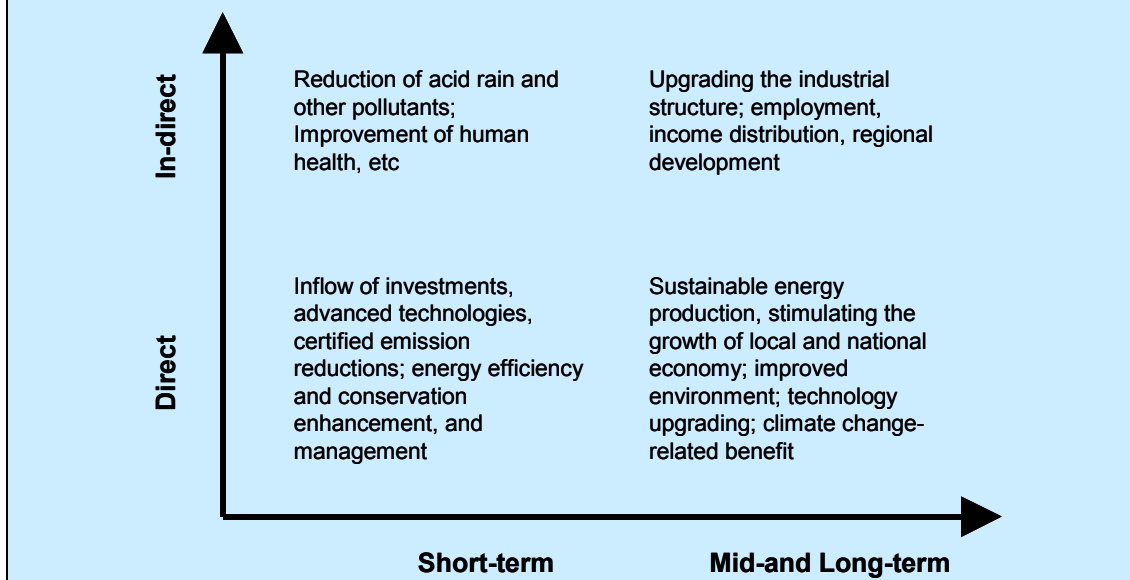
²⁴We calculate this with a very simple methodology that uses as a starting point the current value of CDM credits generated by an overall approximate 5% reduction in developing countries, and therefore assumes the difference between business as usual and emissions reduction paths remains stable up to 2050. We also assume that Annex I countries are currently meeting their reductions 50% domestically and 50% abroad, and a carbon price of \$10/t CO₂. The UNFCCC Secretariat have used a different methodology to suggest that “100 billion dollars a year...would come about if half of the 60 to 80% reduction in emissions [by 2050] is met by industrialised countries through investment in developing countries”.

http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20060919_riyadh_press_release_vs5.pdf

²⁵“Offsetting” mechanisms include Kyoto’s Clean Development Mechanism, which is introduced in Chapter 22 and discussed in more detail in Chapter 23. The offset credit is ‘additional’ if it represents a reduction that would not have otherwise happened under a business as usual path of emissions. Chapter 23 discusses how, in the absence of emissions reductions commitments, offsetting mechanisms can create moral hazard.

Box 21.5 Drivers for participating in international collective action on climate change

There are a number of drivers for participation in international collective action for both developed and developing countries. For example, an analysis of drivers for China's participation carried out by the Chinese Academy of Social Sciences (2006) shows a range of short and medium-term goals, including improving energy efficiency and financing the development and deployment of low carbon technology. Co-benefits include reducing air pollution and improvements to industrial structure, employment and regional development.



Shared notions of responsible and collaborative behaviour, within and outside governments, create the conditions in which countries honour international commitments.

The game theory that underpins analyses of international co-operation for global public goods tends to take as its starting point a narrow perspective of self-interest as the only motivation for action, distinguishing it from ethical approaches. In fact, these can be combined²⁶. Although the key conclusions arising from these analyses are vital to examine, the creation of norms, and links to notions of responsible behaviour, are central to actions taken by governments²⁷. Indeed, as we have noted, some game theory is moving beyond the traditional focus to examine the importance of reciprocity and reputation in solving collective action problems.

On many dimensions of international relations, governments make and respect international obligations because they are in line with perceptions of responsible and collaborative behaviour, and because domestic public opinion supports both the objectives and the mechanisms for achieving them.

Custom plays a very important role in international relations, and is often embodied in understandings and agreements that are not formally binding. These are often referred to as soft law. Environmental collective action provides numerous examples of the soft law approach and creation and recording of acceptable norms of behaviour between countries.

The principles set out in the non-binding 1972 Stockholm Declaration on the Human Environment were developed in numerous subsequent formal and informal agreements. They were picked up at the Earth Summit held in Rio de Janeiro in 1992. At Rio, world leaders signed conventions on climate change, biodiversity and desertification. They also adopted Agenda 21, a wide-ranging blueprint for action to achieve sustainable development

²⁶ For example, see Gauthier (1967).

²⁷ Some authors refer to this as the building of social capital, for example, Adger (2003); Dasgupta (2005).

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worldwide. The Earth Summit concept of *think globally, act locally* inspired action from governments, community groups and individuals around the world. The Earth Summit was followed up at the World Summit on Sustainable Development in Johannesburg in 2002, where governments agreed a non-binding Plan of Implementation. This was supported by the launch of a large number of multi-stakeholder partnerships to take forward specific action. The UN Commission for Sustainable Development is currently reviewing the Johannesburg commitments on sustainable energy.

Soft law may allow countries to take on obligations that otherwise they would not. This is because non-binding instruments usually have an element of good faith that they will be adhered to by countries if possible, and may embody a desire to influence the development of state practices towards actual law making²⁸. They can also be vehicles for focusing consensus on rules and principles and for mobilising a consistent, general response on the part of states. An example of this is 'tote-board diplomacy', whereby a collective standard for action is held up publicly, and countries that fail to agree are subject to collective pressure²⁹.

A collective sense of responsible behaviour and public acceptance of policy measures requires a shared understanding of action around the world. Governments also tend to look to the actions of neighbouring countries and key trade partners to benchmark the level of effort they are willing to make.

Co-operation across a broad range of issues including security and development can be sustained by norms of internationally responsible behaviour. Powerful statements stressing the importance of such behaviour in these contexts have been made by individual leaders, or expressed in a variety of non-binding international legal texts such as the declarations of the United Nations and communiqués from bodies such as the G8.

Collective action can be strengthened through actions taken at smaller, regional and national levels, for example, because "innovative rule evaders can learn how to get around a single type of rule more effectively than a multiplicity of rules-in-use."³⁰ Therefore, codifying and passing commitments into domestic law can reinforce current and future commitments for action on a global public good. This sends a strong signal that a country is sincere in pledging action – and it means that reversing course becomes considerably more difficult and politically and legally challenging. Trust and credibility will be built especially when a country is seen to be taking real action to meet those commitments.

Formal compliance mechanisms have a role to play in managing specific and limited infractions of rules within international regimes. Agreed processes of adjustment may promote continued participation in a regime.

Where governments have set up a regime to take international action, compliance mechanisms can be used to maintain the credibility of that regime. The credibility of the regime will be damaged if rules of the regime are seen to be flouted, and this will quickly lead to a loss of support from other participants.

The existence of a compliance procedure may be sufficient to deter free-riding within the regime, provided that there is transparency, monitoring of actions, and, most importantly, there is pressure for the country concerned to remain part of the regime. However, participants can quit regimes. This means that for global public goods, formal compliance mechanisms are likely to only be effective for specific and limited infractions.

Chapter 14 discussed the issues for ensuring credibility of climate change mitigation policy on the national level³¹. National commitments, or sanctions applied in domestic law if those commitments are not met, may not be credible because governments can renege on their predecessors' commitments. This can also present a problem for international compliance³².

²⁸ Birnie and Boyle (2002).

²⁹ Levy *et al*, 1992. The authors use the example of the 1979 Geneva Convention on Long-Range Transboundary Air Pollution, which created pressure on countries to tackle the problem of acid rain.

³⁰ Dietz, Ostrom and Stern (2003); 1911.

³¹ For example, see Helm *et al* (2004).

³² See Aldy *et al* (2003). In particular, Schelling and Barrett propose regimes to take into account this issue.

We thus provided in Chapter 14 the rationale for short-term flexibility within an overall framework that has clear long-term goals in line with the scale of action required. The corresponding notion on the international level is that an international regime requires clear goals, and may require some form of adjustment of specific levels of effort to reach those goals over time to allow flexibility to respond to unforeseen circumstances. Adjustment could take account of economic growth, the underlying carbon price in economies, the cost of low carbon technologies, or emissions reductions achieved. This, rather than automatic sanctions or punishment, may therefore create a way to respond to changing circumstances within one or a few countries without jeopardising the future of the entire framework.

It would be important that these rules were set, monitored and revised by a competent and credible international process, ideally a body independent of government ministries and influence in order to build credibility through reputation¹. In the absence of such a body, representation of finance, external affairs and economic ministries in addition to environmental ministries would be important to obtain real buy-in to agreed rules.

Increasing the transparency and comparability of parallel national action is a significant challenge and will require a strong response from existing international institutions to enhance the coherence and cohesion of different policies.

Increasing understanding of action across different dimensions at different levels will build confidence amongst countries regarding the efforts of others and this could strengthen overall effort. Increasing information and monitoring may help to reduce free riding and improve accountability for the provision of public goods.

In the case of climate change, it is already clear that there are a number of dimensions of and a range of overlapping approaches to co-operation. Transparency and a shared understanding of action is required across all these dimensions, including on emissions reductions, the scope and level of carbon prices and policies, investment in innovation, parallel and coordinated approaches to standards and regulation, commitments to international co-operation on the deployment and diffusion of relevant technology, as well as international support for adaptation. The ways in which co-operation are assessed therefore have to be similarly broad, in the same way that the metrics used for organisational performance management have widened in recent years through use of approaches such as the balanced scorecard³³.

The task of benchmarking responsible action against other countries is made more complicated in the case of climate change by the competing priorities that can drive similar action. For example, the promotion of biofuels in Brazil, China and the US is often described as an energy security measure; in the EU, it is seen primarily as a response to climate change. Even more complex are the drivers for energy efficiency measures across countries. Therefore the definition of overall commitments for domestic climate change and energy policy also plays an important part in comparing efforts across countries.

The UNFCCC and Kyoto Protocol have already created a strong system for estimating and reviewing emissions according to standard guidelines³⁴. Developed countries report emissions annually under this system. Formal national communications required from all countries also set out at a high level the policies and measures that are being implemented, but they are less frequent (every five years or so) and although there are agreed reporting guidelines, cross-country comparison is difficult.

Other initiatives can provide supplementary information. The G8 countries have agreed to provide annual updates in implementing the Gleneagles Plan of Action on Climate Change, Clean Energy and Sustainable Development, which covers areas including energy efficiency, cleaner power and the use of market-based instruments. The World Resources Institute has begun to develop an informal database of policy measures implemented in developing countries³⁵.

³³ Kaplan and Norton (1996).

³⁴ The UNFCCC and Kyoto Protocol will be discussed in more length in Chapter 22.

³⁵ This database is soon to be online at http://www.wri.org/climate/project_description2.cfm?pid=211.

Transparency plays a key role in other areas of economic co-operation. The IMF, OECD, IEA, and many UN organisations systematically collect and compare data across countries on a wide range of economic policy issues³⁶. It may be that a more systematic approach to monitoring economic policy relevant to climate change, including the explicit and implicit prices of carbon across the economy, would require the skills and expertise found in these institutions.

Global public concern and awareness about climate change are growing rapidly. They both influence and sustain international co-operation, national aspirations and private sector leadership on climate change.

As outlined in Chapter 17, individual preferences are subject to change, and public opinion across the world plays a very important role in sustaining co-operation on climate change. As on many other issues, public scrutiny of government policy matters. Public understanding of the challenge of climate change is essential to create the political space for governments to introduce and sustain the policies that are required to make the transition to a low carbon economy. International stakeholder pressure is also relevant, as a result of global investment flows and the responsibilities of multinational companies for their worldwide operations.

The public is influenced by the statements of, amongst others, politicians, scientists, Non-Governmental Organisations (NGOs), religious leaders and businesses, and by the presentation of the issues in the media. There has been a clear recent increase in public concern over climate change. Analysis of the incidence of references to climate change and global warming show that between 2003 and 2006, references in major newspapers doubled. International development NGOs and faith groups have increasingly become concerned about climate change. The UK's Stop Climate Chaos includes environmental and development NGOs as well as faith groups and trade unions. In the USA, a wide range of groups is campaigning on climate change issues. For example, the Evangelical Climate Initiative (ECI) released a statement signed by more than 85 evangelical leaders calling for action on climate change³⁷.

Pew Center polls on changing public attitudes around the world have sought to examine public attitudes to news stories. In a recent poll, awareness of climate change was high in the developed world, but in the developing countries sampled, awareness was generally lower than for a range of other issues. Clear majorities in most countries surveyed were concerned about the problem.

As the science of climate change is widely accepted, public attitudes will make it increasingly difficult for political leaders around the world to downplay the importance of serious action to respond to the challenge.

³⁶ For example, the OECD regularly publishes Consumer and Producer Subsidy Equivalent statistics for the area of agriculture.

³⁷ <http://www.christiansandclimate.org/statement>.

Box 21.6 Public attitudes to climate change around the world³⁸

A poll by the Pew Center presented a snapshot of attitudes in 2006. Even in countries with limited formal participation in international action, at least half of the population now thinks that climate change matters a fair amount or a great deal.

Global Warming Concerns				
	A great deal	A fair amount	Only a little/ Not at all	DK
	%	%	%	%
United States	19	34	47	1
Great Britain	26	41	32	1
Spain	51	34	14	2
France	46	41	14	0
Germany	30	34	36	1
Russia	34	31	34	1
Indonesia	28	48	23	1
Egypt	24	51	23	1
Jordan	26	40	34	0
Turkey	41	29	23	8
Pakistan	31	25	39	5
Nigeria	45	33	20	2
Japan	66	27	7	0
India	65	20	13	2
China	20	41	37	2

Based on those who have heard about the “environmental problem of global warming

21.5 Conclusions

In this chapter we have examined the conditions for international collective action on climate change. We noted that extensive action has already begun on different levels – from the multilateral to the individual level, but that the scale of action now required demands a response on a much larger scale, involving all developed and developing countries in a collective endeavour to limit and reduce emissions.

Economic analysis can provide some guidance on the directions for effective, efficient and equitable frameworks for co-operation, and the following chapters will consider in more detail how to build key elements of international co-operation on climate change. These include carbon markets, support to developing countries in the transition to a low-carbon economy, international co-operation to accelerate innovation and to support the diffusion of energy efficient and low-carbon technologies, action to reverse emissions from land use change and forestry, and support for adaptation.

Each of these dimensions of action has its own specific challenges. An effective response to climate change requires co-operation in each area, supported by a shared understanding of long-term goals, and transparency about the contribution that each country is making towards them.

³⁸ <http://people-press.org/reports/display.php3?ReportID=280>

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