

Can Asia Change the Game? provides a concise overview of Asia's concerns, aspirations, and responsibilities for the post-2012 global climate change agreement. It draws on contributions from experts in the region and around the world articulating the key issues related to encouraging Asia's meaningful participation in negotiating and implementing this agreement. The editors and authors also provide a series of specific recommendations for climate negotiators, policy-makers, and stakeholders regarding how to build cooperation within the region and between Asia and the West in developing an effective and equitable global climate change solution. Key issues examined include overall principles, 'co-benefits' strategies, forests, food and water, equity, cities, energy efficiency, trade, markets, and international negotiations.

Civic Exchange is an independent, Hong Kong-based public policy think tank with solid experience in air quality, energy, environment, urban planning, and climate change research, as well as economics and governance issues.

The **Singapore Institute of International Affairs** is a non-profit, non-government organization dedicated to the research, analysis and discussion of regional and international issues, including environmental policy, political security, and governance.


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Edited by Christine Loh,
Andrew Stevenson and Simon Tay

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SIIA
SINGAPORE INSTITUTE OF INTERNATIONAL AFFAIRS

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PREFACE

This book is the product of a year-long collaboration between Civic Exchange and the Singapore Institute of International Affairs (SIIA), which began with a background paper on Asian climate change policy ('Climate Change Negotiations: An Asian Stir Fry of Options') published in December 2007. There were three objectives: to develop an initial list of key Asian concerns and responsibilities for the future international climate change agreement; to encourage stakeholders in the region to consider the challenges involved; and to promote constructive dialogue within and outside the region. The release of that report coincided with the United Nations Framework Convention on Climate Change (UNFCCC) conference in Bali, Indonesia, which launched a two-year negotiation process on the 'post-2012' regime, set to conclude in Copenhagen in late 2009.

Building on that first publication, in May 2008 Civic Exchange and SIIA invited experts from within Asia and around the world to a policy workshop in Singapore to deliberate and present their perspectives on Asia's key issues in the post-Kyoto agreement, culminating in this new publication. Each chapter provides an analysis of key issues, with targeted recommendations for governments and climate negotiators. We hope this publication provides a concise but comprehensive overview of the current Asian position on climate change negotiations. It spans the full scope of the climate change discussion, from key negotiating principles to serious impacts to the most promising mitigation and adaptation strategies.

We believe that Asia can be a 'change agent', but Asian countries need to be more proactive. They should develop their own emissions reduction plans, policies, and targets and use them as the basis of climate negotiations. This way, Asia can change the game, and get beyond the 'finger pointing' with the West that has characterized much of the negotiations so far. Both sides will need to understand each other's key objectives, concerns, aspirations, and responsibilities better. Ideally, this mutual un-

derstanding will allow both sides to reach an agreement that is both equitable and equal to the magnitude of the global challenges of climate change. Serious ecological impacts are already ‘in the pipeline’ and cannot be avoided. Asia should begin taking the initiative rather than taking a wait-and-see attitude on what developed countries will do. There is much more work to be done, and we hope this book will help to push the debate in a small way.

Civic Exchange and SIIA would first like to thank the authors for their outstanding contributions and patience throughout the writing and editing process. We would also like to thank all of the reviewers for their valuable feedback. Most importantly, we need to acknowledge the enormous contribution of Andrew Stevenson, Civic Exchange’s resident Fulbright Scholar, who dedicated his time to shepherding the whole messy process from start to finish, including contributing research and writing. He was ably assisted by Civic Exchange’s tireless colleagues, Andrew Lawson and Mike Kilburn, who spent many hours reading chapters in the editing process. We also wish to thank Michele Weldon for her tireless efforts managing and providing feedback in the early stages of the book process, and Thanh Nguyen for his work on layout and design. Finally, this project would not have been possible without CLP Power providing the essential funding and also Gail Kendall’s encouragement and intellectual involvement.

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Civic Exchange is a Hong Kong-based non-profit public policy think tank that was established in October 2000. It is an independent organization that has access to policy-makers, officials, businesses, media, and NGOs—reaching across sectors and borders. Civic Exchange has solid experience in many areas, including air quality, energy, environment, urban planning, and climate change research, as well as economics and governance issues. Recent work in these areas includes studying Asian climate change negotiations, green buildings, shipping-related air pollution, and the health impacts of air pollution in southern China, and books analysing the changes in Hong Kong’s environmental and air quality policy since 1997. It has also hosted a series of forums on the relationship between energy policy, air quality, buildings, and climate change.

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The Singapore Institute of International Affairs (SIIA) is a non-profit, non-government organization dedicated to the research, analysis and discussion of regional and international issues. Its work focuses on environmental policy as well as governance and political security issues. The wide range of research and events—funded by foundations, membership subscriptions, and corporate sponsorship—reaches out to policy-makers, business leaders, professionals, and youth. One of the SIIA’s major projects has been analysing the causes of the haze since the 1997–98 episodes. The SIIA is also a key member of the ASEAN Institutes of Strategic and International Studies (ASEAN-ISIS), a regional grouping of think tanks that has one member from 9 ASEAN member states (excluding Burma/Myanmar).

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EXECUTIVE SUMMARY

Growing numbers of governments and peoples around the world have come to recognize climate change as a global challenge, and new scientific findings suggest that the scale and pace of change may be more rapid and serious than originally thought. It is against this background that negotiations are underway to agree on a successor to the current Kyoto Protocol. These negotiations began in the Conference of Parties in Bali, Indonesia in December 2007 (COP 13), and are scheduled to continue through meetings in Poznan, Poland in December 2008 (COP 14), before concluding in Copenhagen, Denmark in December 2009 (COP 15).

The ultimate goal is to achieve significant progress towards a global framework for long-term climate stabilization at a level that avoids dangerous human interference with natural systems.

Many have set ambitious objectives for these two years of negotiations. First and foremost is the adoption of greater commitments from developed countries, to be paired in the medium term with initial commitments by large developing countries and increased adaptation funding for Least Developed Countries (LDCs).

Other important areas for negotiation are the reform of market mechanisms and agreement on technology transfer, financing, mitigation, and adaptation. These would form a firm foundation for a global, equitable, and workable response to climate change.

How can and should Asia and the states in the region respond?

The outcome of these negotiations will have long-lasting, large-scale implications for governments, business and citizens in Asia, the region that contains many of the world's largest and fastest growing emitters, and many vulnerable countries. There is, as such, no doubt that Asia will play a key role in the negotiation and implementation of a successful agreement.

As they participate in the negotiations, many developing countries in Asia have legitimate arguments—based on historical and per-capita emissions—that they should be considered less responsible for climate change than the developed world. However, this can no longer be used as an excuse for inaction. Emerging scientific evidence indicates that climate stabilization will likely be more difficult than previously thought, necessitating a faster and deeper global response. Planet Earth is not negotiating. Once ecological tipping points are reached, as some predict, the serious effects will have wide and irreversible impacts. Evidence shows that ecological changes are already occurring, which should be a sobering reminder to countries, businesses, and citizens from around the world.

There is little question that Asia must work alongside the developed countries, and all others, to contribute to a global climate change solution. The question that remains, however, is the nature, extent, and terms of Asia's contribution.

Although the domestic and international engagement of Asian governments on climate issues has not been as strong as it should be, there are signs that this is now changing for the better.

Asia can, and must, be a 'change agent' in climate change negotiations, helping to accelerate the global effort to drive down greenhouse gas emissions. To do this, Asian states must go beyond environmental policy, narrowly defined, and defy simple thinking about making commitments or indeed avoiding them. Fundamentally, Asia must make the push towards sustainable development and transform the current fossil fuel based industrial structure into a low-carbon one. Beyond achieving much deeper mitigation within a shorter time frame, Asia and the world must urgently work on adapting to climate change and the ecological changes that are already in the pipeline. States that are early pathfinders on this transformation will be more competitive economically and also be better placed to provide their people with a cleaner, healthier, and more secure environment.

The different chapters in this book each review an important topic in Asia's objectives, concerns, aspirations, and responsibilities in addressing global climate change. Drawing on analysis of these chapters, a set of key insights and recommendations has emerged that cuts across the different topics:

KEY INSIGHTS

1. Asia's opportunity: 'game changing' solutions

Asia can be a 'change agent' in the post-2012 climate negotiations—greatly increasing the scope of potential solutions in the short-term and opening the space for greater reductions in the medium-term.

- Asian countries should put forward their own sustainable development and emissions reduction plans, policies and targets as soon as possible as the basis for climate change negotiations.

While Asia's initial commitments may be modest, this will move the debate from generalities to specifics, and provide the game-changing opportunity for a new global collaborative effort focused on fast and deep emissions reductions in the long-term beyond COP 15.

Because of the danger of reaching an ineffective agreement at COP 15, it serves Asia's interests to use these plans to move forward on as aggressive emissions reductions as possible even in the short-term.

- It is vital to conclude an effective post-2012 framework at COP 15 that keeps up the pressure on all countries to drive down emissions as quickly as possible.

An agreement that presents the illusion that the climate problem is solved, while the world falls into a false sense of complacency, will be counter-productive and even dangerous.

Climate change should represent a much wider opportunity for change and re-organization of existing inefficiencies, within Asia and throughout the world.

- National and international policy should target the inputs that drive emissions: addressing resource distribution, incentives, pricing, and misallocation problems.

Current actions are driven by existing assumptions and policy structures that hinder action. Climate change should be seen as an opportunity to address these assumptions and rebuild more sustainable policy frameworks.

In order to achieve meaningful emissions reductions in Asia, markets must be part of the solution.

- Asia should begin investing in developing its own market solutions, which will likely start by targeting air and water pollutants before incorporating carbon.

To capture the opportunities presented by global markets, Asia will need to begin developing domestic and regional markets.

2. Post-2012 principles: a ‘development round’

Asia’s aspirations for development cannot be ignored.

- The current negotiations for the post-2012 agreement should be re-framed as a ‘Development Round of Negotiations’, whose central goal is to develop a global framework that aligns development and climate objectives.

If the post-2012 agreement is to secure meaningful commitments from Asian countries, essential for setting the world on a path to avoiding dangerous ecological impacts of climate change, it must be aligned with development objectives.

There are many win-win opportunities in Asia for mitigation and the pursuit of sustainable development, pollution control, resource efficiency, adaptation, security, and equity goals.

- Asian countries should target ‘co-benefits’ strategies that align these other objectives with greenhouse gas mitigation goals.

Opportunities for co-benefits strategies include measures undertaken in cities such as building energy efficiency and transport, as well as more sustainable forest management.

3. Improving dialogue: ‘beyond finger pointing’

In order to build a rapid response within Asia, and between Asia and the world, deliberative and dialogue processes must be greatly improved.

- Redesigning or providing new processes for deliberation both at the level of the UN Framework Convention on Climate Change (UNFCCC) and at the regional level will be essential to shift from confrontation to cooperation in the climate negotiation process.

Standard political processes tend to promote assertions of positions rather than dialogue, which often lead to agreements that are combinations of non-cooperative national solutions instead of mutual collaboration.

Initiatives beyond the state are important, including those taken by cities, community organizations, and businesses.

- These key non-state actors should not use a lack of national action or regulations to delay their own response to climate change, and should begin to take mitigation, adaptation, risk assessment, and collaboration measures forward immediately.

In many cases these actors are more willing, flexible, and capable to act than other authorities. In the case of cities and corporations, they will be responsible for implementing commitments handed down by national negotiators, but have often faced challenges of poor monitoring and enforcement from weak national institutions.

4. Science provides a clear message: ‘delay no more’

Science shows the climate change challenge is very large for Asia.

- Governments and negotiators should build into the UNFCCC process regular briefings of the latest science (beyond the IPCC process).

Scientific evidence can be the proxy for the voice of Planet Earth, so far a missing party in climate negotiations. It must be brought in.

Although the challenge for Asia is large, the current capacity to act in Asia is relatively low.

- Increasing knowledge, capacity, innovation, and cooperation within Asia is vital to developing stronger regional participation in negotiation and implementation of international climate change agreements.

Climate change is a global issue that emphasizes interdependence, but Asia's role is not fully recognized nor is it participating sufficiently in the on-going negotiations.

Shared adaptation and mitigation concerns, especially in the areas of energy, food, water, and disaster relief, make Asia important as a distinct unit of analysis.

- In order to avoid the most dangerous ecological and economic threats presented by climate change, it is imperative that Asian countries increase collaboration and dialogue within and outside the region.

The impacts of climate change exacerbate other challenges—including food, water, and energy security, population growth, increasing consumption, and governance. These are all issues that need to be addressed on a regional scale in Asia.

RECOMMENDATIONS

Chapter 1: Be guided by science and key principles for post-Kyoto negotiations

National governments and UNFCCC negotiations:

- Be guided by emerging science in preparing and assessing development plans alongside climate mitigation and adaptation, and ecological restoration policies and targets.
- Focus aggressively on lower-hanging fruit in the Bali Road Map—energy efficiency, co-benefits, and forests.
- Redesign climate-related meetings in order to enhance deliberation and dialogue.

Chapter 2: Learn from the domestic politics of climate change in Asia

National governments:

- Acknowledge the legitimate competitiveness concerns of key industries in developing integrated economic development, energy, and climate strategies, but do not allow them to dominate planning efforts.

UNFCCC negotiations:

- Promote greater understanding of climate impacts, as this knowledge should be effective in securing greater action from policy-makers in Asia and elsewhere.
- Reduce the costs of climate change mitigation for Asian developing countries, including access to foreign funding, technical expertise, and information.

Chapter 3: A 'co-benefits' approach is needed for climate and development policy

Researchers:

- Continue developing tools and models for co-benefits measurement, create a pool of Asian co-benefits experts, and facilitate the transfer of European and US co-benefits-related knowledge base to developing countries.

National governments:

- Encourage additional research on co-benefits strategies, and connect this research with policy-making on development, environment, energy, and climate. This will require improving sectoral cooperation and institutional fragmentation of responsibilities.
- Create country profiles and baseline information on the use of the co-benefits approach in cities.

UNFCCC negotiations:

- Include black carbon in post-Kyoto climate governance.

Chapter 4: Forests can be used to align climate and development goals

Local officials:

- Enhance local capacity to implement REDD ('reducing emissions from deforestation and forest degradation'). This includes the ability to adequately measure and monitor forest carbon stocks and changes, and to design and implement effective and efficient national policies.

National governments:

- Remove perverse subsidies and taxes that are distorting the economics of forest resource management, especially for pulp and paper and palm oil industries, and limit biofuels development to already degraded land.
- Build local capacity to independently measure and monitor forest carbon sinks, and improve enforcement at the national level, including property rights and tenure security, especially in areas where local authority has been problematic.

UNFCCC negotiations:

- Create an REDD scheme that includes the full external costs of forest degradation, and is equitable in terms of benefit distribution across stakeholders, and include peatlands under the scheme.
- Encourage widely accepted, credible, and sound methods for estimating and monitoring carbon stocks, including standards and certification.

Chapter 5: Climate change is exacerbating food and water security concerns

Local officials and community leaders:

- Expand level of participation of vulnerable peoples in exploring and formulating adaptation policies at the local level, and ensure they are deliberated at national and regional levels.

National governments and regional organizations:

- Seek inputs from vulnerable groups in policy formation, support cooperation among the authorities, business, and civil society, and establish seasonal early warning systems for farmers.

UNFCCC negotiations:

- Strengthen capacity for national–local adaptation assessments in developing countries, and provide adequate technical and financial support for LDCs to integrate adaptation into economic development strategies.

Private sector:

- Invest in adaptation, such as drought- and flood-tolerant crop varieties, as well as water-saving technologies. Partner with public agencies and farmers to develop new agricultural technologies that are profitable to smallholders; and strengthen entrepreneurial and business management skills of household-based farms with special emphasis on managing climate risks.

Chapter 6: Equity must be a guiding principle of the climate regime

National governments:

- Align objectives of development and climate mitigation at the national policy-making level.
- Present a strong voice for the principle of equity in post-2012 climate negotiations.

UNFCCC negotiations:

- Re-open the menu of options for climate solutions under what may be called a new ‘Development Round of Climate Negotiations’.
- Pursue a completely integrated strategy on climate and development by using an investment-based approach.

Chapter 7: Cities should be driving force on mitigation and adaptation measures

Local officials:

- Integrate the direct and indirect impacts of climate change into economic and infrastructure planning.
- Convene appropriate deliberative and collective learning processes for mayors and city officials.

Cities and regional authorities:

- Enable discussion on how cities and urban regions can create regional rapid response networks for adaptation and disaster relief.

- Publish a handbook on establishing emissions inventories, standards, and best practices for urban regions.

UNFCCC negotiations:

- Allow developing countries to use city and regional sustainable development and emissions reduction plans as the basis for national commitments under the post-Kyoto regime in the short-term.
- Streamline the Clean Development Mechanism (CDM) approval processes for policy-based urban building and transport energy efficiency projects.

Chapter 8: Learn from Japan's energy efficiency experience

National governments:

- Learn from the Japanese experience on promoting energy efficiency, including the importance of strong regulations and a conservation-minded society.
- Pursue an integrated policy approach to energy efficiency, economic development, and climate change.
- Increase cooperation in regional and global initiatives for the transfer of energy efficient technologies beyond the UNFCCC process, such as the Asia Pacific Partnership on Clean Development and Climate (APP).

UNFCCC negotiations:

- Encourage the use of sectoral reductions and technology funding contributions as one type of commitment in the post-2012 regime.
- Create a technology fund for developing countries to draw on for energy efficiency projects.

Chapter 9: Global trade and climate change regimes must be aligned

National governments, UNFCCC negotiations and the WTO:

- Align climate and trade goals so that they are mutually supportive.
- Facilitate the wide diffusion of climate-friendly technologies and services within the current trade regime.

- Start a serious discussion about how to eliminate fossil fuel subsidies.

Chapter 10: Markets must be part of an effective solution

Local officials:

- Take advantage of the CDM markets for local government projects, and design regulatory frameworks that use a 'co-benefits' strategy.

Regional authorities:

- Explore how Asia can begin to create regional demand and markets for credits rather than just supply them.

UNFCCC Negotiations:

- Maintain the Kyoto Protocol's market-oriented framework.
- Continue to allow countries to use CDM credits to meet emissions targets.
- Recognize Asia needs time to make the transition to market-oriented environmental management.

Chapter 11: An ineffective agreement is worse than none at all

UNFCCC negotiations:

Key objectives of Copenhagen agreement

- Build climate institutions that are more capable of effective risk management and productive carbon investment by making them more adaptable, flexible, and open to external input than their Kyoto predecessors.
- Begin exploring more comprehensive development strategies for sustained growth and well-being in economies where carbon is no longer treated as free.

Short-term

- Evaluate the probability and risks of an ineffective, 'default' agreement that does not adequately manage climate risks.

- Avoid creating or continuing poor quality institutions and incentives, which are difficult to disrupt once private and public actors have adapted their behaviour to them.

Medium-term

- Focus on the design of institutions and mechanisms that will better manage the risks of ineffective implementation of a reformed post-2012 climate regime.
- Outline the principles and initial composition of institutions that can learn, respond to, and manage the regulatory errors in the post-2012 agreement.
- Ensure there are external organizations with the capacity to monitor, evaluate, report on, and improve the performance of regulations.

Long-term

- Launch a process to explore, evaluate, and map the paths to better carbon productivity that can be analysed and sustained by outside actors in the long term.
- Recognize that carbon productivity is driven by the general economic and regulatory factors that determine the character of input markets; and that many of these broader political and market forces may be increasingly unstable relative to expectations formed in the past decades.
- Think about how financial markets, commodity price increases, or national development models will create challenges or opportunities for carbon management that are not addressed by more climate-centric analyses.

INTRODUCTION

Growing numbers of governments and peoples around the world are now convinced that if nothing is done, we will adversely and irreversibly affect the earth's climate to our own detriment. Yet even as global concern has risen, the prospect of an effective collective response is not guaranteed.

How can governments, climate change negotiators, and other stakeholders create an agreement that puts us on a pathway to avoid the dangerous impacts of climate change? This is the question being pondered by policy-makers, experts, and researchers around the world. It is also a question that properly concerns many more people, as climate change is not just a matter of diplomatic niceties. Indeed, if we are to avoid an impasse that will harm us all, negotiations on a future climate regime are seen by some as the most important challenge of this generation.

What roles can and should Asia play in these negotiations? How can the future regime be best shaped to meet the needs for development in Asia while ensuring that development does not hasten climate change? Can Asia be a 'game changer' in climate negotiations?

This book argues that greater and more effective engagement among Asians, and between Asia and the world, is essential for developing and implementing climate change policies. The rapid population, energy, and economic growth in Asia, as well as predicted vulnerabilities to climate change, make it a key region for a robust global solution. Without engagement of and by Asians, the post-2012 agreement will likely fail to generate the urgent outcome needed. Asian countries must be effectively engaged for the world to have any chance of arriving at a solution to avert dangerous climate change.

It will not be sufficient to just carry on with the present arrangements in the international community. The institutions of the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and 1997 Kyoto Protocol form the current basis for the global response. The Kyoto Protocol commits Annex I signatories (developed countries) to binding greenhouse gas (GHG) reduction targets between 2008 and 2012. Other countries, as non-Annex I signatories, are under no formal obligation to limit their emissions, but must complete National Assessments or National Adaptation Plans.

The Kyoto Protocol also established important mechanisms for financial flows between Annex I and non-Annex I countries to support GHG reduction projects, and set up ‘flexibility mechanisms’ to create markets for the trading of GHG credits generated from these projects.

The ‘first commitment period’ (2008–2012) of the Kyoto Protocol has begun. However, still-rising global emissions levels, increasing scientific knowledge about the serious impacts of climate change, and calls from business for a predictable long-term framework have already sent negotiators back to the table. At the annual UNFCCC Conference of the Parties (COP) in Indonesia in December 2007, the ‘Bali Road Map’ officially kicked off a two-year process to negotiate a post-2012 agreement, set to conclude in 2009 in Copenhagen.

A number of key issues addressed in Bali are directly related to this future agreement. These include the launch of a UN ‘Adaptation Fund’, the acceptance of ‘measurable, reportable, and verifiable commitments’ by developing countries, and the outlining of technology transfer, financing, mitigation, and adaptation as the agreement’s key building blocks. Ongoing negotiations are also addressing future market mechanisms and the opportunity for forests to mitigate emissions. Many of these discussions are intended to address the concerns of developing countries, in order to ensure an effective global response to climate change.

Asian countries have played several and differing roles in climate change negotiations and agreements so far. Among other things, they have argued with western countries over historical and current responsibility for climate change; promoted their domestic concerns; argued for additional adaptation and technology funding; and taken part in innovative, proactive partnerships. Despite such wrangling, there is every possibility that negotiations have been and will continue to be largely driven by the interests of western countries.

Such a possibility cannot be welcome to Asian countries.

Asia is predicted to experience some of the most severe impacts of climate change. Although the per-capita emissions of most countries remain relatively low, Asia’s rapid growth has meant that many countries in the region are among the world’s largest and

fastest growing GHG emitters. The region contains two ends of the risk spectrum—from extremely vulnerable ‘Least Developing Countries’, such as Bangladesh to highly advanced, energy-efficient economies such as Japan.

Given these factors, there is no doubt that Asia—for better or worse—will play a crucial role in determining the structure of this future regime and its success in reducing emissions enough to stabilize the global climate. Conversely, the emergent global regime will—for better or worse—impact Asia, in both environmental terms but also in its economic development and growth.

There is the danger that if negotiations fail to overcome this contentious relationship between Asia and the West, they will fail to produce an effective agreement on the clear and serious threats presented by climate change, including the potential breakdown of ecological systems. If Asians cannot articulate and adopt a consistent set of objectives, concerns, aspirations, and responsibilities in UNFCCC negotiations, it will be more difficult to muster the will for sufficiently strong action.

It is therefore essential for Asians to begin developing their own responses to climate change. To be effective and sufficient, they must respond to concerns at the global level and reflect a full understanding of national interests and voices within their society. They will also need to consider strategies for both mitigation and adaptation.

This book aims to promote four goals: greater attention by governments and the UNFCCC process to continuously assess new scientific evidence on climate and the consequential ecological changes that are taking place; greater action by Asian governments and stakeholders on climate mitigation and adaptation, as well as achieving development that is ecologically sustainable; a stronger, more consistent, and responsible Asian voice in international climate negotiations; and greater understanding between developed and developing countries on development and climate change.

Each chapter provides a concise overview of a key area for Asian countries on climate change. Each chapter aims to go beyond a general discussion of the issues to provide specific, targeted recommendations for different stakeholders—including negotiators, the business community, national governments, and cities.

While the perspectives of different contributors to this volume are not uniform, Chapter 1 frames the issues discussed in the book by advocating that Asian countries seek to act as ‘change agents’ in post-2012 negotiations. To do this, it suggests that Asian countries will need to develop national emissions reduction and mitigation plans, policies and targets, and propose them as their UNFCCC commitments in the short-term. The chapter also points out the necessity of incorporating regular scientific updates into negotiations, and placing greater emphasis on designing dialogue and deliberation processes that promote genuine exchange, and not stubborn assertions of existing positions.

Politics are the focus of Chapter 2, which provides an overview of the current climate policies of Asian countries, and analyses the domestic and international drivers for them. While the diversity of the region is reflected in the differing policies of Asian countries, the chapter observes that the driving factors in Asia point in the same direction: more attention and action on climate change. The chapter goes on to explore how these drivers can be targeted to encourage the most appropriate actions.

Chapters 3, 4 and 5 focus on important and quite different areas for progress on climate change issues and Asia's future development.

Chapter 3 provides an in-depth historical and literature review of one of the most promising strategies for encouraging Asian governments to take greater action. This is a 'co-benefits' strategy, which aligns climate policies with other domestic concerns such as air pollution and economic growth. Cities are emerging as key players in promoting and implementing these policies and the chapter looks at the similar factors and policies in this arena of response, below the level of the state.

The effort towards Reducing Emissions from Deforestation and Forest Degradation (REDD) is the focus of Chapter 4. Forests, many of which are located in developing countries, offer another promising opportunity to align climate change mitigation and development goals, and are one of the most hotly debated areas in current global climate negotiations. The chapter describes the current issues framing the forests discussion in Asia, and recommends how measures can be taken to move the debate forward.

Agriculture—the focus of Chapter 5—is another sector that is facing problems of land conversion in Asia. Yet it is also one of the sectors where climate change will present the most serious impacts. The chapter looks at how to address this emerging issue by engaging local stakeholders, and focusing on the relationship between water insecurity and food production.

Chapter 6 outlines how an equitable framework that aligns development and climate concerns is essential for encouraging Asian participation, but still must be robust enough to secure large-scale emissions reductions. It therefore proposes a 'Development Round' of negotiations be taken forward in the short-term for the post-2012 agreement.

One of the most effective ways to achieve this goal is to use the most developed and vulnerable parts of Asia—urban areas—as the basis for commitments of large developing countries. The large-scale sustainability challenges and opportunities faced by Asian cities are analysed in Chapter 7, including how to capitalize on the important roles they play in the region's politics, economics, media, culture, and society.

Energy efficiency has been widely identified as a low or negative-cost mitigation measure available on a large-scale to Asian cities and industries. But questions remain over why these opportunities are not being harnessed. Chapter 8 explores the situa-

tion in one of the world's most energy efficient economies, Japan, which has emerged as a climate leader in the region. The chapter also discusses how its success could be adopted in other countries.

Chapter 9 describes one of the key obstacles to and opportunities for increasing energy efficiency in Asia—the World Trade Organization (WTO) and global trade law. It argues that aligning the WTO regime with the future global climate regime—or at least avoiding a collision between the two regimes—will be an essential pre-requisite to overcoming this potentially divisive barrier.

Kyoto's market mechanisms—particularly the Clean Development Mechanism (CDM)—have played a central role in engaging developing countries in technology transfer and emissions reductions, but a number of flaws have also been identified. Chapter 10 presents the argument that these markets should be maintained, but reformed in the post-Kyoto regime, in order to promote the improvement of domestic emissions markets and environmental management norms in Asia.

The book concludes with a discussion of the current state of international negotiations, which have been framed by many stakeholders as a 'deadlock' requiring a landmark 'global deal'. Chapter 11 argues the opposite: that with current institutions and negotiating norms, what looks like a 'deal' will actually be a 'default' agreement that combines non-cooperative national positions. It argues for reform of these institutions and widening and deepening of climate action as prerequisites to an effective international climate agreement.

Chapter 1

The Road to Poznan and Copenhagen

Christine Loh

Recommendations

Asian governments

- Develop national emissions reduction plans and use them as the basis for negotiating commitments.
 - This will make negotiations concrete and based on national priorities of the country. It will also provide opportunities for a new global collaborative effort in the short-term to start driving down emissions.

Governments and climate negotiators

- Be guided by emerging science and evidence-based targets to avoid dangerous climate change.
 - Negotiators should make the objectives and outcomes of the post-2012 framework flexible enough to be guided by the latest scientific research. Uncertainty on climate thresholds should not hold up action, as the important goal is to produce a framework that starts moving global emissions in a downward direction.
 - Science briefings should be built into the process of the UN Framework Convention on Climate Change (UNFCCC) meetings beyond how the Intergovernmental Panel on Climate Change (IPCC) currently functions.
- Align sustainable development and climate strategies.
 - Negotiators should synthesize and integrate development and climate policies in the post-2012 agreement so both objectives can be met for developing countries.
- Focus on lower-hanging fruit in the Bali Road Map—energy efficiency, co-benefits, and forests.
 - Speed of reduction is important, and the quickest gains will come from energy efficiency.
 - National governments and negotiators should advance climate change mitigation through integrating climate, energy, pollution, and environmental management in a ‘co-benefits’ strategy.
 - Negotiators should seize the significant opportunities presented by forest policy to develop payment and market schemes that are science-based, cost-effective, and can achieve public goods.
- Improve the design of meetings and deliberative processes for global collaboration.
 - Negotiators should adopt well-designed processes to aid deliberation and dialogue processes and achieve better emissions outcomes.
 - There are many possibilities for new collaborations. Examples include developing and implementing clean coal and energy efficiency technologies, and regional partnership plans based on common airsheds and watersheds. These ecological partnerships will help deal with natural disasters and create a greater sense of climate–ecological inter-dependence.
 - Governments should also include regional and municipal authorities in the processes.

1.1 INTRODUCTION

The stated objective in Article 3 of the UN Framework Convention on Climate Change is to prevent dangerous climate change caused by human activities.¹ Given concerns about the Kyoto Protocol's inability to deliver absolute global greenhouse gas (GHG) reductions, this objective must be re-emphasized as the guiding principle behind any future regime. Unless the post-2012 agreement relies on and responds to emerging scientific evidence, this shortcoming is likely to be repeated with increasingly dangerous consequences. Often these consequences will be felt most severely in countries that are the least responsible for existing climate change—many of which are located in Asia.²

To achieve the necessary overall reductions, countries in Asia must be prepared to make meaningful contributions to the global reduction effort. However, equity concerns and domestic goals necessitate that economic development remains the first priority in these countries. In the short-term, without a policy framework designed to align this development objective with climate change mitigation, the post-2012 agreement will not succeed.³

The Bali Road Map, completed at the Conference of Parties in Bali (COP 13), includes an Action Plan which recognises the 'urgency' that 'deep cuts in global emissions will be required' to achieve the objectives of the UNFCCC.⁴ It laid out the key principles—called 'building blocks'—for this post-2012 agreement, and set the date for negotiations to conclude at the annual Conference of Parties in Copenhagen (COP 15) in late 2009. It may be described as a success—it was not intended to go much further. The pace of negotiation finally picked up at the Accra round of climate talks in August 2008 in Ghana, the last meeting before Conference of the Parties in Poznan (COP 14) in December. Most importantly, some parties from the developing world put forward specific proposals. For example, South Korea said it planned to set a binding target for emissions and wanted to act as a bridge between the developing and developed nations, and South Africa laid out a scenario that could mean a peak in its GHG by 2020 to 2025.⁴ These represent signs that the richer non-Annex I parties could provide the leadership to articulate their aspirations for further development and shoulder emissions reduction responsibilities. This exciting development could provide a 'game-changing' opportunity for a new problem-solving space to be created within the UNFCCC structure.

A chance has thus opened up for breakthrough between COP 14 and COP 15. Within this emerging space for new solutions, arrangements should be made to enable negotiators to both keep-up with emerging science, and support the alignment of climate and development concerns of developing countries. There are opportunities for

Asian countries to discuss how they might collaborate and cooperate in reducing emissions and so present a compelling voice in the upcoming negotiations. Greater support and participation from developed countries—especially the United States and the European Union—are also essential. However, because achieving low-carbon growth is in their own interest, Asian countries should be prepared follow the lead of South Korea and South Africa, discontinue using their lower development status as a reason to delay action, and move forward on their own. Unless Asian countries actively speak out about the threats to adaptation and their preferred mitigation strategies, there is the danger of getting stuck with an ineffective 'default' global agreement that is dominated by the concerns of developed countries [*Ed.: see Chapter 11*].

This chapter attempts to answer several key questions central to developing an effective 'Road Map' with which to negotiate a successful post-2012 agreement:

- How do targets and the global vision need to be modified in order to be responsive to the latest climate science?
- How can development and climate be aligned to promote meaningful participation from large developing countries?
- How can the building blocks in the Bali Road Map be integrated to address the key challenges and opportunities faced by Asian countries?
- How can dialogue and meeting processes among Asian institutions be improved to enable better deliberation that could lead to agreement and effective implementation?

1.2 FOLLOW THE NUMBERS: EVIDENCE-BASED PRINCIPLES TO PREVENT DANGEROUS CLIMATE CHANGE

Recently emerging scientific evidence indicates that avoiding the dangerous impacts of climate change may require more serious action than previously thought.⁶ Instead of a long-term stabilization in the atmosphere at 450 to 550 parts per million (ppm) carbon dioxide equivalent (CO₂e), the number may need to be closer to 350 ppm CO₂ (with non-CO₂ GHGs reduced as close to zero as possible).⁸ Instead of seeing a 2 °C rise in global mean temperature as being relatively safe, new evidence shows it could in fact produce severe consequences. It shows that ecosystem functions are stressed and some are on the brink of breakdown. Especially dangerous are melting ice sheets, oceans becoming more acidic, and biodiversity loss. These changes may be unmanageable for humanity, a truth that is not only sobering but heartstopping.

The total CO₂e concentration of GHG is now already at 455 ppm. To achieve 450 ppm CO₂e by 2050, the world would need 25 to 40 per cent cuts by 2025 and more than 80 per cent cuts by 2050.⁷ This achievement would require changing the world economy and consumption patterns. It would also require a wide range of urgent and sustained actions in global collaboration. These would need to synchronise regulatory, technological, financing, business management and consumer behavioural change responses.

The scientific community will continue to provide updates, but climate negotiators and governments must consider how new research should influence the global agreement and reduction commitments. In addition, scientific uncertainty in some areas, such as where the exact ecological tipping points are, should no longer be used as an excuse to delay action. The key is to craft an agreement that first and foremost starts to reduce global emissions, but it must also be flexible enough to be adapted if science indicates that greater reductions are needed.

The UNFCCC's implementation agreement—the Kyoto Protocol that came into force in 2005—represented a limited first attempt to create a multilateral framework to deal with climate change. One major achievement of the Kyoto Protocol is that it sets binding targets for industrialized countries for reducing GHG emissions. The targets amount to an average 5.2 per cent reduction against 1990 levels over the period from 2008 to 2012. This overall average includes an 8 per cent reduction for the European Union, 6 per cent for Japan, and 7 per cent for the United States (which did not ratify the treaty). Rapidly growing countries, including China, India and those of South-East Asia, do not have to meet specific targets during this period as a result of the principle of 'common but differentiated responsibilities'.¹⁰ Despite this multilateral effort, the growth of CO₂ emissions from burning coal, oil, and gas has actually accelerated. Exacerbating factors include population increase, extensive deforestation—forests act as 'sinks', absorbing carbon from the atmosphere—and other changes in land use patterns.

One of the other successes of the Bali Road Map was to link desired negotiation outcomes with the scientific work of the IPCC. The underlying hope is that all countries will adopt a shared vision for long-term cooperative action that will include a long-term global goal for emission reductions through increased actions on mitigation, adaptation, technology development and transfer, and financing and investment. If COP 15 can create the breakthrough needed to set the world on a speedy road to climate-friendly sustainable development, action in each of these areas will need to be greatly extended and expanded.

2 °C and 450 ppm CO₂e are the key climate numbers informing the post-2012 negotiations [*Ed.: see Chapter 11 for a summary of what is currently on the negotiating*

table]. So far, climate negotiations have followed economic logic by beginning with a normative objective, defining the policy tools to achieve it, and relying on market institutions to do so at the lowest possible cost. However, this approach may not be enough to produce results very soon, in light of the potentially dangerous climate impacts. Economics only addresses how people react to their own incentives—it cannot address how the planet may react. The Synthesis Report of the IPCC Fourth Assessment Report published in 2007 made clear that 'delayed emission reductions significantly constrain the opportunities to achieve lower stabilization levels and increase the risk of more severe climate change impacts'.⁹

Several recent proposals have acknowledged the potential inability for this approach to deliver an adequate solution through existing negotiating strategies and have highlighted the need for greater action. Some have suggested a radical overhaul of the current system, and raised completely new ways of approaching the climate change problem. One new and interesting idea proposes a global auction for a limited number of rights for the emissions of GHG as close as possible to their original source, which usefully serves to raise public awareness and provoke debate that will have an impact on driving political change.¹¹ Other approaches that draw from the traditional 'menu' of options for addressing climate change—markets, technology, taxation, and the integration of development goals—are more likely to be taken into account in the immediate future of COP 14 and COP 15 by countries and their climate negotiators because they work within familiar structures.¹² [*Ed.: Chapter 11 discusses some of the shortcomings of such proposals and emphasizes the need to move beyond the business-as-usual approach that these reports seem to advocate.*]

In light of emerging science, when discussing proposals such as these, negotiators should keep key ecological principles in mind:

- Human activities are supported by the natural resources and ecosystem services provided by planet Earth; and
- The planet operates under its own rules and boundaries. Humans cannot negotiate with the planet using economic logic. These planetary rules and boundaries will need to be observed if dangerous climate change is to be avoided. If planetary systems are pushed past thresholds of no return, changes will no longer be reversible on a practical timescale.

The negotiations at COP 14 not only need to address the fact that climate change is a global issue that magnifies the interdependence of the nations and peoples of the world, they must also stress the dependence of humans on the ecosystem services that

the Earth provides, and without which life would not be the same. Bringing the value and resilience of ecological systems into the climate negotiation process is critical in helping the post-2012 regime ensure dangerous impacts on these services are avoided.

1.3 INTERDEPENDENCE, DEVELOPMENT, AND CLIMATE CHANGE

Beyond the threat of climate change caused by the increase in GHGs in the atmosphere, human population growth, industrialization, urbanization and increased consumption of natural resources have also put tremendous strain on Earth's natural systems—with the result that system strains and breakdowns have become obvious. Human activities are now of such great scale and magnitude that staying on the business-as-usual path is widely recognized as unsustainable. The concept of sustainable development seeks to redress high-consumption growth by promoting development that meets the needs of the present without compromising the ability of future generations to meet their own needs.¹³ In other words, the present generation of humans must not consume so much that natural resources become depleted, ecosystems are wrecked, and the well-being of future generations is compromised.

To date, a key stumbling block to a stronger global agreement to achieve the sharp decline of global emissions is that national governments continue to push their climate negotiators to get the best possible emissions reduction deals to accommodate their growth aspirations. Serious concerns remain about the possible negative effects of climate and other environmental regulations on economic growth. Moreover, many developing countries see the mitigation mechanisms preferred by Annex I countries—such as emissions trading—as a way to offset their emissions by reducing the space for domestic growth in developing countries. However, the news from Accra offers hope that some richer developing countries can energize the negotiations by shouldering emissions reduction commitments.

Promising signs began to surface at COP 13: governments began to realize that climate change is not an independent phenomenon but one that exacerbates challenges in different sectors, including food, water, energy security, population growth, and increasing consumption. With the world moving towards greater interdependence, it is in their best interests to ensure that all nations have adequate energy security for development and are resilient to the impacts of climate change. Policy-makers are beginning to consider energy strategies that diversify away from fossil fuels, and also to appreciate that energy policy and foreign policy are closely linked. Indeed, it is be-

ginning to be accepted wisdom that protecting against climate change and improving sustainability is good for the economy and promotes prosperity, productivity, competitiveness, efficiency, and cost-effectiveness.

Nevertheless, it will still not be easy to combine economic growth goals with an adequate response to climate change in developing Asia. Discussions at COP 13 attempted to address environmental sustainability entirely within economic thinking and action, but greater efforts must be made at COP 14 and COP 15. This will require not only the involvement of economic and trade ministers and officials at the national level but also finding ways to involve those at regional and city levels. The Climate Prosperity Project offers one potentially useful way to re-frame the development discussion. Started and spreading in the United States, it promotes the message that innovation, efficiency, and conservation in the use and reuse of resources are central to increasing jobs, incomes, productivity and competitiveness at the local–regional level.¹⁴

However, it is unrealistic to sacrifice the goals of inequality and poverty reduction in developing countries for climate mitigation, as these are central problems for them. Although there are many conceptual, political, technological, and financial obstacles, development and climate change goals must go hand-in-hand. One danger is that developing and Annex I countries will take divergent paths—one that prioritizes economic growth, and another that prioritizes GHG emissions reduction. If an integrated strategy for development and climate change cannot be created, it will make it much more difficult for constructive dialogue between developing and industrialized countries. Asian countries must play a large role in conducting research and creating forums for deliberation. They must also be prepared to participate vigorously in the formulation of this strategy.¹⁵

1.4 ASIA CAN BE A 'GAME CHANGER'

Indeed, this chapter argues that Asian countries should take the lead in articulating a compelling vision of their aspirations for a better life but also accept their responsibility for achieving sustainable development. This requires Asian countries to propose their own GHG reduction targets, policies and plans, as well as to engage in deliberation within the UNFCCC structure for policy coordination. This will help them find solutions to address specific problems, such as accelerating technology development and financing in critical areas such as clean coal technologies, pushing for wider diffusion of existing energy efficiency solutions, and implementing good forest management plans. This way, developing countries can seize the initiative and engage others in priority-setting and problem-solving using their own plans as the base, rather than arguing on non-specific terms.

In other words, this chapter advocates that Asia can be a game changer in climate negotiations, thereby pushing the talks forward. In light of the urgency to start reducing the world's overall GHG emissions, Asia can help to force the pace in the coming months. This would hopefully open the door to a new global collaboration that pushes the world to embark on the dramatic changes that will be necessary to achieve better than 2 °C and 450 ppm CO₂e by 2050.

It is imperative for COP 14 to provide a clear direction and prescription for COP 15, so that an agreement can be created that synthesizes development and climate objectives. In order to focus this discussion, countries should be encouraged to consider what policy options for development are available. International institutions should enable financial and technology flows from developed to developing countries that assist in meeting development and climate goals. They must also ensure that the national policies of developed countries in areas such as trade reinforce these goals rather than weaken them.

Both domestic and global policy should target the inputs that drive emissions levels, including resource distribution, incentives, pricing, and misallocation problems. Climate change represents a much wider opportunity for re-organizing existing inefficiencies. Capturing this wider opportunity to promote sustainable development and prevent climate change will require aligning mitigation, adaptation, technology development and transfer, and financing policies across different scales.

The Bali Road Map includes the four 'building blocks' listed below. Most previous negotiation has been focused on mitigation and financing because they are the primary interests of Annex I countries. This chapter aims to highlight a number of key issues with these building blocks that require greater focus and attention. Since there is substantial overlap between the building blocks, COP 14 should take advantage of the opportunity to consider them in an integrated manner.

1.4.1 Mitigation

- **Customized capacity building**

Close cooperation between Annex I and fast-growing non-Annex I emitters is essential in building capacity for policy execution, compliance, regulation, and environmental management. These efforts will be crucial to long-term emissions reductions. Important opportunities exist in countries such as China, where the government controls large state-owned industries and emissions are increasing rapidly, and Indonesia, where tropical forests need to be managed and protected. Customized

approaches will be needed to suit each country, region and sector, and effective enforcement requires the setting of ambitious but achievable objectives and goals, as well as developing increasingly rigorous regimes to achieve them. It has already been argued above that Asian countries can use their own emissions reduction or sustainable development plans as the starting point as specific proposals at COP 14 and COP 15, which could create space for a new global collaborative effort (see Box 1.1 below for an example).

- **Push energy efficiency**

Developing Asia can achieve significant GHG reductions both when producing and when using power. National policies and international cooperation to improve the thermal efficiency of power plants will deliver lower carbon emissions, improved air quality and public health, greater energy security, higher capacity in plant management, and better competitiveness. Furthermore, encouraging the application of relatively simple technologies such as heat pumps, which Japan is pushing, can reduce energy usage.

Ideas such as Japan's Eco-Action Partnership for Asia¹⁶ could help promote a new 'Energy Efficient Community' (EEC) whereby East and South-East Asian countries could come together through the frame of their common airsheds, watersheds and shared biodiversity. Through this 'EEC', member countries could reduce zero-sum competition for fossil fuels by working on energy efficiency, and developing, financing and using renewable energy resources. Moreover, regional dialogue can benefit from considering the characteristics of the industrial take-off of Japan's experience in the 1970s, the phenomenon of the Four Tiger Economies—Singapore, Hong Kong, Taiwan, South Korea—in the 1980s, and China's modernization from the late 1990s, in order to set a course for low-carbon development suitable for Asia.

- **Be explicit about importance of co-benefits**

In integrating strategies for achieving sustainable development and preventing climate change, it is essential to also address energy and air quality management. Integrating pollution abatement and climate change mitigation policies may offer large cost reductions compared to treating these issues separately. This view is supported by the IPCC but is not prominent among current negotiating options.

- **Role of markets**

While it is clear that carbon markets cannot address all the issues in developing countries, including forestry, water, efficiency measures, and city programmes, it is also recognized that markets have to be a part of the development and climate solution. Carbon markets with electronic platforms in the European Union and some Annex I countries are continuing to evolve along with private markets. Significant innovation has arisen from the development of markets for carbon and other emissions, other environmental products, and the professional services needed to support the development of these markets. Indeed, these trading platforms are already more fully evolved than the system for creating the credits and bringing them to market. Nevertheless, developing Asia should not dismiss efforts to improve markets and market mechanisms even though the conditions that make them work in developed economies are not yet available in developing economies—such as reliable and transparent emissions data. Developing countries will eventually also need to use market mechanisms to help drive down their own emissions [*Ed.: see Chapter 10*]. There are also a growing number of Asian exchanges in China, India, and Singapore taking an interest in developing emissions products in the foreseeable future [*Ed.: see Chapter 7*].

- **Role of forests**

New challenges include how to deal with reducing emissions from deforestation and degradation (REDD). However, the debate over how to manage forests also has the potential to help governments and people understand the nexus between nature, ecosystems, and development. There is a growing awareness of the ecosystem services that forests provide and the cost to society when these services are degraded or lost. This new interest and the innovative payment schemes that are being proposed around the world are moving markets for ecosystem services towards centre stage in the debate about forests, climate, biodiversity, and sustainable development.

At COP 14 and COP 15, payments, markets, and market-like instruments for forest ecosystem services will be discussed. However, there are significant obstacles for governments, businesses, and NGOs to synthesize the various ideas and proposals into an equitable framework. The coming decade will be crucial for establishing the policy frameworks and institutional arrangements that ensure new markets and payment schemes will achieve public goods as well as private benefits. These frameworks must be robust and science-based, provide meaningful incen-

tives to resource stewards and investors in stewardship, have low transaction costs for both buyers and sellers, and enable direct beneficiaries of ecosystem services to finance their management.¹⁷

1.4.2 *Financing and investment*

- **Reform the CDM to incorporate sustainable development**

There is already a vibrant private market in green investments in Asia, especially in renewable energy and energy efficiency, water supply and treatment, and generating carbon credits. Global policies that push financial flows towards sustainable development and low-carbon options will create larger and faster flows. Despite its faults, the Clean Development Mechanism (CDM) has helped to develop a set of offset rules for assessing the costs associated with the reduction of GHG emissions. It is an important model for project-based action. Expanding the CDM to include more and different types of projects, and even sectors and policies, will be important to help developing countries achieve sustainable development faster. Less desired projects could be discounted to discourage investment.

A wide range of new proposals and analyses that suggest potential reforms to the CDM and to broader emissions trading are emerging [*Ed.: see Chapter 10*]. A recent WWF China report prepared by Ecofys-Azure that presents an analysis of the CDM from the perspective of China's energy sector supports this policy and a sector-based approach to reform. Although the CDM has contributed to China's renewable energy transition and has greater future potential, national economic and energy policy and traditional investment remain the overwhelming drivers.¹⁸

1.4.3 *Adaptation*

- **Focus on reducing climate change risks**

Adaptation does not reduce GHG concentrations in the atmosphere, but it does reduce the risks arising from them. Adaptation measures are necessarily broad—ranging from developing new varieties of seeds that perform better in a changed climate to building physical structures to prevent flooding. Many such responses do not need to be addressed by a multilateral treaty as they arise from market or societal demands (e.g. for new seeds and sea walls). Poor countries, including those in Asia, however, present a special case because they lack the resources and capacities to protect them-

selves from climate change impacts. Some adaptation investments need to be made early in the least developed countries rather than wait for the impacts to hit. The Adaptation Fund set up at COP 13 was in recognition of these realities. The fund has been placed under the management of a 16-member Adaptation Fund Board, with the UN's Global Environment Facility serving as the secretariat and the World Bank as trustee.¹⁹ Pledges so far are inadequate, which is an indication that adaptation is not yet a serious enough concern for the UNFCCC parties. COP 14 and COP 15 need to give attention to reducing climate change risks for those least able to do it for themselves.

- **Include adapting regulatory systems**

In thinking about 'adaptation', the term should include methods by which existing regulatory systems in electricity generation, distribution, and pricing in Asian countries can be modified so they promote energy conservation and efficiency. Moreover, identifying and removing barriers is vital to making the most of improved energy codes, building codes, and product labelling. The challenge is to align the policy goal to reduce energy usage and emissions with the utilities' interest to earn a profit, and consumers' interest to achieve comfort at a reasonable cost. This will require profit to be allowed where watts are saved rather than where watts are used—the 'negawatt' concept.²⁰ Innovation in regulatory systems should help even energy efficient Japan to reduce emissions further.

- **Create standing disaster rescue-relief capabilities**

Another important adaptation need for Asian countries is to deal with natural calamities by creating standing regional bodies with the capability to help neighbours. The Eco-Action Partnership for Asia envisaged by Japan includes environmental satellite information systems that can be adapted to track natural disasters and help neighbouring countries support rescue or crisis operations.

1.4.4 *Technology Transfer*

Achieving long-term climate change policy goals requires technological innovation, especially in the energy sector. An essential part of combating climate change is transitioning away from fossil fuels as the foundation of industrial development. Given the long lifetimes of capital investments in power generation, the investment decisions made in the next five years will determine the world's generation mix for several de-

acades to come. In view of the urgency to drive down carbon emissions as soon as possible, existing energy efficient technologies need to be widely deployed. Innovations are needed to keep increasing efficiency and reducing costs. Developing countries face a number of challenges, including costs, access to future technologies, safety and security, and the trade-related aspects of intellectual property under the World Trade Organization [*Ed.: see Chapter 9*].²¹ The CDM has helped to address some of these issues but needs to be reformed in order to play a bigger role. The idea of using a technology or research and development fund to help is not new, but it has been hard to set one up which has the right mandate. The Bali Road Map provides for a new technology programme, although no fund was created.²² A global policy agenda that addresses sustainable development and climate change is needed to resolve these issues.

- **Focus on clean coal technologies collaboration**

In view of the fact that coal will remain an important part of the world's energy mix for some time and the major developing countries of China and India will need considerable time to reduce reliance on fossil fuels, innovation in clean coal technologies to improve energy efficiency in power generation is critical to combating climate change. Box 1.1 provides an example of a new global collaborative effort.

- **Carbon capture and storage and small-scale distributed power**

COP 14 and COP 15 should also start to place greater emphasis on carbon capture and storage (CCS), and small-scale distributed power.

CCS is a known technology, but government policy is needed to guarantee funding to deploy CCS schemes on a vast scale. In light of fuel consumption trends, Shell estimates that by 2050 the world will need to achieve carbon capture for 90 per cent of power generation in the developed world and 50 per cent in the developing world.²³ There needs to be an international regulatory framework to support the potential for thousands of power stations fitted to be with CCS around the world.

There are also sustainability advantages for developing small-scale power generation (including renewable generation) facilities that do not need to be part of national or regional grid systems. Again, government policy is needed to drive technology development and diffusion. Small-scale distributed generation is ideal for countries such as Indonesia, with large and widely dispersed land areas, as well as districts in urban regions. Moreover, small-scale distributed power systems will also enhance energy security as breakdowns in one system would have relatively limited impact.

- **Focus on energy efficiency using existing technologies and regulatory reform**

There are many existing technologies that can help achieve ‘negawatt’ outcomes (using less input to generate a unit of energy) through better design and regulation (such as rewarding savings in utility regulation). These savings can be cheap in comparison with adding capacity but are under-used. International and regional cooperation should focus on these ripe low-hanging solutions.

Box 1.1
Global collaboration on clean coal technologies

Building collaboration is about getting process right. An example of a global collaborative effort is needed in pursuit of the further and faster development, as well as financing and diffusion, of clean coal technologies for coal fired power plants (‘clean coal technologies’ is used here for non-carbon capture and storage technology). China, India, and Indonesia are major producers and users of coal. Japan is an importer of coal but Japanese companies are leaders in clean coal technologies, along with companies in France and Germany. These companies compete fiercely for business worldwide. While both developed and developing countries are interested in developing and adopting super-critical clean coal technologies, it has been far from easy to conceive of a structure for governments and commercial entities to devise a collaboration path. Companies holding the intellectual property rights to the technologies should be able to monetize them, but at the same time developing countries need to be able to afford them to facilitate wider adoption. Innovative financing from both multilateral institutions and commercial banks is also essential to ensure wide diffusion of technology.

To create the right structure for collaboration, all stakeholders need to help design it from the outset so that it becomes a co-creation project. An appropriate neutral institution needs to identify the stakeholders and assess their willingness to participate in initial no-commitment deliberations on how to design an exploratory process that advances one step at a time. This approach is intended to build mutual trust and focus on finding solutions. Early rounds may be spent on comparing notes about each country’s technology policy related to coal to see if there are ways to speed-up the development process, identify synergies, and avoid duplication in investments. Later rounds may discuss what opportunities can be created for international cooperation on procurement and deal with intellectual property issues. The host organization for on-going deliberation needs to be agreed upon and funds for organising and sustaining the process need to be shared. Costs should not be a significant barrier. This effort may be kept under the UNFCCC structure to ensure high-level support. When exploration and deliberation have been taken to an advanced stage, negotiations to strike agreements should be easier to achieve.

Another useful area for global collaboration is on energy efficiency, through a partnership such as Japan’s Eco-Action Partnership, as discussed earlier (see section 1.4.1: Push energy efficiency).

The skilful and patient use of *Sustainability Tools*, noted in Box 1.2, is necessary to shepherd both processes forward, and can also be used to explore CCS and small-scale distributed power deployment.

1.5 INTERDISCIPLINARY DIALOGUE

To make effective policy on development and climate change, Asian institutions need to consciously consider *how* they deliberate as much as *what* they deliberate. Even with a willingness to create a new path, discussion across sectors is not easy. The United Nations’ bodies are often organized along specializations rather than inter-disciplinary lines. Redesigning the way meetings are held within agencies and organizing meetings for inter-agency discussion will improve the quality of deliberation. The June 2008 meetings in Bonn have made a positive start, with the Subsidiary Body for Scientific & Technology Advice (SBSTA),²⁴ Subsidiary Body for Implementation (SBI),²⁵ Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP),²⁶ and Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA)²⁷ conducting sessions in parallel. Climate negotiators were required to address

Box 1.2
Sustainability Tools—New competence for deliberation²⁸

Government and public sector officials usually rely on existing political processes to make and implement decisions. However, those processes are not well suited for the modern-day policy-making demands of simplicity, sophistication, and speed. Many competing interests and issues must always be considered. There are also limited opportunities to change political structures so that they support rather than hinder transformation.

Envisioning a preferred future as far ahead as possible is the most critical element in the process, because all subsequent actions and decisions will be based upon it. In order to create this future, the whole system for how things are done today may need to be transformed. Resistance needs to be identified and understood in order to focus effort and resources to address it.

The process for public consultation, decisions, and actions must be transparent and open. Before decisions are made, consultation and deliberation processes that engage stakeholders are crucial to build trust, instil ownership among various actors, and meet the demand for public accountability. Deliberation sessions are exploratory in nature, and should be designed to facilitate exchanges of views and question the underlying assumptions of different perspectives, ideas, and solutions. These processes also help decision-makers to be more effective at the decision-making stage. There is also a need to set up a system for measuring performance and outcomes on a consistent and continuous basis.

Civic Exchange has branded these processes and methods under the term *Sustainability Tools*.

all the pillars of the Bali Action Plan together. Greater attention could be paid to the effectiveness of this process when structuring future dialogues. There are a variety of available meeting design options that can be both useful and effective (see Box 1.2).

In addition, beyond the formal UNFCCC process, there is an enormous desire across the globe for more effective ways to deliberate and debate complex issues. The development and climate change challenge requires new capacity building for decision-makers and institutions, and those who are responsible for the execution and implementation of policies. Involving regional, municipal and city officials in this capacity building will be critical to success. Groups such as the C40 Cities–Climate Leadership Group, Local Governments for Sustainability (ICLEI), and associations of mayors and governors can help shorten the time societies need to transition to low-carbon development paths [*Ed.: see Chapter 7*]. For sure, new collaborative deliberation, dialogue, and negotiation structures are going to be needed at global, regional and local levels to envision and sustain the continuous efforts necessary for the large-scale and long-lasting changes needed to drive down GHG emissions.

Within the formal negotiation process at COP 14 and COP 15, the necessary outcome is clear: an agreement that is explicit about the risks of climate change, clearly states that the world’s goal is to manage and adapt to the unavoidable changes already in the pipeline, pledges to assist those countries least able to help themselves, and begins aggressive mitigation as quickly as possible in order to avoid the unmanageable risks that could arise from abrupt global ecosystems breakdown.

Chapter 2

Politics, Positions and Policy-Making on Climate Change in Asia

Simon Tay and Phir Paungmalit

Recommendations for governments and climate negotiators

Asian governments

- Promote greater international understanding of and more clearly articulate the driving forces behind domestic climate policy-making in Asia.
- Aim to align policies with the objectives of key industry interest groups, in light of their large influence on national economic and climate policy.

Negotiators

- Reduce the costs of climate change mitigation for Asian developing countries, including access to foreign funding, technical expertise, and information. These steps can both further Asia's economic development goals and motivate Asia to act on climate change.
- Promote greater understanding of climate impacts, as this knowledge should be effective in securing greater action from policy-makers in Asia.
- Make equity a key principle of any future agreement, which will be necessary to encourage more proactive participation from Asia.

2.1 INTRODUCTION

The awarding of the 2007 Nobel Peace Prize to Al Gore and the Intergovernmental Panel on Climate Change (IPCC), along with increased media coverage of the issue, served to increase global awareness of the threat of climate change. However, different countries and actors have different perceptions of—and responses to—this threat. Asian perceptions and responses have differed from those in the West, and they have varied across the region. More than 180 nations are signatories to the United Nations Framework Convention on Climate Change (UNFCCC).

However, Japan is the only Asian country on the list of ‘Annex 1’ parties that have taken on specific carbon reduction targets under the Kyoto Protocol. Aside from South Korea, no other Asian countries have expressed willingness to take on binding targets in the near future—whether inside or outside the Kyoto structure. Given that many of the largest and fastest growing CO₂-emitting countries are in Asia—although they are still well below the global average in per capita terms—this limited response should be a central concern for negotiators of the post-Kyoto regime. While these countries may not be ready for legally binding targets in the next phase of Kyoto, it is essential that they begin to make meaningful contributions to the global greenhouse gas (GHG) reduction effort in order to achieve the central environmental performance goal of the UNFCCC—stabilizing greenhouse gas concentrations ‘at a level that would prevent dangerous anthropogenic interference with the climate system’.¹

Given their emerging domestic action plans and the content of the Bali Road Map, there should be no doubt among negotiators from the West that Asian countries are prepared to begin making this effort, even though their policies, measures, and commitments may differ from developed countries. The remaining chapters in this book are largely focused on the key climate-related concerns of Asian countries and how the international agreement can be aligned with these concerns in order to encourage and ensure greater action on mitigation and adaptation. These key issues include equity, air pollution and co-benefits, food and water security, forests, urbanization, energy efficiency and security, international trade, and markets.

In order to help the international community to understand these concerns and select targets for the post-Kyoto regime, this chapter first presents Asian perceptions on the problem of climate change and sustainable development, the negotiating positions that follow from these perceptions, and the policies Asian countries have undertaken so far. It then addresses the key considerations of policy-makers in Asian countries in climate policy decisions, including international and domestic influences. It concludes by suggesting ways to encourage Asian countries to take greater action in response to the threat of climate change.

2.2 ASIAN PERSPECTIVES: BUSINESS-AS-USUAL FOR NORTH–SOUTH POLITICS?

Although there is increased awareness about climate change in some Asian countries, states, ecological zones, and perspectives in the region are diverse. This diversity spans from large developing countries such as China and India, to highly vulnerable countries such as Indonesia, the Philippines and Bangladesh, developed, energy-efficient countries such as Japan, and in-between states such as South Korea and Singapore.

However, most countries and jurisdictions in Asia ex-Japan share three common points in their perspective on climate change and binding reduction targets:

(a) Production, consumption, and emissions from the developed world are responsible for the current impacts of climate change, and will continue to be more responsible in the near and medium term. This leads developing countries to emphasize their right to growth to the international community under the principle of ‘common but differentiated responsibilities’.²

For example, China’s National Climate Change Programme, published in 2007, stresses that the country’s first priority remains ‘sustainable development and poverty eradication’.³

(b) Even though overall emissions may be on par with developed countries, per capita emissions remain much lower. This point is also used to raise equity concerns about the right to economic development.

In 2004 India produced roughly 1.2 tonnes of CO₂ per capita, while the United States produced about 20, and the world average is 4.⁴ During the release of India’s Climate Change Action Plan in June 2008, Indian Prime Minister Manmohan Singh claimed that ‘despite our development imperatives, our per capita GHG emissions will not exceed the per capita GHG emissions of the developed industrialized countries’.⁵ He also argued that emissions standards had to be ‘fair and equitable’—an apparent reference to what India sees as the West’s unfair demands that it limit its emissions at the same rate as more developed countries.

(c) Many of the solutions proposed by developed countries involve advanced technology not easily or cheaply available in developing Asia. This once again leads to equity concerns about potential solutions, since many developing countries will need to rely heavily on transfers from the developed world to achieve GHG reductions. These technological disparities, and the consideration of mitigation commitments for developing countries in a post-2012 regime, have placed technology transfer at the centre of current negotiations. The Bali Action Plan recognized that enhanced technology transfer will be central to the effective, continued implementation of the UNFCCC in developing countries.⁶

Many Asian states see climate change as simply another aspect of North–South politics. The aforementioned equity arguments have divided the international community on environmental issues like biodiversity and forests since the 1992 Earth Summit, despite near-universal rhetoric about sustainable development. From this perspective, climate change policy appears to be a kind of ‘green imperialism’ in which developed countries limit carbon and energy use, industrialization, and therefore economic growth in Asia. While many in the West feel there is no point in cleaning up unless large developing countries begin to make some commitments, the reverse is just as true for many Asians: there is no equity in reducing carbon emissions unless the developed world leads and facilitates the changes.

If both sides remain rigid in their perspectives, no progress can be expected. Therefore, it is vital for dialogue and negotiations on climate change to deal with these arguments and to work to defuse the divisiveness of North–South politics.

2.3 SIGNS OF POSITIVE CHANGE

However, there are signs of positive change in Asian attitudes to climate change and growing optimism in the potential to resolve this debate. At the 2007 conference of the Asia–Pacific Economic Cooperation group (APEC), leaders of the 21 member economies acknowledged the problem of climate change and voiced support for the post-2012 arrangement.⁷ APEC leaders also made a voluntary declaration to improve energy efficiency by 25 per cent from 2005 to 2030.

Also in 2007, the Association of Southeast Asian Nations (ASEAN) and the East Asia Summit both issued declarations on the environment, climate change and energy.⁸ These express commitment to ‘stabilizing atmospheric greenhouse gas concentrations in the long run, at a level that would prevent dangerous anthropogenic interference

with the climate system’, and ‘developing an effective, comprehensive, and equitable post-2012 international climate change arrangement under the UNFCCC process’.⁹

At the national level, more Asian countries have announced and begun to implement action on climate change, energy efficiency, and clean energy. China issued its *Renewable Energy Law* in 2006 and set a target to generate 15 per cent of its energy from renewable sources by 2020.¹⁰ Its investment of about US\$10 billion in renewable energy in 2007 was second only to Germany’s.¹¹

In late June 2008, India also announced its national plan on climate change. It has already emerged as the world’s fourth-biggest producer of wind power,¹² and has a solar yield that is bigger than any country except the United States. Although it places economic growth as the first priority, India’s plan identifies renewable energy, energy efficiency, and a green technology fund as key measures.¹³

Among smaller states, Singapore was among the first in ASEAN to adopt a National Climate Change Strategy and energy efficiency plan with targets. It is also completing a major study on climate impacts and adaptation. In addition, as host of the ASEAN and East Asian Summits in 2007, Singapore played an important role in bringing climate change issues to the attention of regional leaders.

While avoiding legally binding emissions targets, these measures are significant steps forward. Taken together, they are a departure from the absolutist rhetoric of the North–South divide, and show that it may be possible to move forward on greater action in the post-Kyoto agreement.

Key questions remain to be answered. What has led to this progress? Why has it been limited in certain aspects, such as the rejection of binding targets, and a persistent scepticism? And why are some countries more proactive, while others are lagging?

In order to help answer these questions, both international and domestic influences on national-level climate policy must be considered.

2.4 INTERNATIONAL FACTORS: INFLUENCE, ISSUE-LINKAGES AND COMPETITIVENESS

There are three main international influences on Asian climate policy:

1. Normative pressure from foreign governments and NGOs;
2. International bargaining to reduce the costs of compliance, issue-linkages, and side-payments; and
3. Concerns about competitiveness in the global economy.

2.4.1 *Pressure from foreign governments and NGOs*

First and foremost, countries are concerned about their international image. They want to be viewed as cooperative and responsible actors. This leads them to respond to normative pressure applied by foreign governments and transnational NGOs in an effort to influence their decisions. However, climate policy decisions involve a combination of strategic and normative factors, including material interests, so it can be difficult to argue that international norms play a decisive role.

However, international pressure from the EU played a key role in Japan ratifying the Kyoto Protocol even when the US backed out. Furthermore, while smaller but fast-growing emitters like Thailand, Malaysia or Vietnam receive little pressure to act on climate change, China and India are increasingly targeted in the international arena. Although domestic factors are also important, this pressure has clearly had some impact on these two countries, which are now among the most proactive in the region. The more negative the international image that comes with a low-commitment approach, the more likely it is that Asian countries will take greater action.¹⁴

Given the danger of the continued North–South finger-pointing outlined above, applying greater international pressure is not the most effective strategy for convincing Asian countries to take greater action.

2.4.2 *Other types of international bargaining*

More importantly for Asian countries, in addition to moral pressure, foreign governments also engage in diplomatic and financial bargaining that reduces the costs of complying with international agreements.

Although it involves a non-Asian state and was never officially confirmed, perhaps the most famous example of diplomatic bargaining on climate change occurred when Russia was apparently granted membership in the World Trade Organization (WTO) in exchange for its ratification of the Kyoto Protocol.¹⁵

External funding is another form of bargaining that alters the economic incentives of participating in an international environmental regime, as occurred in negotiations for the Montreal Protocol. It has been suggested that one of the main motivations for China and India to take part in an international climate agreement is that greater access to technical expertise, foreign aid, and information will further their economic development goals.¹⁶ As a country that is both a major emitter and highly vulnerable to climate change, China is the largest recipient of environmental

aid from the World Bank and receives financial support for climate projects from agencies such as the United Nations Development Programme (UNDP) and the Asian Development Bank (ADB).¹⁷

Indonesia is leading the push for a new system to secure payments under the UNFCCC for preserving their forests as a carbon sink. The World Bank has also announced a development fund, the Forest Carbon Partnership Facility, which aims to assist developing countries in their efforts to reduce emissions from deforestation and land degradation.

In the post-2012 negotiations, the nature of these financial incentives will be key in motivating developing countries to participate in climate change mitigation and in ensuring global emissions reductions.

2.4.3 *The interdependent global economy*

The third international factor influencing Asian climate change policy at the national level is the increasingly interdependent global economy. States adopting stricter climate policy are concerned that their industries will not be able to compete in the global marketplace with those in countries with more relaxed standards. However, multilateral agreements like the Kyoto Protocol function to overcome this barrier. Countries that may be unwilling to act unilaterally, either from competitiveness concerns or because their unilateral actions will produce limited environmental benefits, may be more willing to act with the assurance that others will do the same.¹⁸ Addressing these concerns could be a powerful tool to convince Asian countries to take greater measures on climate change, but will likely be a complicated, divisive process that requires action from the WTO [*Ed.: see Chapter 9 for an overview of the current key issues surrounding climate change and international trade regimes*].

However, there are serious concerns about whether the post-Kyoto agreement will achieve mutual cooperation, or whether it will default to a non-cooperative combination of national solutions [*Ed.: see Chapter 11*]. Although financing will be an effective international tool in encouraging Asian countries to adopt stricter policies, using moral persuasion and international trade standards will be more difficult. Targeting domestic political concerns should be a more effective method in promoting greater climate action in Asian countries.

2.5 DOMESTIC FACTORS: COST–BENEFIT, POLITICS AND KNOWLEDGE DIFFUSION

There are three central drivers of climate change policy-making at the domestic level: rational cost–benefit analysis of national interests, domestic political bargaining and electoral incentive, and the perception and diffusion of knowledge on climate change by policy-makers.¹⁹ These three factors both complement and conflict with each other, and provide a stronger explanation for national climate policy in Asian countries than international influences.

2.5.1 National cost–benefit assessments and interdependence

In many Asian countries, and indeed around the world, cost–benefit assessments are frequently a key driver of the policy-making process. In terms of climate change, this requires an analysis of the economic costs of climate change impacts, and the costs and benefits associated with emission reduction activities.

(a) Vulnerability to the impacts of climate change

High expected costs of climate impacts can be a key driving force for countries to adopt a more proactive response to climate change, especially if economic interests are threatened. The IPCC has characterized Asia as having a high climatic and geographical vulnerability to climate change and a low socio-economic capacity to adapt.²⁰ The main concerns of highly vulnerable countries such as Singapore, Indonesia, and India are rising sea levels, negative impacts on the agricultural sector, and declines in already scarce water resources. The low level of economic development in many of these areas exacerbates vulnerabilities and reduces the capacity for adaptation. [Ed.: Chapter 5 provides a discussion of the serious impacts of climate change on food and water security in developing Asia].

On Asia's high vulnerability alone, a more proactive response to climate change is necessary. However, imperfect information lowers the perceived costs of climate change vulnerability. This leads policy-makers to base decisions on general ideas about how it will affect national interests such as economic development and social wellbeing.²¹ Furthermore, although Asian countries are concerned about the threats of climate change, the use of cost–benefit analysis discounts long-term problems and favours the use of scarce resources on short-term poverty alleviation²² and reduction of acute local environmental problems like air and water pollution.²³

Although existing perceptions of the economic impacts of climate change have not driven Asian countries to accept legally binding targets, they are clearly having some impact on their greater participation in international negotiations. Regional bodies like APEC and ASEAN are now talking about climate change and adaptation on a regular basis; China and India are continuing to exert pressure on developed countries to take on greater emissions cuts; and developing countries are calling for more emphasis on adaptation in the post-Kyoto agreement.²⁴

(b) Mitigation Costs and Benefits

Since Asia ex-Japan has no legally binding reduction commitments, GHG mitigation costs are currently based on policy-makers' assessments of the impact of emission reductions on national economic development. In general, any proposals of reduction commitments in Asia are assumed to be a threat to economic development and energy security.

Since economic development is the top priority, if net costs of mitigation are expected to be high, the likelihood of a proactive climate policy is reduced. Although the positive side effects of reductions are recognized, uncertainty about these benefits and the lack of technological solutions makes them seem distant compared to the costs of reduction. Potentially larger long-term costs are also discounted relative to moderate short-term costs.

Furthermore, Asia's energy demand is growing rapidly, making the region dependent on cheap, secure energy supplies such as (carbon-intensive) coal. Although alternatives are available and there are co-benefits such as lower air pollution from reducing coal use, Asian countries' capacity to make drastic changes in their energy structure is limited because of the huge investments required.²⁵ This drives up mitigation costs, which in Asia are largely related to a major restructuring of the coal-dominated energy sector, and to a lesser extent energy efficiency and conservation.²⁶

Since perceived mitigation costs are such a key driver of climate policy and the acceptance of reduction targets in nearly all cases in Asia, it is essential for countries to understand the true costs and benefits of GHG abatement. [Ed.: As discussed in several other chapters, large energy efficiency gains can be achieved at a low cost (Chapters 7 and 8), diversifying energy sources will produce large economic co-benefits (Chapter 3) and reforestation can reduce atmospheric carbon and promote national development goals (Chapter 4)].

However, there is also significant political will behind biofuels and nuclear energy in many Asian countries, two seemingly promising energy sources that still have significant problems and should be discouraged (Boxes 2.1 and 2.2).

Box 2.1**Potential policy fault steps for Asian countries #1: Biofuels**²⁷

In Asia, the production of biofuels is at the intersection of agriculture—the predominant economic sector—and energy, as national economies are affected by rising oil prices and climate change mitigation.

As a result, some governments in South-East Asia have begun promoting biofuel crops to cut fuel imports and tackle climate change.

However, there is increasing evidence that the original enthusiasm and policy encouragement in the West for biofuels as a green transport alternative may have been misguided and damaging.

Two separate studies published in the journal *Science* last year showed that the current range of biofuels crops being offered as ‘green’ alternatives to oil-based fossil fuels are not a viable strategy for reducing climate change as they will likely lead to greater overall carbon emissions.

These studies showed that conversions of land for these biodiesel or bioethanol crops releases between 17 and 420 times more carbon than the annual savings from replacing fossil fuels. If overall energy maximization from land use is the goal, wind and solar provide greater energy per hectare than biofuels.

However, biofuels can be efficient if they are produced close to where they are used and crop growth, land conversion, and fuel use are monitored and certified based on carbon and sustainability criteria. With biofuels already entering global markets, it is vital for this consistent assessment to begin as soon as possible.

If UN negotiators and national policy-makers focus on promoting more appropriate cost-effective and no-lose policies that are aligned with economic growth, Asian countries will likely be willing to take on greater mitigation responsibilities.

2.5.2 Domestic Political Bargaining

In most Asian countries, although public concern over climate change is growing, it has yet to make a significant difference at the national policy-making level. In democratic countries such as Japan, however, greater public concern over environmental issues is a key driver of policy-making on climate change mitigation and adaptation.²⁸

There is a close relationship between public concern and policy in other Asian countries, but the impact varies based on how strongly government institutions are designed to allow public input. Interpreting public pressure for climate change in Asia is also challenging because environmental protection is an issue that typically has widespread support in public polling. However, voters do not seem to actually

Box 2.2**Potential policy fault steps for Asian countries #2: Nuclear energy**²⁹

Nuclear power generation is growing in significance in East and South-East Asia. The region has 109 operational nuclear power plants, 18 more under construction and around 110 in the planning stages. There are also 56 research reactors in 14 countries.

Many countries argue that the nuclear option should be retained because it is an important carbon-free source of power. However, the prospects for nuclear energy are limited by four major problems: high relative costs; perceived adverse safety, environmental, and health effects; potential security risks stemming from proliferation; and long-term waste management.

Cost: the full costs of nuclear energy are quite high, but are typically hidden by government financing and subsidies. Since nuclear energy is arguably neither sustainable nor infinite, many argue that this funding could be better spent on other sources of renewable energy.

Safety: the perceived potential for a catastrophic accident makes nuclear power a uniquely dangerous source of electricity, not only because of the 1979 Three Mile Island and 1986 Chernobyl reactor accidents, but also because of accidents at fuel cycle facilities in the United States, Russia, and Japan and growing concern about the vulnerability of facilities to terrorist attacks.

Proliferation: the current international nuclear proliferation regime is inadequate to meet the security challenges of greatly expanded nuclear deployment. The IPCC has warned that the security threat would be colossal if nuclear power was used extensively to tackle climate change.

Waste: nuclear power still faces unresolved challenges with the long-term management of radioactive waste. Currently this seems to be an intractable problem for the industry, as no country has been able to implement a successful system for waste disposal.

The ability of many Asian countries to afford and manage these safety and security costs and risks remains in doubt. Thus, compared to other renewable energy sources, it is difficult to present a credible case for the expansion of nuclear power to fight climate change in Asia.

Asia would be better suited to choose a system with fewer serious negative impacts in the short to medium term, while moving towards completely renewable, sustainable, and safe energy in the long term.

pay close attention to their countries’ climate policies, and are more concerned with direct issues such as energy prices. Considering the low per capita income in many Asian countries, this is not unexpected.

When the general public is not paying close attention, organized interest groups are, and, moreover, are more likely to exert influence on the government. In many Asian countries, powerful business interests and lobby groups have been able to exert greater influence than the public or less well-organized environmental NGOs. Their aim is to focus the climate policy debate on the economic consequences of abatement poli-

cies for vital industry sectors. In Indonesia, the expansion of palm oil plantations by big investors, partially supported by government, has been one of the most significant causes of deforestation.³⁰ Since the forestry sector is responsible for around 85 per cent of Indonesia's annual emissions,³¹ Indonesia is caught between its own financial interests in the palm oil industry and growing international demands for conservation.

Given this political situation is similar in many Asian countries, it is likely that engaging business lobby groups and developing climate reduction strategies that are aligned with their interests will prove a more effective strategy than public outreach.

2.5.3 *Social learning and knowledge diffusion*

Knowledge and beliefs among policy-makers about the impacts and opportunities presented by climate change can shape how the problem is handled at the national level. Conventional wisdom holds that the more convinced politicians are that climate change is real and caused by human activity, and the more severe the impacts they expect, the more they would support costly measures to address the problem.³²

Although NGO and academic networks exist for science and policy research in Asia, they are not sufficiently linked to national and regional policy-making institutions. Increasing these linkages is likely to influence Asia's attitudes towards this problem and produce a more proactive climate policy. This once again highlights the importance of comprehensive national studies on climate change and the necessity to educate and involve key government decision-makers.

Policy also evolves through the diffusion of social norms. But how do Asian values and concerns such as equity influence national policies on climate change? An agreement that is perceived as equitable should lead to more proactive climate policy in Asia. The banner of equity has been carried by developing countries in climate change negotiations under the principle of 'common, but differentiated responsibilities'.

However, these responsibilities can differ based on whether emissions are measured in terms of historical, current, or per capita amounts. The classic argument is that developed countries have used more than their fair share of the historical global commons—the atmosphere—and therefore should be the first to act. Most Asian countries consider historical and per capita emissions as the fairest criteria for burden sharing, leading them to perceive their own responsibility as low. In their view, the imposition of reduction targets is unfair because Asian developing countries' high emissions are mostly due to large populations and necessary economic development. Why, they argue, should they be forced to limit their 'survival emissions', while industrialized countries are still increasing their 'luxury emissions'.

Developing countries also view themselves as short of financial and technological capacity to reduce emissions and remain the most vulnerable to climate change impacts. Developing Asia expects wealthier countries to help it use more efficient and cleaner energy and set the example before their commitments can be discussed.³³ The post-2012 agreement must be in accordance with the notion of equity if it is to increase the possibility of more proactive climate policy in Asia.

2.6 CONCLUSION

Asia's role is becoming increasingly important in every aspect of international relations, and climate change is no exception. Due to its geographical location, climate-vulnerable economies, and limited adaptive capacity, Asia is expected to experience serious impacts from climate change. As some of the fastest-growing and largest emitting countries in the world, China, India, and Indonesia are beginning to acknowledge these serious impacts and preparing for meaningful participation in the global reduction effort. Therefore, understanding the driving forces behind Asian countries' climate policy-making is of crucial importance for negotiation of an effective post-2012 agreement.

Asia's developing countries have similar ways of thinking about climate change and binding commitments on carbon reduction. They feel that since the GHGs currently driving climate change came mostly from the growth phase of developed countries, they should be allowed a similar level of development. Countries such as India also frequently point to their low per capita emissions when commitments are discussed. Inadequate technology, inability to use technical solutions, and lack of capacity are also often identified as constraints on greater action.

International influences on climate policy include concerns about image, bargaining to reduce the costs of compliance or 'side-payments', and concerns about global economic competitiveness. For Asia the most important factor is bargaining and side-payments that increase access to technical expertise, foreign funding and information, and that are aligned with economic development goals. These mechanisms are a key driver for Asian developing countries to act on climate change.

However, domestic factors are generally more significant policy drivers. Although policy-makers are motivated by moral imperatives to conserve resources and protect future generations, the perceived negative economic costs of emission reductions in the short term, and low capacity to act are still more important. An effective post-2012 agreement should therefore include mechanisms to equalize or reduce mitigation costs, and promote capacity building for active participation by developing countries.

The public can also encourage more proactive climate policy by affecting politicians' strategic policy-making calculations. Although the nature of institutions and government matters, the strength of public will is more important. When the public is not strongly engaged in climate policy-making, as is the case in most Asian countries, politicians are under greater influence from organized interest groups. An effective post-2012 agreement should therefore engage and align with the business objectives of these industry actors in order to promote greater government action.

Lastly, a greater understanding of climate change is also likely to encourage action in Asian countries, since the predicted impacts for the region are severe. In addition, in order to be effective and encourage a more proactive response from Asia, the post-2012 agreement must be in accordance with the notion of equity, a key value asserted in negotiations by many Asian countries [*Ed.: Chapter 6 provides a discussion of how equity is central to an effective international regime that engages developing countries in Asia*]. However, ultimately Asian countries need to acknowledge that the planet is not a negotiating party, and the principle of equity also dictates that they will need to start making their own GHG reductions in the near future.

Chapter 3

The Co-Benefits Approach: An Integrated Policy Response to Climate Change and Development in Asia

Cornie Huizenga, Charlotte Kendra Castillo,
May Ajero, and DeeJay Cromwell Sanqui

Recommendations:

Researchers

- Continue developing tools and models to measure co-benefits, create a pool of Asian co-benefits experts, and facilitate the transfer of EU and US co-benefits-related knowledge to developing countries.

National Governments

- Encourage additional research on co-benefits strategies, and connect this research with policy-making on development, environment, energy, and climate. This will require improving cross-sectoral cooperation and institutional delegation of responsibilities.
- Create country profiles and baseline information on the use of the co-benefits approach in cities.

UNFCCC negotiations

- Include black carbon in post-Kyoto climate governance.

3.1 INTRODUCTION

There is increasing scientific evidence linking climate change with other environmental issues and concerns. The progress made in linking criteria air pollutants to weather and climate dynamics, and vice versa, illustrates how scientific evidence can be used to influence and justify integrated approaches to analysing climate change, health, and other developmental issues. Research in energy and transport, which are currently the main focus of development planning in Asia, already benefits from highly developed measurement tools and models. In order for the increased scientific understanding to spur adoption of a co-benefits approach, it is important that new insights are translated into readily understandable messages. This will help the transition from knowledge to awareness and finally, towards action.

The co-benefits approach creates potential to leverage financial and manpower resources. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) reaffirms the cost-effective use of resources under the co-benefits paradigm. The report states that the inclusion of health, air quality, energy security, and agricultural production co-benefits into climate mitigation policies offers substantial cost reductions and savings as compared to treating them separately.¹ Moreover, co-benefits also help forge wider international support if woven into sustainable development activities, and can mobilize funds that are available for either climate change actions or for development actions alone (e.g. Official Development Assistance). Furthermore, interdisciplinary and integrative activities will encourage the increased participation and engagement of important stakeholders and decision-makers.

The co-benefits approach creates drivers for government and other development partners to engage in climate change research and activities by making development goals and climate actions consistent with each other. For example, Asian cities could consider a co-benefits approach that would allow them to reduce both air pollution and greenhouse gas (GHG) emissions.

3.1.1 Air quality in Asian cities

The sources of air pollution in Asian cities are typically:

- (a) Mobile sources, which consist mostly of land transport (however, shipping has also received much attention recently because maritime emissions can have significant impacts in port cities);

- (b) Stationary sources such as large and small-scale power plants and industrial facilities; and
- (c) Area sources, which include open burning, re-suspended road dust, and construction activities.

Concentrations of Total Suspended Particulate (TSP) and sulphur dioxide (SO₂) have improved over the last 15 years, while the concentrations of nitrogen dioxide (NO₂) and particulate matter less than 10 microns in diameter (PM₁₀) have more or less stabilized.² Considering that since 1993, economic indicators (e.g. GDP, population, number of vehicles, energy use) have all increased by at least 25 per cent, it is clear that past air quality management efforts have had some effect (see Figure 3.1). However, air quality in most Asian cities still breaches World Health Organization guidelines. PM₁₀ levels are of particular concern in Asian cities because of their close association with health impacts.

3.1.2 Greenhouse gas emissions trends for Asia

Unlike air quality trends, GHG emissions in Asia are increasing in parallel with the drivers of growth—GDP, urbanization, motorization and industrialization. Overall, the growth of CO₂ emissions of Asian countries from 2000 to 2005

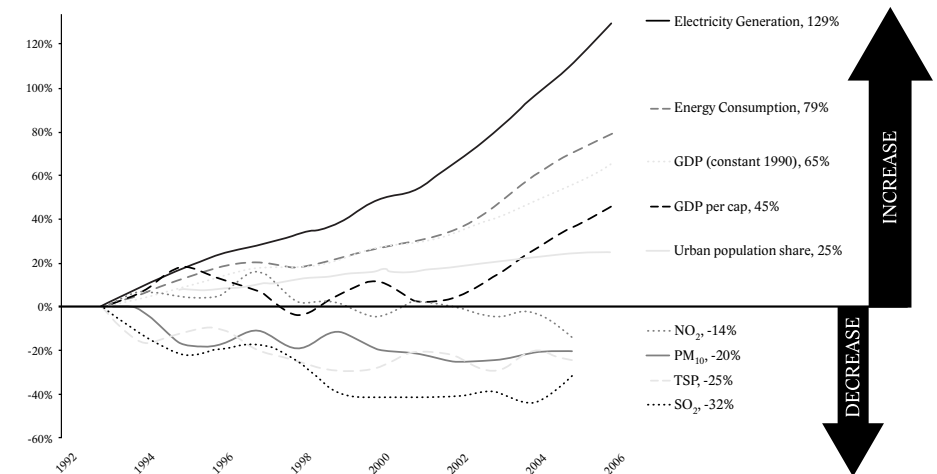


FIGURE 3.1: Average comparative trends in Asia—air pollution drivers vs. air quality levels^{3, 4}

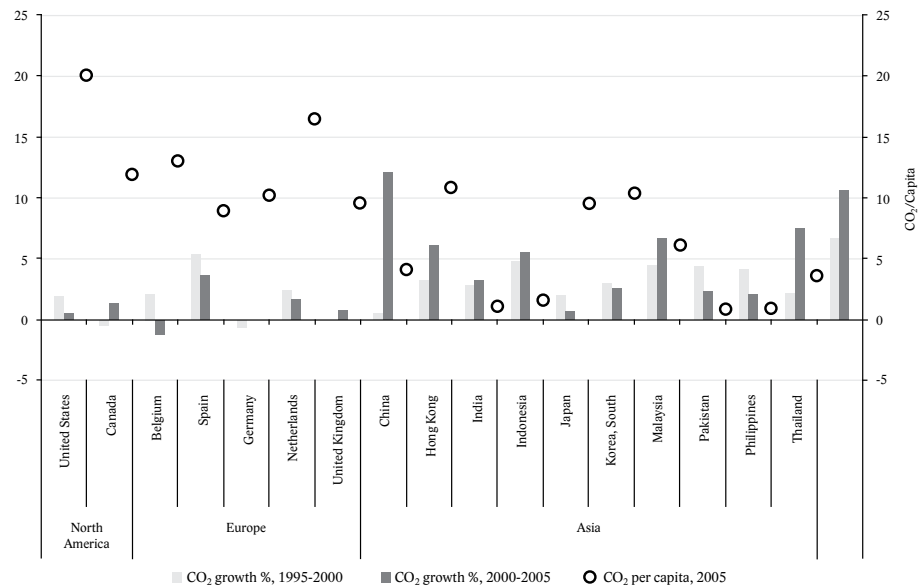


FIGURE 3.2: CO₂ profiles of Asian countries vs. developed countries⁵

is much higher than from 1995 to 2000. For the same period, countries in North America and Europe have exhibited either a lower growth rate or a negative CO₂ emissions growth rate. However, the per capita CO₂ emissions of most Asian countries are still much lower than western countries (see Figure 3.2). Energy-related CO₂ per capita in 2030 is still projected to be lower than the 2004 energy-related CO₂ per capita of developed countries.

3.2 EVOLUTION OF THE DEFINITION OF CO-BENEFITS: WHAT IS ITS RELEVANCE FOR ASIA?

From the global climate change perspective, co-benefits are additional benefits beyond GHG reductions resulting from mitigation measures. These benefits include reduced air pollution and improved energy security. From the Asian perspective, co-benefits can also be thought of in the opposite direction, as additional GHG reductions resulting from measures aimed to address development issues such as air pollution and economic growth.

There are still differing perspectives on the basic definition of co-benefits, which must be resolved to help ‘achieve methodological consistency across studies and consensus on how results can be interpreted and incorporated in climate policy discussion.’⁶ A variety of definitions have been proposed, but they are not all significant in the Asian context.⁷ In this chapter, the definition of co-benefits in Asia includes all potential benefits, and requires that these be considered within the project objectives and framework regardless of the primary goal of the policy, programme or project.

3.3 STATUS AND CHALLENGES OF A CO-BENEFITS APPROACH IN ASIA

The basic premise of the co-benefits paradigm makes it flexible and adaptable to different fields. The dominant issues that are combined with GHG reduction and climate change mitigation are air quality and public health, clean transport, and energy. Other emerging linkages include economics, social issues, agriculture and forestry, biodiversity, land use, and urban planning. Currently actions in energy and transport are dominant, mostly because of better quantifying methodologies exist for these sectors.

3.3.1 Scientific research on the integration of climate change with various developmental fields

The increase in recognition given to the co-benefits paradigm has been fueled by an increase in the available scientific research on the linkages between climate change mitigation and other developmental fields.

(a) Climate change and air quality

Scientific studies within and outside Asia that support the strong linkage between air pollution and climate change are increasing. These recent studies have shown the need for mitigation to look beyond the six GHGs of the Kyoto Protocol,⁸ because other pollutants such as aerosols and particulate matter also have significant effects on climate. Comparing information from the IPCC’s Fourth Assessment Report in 2007 and the IPCC’s Third Assessment Report in 2001 indicates there has been substantial progress in scientific research on the linkages of climate and air pollution.^{9,10}

Aerosols have a dual effect on climate. First, cloud cover increases in proportion with the total amount of light-reflecting aerosols emitted, and second, radiation-absorbing (e.g. black carbon) aerosols suppress cloud formation.^{11,12} Of particular interest to scientists are soot particles or aerosols that contain black carbon. Some leading atmospheric scientists are now arguing that black carbon is most likely the second-leading cause of global warming—after carbon dioxide and ahead of methane. Black carbon may even account for 16 per cent of gross global warming.¹³

A 2007 study argued that black carbon has the capability to reduce incoming solar radiation (insolation).¹⁴ In South Asia, a research consortium investigated the dimming effects of air pollutants, which has added to the understanding of climate change researchers on the effects of dust and aerosols from anthropogenic sources on the planet's albedo or its ability to reflect light.¹⁵ Additional studies from Peking University investigated the drying and rainfall-reducing effects of increased aerosol levels over eastern central China.¹⁶ Another study probed into the temperature-altering effects of aerosols during winter in China.¹⁷

Although previous studies focused more on determining the influence of air pollution on climate change, recent research has also shown that climate change affects air quality.¹⁸

(b) Climate change and energy

The link between the energy sector and climate change mitigation has been established in a number of current studies, albeit without the explicit use of co-benefits analysis as a governing principle. The International Energy Agency (IEA) has released a framework on how to conduct both qualitative and quantitative assessments of interactions between energy security and climate change.¹⁹ Energy efficiency and climate change considerations for on-road transport in Asia were also examined in a joint study by the Asian Development Bank (ADB) and CAI-Asia.²⁰ Another study focussing on four Asian mega-cities—Tokyo, Seoul, Beijing, and Shanghai—examined the factors that influence energy use and the resulting CO₂ emissions, such as the compactness of urban settlements, urban spatial structures, urban functions, transportation systems, income and lifestyle, and waste disposal methods, amongst others.²¹ That study recommends carrying out sound energy management at the city level and the implementation of synergistic policies as the primary step towards achieving low CO₂ emissions for Asia.

(c) Climate change and transport

A review of the GHG emissions of developing countries in Asia shows that besides the serious consequences of mobile sector emissions on people's health, motorized vehicles are now one of the leading contributors to Asian GHG emissions. The transport sector's share in the GHG emissions pie will increase further in the coming years as vehicle fleets in Asia double every 5 to 7 years. However, control measures for mobile emissions in Asia are mostly intended to address air pollution and do not consider climate change implications. If existing plans for strengthening standards and fuel efficiency targets for China and India are implemented, future emission scenarios show a decrease in PM₁₀ but a continued increase in CO₂ (see Figure 3.3).

A study by ADB and CAI-Asia, identified a menu of short to long-term transport policy interventions which can bring about the greatest reduction in CO₂ emissions in the transport sector.²² The proposed measures include vehicle fuel efficiency, demand management, land use planning, and biofuels.²³ For the transport sector, measures that bring about reduced total fuel consumption, either by improving vehicle fuel efficiency or improving transport and land use planning, contribute greater reductions in CO₂ emissions than measures such as the use of biofuels and transport modal shift. Research is evolving in this area, but methodological constraints on how to assess CO₂ emissions from the transport sector still limit the scale of research.

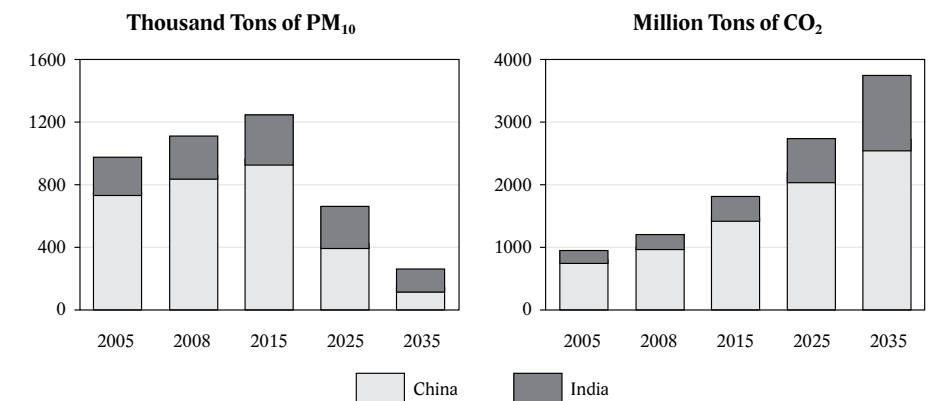


FIGURE 3.3: PM₁₀ and CO₂ scenarios for China and India, 2005–2035²⁴

(d) Climate change and agriculture

The agriculture and forestry sectors include a number of practices—such as rice cultivation and deforestation—that have major implications for global climate change. Aside from the potential to lower GHG emissions—specifically the main sources of CH₄ and N₂O—climate-related policies in these sectors can also improve crop yields, the health of land, and biodiversity. A 2006 study illustrates the significance of the agricultural and forestry sectors in global GHG emissions, and presents a wide range of management strategies that answer the different treatment needs of the mostly non-energy based and non-point source nature of GHGs coming from agro-forestry.²⁵ Potential co-benefits are: reduction in erosion, improvement in water quality, increase in species diversity, air pollution control, watershed protection and biodiversity conservation, increased soil fertility, and prevention of land degradation.

From the economic and social standpoint, GHG management in the agro-forestry sector is expected to yield co-benefits in the form of increases in farm income, new job opportunities, social infrastructure development, recreation enhancement, and health benefits. A review of four co-benefits case studies from China, India, Indonesia, and Vietnam led to the observation that the agro-forestry sector in Asia is not yet organized, making mitigation more difficult than in other sectors and gives little consideration to capturing the full range of co-benefits. There is a need for a more integrated assessment of the costs and benefits of climate change mitigation in agro-forestry. There is also a need for the development of tools for assessing the socio-economic impacts of mitigation in agro-forestry.²⁶

(e) Climate change and economics

The majority of the studies on the economic impacts of climate change do not directly use the term co-benefits as a governing concept in the study design, although it is a significant criterion in evaluating policy options. The Stern Review in 2006, for instance, serves as a useful precedent to studies considering the economic costs of climate change impacts and the costs and benefits of GHG reduction activities.²⁷ Conclusions from the Stern Review support the undeniable advantage of strong, early preventive action over the costs of reactive climate change response. A 2005 review looked at the various economic instruments such as green taxes and emissions-trading schemes that are used to address air pollution and greenhouse gas emissions in the Pan-Japan Sea Region.²⁸ Other measures foreseen to help curb future emissions identified in that

review include differentiated taxation for clean fuels and vehicles, expansion of SO_x emissions-trading systems, the increase in pollution charge rates in countries like China and Russia, and the application of carbon taxation to reduce GHG emissions such as in Japan and in European countries.²⁹

3.3.2 Methodologies and tools

Methodologies for measuring carbon are becoming increasingly important as inputs to cost-benefit analyses and decision-making models, and seven of the most relevant for Asia are described below. The first six focus on the quantification of benefits such as reductions in CO₂ or air pollutant emissions, and monetized benefits or costs for other sectors such as health, transport, or economy. The last tool focuses on the process of prioritizing options by relative weight of criteria.

(a) Integrated Environmental Strategies (IES)

The IES Program was created by the US Environmental Protection Agency (US EPA) in 1998 to build the capacities of developing countries to identify, analyse, and evaluate integrated measures that reduce GHG emissions while achieving public health, economic, and environmental co-benefits.³⁰ Governments and research institutions from four countries in Asia have participated in the programme—China, India, the Philippines, and South Korea. The IES methodology is a practical example of a project framework that can be used for adopting and evaluating potential co-benefits measures.

(b) Harmonized Emissions Analysis Tools (HEAT)

Developed by the Cities for Climate Protection campaign of Local Governments for Sustainability (ICLEI) through the funding assistance of the United States Agency for International Development (USAID), HEAT consists of online software that supports local GHG and air pollution emission reduction planning.³¹ The software enables local governments to plan for reduced GHG emissions based on an approach that integrates sound governance, economic development, improved waste management, energy efficiency, better urban mobility, and better air quality. It also offers tools to calculate emission loads for energy, transportation, and waste activities into pollution emissions. Countries for which HEAT has been prepared include India, Indonesia, South Africa, and Brazil.

(c) *Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS–Asia)*

GAINS–Asia is an integrated assessment model, developed by the International Institute for Applied Systems Analysis (IIASA), to assess the co-benefits, particularly the economic impacts, of concurrent reductions in air pollution and greenhouse gases for the Asian continent.³² The model addresses local health impacts associated with fine particulate matter and ozone, vegetation damage to natural ecosystems and agricultural crops, and greenhouse gas emissions. Taking full account of the interactions among over 1,500 air pollution emissions reduction measures and assessing their local application potentials and costs, the model aims to identify the most practical policies for reducing air pollution and GHG emissions in the region over the near and medium term (5–20 years) and identify opportunities to generate revenue through instruments such as the Clean Development Mechanism (CDM) of the Kyoto Protocol.

(d) *Carbon Value Analysis Tool (CVAT)*

The CVAT is a screening tool developed by the World Resources Institute (WRI).³³ It aims to help companies integrate the value of carbon dioxide emission reductions into energy-related investment decisions. Designed for the use of many types of professionals, including project managers, engineers, and energy managers in large companies, the tool helps end-users estimate direct and indirect emissions reductions using the standards developed under the GHG Protocol Initiative.

(e) *The Simple Interactive Model (SIM) for Better Air Quality*

Developed by the World Bank, the SIM-BAQ is an MS Excel-based prototype model intended as an interactive and integrative tool for a wide variety of users, particularly those from developing countries.³⁴ The purpose of this model is to serve as a decision support system for air quality management and as a catalyst for enhancing stakeholder participation in air quality management. The spreadsheet simulates the computation of an emission inventory for key pollutants (including CO₂) and estimates their impacts on environment and health. Although the focus is on AQM rather than climate change policies, the model still utilizes the co-benefits concept by allowing for the assessment of combinations of management, policy, economic, and technical options across the different sectors that are significant sources of GHG emissions.³⁵

(f) *Climate, Community, and Biodiversity (CCB) Standards*

Developed by the Climate, Community and Biodiversity Alliance (CCBA) for the use of project developers, project investors, and government stakeholders, the CCB Standards is a tool for evaluating land-based carbon mitigation projects.³⁶ It fosters synergistic, innovative approaches to developing projects—mainly by integrating best-practice and multiple-benefit approaches into project design and evolution—that simultaneously address climate change, support local communities, and conserve biodiversity.

(g) *Clean Development & Climate Program (CDCP)*

Developed by the USAID Environmental Cooperation-Asia programme (ECO-Asia), the CDCP component developed a resource tool to aid the planning efforts of public, private, and multilateral energy actors in the region.³⁷ Although the tool was developed to prioritize the clean energy options and initiatives for the entire region, the process can be translated for application in national policy-making. Unlike the other tools which focus on quantifiable emission reductions or monetized benefits, the CDCP process translates benefits or factors which would have otherwise been difficult to quantify by assigning weighted points.

3.3.3 *Major players, partnerships and events*

The co-benefits work in Asia, as observed in this chapter, is mostly regional in nature. As in the cases where activities are country or city based, these have been driven mostly by initiatives of external organizations, mostly coming from developed countries. The number of organizations that have initiated work on promoting and adopting co-benefits work in their different constituencies in Asia is increasing. Although these organizations have started to exchange information, collaboration between organizations is still limited. To date, only a few formal collaborations exist to advance co-benefits. The need to expand this is ever more important as partnerships are essential in coordinating actions among the local, national, and regional levels and in building capacity through the sharing of knowledge and resources.³⁸

3.4 POLICY RESPONSES

Because the concept of co-benefits originated mostly from initiatives in US, Europe, and Japan, the developed world has already started to mention co-benefits in policy documents. For instance, the Group of Eight (G8) has highlighted the importance of integrated approaches to addressing major problems including climate change, energy security, and air pollution. Another example is the Californian *Global Warming Solutions Act* of 2006, under which the intention is to meet state GHG emissions limits without compromising modernization and improvement of reliable energy infrastructures, yet maximizing additional economic and environmental co-benefits for the state. It further states that reduction measures should complement the state's efforts to improve air quality.³⁹

Although the current climate policy measures undertaken in Japan are aimed at meeting its targets (6% reduction) for the Kyoto period, it has also been engaged in a number of initiatives to start discussion on post-Kyoto actions. Major objectives are accelerating measures through innovative technologies, shifting to a social structure with low-carbon emissions, mandatory GHG accounting and reporting systems, voluntary emissions trading, and the potential implementation of carbon taxes. Initiatives at the local level (city) are also increasing (e.g. Tokyo). Although the existing policy has no direct reference to co-benefits, Japan has been actively collaborating with the US on this theme.

Developing Asia is still assessing how the co-benefits concept can be harnessed in its particular context. Although climate change is generally acknowledged as an important emerging issue, it is given a lower priority compared to economic development and poverty alleviation. Asian policy making in recent years is increasingly oriented towards energy security with climate as an additional benefit.

In its 11th Five Year Plan, China includes 20 per cent energy efficiency improvement and 10 per cent reduction in SO₂ goals along with its economic objectives. The policy clearly indicates integrated targets for economy, energy, and SO₂. China has also announced the formulation of a Chinese Environmental Macro-Strategy Study to explore and identify strategic guidelines, priorities, and measures on environmental protection. The Vice Premier, Zeng Peiyan, has indicated that the implementation of this project is a key action toward energy conservation and emissions reduction.⁴⁰ Zeng required the project team to explore and prioritize building regional environmental capacity, environmentally friendly policies of technology and industry, and an institutionalized system for strengthening environmental protection and responses to climate change.⁴¹ China has also issued its first Climate Change Action Plan,⁴² which is closely linked with the energy related objectives of the 11th Five Year plan. However, no direct reference is made to co-benefits.

India is not far behind in the movement to adopt a co-benefits approach. In its National Action Plan on Climate Change (NAPCC) released in 2008, the Government of India specifically states that 'the National Action Plan on Climate Change identifies measures that promote our development objectives while also yielding co-benefits for addressing climate change effectively'.⁴³ The NAPCC explains that it is not desirable for India to design strategies that are exclusive for responding to climate change because of the large uncertainties (spatial and temporal) that relate to climate change impacts. The co-benefits approach for India is a means to identify strategies to promote development goals that also have climate benefits.

Singapore's National Climate Change Strategy also adopts the co-benefits approach.⁴⁴ The strategy document recognizes that climate change is a multi-dimensional challenge that cannot be disconnected from energy and the economy. From the standpoint of Singapore's climate strategy, it is worthwhile to pursue climate action due to the co-benefits of cleaner air, economic opportunities, energy cost savings, and enhanced energy security.

At the city-level, the Bangkok Metropolitan Administration (BMA) has adopted a co-benefits approach to its climate change mitigation.⁴⁵ While it did not specifically mention the word co-benefits, Bangkok's Action Plan on Global Warming Mitigation 2007–2012 adopted the approach by identifying existing measures and activities that can provide GHG emissions reduction benefits. As with India, the strategy of Bangkok is to prioritize, speed up, and expand the implementation of existing or planned activities relating to energy efficiency, public transport, and renewable energy.

Another city with a climate strategy is Tokyo. As indicated above, the policy documents in Japan do not refer directly to the co-benefits approach. The same is true for the Tokyo Climate Change Strategy of 2007. The strategy however, identified that the Tokyo Metropolitan Government (TMG) will promote GHG emissions reduction in industries in conjunction with the existing air pollution control measures.⁴⁶

3.5 CONCLUSIONS AND RECOMMENDATIONS

The application of the co-benefits approach will allow Asia to participate actively in climate mitigation efforts that are aligned with its development concerns and priorities. While the institutions and policies in Asian cities are not perfectly prepared for the co-benefits approach, there are examples of its applicability in the region, and there are organizations based in the region that can provide more guidance. Using the co-benefits approach on air pollution and climate issues will also cover important goals in transport, energy, and economy. These opportunities are available for immediate action.

The further development of the co-benefit approach will be facilitated by the following:

- ***Include black carbon in post-Kyoto climate governance***—Studies increasingly point to black carbon’s contribution to climate change being second to carbon dioxide, and more important than methane. In addition, since sources of black carbon are usually fossil fuel combustion such as those in diesel engines, mitigating black carbon will improve local air pollution and benefit public health. However, while measures to reduce black carbon are available, black carbon is not covered by the Kyoto Protocol, nor is it currently a regulated pollutant under air quality management policies. At the very least, knowledge on black carbon need to be disseminated to air quality and climate change stakeholders.
- ***Continue development of tools and models for co-benefits quantification and measurement***—There is an apparent lack of substantive methodologies in measuring co-benefits across the different sectors, largely because of the differences in scales and means of measurement. For example, the temporal and spatial scales over which climate change is measured differ from and are far greater than the localized issues of health, air quality, land use, and poverty. In addition, potential social benefits such as greater stakeholder involvement are difficult to measure in a quantitative sense. In Asia and elsewhere, there is a need for the development of rigorous and comprehensive cost-benefit analysis tools that are based on commonly adopted and agreed-upon metrics. The accuracy of tools that are currently available, such as the ones cited above in section 3.3.2, still needs to be tested.
- ***Create country profiles and baseline information***—Currently, there is a lack of comprehensive and comparable country profiles and baseline information on the co-benefits activities within Asian countries. This is largely due to the lack of consensus among stakeholders on the definition and criteria for co-benefits and to the lack of documentation of experiences or applications of integrative approaches.
- ***Build a pool of experts***—As seen in the number and type of organizations that are involved in co-benefits activities (mostly NGOs and private research institutions), there is a need to grow the resource pool of experts in Asia by engaging more sectors, particularly governments at the local, regional, and national levels. In addition, the bulk of the scientific research and development of methodologies and tools that occurs in Asia is still mainly led by institutions from developed countries.

- ***Increase sectoral cooperation and reduce institutional fragmentation of responsibilities***—As it stands, stakeholder groups actively pursuing the promotion of co-benefits in Asia come from NGOs and private research institutions. There is little participation from governments apart from making general policy statements on the desirability of the co-benefits approach. These stakeholder groups, however, tend to draft their own agenda instead of building a coordinated, sustained, progressive co-benefits programme in the region. Such can only be attained through clear identification of roles, responsibilities, and linkages among governments, ministries, and other involved groups under whose mandate the integration of the co-benefits approach into development planning should fall. This will involve cooperation not only across sectors but also across the local, national, and regional levels of governance. This improved coordination and cooperation can also help to scale-up co-benefits efforts in Asia.
- ***Connect analysis and policy***—Co-benefits research usually begins with academics, and due to the absence of an established system of interface between the research institutions and policy-makers, either does not cross over to policy-formulation, or is slow in doing so. This is a crucial matter since, without translation into actionable strategies, co-benefits will remain purely conceptual. Furthermore, much work appears to be needed in educating policy-makers on the potential of co-benefits as a planning and problem-solving paradigm, especially given the disjoint that is known to exist between the priorities of scientists and researchers and those of policy-makers.
- ***Transfer EU and US co-benefits-related knowledge to the Asian context***—The co-benefits approach is still in the conceptual or theoretical stage in Asia, while in Europe, it (especially for air quality management and climate change mitigation) has been studied more deeply. Concrete steps to apply the co-benefits principle to air pollution and climate change are being considered in Europe, and there are efforts to come up with a combined inventory of air pollutants and GHG emissions. Cost-benefit analyses to quantify the benefits of adopting co-benefits in future policy designs have likewise been initiated.⁴⁷ In the USA, a number of states have called on the US EPA to consider CO₂ and other GHGs as air pollutants and regulate them under the *Clean Air Act*. The State of California has announced policy initiatives that will link air quality management with climate change mitigation.⁴⁸

Chapter 4

An Outlook for Asian Forests in the New Climate Regime

Daniel Murdiyarso and Markku Kanninen

Recommendations for governments and climate negotiators

Local officials

- Enhance local capacity to implement REDD ('reducing emissions from deforestation and forest degradation'). This includes the ability to adequately measure and monitor forest carbon stocks and changes, and to design and implement effective and efficient national policies.
- Support policies that provide for equitable sharing of benefits and responsibilities among stakeholders.

Asian governments

- Remove perverse subsidies and taxes that are distorting the economics of forest resource management, especially for pulp and paper and palm oil industries.
- Build local capacity to independently measure and monitor forest carbon sinks.
- Improve enforcement at the national level, including property rights and tenure security, especially in areas where local authority has been problematic.
- Limit biofuels development to already degraded land.

Negotiators

- Recognize that addressing national governance and international trade barriers are essential pre-conditions for an effective post-2012 REDD scheme.
- Create an REDD scheme that includes the full external costs of forest degradation, and is equitable in terms of benefit distribution across stakeholders.
- Encourage widely accepted, credible, and sound methods for estimating and monitoring carbon stocks, including standards and certification.
- Include peatlands under the REDD scheme in the post-2012 regime.

4.1 THE OPPORTUNITY FOR FORESTS IN THE NEW CLIMATE REGIME

The integration of forests has been widely identified as one of the most critical aspects of the post-2012 regime. Through the application of market mechanisms or multilateral funding, forests can potentially achieve substantial greenhouse gas (GHG) reductions at low costs and promote more sustainable growth in developing countries. Effectively engaging Asian countries is key to an international forest regime, both in terms of reduction volume and deeply entrenched barriers that need to be overcome.

This chapter argues that a forest management 'paradigm shift' from short-term to sustainable thinking is needed in Asian countries to support a robust 'reducing emissions from deforestation and forest degradation' (REDD) scheme in the post-2012 agreement. It first identifies and examines two key obstacles to better forest management in developing Asia: domestic forest economics, governance and institutions, and the challenges of global trade and investment patterns in the biofuels and pulp and paper sectors. Finally, it discusses the impacts of these obstacles on a potential international REDD scheme and how they can be addressed to improve the scheme's effectiveness. If this paradigm shift is achieved, it could also expand the space for meaningful reductions from developing countries in the post-2012 climate agreement.

4.1.1 Deforestation, development, and climate mitigation in Asia

Since the Kyoto Protocol was adopted in 1997, the role of the forestry and land use sectors¹ in developing countries as sinks for greenhouse gases has been discussed. According to the FAO,² total forest cover in Asia is more than a half billion hectares, or around 15 per cent of the world's forest cover. Asia's annual deforestation rate decreased from 0.8 million hectares per annum in the 1990s to a current expansion rate of 1 million hectares per annum—an overall 0.2 per cent increase in forest cover—in the past five years. This occurred in East Asia, mainly in China. In contrast, deforestation rates remain dramatically high in South and South-East Asia and range from 2.6 to 2.9 million hectares per annum—about one per cent of the total forest area—in the same period.

Asian forests have played an important role in the economic development of the region. Many countries have benefited economically from logging and from converting logged forest for agriculture. The recent hike in fossil fuel prices has driven the market to more seriously consider biofuels—including palm oil—as alternative energy sources. The expansion of oil palm plantations is currently delivering substantial

profits. Similarly, the pulp and paper industries have experienced increasing global demand for raw materials in the past decade. As a result, natural tropical forests are experiencing tremendous pressure from investors seeking to meet these demands, with relief coming only when they are able to establish oil and pulpwood plantations on non-forested or degraded lands.

However, despite these economic drivers of deforestation, benefits from land conversion and therefore potential costs of preservation are likely lower than previously believed. The Stern Review recently reported that avoided deforestation is also the least expensive option for climate change mitigation.³ It found that the opportunity cost of forest protection in the eight countries responsible for 70 per cent of emissions from change in land use and forestry could be around US\$5 billion per year initially, although over time marginal costs would rise. Direct yields from land converted to farming, including proceeds from the sale of timber, are equivalent to less than US\$1 per tonne of CO₂ in many areas currently losing forest, and usually below US\$5 per tonne.⁴ Furthermore, according to the IPCC reports^{5,6,7} deforestation in developing countries is one of the largest scale opportunities for climate mitigation. It is responsible for up to 20 per cent of the global carbon emissions annually, which is greater than the global emissions of the fossil fuel-based transport sector.

4.1.2 Forests in the international climate regime

Despite these low costs and high potential benefits, avoided deforestation—especially in the tropics—has been neglected by both the Kyoto Protocol and the Marrakech Accords. Kyoto's primary investment and technology transfer mechanism, the Clean Development Mechanism (CDM), has been largely implemented in the energy and industry sectors. The rules and modalities for including the forestry and land use sectors in CDM were agreed upon only five years after the adoption of the Kyoto Protocol⁸ under the Marrakech Accords, but the agreement was limited in scope. They allowed afforestation and reforestation (A/R) projects to generate credits, but the amount of tradable credit was capped at one per cent of the emission reduction target. In addition, these projects came with high transaction costs, stringent rules, and significant risks that drove away investors and host countries. Out of more than one thousand projects currently approved by the CDM Executive Board, only one CDM project deals with A/R. Moreover, the promise of the CDM to deliver its dual objectives of reducing carbon emissions and sustainable development is currently under public scrutiny [*Ed.: see Chapter 10*].⁹

Political will is growing to expand the role of forests in the future global climate agreement. Avoiding deforestation—which was later called 'reducing emissions from deforestation' (RED)—in developing countries was brought back to the forefront of the global climate change agenda by Papua New Guinea and Costa Rica. Discussion of the methodological issues related to policy approaches and positive incentives was launched in the eleventh session of the Conference of Parties in Montreal in 2005 (COP 11). Prior to the Bali Conference of Parties in 2007 (COP 13), two workshops were organized by the Subsidiary Body for Scientific and Technological Advice (SBSTA) of the UNFCCC. Finally, as part of the four building blocks of the Bali Action Plan, COP 13 adopted a decision to encourage demonstration activities and to give 'indicative guidance' for, what is now called REDD.

4.2 THE CHALLENGES OF NATIONAL FOREST ECONOMICS, GOVERNANCE AND INSTITUTIONS IN ASIA

Creating an effective international REDD agreement will be impossible without understanding and addressing the underlying causes of deforestation and ineffective forest management. Most of these causes come from activities outside the forestry sector. Underlying causes originate in some of the most basic features of society, such as the distribution of economic and political power, attitudes towards corruption, population growth, flaws in the market system, and seemingly unrelated government policies. They may originate in other countries and transmit their effects through trade and the operation of transnational corporations [*Ed.: see Chapter 9*].¹⁰ The causes can be grouped into three categories: (i) market failures, (ii) weak governance, and (iii) misguided policy intervention.

Forests provide a number of valuable goods and services to society; however, the returns from alternative land use when forests are converted and the lack of remuneration for forests' intangible benefits set these ecosystems at a disadvantage and promote further deforestation and degradation. Any loss of these benefits must be considered a cost. For example, there is carbon released into the atmosphere, the loss of nutrients from the landscape and the associated siltation of dams—reducing their life span—and the loss of biodiversity and aesthetics when forests are exploited. All of these are 'externalities' whose costs are not considered by the large-scale loggers and the small-holder farmers, or rural communities who clear forests because it is profitable and the most immediate means of subsistence. If it were possible to alter market forces to take these costs into account, there would be a greater likelihood that some lands would not be deforested or degraded because they would be more valuable to the private agent.¹¹

Weak forest governance and low institutional capacity cause further deforestation because they encourage illegal practices, such as the illegal logging problem in Indonesia. As shown in Table 4.1, in the past two decades illegal logging (and perhaps also illegal trading) has significantly reduced forest health and forest-related industry in Indonesia.

The roots of this problem can be traced back to the government policy supporting the expansion of timber processing industries (plywood and sawn timber) in the 1980s and the subsidized promotion of pulp and paper mills in the 1990s—all without ensuring a sustainable supply of timber. This resulted in a supply–demand imbalance that has been impacting Indonesia’s forestry sector for decades and is the key underlying cause of illegal logging. In the 1980s a significant gap between timber demand and available legal supply already existed, and the gap continued to expand in subsequent years.

TABLE 4.1: Illegal logging in Indonesia (millions of cubic metres), 1985-2004¹²

Year	Official log consumption	Official log production	Illegal log production
1985	23.5	14.6	8.9
1989	40.4	24.4	16
1990	37.9	25.3	12.6
1997	47.4	29.5	17.9
1998	45.3	19	26.3
1999	44.9	20.6	24.3
2000	47.8	13.8	34
2001	49.1	11.2	37.9
2002	50.5	9	41.5
2003	50.5	11.4	39.1
2004	50.5	13.5	37

In addition, there are many reports of conflicts over property rights and land ownership, and communal or customary claims are rarely, if ever, recognized. Insecure tenure is also closely associated with uncontrolled and repeated wild fires. In Indonesia, the combination of those factors was demonstrated at its worst in the 1997 and 1998 fire episodes.¹³

Finally, in many cases governments implement policies intended to enhance economic development and resource utilization, but the policies often drive degradation of natural resources, including forests. In Indonesia, several of these misguided policy interventions in the pulp and paper sectors include logging concession fees and taxes.^{14, 15} Pulp mills constructed in the early 1990s are operating beyond the capacity of plantations to meet demand, which encourages extensive and destructive logging of natural forests. Rent-seeking behaviour due to low fees and high export taxes that depress domestic markets has prevented large-scale concession holders from recognizing incentives for long-term sustainable forest management.

4.3 THE CHALLENGES OF GLOBAL TRADE AND INVESTMENT

In Asia, in addition to domestic factors of economics, governance, and institutions, global trade and investment policies and patterns are threatening more effective forest management and the integration of forests in the post-2012 regime.

In particular, the entry of biofuels into the public debate introduced a new challenge in linking climate change mitigation opportunities and forests. In recent months, the rising price of fossil fuels and the potential role of biofuels as a climate-friendly alternative source of energy have attracted renewed attention in both industrialized and developing countries. Can the potential expansion of oil palm plantations be compatible with avoiding deforestation?

In addition, the expansion of pulpwood plantations to meet a staggering increase in the world’s demand for wood-based pulp has been one of the major fluxes of investment in the region. China’s demand increased 26 per cent per annum from 1.4 million tonnes in 1997 to 5.7 million tonnes in 2003,¹⁶ when world growth was only 1.6 per cent. However, only 5 per cent of the Chinese fibre demand is supplied by domestic wood. What does this imply in terms of avoiding tropical deforestation in its Asian neighbours?

4.3.1 Global demand for palm oil and tropical deforestation

Palm oil is an increasingly versatile tropical agricultural product since its identification as a source for biofuel, especially in view of climate change talks and rocketing fossil fuel prices. Despite legal and political debates within the European Community, Europe has always been an important market for Asian crude palm oil. In 2005, rising demand for palm oil in Europe reached 1.5 million tons.

Environmentally speaking, conversion of palm oil into biofuels to replace fossil fuels is under public scrutiny. The impressive expansions of oil palm plantations during the last decade in South-East Asia, in particular, have occurred at the expense of tropical forests.

The following offers a snapshot of energy policies in some European countries that will dictate future trade and investment from the demand side:

EU: A 2003 EU directive aims to increase the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes in each member state.^{17, 18, 19, 20} The member states must ensure that biofuels and other renewable fuels reach a specified minimum share of their markets, and are required to lay down corresponding benchmarks. The suggested reference values for these benchmarks are a 2 per cent share (measured by energy content) of all gasoline and diesel fuels for the transport sector put into circulation on the market by 31 December 2005, and a 5.75 per cent share by 2010. In March 2007, the European Council agreed on a binding minimum level for biofuels of 10 per cent of vehicle fuel by 2020—for which most of the demand will be met by oil palm-based biofuels. This directive lays the foundation for national policies of the member countries.

The Netherlands: In March 2006, the Dutch government set programmatic targets for biogenous fuels to make up at least 2 per cent of combined gasoline and diesel sales by 2007, and 5.75 percent by 2010.²¹

Germany: Germany is more cautious in terms of promoting biofuels than the Netherlands. At the end of 2004, the German Government adopted a new fuel strategy as part of its first progress report on its sustainability strategy. Starting from an approximate share of 1.2 per cent for biofuels in 2003, it confirms the targets set by the EU as national objectives. The expectation is that biodiesel and bioethanol will play a major role in reaching the targets by 2020, particularly as admixtures blended with conventional fuels. However, lack of domestic land and competition from more climate-friendly uses will make these targets difficult to achieve, hence 5 per cent has been set as a plausible share for mixing biogenous fuels with diesel and gasoline.²²

Austria, Slovenia, Czech Republic: These countries set more ambitious targets for the market share of biofuels for 2005 than other EU states. However, since the market share reached in 2003 was well below 2 per cent in most cases, and for some almost zero, the EU target of a 5.75 per cent share by 2010 is seen as ambitious for these countries.

UK: Driven by the need to meet Kyoto targets and the political will behind climate policy, the Renewable Transport Fuel Obligation (RTFO) in the UK requires transport fuel suppliers to ensure by 2010 that biofuels contribute 5 per cent of all road vehicle fuel.

From the supply side, more than 80 per cent of the world's palm oil is produced in Malaysia and Indonesia (Table 4.2). Almost 60 percent of the expansion of the plantations in these countries has occurred during the last decade. Indonesia is catching up and eager to realize its ambition to overtake Malaysia as the largest crude palm oil producer in the world. It means that the outstanding applications from the private sector to develop oil palm plantations in late 1990, which amounted to nearly 16 million hectares, could be approved and implemented in the near future.²³

TABLE 4.2: Worldwide area under oil-palm cultivation and production level²⁴

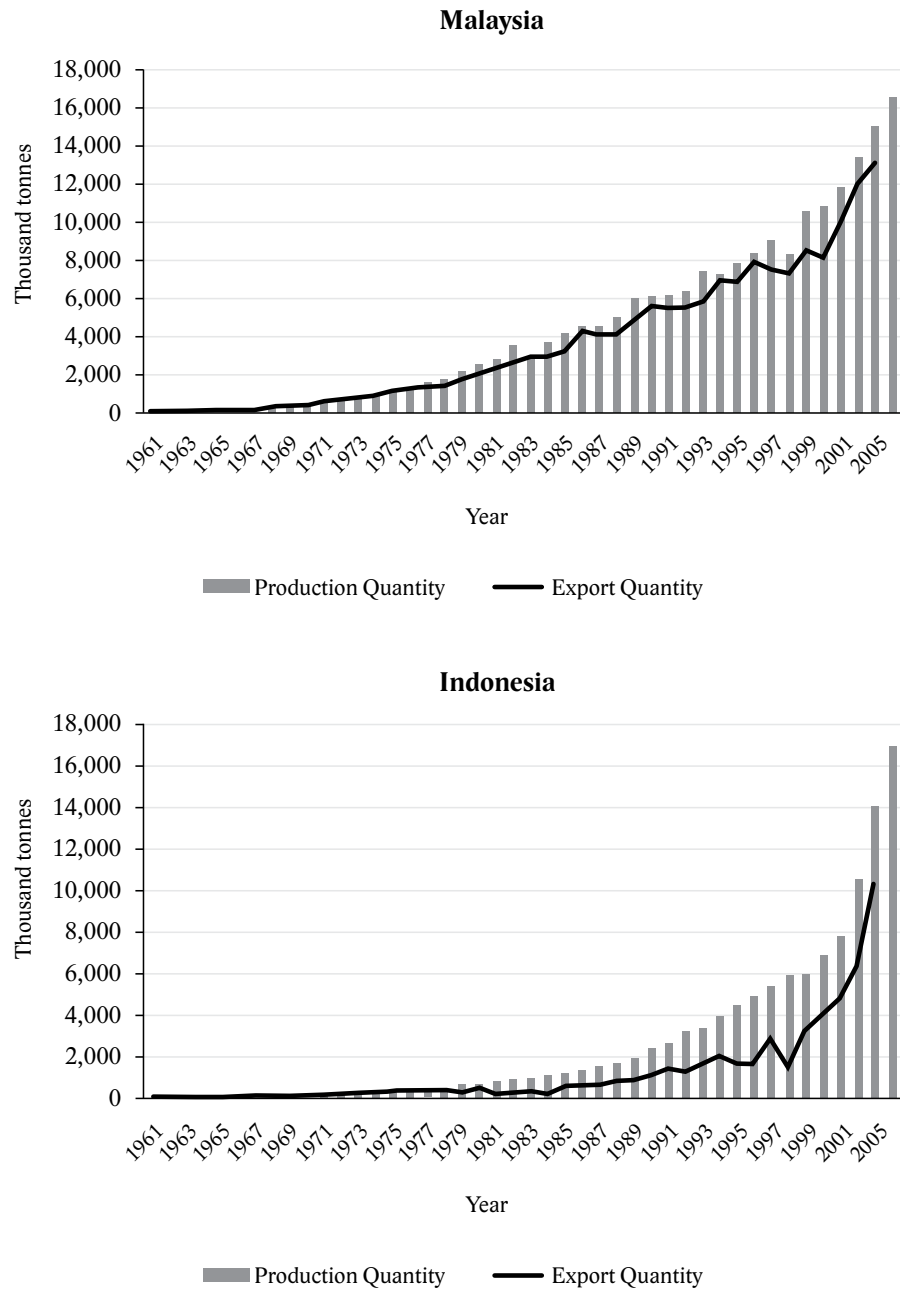
Country	Area (1,000 ha)	Oil production (1,000 tonnes)
Malaysia	3,466	13,976
Indonesia	3,320	12,100
Nigeria	367	790
Thailand	270	668
Colombia	157	632
Others	1,012	2,485
Total	8,592	30,651

To date most of the palm oil produced in Malaysia and Indonesia is exported (see Figure 4.1). The two countries have decided to reserve 40 per cent of these exports for biofuels.

Malaysia is forging ahead with the domestic introduction of a blended palm oil fuel made up of 5 per cent refined palm oil and 95 per cent diesel. There are also plans to start producing a total of 180,000 tons of biodiesel. Indonesia is building or expanding 11 refineries and expecting to earn US\$1.3 billion from exports of biofuels. Moreover, since May 2006, diesel within Indonesia can contain up to 10 per cent of biogenous fuels.

The remaining question is whether replacing fossil fuels with biofuels produced at the expense of removing tropical forests would be an effective way to combat climate change. Strong political will and policies are needed to limit biofuel developments to already degraded land and mineral soils, rather than prompting conversion of the remaining natural forests, especially those in the peatlands. Standards and certification that are the currently available command-and-control mechanisms can be imposed in the market systems.

Aside from ecological problems, issues such as weak governance and poor enforcement of regulations in Indonesia could make it difficult for the country to raise the US\$22 billion needed from investors for the expansion of its oil palm refinery capacity.

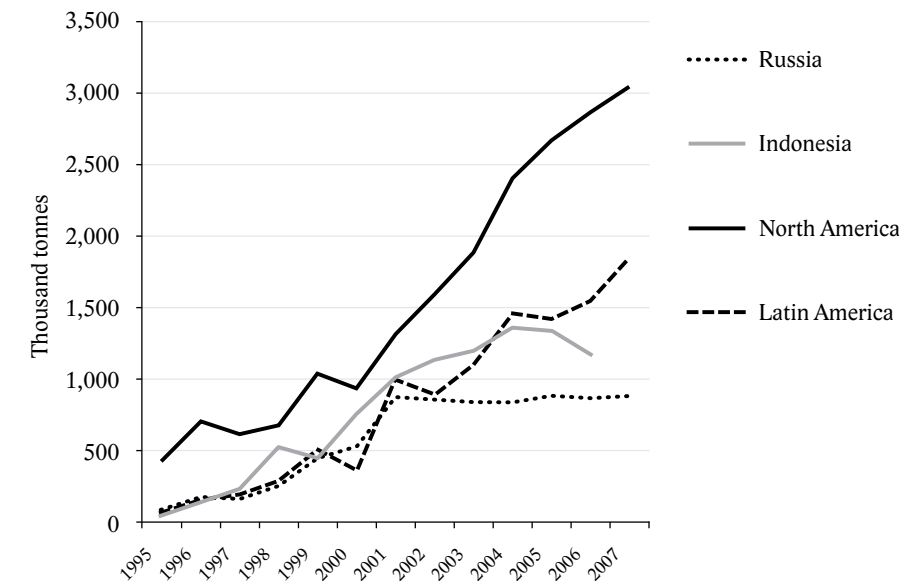
FIGURE 4.1: Palm oil production and export from Malaysia and Indonesia²⁵

Recent decentralization of authority has given more power to district governments of Indonesia. However, at more local levels, the process of granting licences to use land classified as ‘areas for other uses’ is susceptible to irregularities regarding the rule of law and bad governance practices that may lead to corruption.

4.3.2 Pulp and paper supply and demand

Since the early 1990s, the Government of Indonesia has subsidized the expansion of pulpwood plantations and the paper industry. As a result the pulp and paper sector has been growing rapidly with a number of social and environmental consequences.²⁶ This ambitious expansion was primarily policy-driven.

The capacity of Indonesian mills to produce pulp was on the order of 6 million tonnes a year in 2004. To meet this capacity, companies relied heavily on mixed tropical hardwood from natural forests. Pulp exported to the main importer (China) for the same period was only 1.2 million tonnes (Figure 4.2). This means that even if domestic consumption of pulp is assumed to be in the same order of magnitude, there is still a huge shortfall in terms of supplying the raw materials. If REDD measures are not driven by strong policies, it will be difficult to compete with the increasing demand for pulp and paper. The governance risks need to be nationally managed through strong policy interventions.

FIGURE 4.2: Bleached pulp export by major supplier, 1995–2007²⁷

Fibre deficit at mill level has been caused by inadequate raw material supplies from owned-concessions of natural forests and newly planted fast growing species.²⁸ In terms of developing REDD projects at sub-national level this situation could cause a considerable leakage, especially if the raw materials are supplied from supposedly REDD project areas.

For a number of major pulp producing companies, sustainability is a big issue. Cheap raw materials from mixed hardwood (with royalty payments of less than US\$2.5/m³) would be less competitive if sellers could potentially earn twice as much by selling the CO₂ equivalent. REDD would become more competitive if soft loans and subsidies to develop plantations and mills were removed or restricted.

4.4 PROMOTING REDD: WHAT DOES IT TAKE?

Although a variety of finance mechanisms have been proposed, it seems likely that forests will be integrated in the post-2012 regime through some kind of global REDD finance scheme.²⁹ Addressing the two challenges outlined above will be an essential pre-condition to shifting the paradigm of forest management in developing Asia and creating an effective international scheme.

The Bali Action Plan provided support for REDD as a climate change mitigation measure.³⁰ It invites countries to consider policy approaches and positive incentives on issues relating to REDD, including the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries. They have five years to explore actions, identify options, and undertake efforts, including demonstration activities. The objective is for countries to address the drivers of deforestation relevant to their national circumstances before the Kyoto Protocol expires in 2012.

Learning from the lessons of A/R CDM, the challenge will be to simplify procedures and cut the transaction costs. One of the potential hurdles is that baselines would be set at a national level while implementing activities would be undertaken at a sub-national level. This is not a mere technical issue but an issue of institutional preparedness. Another hurdle identified at the UNFCCC Workshop on Methodological Issues in Tokyo in June 2008 was that further consideration of methodologies to address forest degradation is required.³¹ Finally, there have been concerns that the markets might be flooded, resulting in cheap carbon credits.

Dozens of countries have the opportunity to host a REDD scheme. Some of them have been getting ready, mainly through voluntary markets, to build capacity and identify unforeseen barriers. Most of these countries are in different stages of forest transition, meaning that the forested area and the rate of deforestation vary from country to country.³² In some countries (e.g. Indonesia), REDD may be seen as an alternative source of funds for carbon

Box 4.1

Peatlands: vulnerable terrestrial carbon pools

Globally, peatlands cover an area of 400 million hectares, which is equivalent to three per cent of the Earth's land area. This ecosystem stores a large fraction of terrestrial carbon, as much as 528 picagrams (Pg)—528 billion tonnes—or one-third of global soil carbon.^{33, 34} This amount is equivalent to the emissions from burning fossil fuels at the current annual global rate (approximately 7 Pg in 2006) for the next 70 years.

One third of the carbon content of peatlands (191 Pg) is located in the tropics,^{35, 36} of which sixty per cent is in South-East Asia with an estimated area of 25 million hectares. The majority (70 per cent) of South-East Asian peatland occurs in Indonesia (around 21 million ha), while the other major location in South-East Asia is Malaysia, which harbours between 2 million and 2.5 million hectares. Thailand has an area of peatland of 45,000 hectares and relatively small areas are found in Vietnam, Brunei, and the Philippines.³⁷

In South-East Asia, peatlands are usually found in low altitude, coastal areas extending inland for distances up to 300 km. The thickness of peat varies from half a metre to more than 10 metres. They are mostly designated as conservation areas, production forests, or agricultural lands, and the proportion varies significantly between countries. However, the area of undisturbed peatland remaining in the region is very small. Peatlands provide a number of uses, goods and services, including timber, non-timber forest products, fish, meat, water supply and storage, flood control, carbon sequestration and storage, ecotourism, and biodiversity conservation.

It was estimated that the 'Big Fire' in 1997/98 involved more than 2 million hectares of peat swamp forests in Indonesia.³⁸ A 2006 report found that the annual CO₂ emissions from South-East Asia in the past decade were around 3 billion tonnes, two thirds of which were due to fire, primarily in Indonesia.³⁹

The key question is, can peatlands be included in the new climate regime under the REDD scheme? In some places these ecosystems remain untouched, but in many places in Asia they are degraded and even non-forested. Tropical peatlands remain an important terrestrial carbon pool, but they are highly vulnerable and can potentially become a major source of carbon emissions that will subsequently require mitigation.

mitigation, while in others (e.g. Nepal), it would be additional or even new. One of the key challenges and opportunities for many countries, particularly those in South-East Asia, is how peatlands will be incorporated into the post-2012 climate regime (see Box 4.1).

Overall, the bottom line is that forest-based and logging industries are not paying the full external costs of forest degradation, and are therefore very profitable for a few stakeholders. This will have serious implications in the context of REDD implementation, particularly regarding the opportunity costs and the distribution of benefits because unless unsustainable land use practice is effectively reversed through appropriate payment mechanisms, efforts such as increasing tenure security and improving governance may be in vain. However, evidence suggests that if the right policies and institutional structures are put in place, then REDD would be cost effective.⁴⁰

It is imperative to address issues of local and national capacities for the implementation of REDD schemes. These include the capacity to adequately measure and monitor forest carbon pools, to design and implement cost-efficient national policies for forests, and to assure equitable sharing of benefits and responsibilities nationally and internationally. In many countries, the key issues are related to weak governance structures, including property and access rights to forests and potential carbon credits derived from REDD schemes, especially in areas where the access of local communities to the forests has been problematic. These will comprise a major part of any risk assessment during REDD demonstration activities.

Finally, from a scientific point of view, an effective REDD scheme requires standardized, widely accepted, credible, and sound methods for estimating and monitoring carbon stocks and changes over time. In addition, the governance system should allow legitimate processes and be supported by an institution that can effectively manage the risks and tradeoffs.⁴¹ The scheme should be able to demonstrate equity in terms of benefit distributions across stakeholders. Strong political will is needed, and decentralized governance systems offer both challenges and opportunities in paving the way for these new carbon markets.

4.5 CONCLUDING REMARKS: PARADIGM SHIFT NEEDED?

Overall, a shift in the paradigm for managing forests in Asia from short-term use to sustainable, forward-looking management is urgently needed in order to meet the challenges posed by climate change, and to effectively integrate forests in the post-2012 regime. In addition, an international REDD scheme will not be successful unless it addresses the challenges presented by national economic, governance, and institutional factors, as well as global trade and investment policies.

The Fourth Assessment Report of the IPCC in 2007 indicates that increasing regional temperatures and changing rainfall patterns are affecting many natural systems.⁴² In Asia, the main projected impacts of climate change include: (a) retreat of glaciers associated with flooding, especially in mega-deltas and cities; (b) decrease of fresh water resources for human consumption and agriculture; (c) significant losses of coastal ecosystems due to sea level rise; and (d) increased risk of extinction for many forest-dwelling species as a result of the synergistic effects of climate change and habitat fragmentation.

Asian forests are also under tremendous pressure because of the world's increasing demand for biofuels, pulp and paper, and other forest products. This will cause massive conversion of natural forests and thus emissions of greenhouse gases that ex-

acerbate climate change. These extractive activities also threaten the sustainability of ecosystems that provide services for human needs, particularly in local communities. Encroachment is approaching its limit, and is felt most seriously in areas with high conservation value, including vulnerable peatlands and montane forests in many parts of the region.

In the post-2012 regime, a new framework is likely to emerge—called REDD—that will support greater emissions reductions from forestry sector. However, the global carbon markets that include forests are likely to be a mix of ‘compliance markets’ under the UNFCCC and ‘voluntary markets’ with more diverse objectives. Another possibility is the development of a kind of ‘REDD fund’ that is proposed by some countries and still under negotiation.

Along with being a key climate change mitigation measure, REDD should be seen as an opportunity to shift the paradigm of forest management in developing countries. This will not be easy, as the scheme will have to compete with the costs and benefits of globalized trade and multi-national investment.

Shifting the paradigm of forest management from short-term to sustainable thinking will take a major effort from all stakeholders regarding:

- Improving the effectiveness of the REDD scheme in reducing emissions;
- Accurately pricing ecosystem services to compete with other land use and forestry options; and
- Ensuring equity in the distribution of benefits across stakeholders and generations.

In many countries in Asia, key obstacles are related to weak governance structures, including property and access rights to forests. This affects potential carbon credits derived from REDD schemes, especially in areas where the access of local communities to forests has been problematic. This will comprise a major part of any risk assessment during REDD demonstration activities.

Finally, it is also imperative to address issues of national and local capacity in the implementation of REDD schemes. This includes the capacity to adequately measure and monitor forest carbon stocks and changes, and the capacity to design and implement effective and efficient national REDD policies that ensure equitable sharing of benefits and responsibilities at national and local levels. Achieving this paradigm shift could also greatly increase the space for meaningful reductions from developing countries in the post-2012 agreement.

Chapter 5

Climate Change, Water Insecurities and Food Systems in Monsoon Asia

Louis Lebel

Recommendations

Local officials and community leaders

- Increase participation of vulnerable peoples in exploring and formulating adaptation policies at the local level, and ensure their views are deliberated at national and regional levels.
- Monitor and evaluate the local impacts (beneficial and adverse) of national-level climate change adaptation policies.
- Strengthen local initiatives to improve soil and water management, including small-scale water harvesting and storage for climate-vulnerable groups.
- Discourage expansion of flood-intolerant crops into high-risk flood plains and very low-lying coastal areas.

Private sector

- Invest more in drought- and flood-tolerant crop varieties, as well as water-saving technologies: they will become profitable.
- Partner with public agencies and farmers to develop new agricultural technologies that are profitable to smallholders: there will be new market niches.
- Strengthen entrepreneurial and business management skills of household-based farms with special emphasis on managing risks, including those arising from variable and changing climates: they will become long-term clients.

Regional leaders

- Analyse the benefits, burdens and risks of alternative adaptation options for poor and other highly vulnerable groups in rural areas. Acknowledge diverse and unusual interests, capabilities and needs by continually seeking their inputs into policy formulation.
- Support cooperation among governments, business and civil society to establish principles, identify good practice, spread financial risks from climate and water disasters, and reduce adverse trans-boundary impacts of individual adaptation policies.
- Recognize and secure the water rights of vulnerable groups, especially small-holder farmers.
- Establish medium-term climate forecasting and seasonal early warning systems that will communicate timely and salient information to all farmers.

Negotiators and donors

- Strengthen capacity for national-local adaptation assessments in developing countries.
- Provide adequate technical and financial support to initiatives by least-developed countries to integrate climate change adaptation into economic development strategies.

5.1 INTRODUCTION

A key challenge in global governance is in engaging the wider public in developing long-term policies.¹ In Monsoon Asia, agriculture is crucial to both economic development and security.² Climate change poses significant risks and burdens to the agricultural sector through its impacts on temperature, seasonal rainfall patterns and extreme events. Many of these risks exacerbate current and looming water insecurities, especially for vulnerable and disadvantaged groups. New frameworks, policies and programmes need to be launched now to ensure successful adaptation to climate change in the agricultural sector.³

The surge in rice prices during 2008 underlined the importance of food prices to the region's poor and exposes the challenge of ensuring food security in the free trade era.⁴ While the higher prices that wealthier consumers are willing to pay for rice may enhance profit margins for some exporting firms and farms in developing Asia, they also cause higher domestic prices for staples in the weekly budget of poor households. Even slight increases of crop failure, or their synchrony in different parts of the world, can have a major impact on the vulnerability of the poor.

Trade can be a source of both resilience and greater vulnerability to climate change, but the only certainty is that it will be difficult to predict how serious or beneficial the impacts will be [*Ed.: see Chapter 9*]. More fundamentally, policies on land and water-use affect food security through their impacts on access and allocation of natural resources and thus livelihoods. Policies in science, technology and innovation will also affect the productivity of livelihood options, and the quality of environmental management associated with food systems.

5.2 CLIMATE CHANGE: CLEAR AND UNCERTAIN DANGERS

A fair amount is known about recent changes in climate across Asia.⁵ Key areas of recognized change include overwhelming evidence for warming: annual mean temperatures have increased in many locations, there are more hot days and warm nights, glaciers are retreating, and snow-cover is decreasing. Observed trends in precipitation are more complex and uncertain, but include drying trends, changes among seasons, and more intense rainfall events.

But local climate is affected by many factors. Concrete and bitumen make cities warmer. Air pollution from burning fossil fuels and land fires can alter regional rainfall and the amount of sunlight reaching crops and the ocean.⁶ Large-scale changes to tree cover affect the roughness and reflectance of the land-surface—with a corresponding influence on rainfall.

Post-Kyoto negotiations remain focused on stabilizing greenhouse gas (GHG) concentrations in the atmosphere at levels that will prevent dangerous interference with the climate system.⁷ But regardless of any action on emissions over the next few decades, global mean temperatures look likely to continue rising for a century or more. If action is limited and late, then the increases will be larger. The world is committed to a changed climate, and the impacts on Monsoon Asia are expected to be significant.⁸

The Asian Monsoon system is the world's largest pattern of atmospheric circulation. Interactions between global warming and the Asian Monsoon are complex, but crucial to the sustainability of the earth system.⁹ Monsoon-induced rainfall and temperature in parts of Asia are clearly correlated with El Niño–Southern Oscillation (ENSO) phases in the Pacific: for example, more rain falls in Indonesia when surrounding oceans are warm (non-El Niño years) and less when they are cooler (El Niño years).¹⁰ Dry phase ENSO events already have major impacts on food crops and fires.¹¹ Understanding the impact of global warming on the Asian Monsoon, ENSO, and circulation systems is an area of active research.

There are both clear and uncertain dangers ahead.

5.3 ADAPTATION: BY WHOM? WHO PAYS?

Adaptation processes are vital to the well-being of Monsoon Asia's vulnerable groups, many of which are engaged, at least partly, in agriculture. The public policies of governments and the investment policies of corporations can make adaptation to climate change for poor households harder or easier. Policies that impact rural markets and livelihood opportunities, such as water resources, infrastructure, coastal zone management, access to credit and education, or the price of food and farm commodities, may all make a difference. Ultimately, the effectiveness of adaptation in rural hinterlands has important implications for the growth and vulnerability of urban communities.¹²

Although a commitment to provide assistance for adaptation has been made under the United Nations Framework Convention on Climate Change (UNFCCC), and initial mechanisms to distribute funds have been established, the funds available remain negligible relative to impacts and needs.^{13, 14} Improving financial assistance to developing countries remains the core social justice issue in international climate politics^{15, 16, 17} [*Ed.: see Chapter 6 for a more detailed discussion of equity issues*]. For developing countries, the key issue is security of low-income households dependent on agriculture for

livelihood security, or for whom high food costs would mean hardship and starvation. However, the potential benefits of adaptation to climate risks, regardless of cause, and at multiple levels, have not been sufficiently explored.¹⁸

In the lead up to the UNFCCC conference in Bali, December 2007, there were calls for wider exploration of options, reflecting the diversity of attitudes, opinions, experiences and needs across Asia.¹⁹ Modest attention to adaptation was made, in particular, to ways to enhance the UNFCCC's Adaptation Fund, as well as using climate insurance and linking adaptation to aid. Indeed, more policy alternatives and analyses are needed, especially of the interests, capabilities, and needs of the rural poor and others otherwise dependent on the performance of the agricultural sector.

The rest of this chapter²⁰ argues that new strategic, long-term policies on adaptation to climate change are needed to help poor agricultural households, and that these cannot be properly developed without substantial initial and on-going input of vulnerable groups. Public engagement in exploring alternative policies is the only way for rural and other natural resource-dependent people to be represented, and their basic rights protected. It also argues that regional co-operation among governments, business and civil society can help establish good principles and practices, spread financial risks from disasters, and reduce adverse trans-boundary impacts of individual adaptation policies.

Adaptations are needed at many levels of society and will have to be paid for.

5.4 WATER INSECURITIES: TOO MUCH, TOO LITTLE

An important subset of climate change challenges facing agriculture is that related to how water is managed. These can vary dramatically among places and seasons. For example north-east China faces both less rainfall and higher expected water demand.²¹ Although a few places are very dry and others invariably wet, the principal challenge in Monsoon Asia comes from having to deal with both too much and too little water, each year.

Much of the infrastructure, technology and culture of rural places is associated with diversion of wet season floodwaters to irrigated fields. Like the wetlands they often replaced, these maintain crucial social and ecological resilience to climate variability. At the same time, the intensification of agriculture has seen a major shift towards storage and diversion that extends growing seasons, thereby reducing immediate dependencies on rainfall. Subsequent urbanization and industrial development has put extra pressure on allocations of water traditionally available to agriculture [*Ed.: see also Chapter 7*].

Water scarcity is a growing threat to agriculture. Across Asia, increasingly frequent and lengthy droughts are attributed to rising temperatures during drier months and ENSO events.²² Freshwater availability in densely settled, large river basins, already constrained by population and consumption growth, may be further reduced by changes in climate. Water stress has already impacted production of rice and other key crops across Asia.²³ Urban–rural conflicts over water resources are emerging across the region, creating insecurities. Adaptation for Indian cities would benefit from a strengthening (rather than polarizing) of rural–urban linkages.²⁴ Functioning and productive rural systems are critical to urban areas, for example, for flows of food and biomass fuels. National, state, and municipal adaptation strategies should be integrated into regional investment planning, especially with respect to water, energy, and transport. Cities need to be seen as embedded in their rural surrounds.

Temperature increases due to global warming are most pronounced at high elevations. As the ‘water tower’ of the world, the Himalayas have a huge influence on rainfall, the monsoon, and storage of the water that sustain the food systems of Asia. Scientific studies suggest that rivers will swell for a few decades as glaciers and snow packs melt, but eventually those flows will decline. The impacts of glacial retreat on water resources are likely to be largest in the western Himalayas, with the River Indus in Pakistan especially vulnerable.

Floods are also an important threat to agriculture. Climate change could result in more serious floods, but the degree will depend on how climate change will interact with land- and water-use changes within a basin.²⁵ The flood plains of major rivers like the Ganges-Brahmaputra, Mekong, and Yangtze are critical for food production, as are cyclone-prone coastal regions around the Bay of Bengal and the South China Sea.

The devastation and suffering caused by Cyclone Nargis in the Irrawaddy Delta underlined the magnitude of risks faced by poor farmers and fishers where information sharing and state capacities are limited. It also illustrated how risks of disaster are magnified by lack of trust, simple tyranny, and grandstanding in international politics. Improved regional cooperation within Asia is likely to be equally crucial for adapting to the increased risks climate change poses to vulnerable peoples.

Bangladesh and Cambodia are among the few least-developed countries (LDCs) to have so far completed National Adaptation Programmes of Action (NAPA) under the UNFCCC.^{26, 27} Both plans focus largely on water-related issues, particularly flooding in coastal areas. The Bangladesh NAPA includes several measures directly related to agriculture, including promotion of drought, saline- and flood-tolerant varieties of crops, as well as integrating climate change into planning and infrastructure design.

Box 5.1**Cambodia: a NAPA follow-up**

- One of few LDCs to complete a National Adaptation Programme of Action (NAPA).
- NAPA focuses on water resources management.
- US\$1.8 million from Global Environmental Facility for follow-up.
- The follow-up focused on reducing flood risks from higher peak flows through re-designing reservoirs and irrigation channels.
- The possible side-effects of interventions on ecosystems and people dependent on natural flood-pulse remain a concern.

The Cambodian Government is now following up with a project on integrated water resources planning (Box 5.1).²⁸ Given that Tonle Sap is a flood-pulse ecosystem upon which millions depend for food and livelihood,^{29, 30, 31} and the prospects of changes to glacier in-flows and the influence of dams further upstream in the Mekong River basin, any further interventions (made in the name of adaptation) must be scrutinized carefully for cumulative and interactive effects that might leave at-risk ecosystems and people even more vulnerable to climate change than before.

The Thai Government has prepared a draft Five-Year Strategy on Climate Change (2008-12) in which adaptation and mitigation issues are strongly intertwined in the document.³² In contrast to Bangladesh and Cambodia's emphasis, adaptation and other ways of reducing vulnerabilities to climate change are not seen as closely related to improving flood disaster management.

Although much of the focus so far has been on technologies, key adaptations may have more to do with rights of access and availability of water. Integrating adaptation into development, in this case, means securing small-hold farmers rights to water, and discouraging the expansion of flood-intolerant crops into high-risk floodplains.

Climate change will make the challenge of dealing with water insecurities—both having too much, and, not enough—more difficult.

5.5 SUSTAINABLE LIVELIHOODS: UNDERLYING CAUSES

Climate profoundly influences what crops can be grown where. The impacts of climate change will be borne disproportionately by poor countries because poor countries are often already warm, and further increases are detrimental to agriculture.³³ But variability in rainfall is another important factor, especially for rain-fed crops.

Every few years an ENSO event delays rainfall. Much less rice is planted in Indonesia, thereby elevating the risks of a rice deficit.³⁴ Climate change is predicted to increase the risk of delays by a month or more in the onset of the monsoon from 9 to 18 per cent today to 30 to 40 per cent by 2050. Adaptation strategies that might include improving drought-tolerance, water harvesting and storage methods, and seasonal early warning systems are urgently needed.³⁵

Indonesia's National Action Plan for Mitigation and Adaptation to Climate Change (prepared by the Ministry of Agriculture) has begun investing in research and development under an 'anticipation strategy'.³⁶ Initially this focused on better crop varieties, as well as water and soil management but irrigation development is also included in its longer-term 'adaptation strategy'. For Indonesia, local research capacity is also important for political projects, for example, 'to verify whether indispensable agriculture is the cause or victim of climate change.'³⁷

Improving efficiency and water productivity in irrigated farmland is already an important, technical, policy objective.³⁸ Paddy agriculture integrates sustainability into adaptation—the landscape provides multiple ecosystem services, including flood control, water purification, and climate adjustment. The social institutions that underpin water sharing in gravity-based systems are also an important asset for co-operative responses, even as these are often re-labelled as state-sanctioned water user groups. Adaptation strategies that have immediate benefits are of course preferable, and at least in relation to water management in paddy landscapes, are not inconceivable.³⁹

China's National Climate Change Programme (CNCCP) includes an outline of policies and measures for adapting to climate change. Adaptation (through innovations in science and technology) is given equal priority to mitigation. China's Ministry of Science and Technology is playing a leading role in the CNCCP,⁴⁰ but the Ministry of Agriculture holds key knowledge, and thus bargaining power, in developing climate change policy.⁴¹ Adaptation technologies and measures, to date, largely focus on observing and assessing impacts on water resources and agriculture. Very little is said about institutional and governance issues. The public, when mentioned, is presented as a group that needs to be made aware of climate change. In contrast, some experts see the key problem of adapting to climate change in China as one, primarily, of more closely aligning existing environmental protection, economic and sustainable development strategies.⁴²

Rural communities' experience in managing existing climate risks should be relevant to reducing climate change impacts. Farmers who depend on rain-fed crops must be skilful at managing climate and flood risks and should be better equipped to cope with climate change.⁴³ In semi-arid south-east India, for example, there is a 2000-year history of harvesting water from the north-east monsoon. This history shows evi-

dence of water storage in the landscape from cyclones, which vary in frequency over long-time scales.⁴⁴ Rice farmers in Thailand adopt a range of strategies to deal with late-season floods that would otherwise result in serious crop losses. These include adoption of alternative varieties and diversifying income sources.⁴⁵ But the increasing commercialization of production has led to the variety of choices of adaptation options becoming strongly constrained by consumer preferences.⁴⁶ This implies that reducing risks of exposure is not only a supply-based but also a demand-driven issue.

Strengthening entrepreneurial and business management skills may be as important as crop selection in improving the resilience of individual farmers. More specifically, farmers need better access to risk-management tools. Seasonal forecasts, early warning of extreme rainfall, crop insurance, compensation schemes, and other social institutions will help to encourage appropriate risk-taking behaviour. Engagement is crucial to understanding how farmers manage risks, and consequently how they could be helped. Finally, rural households do not only farm. Rural household strategies often include going to work in the city, but without investment in rural education, farming remains the only option for many. Business and social development policies need to take non-farm income sources into account, as they are important to reducing vulnerabilities to climate events.

The underlying causes of vulnerability need to be adequately addressed before more nuanced features of climate change adaptation policies can be expected to have real benefits.

5.6 FOOD SYSTEMS: GOING HUNGRY IN THE WORLD'S KITCHEN

The organisation and policies in food systems may either improve or worsen the challenges climate change imposes on agriculture from water availability and flooding. In this context, 'food systems' mean the full set of activities from production through to consumption, the interactions between bio-geophysical environment and human society, and the contributions to food security, environment, and social welfare.⁴⁷

Food systems are shaped, not only by markets and material flows, but also by cultural values, and power.⁴⁸ Demand for different kinds of food has been changing rapidly across Asia. In South-East Asia, for instance, per capita rice consumption halved between 1961 and 1998.⁴⁹ Meat consumption is growing at the expense of grain, requiring even more water for food production.⁵⁰ Among wealthier consumers, health concerns are also driving shifts in production and processing technologies. Food safety standards are becoming more stringent, especially for exports to important European and North American markets.

The set of production and consumption systems that bind food systems together ultimately determine who grows, and who eats, what. Small-scale producers should not be bearing all the risks and burdens of standards, quality assurance schemes and poor market regulation that leave power firmly in the hands of exporters or retailers.⁵¹ At the same time, poor consumers, who are often primary producers themselves, should not be at the mercy of food speculators or at the mercy of fast-shifting markets on critical staples.

Several countries in Asia have pursued export-oriented, value-added agro-industries. Enabling policies have included tax exemptions, subsidized credit and duty reductions for imported equipment. As a result, key agro-industries around chicken, pigs, and shrimp, for example, are dominated by large companies like the Charoen Pokphand Group in Thailand.^{52, 53}

In other cases, vulnerabilities of the food system may reflect other socio-political factors and histories. A preliminary study in East Timor on the impacts of climate change on agriculture and food security noted that poor health is another important confounding factor, causing, for example, secondary malnutrition.⁵⁴ Outside of the two main cities, Dili and Bacau, many poor households already face food insecurity from November to February as stores of maize and rice are depleted and cash reserves are too low to purchase food grown elsewhere. One reason is that the most important crop—rain-fed maize—is highly vulnerable to drought and irregular rainfall.⁵⁵ Despite these difficult circumstances the study concluded optimistically:

'Offsetting these risks, however, is the adaptability, ingenuity, and tenacity of the East Timorese: there can be no discounting their capacity to adapt to climate change given that it is nowhere near as dangerous as their long struggle for independence.'⁵⁶

Policies explicitly addressing vulnerability and adaptation of food systems are still uncommon in Asia. Most governments are still engaged in understanding the key impacts.⁵⁷ Awareness of the importance of climate change to food security has grown, suggesting there is a window of opportunity to explore longer-term policy alternatives. Elimination of trade barriers by developed countries would reduce the impacts of sharp changes in food prices on poor consumers. Developing countries may need to invest in infrastructure as well as market development, especially for agricultural inputs such as cheap nitrogen fertilizers.

Access to nitrogen fertilizers is uneven. Some parts of the world do not have enough to grow the food they need. This is a crucial factor in addressing vulnerabilities to climate change and other stressors. While reducing wasteful fertilizer use is impor-

tant, many places would still benefit from more nitrogen inputs to improve the productivity of their crops. However, responding to the nitrogen management challenge is tough, and will take many complimentary strategies.⁵⁸

Heterogeneity among farming households, in terms of capabilities, resources, constraints, and likely responses also needs to be considered when contemplating adaptation measures. Policies will need to be tailored to targets, and they will need updating as these move. Nowhere is this heterogeneity more obvious than around the major food exporting regions of Asia. The juxtaposition of the economically successful industrialization of the food system around key commodities with persistent poverty is a hidden source of social and political insecurity in Asia.

People should not be going hungry so near the ‘food bowls’ and ‘kitchens’ of the world.

5.7 POLICY IMPERATIVES AND ALTERNATIVES

The extent of damage caused by global warming to agriculture in Asia will depend, in part, on the emerging responses of governments. Their long-term policies on adaptation to climate change could enhance—or further exacerbate—the capacities of farmers to cope, respond, and adapt.

It is imperative that vulnerable peoples are consulted more in exploring and formulating adaptation policies. Technical task forces sitting in the capitals cannot produce practical or fair policies without such inputs. This is because adaptation to a changing climate, among many risks that farmers must manage simultaneously, should build upon, and take into account, existing capabilities and constraints to innovation. It is also because the disenfranchised groups (migrants, minorities, women, and children), who are often among the most vulnerable to extreme climate events, have a history of being poorly represented. Empowerment should expand the options, opportunities, and quality of local adaptation. Farmers, fishers, and other natural resource-dependent peoples need social, economic, and political space in which to exercise their expertise and rights in order to adapt.⁵⁹

What is most needed to adapt to climate change—in short—is a change in how adaptation is governed.

National-level assessments will need to be built, ground-up, from local level consultations and cannot assume that findings will be homogenous or easily aggregated into summaries at a higher level.⁶⁰ This does not mean that higher-level capacities are not needed—they are—but rather that thinking must be multi-level from the start.⁶¹

Response strategies, as they prioritize funding and capacity-building activities, likewise, need to be widely discussed and negotiated. Fortunately, among farmers, interest in managing climate risks is high. This interest should help in devising adaptation policies that are not only forward-looking but also valuable now. Agribusiness firms should also be encouraged to participate, as their investments and influence on practices can often exceed those of public agencies.

Regional co-operation should focus on producing the greatest ‘public good’. It is not essential that all frontier research areas in agriculture, rural development, or disaster risk management be pursued in every country; networks of scientists and practitioners working across the region can be very effective at sharing knowledge. International assistance for capacity building to carry out national–local adaptation assessments could be expanded under the UNFCCC process but also developed independently by other donors.

At the international level, adaptation needs much more support,⁶² especially from donors, aid agencies, and national governments. This includes removing barriers to adaptation that come from their trade, energy, food, military, or security policies. Financial support must shift from reactive policy that supports recovery from disasters to building adaptive capacities.⁶³ Climate adaptation policies should support sustainable development.

The prevailing view of Asian governments—as described in emerging climate change strategies and programmes—is that science and technology innovation in managing water resources and agriculture is key to adaptation. There is a widespread belief that modernizing and improving the efficiency of irrigation schemes is crucial to successful adaptation to climate change.⁶⁴ This chapter suggests that that is a very incomplete view of what policy changes are needed. In particular, much more institutional change is required so that vulnerable groups are routinely and meaningfully engaged in the management of climate risks and in developing adaptation policies that will directly affect their lives.

Finally, once strategic policies are launched, their effects (or lack of) will need to be scrutinized. Monitoring and evaluation are critical because of the large uncertainties associated with both climate change and the impacts of newly formulated policies.

The impacts of global warming will not be experienced equally everywhere or by everyone. Vulnerabilities vary hugely across places and different social groups. Asian governments should acknowledge this diversity in exposure, risks, and response capacities, and respond by putting the needs of the poorer, disadvantaged and marginalized first.

Chapter 6

A ‘Development Round of Climate Negotiations’

Tariq Banuri

Recommendations for governments and climate negotiators

Asian governments

- Align objectives of development and climate mitigation at the national policy-making level.
- Present a strong voice for the principle of equity in post-2012 climate negotiations.

Negotiators

- Re-open the menu of options for climate solutions under what may be called a new, ‘Development Round of Climate Negotiations’.
- Pursue an integrated strategy on climate and development by using an investment-based approach.
- Make equity a guiding principle of post-2012 climate negotiations.

6.1 OVERVIEW

‘The Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change’.¹

Effective progress on climate stabilization will be possible only within an integrated framework that gives equal attention to the seemingly forgotten ‘second’ goal of the UN Framework Convention on Climate Change (UNFCCC), namely economic growth in developing countries. However, it is also becoming clear that climate stabilization cannot be achieved without deep cuts in developing country emissions. Current efforts to initiate such cuts are hampered by reliance on a single framework—national emission targets—that ignores the overriding priority of economic development and poverty eradication in developing countries. Given the urgent need for climate action, the menu of policy options needs to be reopened in order find an appropriate mix that can re-integrate climate and development. Such a reopening is best organized under what may be called a new ‘Development Round of Climate Negotiations’.²

6.2 THE CASE FOR A DEVELOPMENT ROUND

In 1965, *Time* magazine quoted the conservative economist, Milton Friedman as saying: ‘We are all Keynesians now’. This was presumably in response to the validation of Keynesian analysis by the performance of the US economy. Likewise, the succession of grim statistics on environmental trends, especially in the domain of climate change, has converted many sceptics: ‘We are (almost) all environmentalists now’. Climate change has risen to the top of the global policy agenda, scepticism has receded dramatically, and there is an emerging consensus on the need to respond. Yet, action remains slow, tentative, and unfocused. One of the major obstacles is the reliance on policy frameworks that cannot bring together the diverse range of global actors—the North and the South, business, civil society and governments, and vulnerable islands and energy producers.

This paper suggests launching discussions for a global framework that can mobilize this broad range of actors, proposing a ‘Development Round of Climate Negotiations’ for the post-2012 agreement. It reviews the key arguments for and elements to be discussed in this negotiation round, focusing on the discourses of development,

climate and technology; and alternative climate policy frameworks—regulation, taxation, legally defensible rights, and investment. It is proposed that these frameworks would be more effective in supporting sustainable growth and poverty eradication in developing countries than the dominant market-based cap-and-trade system. Although details of a specific framework will be largely left for future analyses, this paper concludes by broadly outlining some key elements of a proposed investment-based approach that aligns development and climate objectives.

6.2.1 *The global climate and development policy discourse*

Since the end of the Second World War, there has been an international consensus over the right to sustainable development in developing countries. This consensus has been reaffirmed explicitly and repeatedly in various international agreements including the UNFCCC, which calls for the integration of climate policy into development in order to avoid adverse impacts and cater to the ‘legitimate priority need of developing countries for sustained economic growth and eradication of poverty’. Yet, in practice climate and development have come to be treated not as common and joint global responsibilities but as ‘separate and equal’ ones, the primary responsibilities respectively of the North and the South.³ However, neither is being pursued effectively, since carbon emissions are growing rapidly, and the threat of severe disruption hangs over developing countries.

There are several indicators of the marginalization of the development agenda in the climate discourse. The most prominent is the dominance of a global policy framework of national emissions targets and carbon markets, which is not adequately addressing developmental concerns and realities, and is therefore unsuited to the challenge of an integrated programme. Industrialized countries are united in calling for developing countries to adopt targets. The United States has made the adoption of targets by the larger developing countries (especially China and India) the price of its cooperation and civil society activists often excoriate governments for not adopting sufficiently stringent targets. However, this framework has failed to generate consensus despite a decade of experimentation and debate.

Current discussions of carbon emissions targets are usually based on what is called the cap-and-trade approach. Although in principle this approach gives national governments the freedom to choose any policy that suits them, and could continue to provide the basis for climate action in industrialized countries, it still fails two litmus tests from a development perspective: it is inconsistent with the institutional capacity and policy experience of most developing countries, and it has so far been ineffective on the matter of sustaining the growth momentum of poor countries.

The second agenda of the dominant approach, the goal of building a carbon market from the top down, is also tailored primarily to the institutional and economic context of developed countries. While developing countries have considerable experience with other options for climate policy—such as direct regulation or quota systems—the creation of virtual markets combined with elaborate systems of monitoring and control creates difficulties. Another difficulty is that the pressure to induce developing countries to accept emission obligations is reminiscent of the unsalutary history of donor conditionalities.

Given the central role played by energy production (and associated carbon emissions) in the growth process, there is not much doubt that targets would harm development. However, the global response has consisted not of the search for more integrated frameworks, but for compensatory arrangements that would in theory offset the adverse impact of the main policy. In practice these have been ineffectual and unconvincing. These compensatory arrangements include:

- *New and additional resources*: Initially, there was hope that financial support and technology transfer would compensate developing countries for the incremental costs of climate action and help maintain growth momentum. Given the failure of such additionality to materialize over the last 15 years, faith in this option has eroded.
- *Exemption from climate obligations*: Another option, which emerged in Kyoto, was to exempt developing countries from climate obligations. By now, it is clear that the rapid growth of emissions from developing countries means that this exemption cannot be sustained much longer.
- *Clean Development Mechanism (CDM)*: In a related effort, Kyoto introduced the CDM, under which private companies were given the incentive to invest in emissions abatement activities in developing countries. The operation of this mechanism has suffered from severe incentive compatibility problems and uneven geographical coverage. This raises doubts about whether it would be adequate to the task if the portfolio were to be expanded dramatically [*Ed.: see Chapter 10*]. It also fragments the climate stabilization agenda in developing countries by making it dependant on individual projects floated by potential international partners.
- *Per capita emission rights*: Most recently, the German Chancellor Angela Merkel has revived an idea, long favored by civil society activists from the South as well as the North, the allocation of per capita emission rights (not targets).⁴ Although it is a more equitable approach, it does not achieve the integrated mitigation and development approach. Once emission rights are allocated, including any possi-

ble financial compensation for permit trading, the responsibility for development reverts again to the national level. Growth once again becomes an outcome of the process rather than an explicit goal of collective policy-making. Finally, permit regimes are extremely complicated, especially when compared with the capacity of institutions that exist on the ground.

6.2.2 *Principles for an integrated climate and development framework*

Given that neither the climate challenge nor the development challenge can be deferred for another day, it is essential that the menu of global policy options be reopened and expanded, so that the world community can find ways to move ahead on both the central goals of the UNFCCC.

This means that the forthcoming climate negotiations, in analogy to a similar unfinished agenda in trade negotiations, should be viewed as the ‘Development Round of Climate Negotiations’. Failing this, it will be virtually impossible to make adequate headway in combating climate change.

Integration of climate and development does not mean that climate policy should henceforth be designed solely for developing countries. Rather it means that global policies and agreements be based on five key principles:

- *Integrated Framework*: It views the protection of the development momentum to be as urgent and necessary a task for the global community as that of coping with and mitigating climate change. Such a framework would seek to ensure that all climate policies, regardless of whether they are designed for rich or poor countries, should ensure that the development momentum of the latter is not compromised.
- *Vulnerability Bias*: It is tailored consciously and deliberately to protecting vulnerable groups from adverse impacts both of climate change and climate policy.
- *Institutional Capacity*: In selecting a menu of policy options, it gives priority to actions that are consistent with the institutional experience and governmental capacity of developing countries.
- *Policy Credibility*: It ensures that the policy choices would be viewed as credible by the private sector and civil society in developing countries, and thus that the policies would elicit the required response.
- *Learning from Experience*: It is based on lessons learned, both successes and failures, from the experience of development and development cooperation.

6.3 DEVELOPMENT, CLIMATE AND TECHNOLOGY

What follows is an analysis of the potential alternative frameworks to the global target-based cap-and-trade system, and a brief outline of the key principles of a potential solution: an investment-led strategy that fully integrates development and climate policy. Before launching into this discussion it is useful to provide an overview of the key development and climate challenges and technology solutions options on the table right now.

6.3.1 *The development challenge*

There is a long-standing global consensus, dated at least from the end of the Second World War, that developing countries have both a right and an obligation to economic development. As mentioned, this consensus has been articulated explicitly and repeatedly in global agreements, including the UNFCCC. The UNFCCC recognizes both the right of developing countries to increase energy consumption for economic development, and the necessity of crafting all climate policies in such a way as not to compromise this right.⁵

The starting point is global inequality,⁶ which maps into conventional geo-economic categories of the First, Second, and Third Worlds.⁷ The argument for economic development is based ultimately in two concerns. First, it is the only way we have learned of reducing inequality. Second, given that inequality is associated with a host of other ills—poverty, malnutrition, disease, lack of access to basic social services, and future opportunities—economic growth constitutes the major policy option for addressing these ills and improving conditions of life in these societies. Inequality also has political implications. Within countries, inequality often leads to political unrest, civic conflict, crime or other forms of societal unrest. Finally, it is not merely growth that is important. What is important is that people in developing countries have the confidence that massive global inequality is not a permanent feature of the human condition.

This role of economic growth in reducing poverty and smoothing inequality has long been recognized by developing country governments and civil societies—which is precisely why the development agenda commands the highest priority in these countries—and increasingly so at the global level. It is recognizable today in the agenda of poverty eradication and, for example, in the Millennium Development Goals.⁸ However, a recurring concern of environmentalists is the fact that if economic growth remains a permanent feature of global society, it will sooner or later come into direct conflict the finite limits of planetary resources.⁹

6.3.2 The climate challenge

This is the context within which the climate threat has emerged. The problem is compounded by the strong correlation between economic growth and the expansion of energy use and consequent increased use of fossil fuels.

Since the focus of this paper is on the appropriate frameworks for collective action in an uneven world, we will not go into the complexities or controversies of climate science. These have been explored in great detail in several publications.¹⁰ For purposes of this chapter, we take as given the target of stabilizing carbon concentrations at 450 parts per million (ppm), which corresponds roughly to an ultimate temperature increase of 2 °C above pre-industrial levels.¹¹

TABLE 6.1: IS92a Projections of key drivers and parameters of climate change¹²

	Population	GDP/capita	Energy Intensity	Carbon Intensity	CO ₂ Emissions
	Billions	Purchasing Power Parity (\$)	MJ/\$	KgCO ₂ /GJ	GtCO ₂
2005	6.42	6,541	12.1	14.8	27.5
2100	11.3	29,730	4.5	13.4	75
The 450 ppm challenge	Little change possible. Estimated range in 2100 is 9-11 billion	Higher income desirable but quality of growth could be improved	Major potential for change is in this area. It needs to be about 5 per cent of the projected numbers.		~4.0

Table 6.1 illustrates both the scale of the challenge and the crucial importance of de-carbonization. Stabilization at 450 ppm requires emissions to be reduced by about 85 per cent from their current level and 95 per cent from the level projected by the end of the century. The major focus of this adjustment will have to be in reducing carbon intensity. Regardless of the specific policy instruments that are chosen for this goal, the end result must be either to reduce to a trickle the extraction of fossil fuels from the ground, or to capture nearly all of the emissions from the carbon that is still extracted from the ground.

This also reveals the immediate dilemma for economic growth. The energy sector, which contributes over three-quarters of the total carbon emissions, provides the critical link between climate and development. As Figure 6.1 shows, the dividing line between rich and poor countries is energy consumption per capita

of 4 kW. Indeed, one theory of the modern era places causality of the industrial revolution squarely in the domain of access to fossil fuels—starting with the invention of pumps to drain floodwaters from coal mines (and thus allowing more extensive and deeper mining operations) and later, with the discovery of oil. The slow expansion of the development impulse is similarly correlated with the slow expansion of energy services. One hundred and twenty six years after the commissioning of the world’s first electricity generating plant in 1881, almost 1.6 billion people, a quarter of the world’s population, remain without access to electricity. Four-fifths of this deprived group is from two regions: South Asia (706 million) and sub-Saharan Africa (547 million)¹³.

The energy sector is closely tied to the prospects of economic growth. The current projection of the energy sector envisages an investment of US\$20.2 trillion in the energy sector over the 25-year period 2005–2030.¹⁴ Of this, more than half (US\$11.3 trillion) is in electricity generation and the bulk of the remainder (US\$6.5 trillion) in exploration, development, refining, and transmission of the three fossil fuels: coal, oil, and gas. The current trend is towards an increasing role for coal, which is a larger emitter of carbon dioxide than oil and gas. The problem is that developing countries need rapid growth in energy use to fulfill their developmental aspirations, and the cheapest resources for this (and the technologies with which they are most familiar) are those based on fossil fuels.

6.3.3 Technological solutions

From this background, the climate debate has evolved along two parallel trajectories: technological and political. On the technological front, perhaps the most elegant exposition is by Pacala and Socolow, who lay out the stabilization challenge into seven wedges.¹⁵

To summarize the Pacala-Socolow vision, even the modest target of maintaining current emissions over 50 years requires huge investments in new areas. These can be divided into four groups:

- *Win-win*: Some actions are desirable in their own right. These include the bulk of the proposals on energy efficiency, for example, improving gas mileage, or cutting carbon emissions from buildings; as well as those pertaining to land use, for example, ending deforestation or introducing conservation tillage. The reason that they have not yet happened has to do with the absence of incentives or the presence of economic or institutional obstacles.¹⁶

- *Carbon capture and storage*: This includes a programme of investment in carbon capture in existing coal based power plants, and making carbon capture mandatory for all new coal based plants.
- *Renewable energy*: Pacala and Socolow recommend a rapid expansion of key renewable energy plants.¹⁷
- *Nuclear fission*: There are serious doubts about the social and environmental costs of nuclear power, but if this option is adopted, it has major implications for the investment programme.

These are some of the key options for a technological solution. In order to explore how these could be integrated into the development process, it is useful to consider how policy discussions have progressed.

6.4 ALTERNATIVE REGIMES

Unlike the technology discussion, the global political discussion on climate stabilization is dominated by a single approach of cap-and-trade and national targets. The theoretical advantages of the global cap-and-trade system are that it leaves critical policy decisions to national governments, it is neutral with regard to technological options, and it can be tailored to build gradualism into the adjustment process. However, this approach suffers from a number of disadvantages, some of which are fatal as far as a global agreement is concerned.

If the objective is to reduce emissions, this is not the only regime that could induce change. At various times, a number of other frameworks have also been discussed. A brief summary of these alternatives includes the following:

- *Regulation*: The simplest and most direct approach is to regulate the use of fossil fuels. A simple solution would be to agree on a gradual reduction on the rate of extraction. However, this approach has two problems. First, given the almost total dependence on fossil fuels for electricity generation as well as transportation and heating, such a reduction would cause considerable economic and social disruption unless alternatives are deployed in time. Second, it would cause extreme hardship for countries whose income and welfare are dependent on fossil fuel extraction. These include not only the oil producing countries (of which many are among the ranks of developing nations) but also large coal producers, including China and India.¹⁸

- *Carbon Tax*: A related option is to impose a tax on carbon, thus providing an incentive to the search for alternatives. In theoretical economic terms, a tax and a quota are equivalent, in the sense that both lead to a reduction in use of the taxed or controlled substance. The problems with the tax system are, therefore, very similar to those of the regulatory framework.¹⁹
- *Emission Rights*: A framework that has a familial similarity with that of the cap-and-trade system is that of emission rights. The main difference between the two is that emission limits are in the form of rights rather than obligations. As such, it has very similar advantages and disadvantages to those of the cap-and-trade system.²⁰
- *Investment*: A fourth framework, which is implicit in most discussions that start from technological options, is that of publicly funded investment in infrastructure projects. Given the need to maintain the development momentum as well as stabilize greenhouse gas emissions, the ideal course would be to embark upon an investment programme, which would encourage economic actors, including governments, to automatically choose the path of de-carbonization. The details of this option are laid out later in the paper.²¹

While the analytical literature sets out the entire range of these alternatives, in practice, the policy discussions quickly coalesced around the cap-and-trade system. This legacy has enormously constricted the global policy space, and effectively excluded all other alternatives from the menu.²² This has also rendered the policy approach inconsistent with the developmental goals.

In the initial period of climate negotiations from the late 1980s up to the adoption of the UNFCCC, a major question was that of responsibility. Motivated implicitly by the well-known polluter pays principle, the analysis sought to assign responsibility for the damage in order to infer the responsibility for (prior) action. In response to an influential World Resources Institute (WRI) report, which placed responsibility on all large countries (US, Russia, China, India, and Brazil) for the volume of their emissions, Agarwal and Narain introduced a focus on per capita emissions, distinguished between luxury and survival emissions as well as between emission and pollution (i.e. emission above an agreed per capita threshold).²³ Based on the same evidence, they argued that the responsibility, both for the problem and ameliorative action, lay with countries with the highest per capita emissions. The text of the UNFCCC reflects this understanding, and places responsibility for action on the rich countries. It also articulates several equity-related principles, including the overarching and unequivocal commitment to enabling sustainable development to proceed in developing countries.

Sixteen years after the negotiation of the UNFCCC and more than a decade after the Kyoto Protocol, action on equity remains both limited and ineffectual,²⁴ and is hobbled in particular by this legacy.

6.5 AN INTEGRATED INVESTMENT-BASED APPROACH

Clearly, in the coming phase, climate action will need to involve greater action from developing countries. The optimal framework for engaging developing countries is one in which the growth rate is not an incidental by-product but an object of policy. As such, it is recommended that in the ‘Development Round of Climate Negotiations’ we eschew any mention of targets and quotas, at least for developing countries. Instead, the aim should be to put together an investment programme that gives incentives for greenhouse gas abatement without compromising the growth momentum. The rest of this paper provides a broad outline of this investment-based approach, which is found to be best suited to facilitation of development-friendly decarbonization in the South.

This idea was first floated by Anil Agarwal and Sunita Narain.²⁵ They proposed that the mitigation process be launched in earnest in the South, through a Manhattan Project²⁶ type funding for the massive deployment of renewable energy technologies and thus for a total reconfiguration of the rising investment in energy and transportation infrastructures in the South.²⁷

The investment-based programme should have the following components:

- *Vulnerability bias*: For ethical as well as political reasons, the goal must be to protect poor and vulnerable groups from adverse impacts of climate policies.
- *Consistency with institutional and policy capacity*: The programme should be administrable by developing countries, and should not provide perverse incentives.
- *Policy credibility*: The policies selected should be credible. This means a preference for policies that are viewed as irreversible and predictable.
- *Learning from experience*: The programme should be based on the lessons from the development experience.
- *Financing*: The financing system should be one that is widely viewed as legitimate and fair.

Based on these principles, the proposal outlined in this paper is a global public investment programme in alternatives to fossil fuels. This programme should be

funded by a scheme that is viewed as legitimate and fair. A one per cent income tax on the richest 20 per cent of the world’s population regardless of their country of domicile is suggested below.

Investment should be targeted in three areas. First, building an infrastructure base around which the private sector and local producers could make their investments. Several possibilities have emerged from the technology review. These include investments in a hydrogen system, carbon capture and storage, and pilot renewable energy plants. In addition, investment is needed in building national institutional capabilities in deploying renewables. Finally, investment funds would be needed for accelerated research and development. The investment would be mobilized globally but managed nationally.

6.5.1 Vulnerability bias

The recent history of the development process offers several experiences that can help illuminate the search for an appropriate integrated framework that does not create adverse impacts for poor and vulnerable groups.

The experience that is closest to the climate challenge is that of ‘structural adjustment’. This was the most significant challenge facing developing country policy-makers during the 1980s and 1990s. The challenge was manifested in the form of a rapid accumulation of external debt, growing imbalances in international payments and government budgets, strong inflationary pressures, and a sustained economic recession. It was the result in large part of external developments, in particular increases in import prices, decline in export demand, and increased costs of borrowing because of the collapse of the international lending boom of the 1970s.²⁸ The policy challenge was not only to reduce debt exposure but also to introduce changes into an economic structure that had become addicted to continued infusions of credit.²⁹

The adjustment crisis is a clear analog of the climate crisis. One can think of climate change as the result of overspending against a ‘climate budget’. Between 1750 and 2000 the global sinks could have absorbed about 1,200 billion tonnes of carbon dioxide equivalent (GtCO₂e), against which the cumulative emissions were about 2,000 GtCO₂e. The remaining 800 GtCO₂e accumulated in the atmosphere, increasing carbon concentration from 280 to 380 ppm.³⁰ This increase is akin to accumulating a carbon ‘debt’, which has to be repaid by reducing emissions below what could be absorbed. However, emissions continue to be far higher. In other words, the world overspent the budget, went in debt, and also developed strongly in-grained habits that require going deeper and deeper into debt.³¹

The world now is in a situation in which the bills have come due, creditors are knocking at the door, and action can be deferred no longer. The only question to be asked is not whether to undertake the adjustment, but how to structure it and time it so as to minimize damage, protect the vulnerable, and promote growth where it continues to be needed.

6.5.2 Institutional capacity and experience

The current policy discussions have tended to be based in a single policy framework, namely the use of market mechanisms for the climate transition, and within this focus, on carbon trading as the desired policy instrument. However, the biggest problem is that the market has emerged mainly in the North. In developing countries, attempts to create markets through fiat have often led to serious problems of leakage, smuggling, black markets, corruption, and incentive conflicts. All these are visible in the operation of the carbon market. On the other hand, developing countries have much more extensive experience with alternative policy frameworks, especially those rooted in investment or regulation.

The idea is that this will lead to the establishment of a robust market for carbon, which will in turn provide the correct market signals to economic actors. However, this is an attempt to create a market through a top-down system, not one that develops through bottom-up processes of exchange and evolution.

This choice of instruments suggests that the challenge is to change things on the margin, not one of transforming the entire underlying structure of consumption and production. Price incentives are quite effective for introducing changes on the margin, but there is little evidence of price incentives inducing a fundamental transformation in the economy or society.

6.5.3 Policy credibility

The reliance on market mechanisms assumes that the establishment of a carbon market would provide the correct incentives to the private sector. However, the signals to the private sector are also dependent on the credibility of the policy itself. If there are questions regarding the future direction of policy, for example, whether future governments would honour the commitments made by their predecessors, the uncertainty would seriously undermine the incentive effect.

Market innovation and investment can be encouraged by an unequivocal policy stance. The current compromise is to opt for painless policies that induce some action and learning, in the expectation that future policies would reward actors who are first to initiate these

actions. However, as Jeffrey Frankel has argued recently, such reversal of policy commitment is highly problematic. For one thing, democratic governments cannot bind their successors, and therefore any policy that involves a future commitment by a successor regime, is likely to be viewed as risky by the business community. The strongest incentives are likely to arise from front-loaded policies that create strong backward and forward linkages.³²

From this perspective as well, the investment approach is far more credible. By committing public resources to infrastructure development, the governments give an irrevocable signal to the private sector. First, the sunk costs in infrastructure investment are always an argument for sustaining the expenditure. Second, investment creates supporting political pressures, both because of the emergence of private sector interests and the interests of the administering agencies. These interests become an added factor in sustaining the policy over time. Third, investment can be targeted at areas with strong linkages in order to stimulate complementary private activities.

6.5.4 Learning from experience

The process of development has generated both positive and negative lessons. It is critical that these lessons figure in the climate debate.

A useful example in this regard comes from perhaps the most successful crash programme of technology transfer, the green revolution. The spectre of famines and starvation over much of the South in the 1950s can be compared with the current threat of climate chaos. Population growth rates had shot up, and agricultural yields and production had lagged far behind. Countries formerly generating food surpluses became increasingly dependent upon imports and food aid.

The climate crisis has many similarities with the green revolution. As detailed by Pacala and Socolow, the world already has the technical knowledge to reduce emissions and shift to superior technologies. What is needed is a system that enables the effective harnessing of these technologies and placing them in the hands of producers and consumers in developing countries. The green revolution accomplished this through a very professional and comprehensive approach, including the establishment and strengthening of an intricate and sophisticated network of institutions for research, extension, education, credit, machinery, irrigation, policy development, and marketing. This network was built by strengthening and adapting existing institutions rather than crafting wholly new ones. The result was for example that every agriculture graduate in South Asia arrived armed with the latest knowledge of hybrid seeds and associated inputs.

The climate crisis is not being addressed in a similarly comprehensive manner.

6.5.5 *Financing*

Discussions of climate action have invariably foundered on the rock of financing. The reason is that these discussions are located either in the framework of foreign aid or that of market incentives. However, if climate change is viewed as a global problem, to be addressed through concerted global action, there will be a need to approach the financing issue differently.

Discussed below is the metaphor of the world as a single (developing) country. If the climate problem had emerged in this country, and policy-makers had to develop a plan for funding investment or the cost of adjustment, they would typically have sought to institute a reasonable progressive tax system.

Instead of organizing financing through traditional channels, the appropriate vehicle for this plan could be to institute a global tax on the wealthiest 20 per cent of the global population regardless of their country of domicile. Although there is not sufficient space to flesh out the details of this financing scheme, it would provide an undeniably equitable way to finance mitigation of and adaptation to climate change.

6.6 CONCLUSION

Climate change is the first truly global challenge faced by human society—in the sense that not only is it occurring at a global scale, but also and more importantly that it cannot be addressed effectively without a planetary level of cooperation.

In order to switch to a development perspective, it is useful to start by imagining that the world is a single country. Elsewhere, this country has been referred to as Earthland. It is best viewed as a developing country—a point that should be self-evident, given that 80 per cent of this country's population is still engaged in what is conventionally called the development agenda. In such a country, the leaders of the world can ask a different question, not the give-and-take of international negotiation, but the how-and-what of solving a problem.

This country has a number of collective goals, of which the two that concern this paper directly are those of coping with climate change, and economic development. Besides this, there are a number of common concerns, including maintaining peace and security, enabling global commerce and other human interaction to continue unhindered, and protecting the world's biodiversity and ecosystem integrity. These concerns are interrelated in complex ways, and neglecting or deferring any of them can have repercussions on the others.

What this metaphor suggests is that the climate problem can be interpreted in the context of a global development plan. If even the moderate projections of climate change are realized in practice, the development process would be reversed, and severe social, political, and economic disruptions will ensue. As was the case in most conventional development programmes, virtually all available policy options that recognized environmental limits appeared at first to be harmful for the development process. Yet, in countries that were able to apply consistent and sustained environmental policies within a development framework, the two objectives soon became integrated. Like the intra-national environmental challenges, *a successful solution to the climate problem may also have to be developed within the development process*; it will need to *begin* rather than end with developing countries, and be based on a deep understanding of how development occurs.

This can only happen if increasing numbers of hitherto developing countries are seen to join the ranks of rich countries. In simplistic terms, this means that it is a global responsibility to ensure that slow growing countries begin to grow faster, and that fast growing countries maintain their growth momentum until they join the rich country club. In other words, the challenge is not only to sustain the incremental, day-to-day growth, but also and perhaps more importantly, to facilitate the phase shift—the discrete, inter-generational jump, the so-called 'take off into self-sustained growth'—that truly describes the development vision.

Chapter 7

Tackling Climate Change in the Post-2012 Regime: The Role of Cities and Urban Regions in Asia

Christine Loh and Andrew Stevenson

Cross-cutting recommendations for cities and urban regions in Asia

Local officials

- Adopt a co-benefits framework for climate change policy by targeting policies that align local environmental quality objectives with climate change adaptation and mitigation goals.
- Integrate the expected direct and indirect impacts of climate change into economic and infrastructure planning. Facilitate the expansion of local clean technology industries.
- Convene appropriate deliberative and collective learning processes for mayors and city officials.

Major cities

- Enable discussion on how cities can create regional rapid response networks as part of adaptation planning and disaster relief, and how to promote resilience to the food and water security threats of climate change.
- Publish a handbook on establishing an emissions inventory and setting targets for cities and urban regions. Include recommended standards, best practices, and successful action plans in co-benefits and sustainable development.

Recommendations for negotiators

- Allow large developing countries in Asia to use mega-city and regional greenhouse gas reduction plans as the basis for their commitments under the post-Kyoto regime.
- Streamline Clean Development Mechanism (CDM) approval processes for urban building and transport energy efficiency projects, and facilitate large developing countries' awareness and use of successful methodologies for these types of projects.
- Require the least-developed countries in Asia to oversee and enforce the creation of greenhouse gas inventories and adaptation assessments in urban areas.

7.1 INTRODUCTION: THE RISE OF ASIAN MEGA-CITIES

Urbanization was the central economic growth pattern for developed countries, and is being replicated at a rapid rate and on a massive scale in developing countries around the world. This process is pervasive throughout Asia, where small, medium, and mega-sized urban areas are driving major shifts in the concentration of population, resources, wealth, society, culture, and politics from rural, agricultural areas to cities.

The scale of the urban shift in Asia is unprecedented. In 2000, half of the world's 2.86 billion-strong urban population was in Asia. By 2030, that number is projected to nearly double. Urbanization in Asia has followed the pattern of mega-urban regions creating sprawling concentrations of population, infrastructure, and economic activity.¹

Like it did in other regions, Asia's urbanization has produced serious, widespread changes for humans, the landscape, and the economy. Among other problems, air pollution, widening income gaps, and social unrest have all been associated with urbanization.² However, others have argued that urban residents enjoy greater social mobility, higher education, better health, more employment opportunities, more concentrated and lower net environmental impacts, and a higher overall standard of living than their rural counterparts.

The driving forces behind large-scale urbanization are many, including government policy, globalization of economic activities (including manufacturing and trade), and the desire of rural residents to make more money and find a better life in the city. Migration is a central driver of population growth: for example, by 2025 urban migrants in China will account for 25 per cent of overall urban population.³ Given the forces outlined above, governments have largely accepted they cannot stop urbanization. Many governments have recognized that urbanization and the demographic and economic transitions it facilitates are crucial to socio-economic development. Through careful planning it is possible to direct this urban development along a more sustainable pathway.

7.2 CENTRES OF DECISION-MAKING

Many publications have addressed the uniquely important role of cities in combating climate change.⁴ Among a variety of others, cities provide residents with four key services—food and water, shelter, mobility, and lifestyle.⁵ They have large ecological and carbon footprints because they rely on imports to sustain large populations and at the same time emit large quantities of pollution and waste. The fact is cities consume 75 per

cent of the world's energy and produce 80 per cent of its greenhouse gas (GHG) emissions.⁶ How cities and their residents choose to live offers enormous opportunities for the world to achieve sustainable development. To capture these opportunities, it is useful to break down the essential functions and roles of cities and examine how they can be used to realize a low-carbon society that is highly adapted to the impacts of climate change.

As centres of population, cities are focal points for all types of economic, financial, social, political, administrative, and decision-making activities. Major urban regions in Asia are among the world's leading export manufacturing, logistics and distribution centres in the global supply chain. Asian cities are also growing centres of consumption for an exploding middle class. In addition, cities are seats of governments that are responsible for decisions that have regional and global implications for the environment and climate change. Larger cities are often hubs of intellectual, civic and political discourse that serve as national and international media centres, making them useful places to explore issues through regional and global dialogue. Indeed, many decisions made at the global level on mitigating and adapting to climate change must be implemented at the local and regional levels by municipal and metropolitan authorities, industries, and the people living there.⁷

In other words, as centres of political and administrative decision-making for governments, commercial decision-making for businesses, and lifestyle choices for residents, cities and metropolitan regions have the capacity to focus the attention and efforts of large numbers of institutions and people to work collectively towards achieving sustainable development and meeting the world's climate change challenge.

7.3 CITY GOVERNMENTS: PLANNING FOR SUSTAINABLE DEVELOPMENT

Asian cities are facing a wide range of impacts from global climate change. Serious adaptation challenges and large-scale mitigation opportunities are being imposed on top of existing environmental problems. More indirect impacts on food, water, and energy security, global economic growth and trade patterns are also emerging.

Municipal governments need to focus on so-called 'co-benefits' strategies that will allow them to improve local environmental stresses and address climate change challenges and opportunities at the same time [*Ed.: see Chapter 3*]. They also need to plan for secure food, water, and energy resources for their residents and re-think economic growth plans in the context of a low-carbon world. Efforts from individual cities will provide the vital bottom-up approach to complement potential action at the UN level.

7.3.1 *Asia's vulnerable mega-deltas and coastal cities*

Cities located in what the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) calls 'mega-deltas' are particularly vulnerable to sea level rise and changes in extreme weather patterns from climate change, and in greatest need of attention. AR4 points out that even small climate alterations can have catastrophic consequences—such as resulting in large numbers of climate refugees. Furthermore, among the countries with the eight largest populations in Low Elevation Coastal Zones, seven of them are located in Asia: China, India, Japan, Indonesia, Bangladesh, Vietnam, and Thailand.⁸ Asian coastal and port cities are therefore on the frontline, with Calcutta, Mumbai, Dhaka, Guangzhou, Ho Chi Minh City, Shanghai, Bangkok, Rangoon, and Hai Phòng projected to be among the top ten most vulnerable cities in the world by population in 2070. Guangzhou, Calcutta, Shanghai, Mumbai, Tianjin, Tokyo, Hong Kong, and Bangkok are projected to be among the top ten most vulnerable by assets.⁹ Research and planning to address these impacts need to be expanded to address the scale of the problem that has been identified.¹⁰

7.3.2 *Asia's local urban environmental challenges*

While climate change is a central global concern, most Asian cities and regions are still struggling with local environmental problems. The Global Environment Outlook 4 report (GEO4) of the United Nations Environment Programme (UNEP), published in 2007, makes sobering reading. Asia's key challenges include transport and urban air quality, stress on freshwater systems, threats to ecosystems, land use problems and threats to agriculture, and waste management.¹¹

Many Asian cities—such as Dhaka, Bangladesh with 3 million of its 11 million people living in slums—still contain large populations residing in squatter settlements.¹² Although considerable progress has been made towards the United Nations Millennium Development Goals—the number of people living on less than US\$1 per day in Asia dropped by 250 million between 1990 and 2001—the main objective of some Asian cities is still to reduce the number of residents living in poverty. Developing Asia powers its growth by adding more and more energy-generating capacity, resulting in high levels of air pollution and carbon emissions. The annual health costs of air pollution in Hong Kong and the Pearl River Delta region of Southern China have been very conservatively estimated as US\$140 million and US\$262 million respectively.¹³ However, successful air pollution control efforts by some cities have led to generally declining levels among major Asia cities since 1993.¹⁴

The supply of clean water is also severely deficient in many South Asian cities: 655 million people across the region still lack access to safe drinking water, and water-borne diseases are responsible for high levels of premature deaths. Water availability is also a serious issue, as it is closely connected with climate change and presents major challenges for agriculture. Glacier retreats and changes in weather patterns are evident outcomes of climate change in the region.¹⁵ The effects of reduced yields or increased crop failures are not just confined to agriculture: they cascade across urban areas in the form of food and water shortages and damage to the economy [*Ed.: see Chapter 5*].

Taking GEO4 alongside AR4, also published in 2007, it is clear that the threats of climate change to Asian cities will only make existing problems worse. Although many Asian cities have built stronger institutions with urbanization, dealing with local and global environmental problems simultaneously remains a major challenge with tight budgets and limited political capital.

7.3.3 *Achieving co-benefits—buildings and transport*

However, there are 'low-hanging fruit' that will address both sets of the problems at the same time through co-benefits policies. In terms of climate change mitigation, the Stern Review and country-specific analyses conducted by McKinsey have both identified policies in urban areas as among the lowest cost per tonne of CO₂ available on the global scale. The greatest no-net-cost opportunities identified in McKinsey's global cost curve for greenhouse gas abatement are mostly related to buildings (insulation, lighting systems, air conditioning, and heating), and transport (fuel efficiency in vehicles).¹⁶

In China, buildings account for about 45 per cent of total energy use across their entire life cycle. Even in its most developed city, Hong Kong, buildings account for around 40 per cent of the city's total energy use, similar to that for many developing countries.¹⁷ Energy reduction estimates vary, ranging from 29 per cent by 2020 at no net cost, to 25 per cent for 'cost-effective retrofits', to 64 per cent for new eco-cities such as Dongtan in eastern China, and up to 70 per cent by using green building principles across the board.¹⁸

Furthermore, government statistics in China identify transport as accounting for 16.7 per cent of total energy consumption, and note that private vehicle ownership is rising at just under 20 per cent per year.¹⁹ India faces a similar situation. Along with vehicle efficiency improvements, public transport systems, such as the Delhi metro, present significant opportunities for reducing emissions. China is projected to build 170 new mass-transit systems by 2025, but also pave five billion square metres of road.²⁰

In Asia, co-benefits measures are normally thought of as policies that derive local environmental improvements—such as reduced air pollution through buildings and transport measures—that also produce climate change benefits. There is already significant political will and ongoing research behind the use of co-benefits strategies in Asian cities, and this interest is already branching out beyond air pollution and climate.²¹ In many urban areas it would be useful to expand the scope of co-benefits to include all policies that align sustainable development with climate change, including adaptation and the indirect but growing, global threats of climate change.

After all, achieving sustainable development in urban regions includes preparing for adaptation challenges such as rising sea levels, greater climate variability, droughts, and the potential for more intense storms. Policies directed at mitigation will also help cities adapt to a climate-constrained world by reducing the reliance on imported energy.

7.3.4 Global and regional linkages—solutions for cities or magnified threats?

Indeed, AR4 emphasizes growing concern surrounding the more indirect impacts of climate change, including serious threats to food, water, and energy security and economic activity that occur across production, consumption and trade systems. These effects will be felt locally but also cascade throughout the globe. Although it will be complex and challenging, it will be useful for governments and climate change negotiators to think more about how to align reductions in these vulnerabilities with existing mitigation and adaptation goals when making policy:

‘Increasingly strong and complex global linkages: climate change effects cascade through expanding series of international trade, migration and communication patterns to produce a variety of indirect effects, some of which may be unanticipated, especially if the globalized economy becomes less resilient and more interdependent (very high confidence).’²²

According to the most recent IPCC report, there is greater and more concrete knowledge about the serious impacts of climate change on agriculture and water security in Asia.²³ Combined with increasing understanding of the interconnectedness of global food markets, and the emergence of water supply as the next big environmental and security issue, Asia and its cities could face increasing threats from hunger and drought in the future. [*Ed.: Chapter 5 provides a more extensive discussion of how climate change will affect food and water security issues*].

Many cities rely mostly on imported energy to keep things running, thus security of energy supply is important. Moreover, the ‘urban heat island’ effect (cities creating and retaining higher levels of heat than rural areas) will drive energy use in Asian cities even higher, especially in warm climates, where air conditioning makes up a significant part of energy use.²⁴

The important point is that cities must begin to think harder about where they will obtain these resources in the future, as the threat of climate change is clearly producing major changes in their distribution, costs, and total supply on a regional and global scale.

7.3.5 The Pearl River Delta: climate threats to global and internal supply chains

It is also evident that the rapid growth in many urban regions in Asia is the product of steady consumption demand from the west. The quintessential example is the Pearl River Delta mega-region of southern China. It has long been referred to as ‘the factory of the world’ because it is one of the global economy’s most productive manufacturing centres. Correspondingly, the port cities of Hong Kong and Shenzhen are key links in the world’s production and logistics supply chain.

Yet, inherent and new environmental threats are emerging. In recent years bad floods have disrupted linkages in supply chains within this delta region, which includes Guangzhou. There have also been water shortages in parts of the delta region due to overuse of water, and there are frequent power shortages since capacity cannot meet rapidly rising demand. Air pollution and carbon emissions have also been rising rapidly for the past decade. Local authorities are putting pressure on factories to clean up or move out, and high energy prices will put some out of business altogether. The global supply chain business is also bracing for carbon prices on aviation and shipping in the foreseeable future that may create new patterns for global distribution of manufacturing and trade. These factors will all provide challenges to economic growth patterns in the Pearl River Delta and other regions around Asia, as the importance of a low-carbon development strategy begins to exert its influence.

It is beyond the scope of this paper to address in depth how improvements in food, water, energy, and resource security can be aligned with climate change mitigation and adaptation. These problems are locally specific and will have different solutions in each urban area. Sorting them out will require serious thinking by local governments and associated stakeholders. In some cases local resources will not be available, and greater reliance on global markets will be necessary. However, given the already evident

disruption by climate change and other economic factors on global resource markets, greater localization of resource supplies and economic development should be seriously assessed. How national subsidy patterns and global trade agreements are reformed due to the global need to deal with climate change presents a major opportunity for positive change, and will also play a critical role in how these issues are resolved [Ed.: see *Chapter 9* for more in depth discussions of trade-related issues].

7.3.6 *Adopting a policy framework for sustainable development*

The Tyndall Centre for Climate Change Research's Cities Programme is developing an Urban Integrated Assessment Framework for global and local environmental and economic trends. This model incorporates city-specific climate impacts and emissions accounting to develop adaptation and mitigation policy recommendations for cities.²⁵ Although they provide a strong methodology for data collection, the wide range of development levels among Asian cities makes it difficult to develop specific policy recommendations based on a common framework.

However, the key overall point is that there is a clear need and opportunity to expand the scope of climate change discussions to adopt a co-benefits policy framework in Asian cities:

- Align climate change adaptation and mitigation, pollution abatement, and development goals in an unified co-benefits policy-making approach;
- Target policies in transport and buildings that can be achieved at low or negative cost, as well as reduce carbon and other air emissions;
- Carry out comprehensive analysis and develop plans for major adaptation needs, such as assessing the impacts of climate change on water resources and food supplies, and take measures to secure local or consistent supplies;
- Consider how climate change will affect key industries and continued economic development; and
- Adopt an overall energy, economic, and financial policy that favours low-carbon alternatives. This includes changing subsidies for fuels, promoting green industries, and serving as regional centres for carbon trading or clean technology investment.

7.4 STRUCTURING EFFECTIVE DIALOGUE PROCESSES

As stated previously, Asia faces both serious adaptation challenges and low-cost, large-scale mitigation opportunities from climate change, but in order to reap the benefits, the leadership and political will behind action and cooperation must be better harnessed. The issue is often not the lack of knowledge about what to do, but the lack of expertise and experience to make it happen expeditiously. Some major barriers concern national policies or large vested interests that local authorities cannot deal with on their own [Ed.: such as those discussed in *Chapters 4, 5 and 10* in forestry, agriculture, and environmental management].

A positive and low-cost strategy to break through barriers is to improve dialogue among stakeholders, most importantly by bringing mayors and city officials in a region together to discuss solutions and share best practices. Dialogue processes designed to reduce assertion of positions and increase deliberation and solution-seeking are vital for communities to strike out on new paths forged by greater collaboration. These processes have been referred to as *Sustainability Tools*—the increased application of which is vital to improve participatory deliberation of complex issues [Ed.: see *Chapter 1* for a discussion on *Sustainability Tools*].

Major cities are in a good position to drive these dialogue processes because of their roles as seats of national government and/or centres for civic and political discourse and media. These roles give them the unique ability to influence lifestyle choices, political trends, and policies at the national, regional, and international level. This is vital to the dissemination of urban-oriented climate solutions. Moreover, because of their wealth and political institutions, major cities generally have greater economic, political, financial, and technological capacities to combat climate change. Emissions levels in many major cities may seem relatively low because of industrial relocation, but comprehensive carbon accounting should also take into account the embodied emissions driven by high consumption and import levels.²⁶

7.4.1 *Major cities in Asia*

Tokyo and Seoul have emerged as the current Asian leaders in addressing climate change, with a strong push from their mayors and a commitment to taking greater action than their national governments.²⁷ Singapore is showing leadership on adaptation planning, and Dongtan and Baoding in China could serve as examples for transformative urban growth in Asia's developing cities. Financial centres in Asia are also jockeying to stake their claims on the new carbon markets that have emerged in recent years.

The Tokyo Metropolitan Government's Climate Change Strategy includes several promising elements, including a target of reducing overall emissions by 25 per cent between 2000 and 2020. Although per capita emissions are already low compared to other 'world cities', Tokyo believes it should be leading the national government, and thus has committed to taking greater measures. The basic policy is focused on promoting the use of best-available technologies—an area where Japan has a distinct advantage. Tokyo is pushing voluntary efforts to reduce carbon emissions by business, industries, and households. It has also committed to using government buildings to lead the way on green practices, and integrating climate change concerns into urban planning and transport decisions. Tokyo is also studying the implementation of a carbon tax, which may be implemented before the national government will take action.²⁸

Seoul is also pursuing a strong environmental strategy as outlined in its climate change action plan. It has set a target of reducing emissions 25 per cent below 1990 levels by 2020, while the South Korean national government has been slow to commit to a target. However this is changing; South Korea's announced at the Accra climate meetings in August 2008 that it plans to set a binding target for emissions and wants to act as a bridge between the developing and developed nations.²⁹ Seoul's major strategies focus on transport, energy, and waste management. Although the number of new vehicles is still a major concern, Seoul will replace all remaining buses with compressed natural gas vehicles by 2010. The municipal government has also set a target of 10 per cent renewable energy use by 2020, which it hopes to achieve in conjunction with the promotion of fuel cell and solar power industries. Finally, they are cooling the city, reducing emissions, and creating public spaces by revitalising dumps and brownfield sites as city parks. Currently, 64 per cent of Seoul's waste is recycled for heat or power generation.³⁰

Singapore announced its climate change action plan in February 2008 and is perhaps the most comprehensive in dealing with adaptation. This is not altogether surprising given the city's long-standing concerns about water security since it has to import water from Malaysia. The plan is linked with IPCC sea level rise predictions, requiring new reclamation projects to exceed even the worst-case scenario in height. The Public Utilities Board is also developing more effective drainage infrastructure, requiring low-lying areas to be raised with re-development, and is studying the need to further protect coastlines.^{31, 32}

Dongtan, which has been designed as a low-carbon city, is being built on a rural island off the coast of Shanghai. The aim is to receive 10,000 residents by 2010, 80,000 by 2020, and 500,000 by 2050. Overall, the plan calls for this small city to use 64 per cent less energy than a typical city through a full range of sustainability initiatives. These gains will primarily be achieved by using the best available technologies and

ideas in buildings, energy, transport and urban planning. Dongtan is also an experiment in realising economic and social sustainability by creating mixed-use communities and jobs for people of all income levels.³³ Baoding is another city in China that is making extensive use of renewable energy and seeking to serve as a sustainable, green model for the rest of the country.³⁴

Asia's financial centres are fighting for a piece of the carbon market pie which, although small today, is expected to grow substantially in the future. Singapore has set up the Asia Carbon Exchange,³⁵ and Mumbai's Multi Commodity Exchange is launching futures trading in carbon.³⁶ In August 2008, the China Beijing Equity Exchange and the Shanghai United Assets and Equity Exchange separately announced they would conduct carbon trading.³⁷ Tianjin had already announced a partnership with the Chicago Climate Exchange.³⁸ Hong Kong's stock exchange also announced that it is considering launching Certified Emissions Reduction credits trading in 2009,³⁹ and Tokyo will no doubt play an important role should Japan switch from its current voluntary pledges for emissions reduction from industry to a mandatory cap-and-trade scheme.⁴⁰

7.4.2 City alliances

Alliances among cities within a specific country, region, or around the world are vital to harnessing the bottom-up, grassroots efforts that have taken place to match the top-down measures taken by leading cities and the UN process. There are now many gatherings around the world each year focussing on how cities and urban regions can fight climate change.⁴¹

Prominent cities alliances include *The International Council for Local Environment Initiatives (ICLEI)—Local Governments for Sustainability*, which is a membership association of local governments founded in 1990. It has 815 members comprising large and small cities, towns, and counties that are working to implement sustainable development initiatives. In recent years, tackling climate change has become a major concern. All the members can vote and participate in the setting of ICLEI's strategic plan.⁴² The majority of members are from North America, Europe, and Australia. The 101 Asian members are mainly from Japan, South Korea, India, Indonesia, the Philippines, and Thailand.⁴³ ICLEI's 'Cities for Climate Protection Campaign' helps cities to adopt policies and implement quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban sustainability. More than 800 local governments participate in the campaign,⁴⁴ and 650 local governments worldwide have adopted carbon targets.⁴⁵ Analysis of the Cities for Climate Protection Campaign so far suggests that cities that are better engaged in the process have been motivated

more by financial and political benefits than the dissemination of information. The dissemination of policy learning has not been straightforward, but has instead been a back-and-forth process between the expectations and desires of local governments and the international network.⁴⁶

The C40 Cities–Climate Leadership Group (C40), established in 2005, is a global initiative of municipal governments focused on tackling climate change in large cities with a population of at least 3 million. By working together, C40 believes it can influence the course of events. Asian members include Beijing, Shanghai, Hong Kong, Delhi, Mumbai, Dhaka, Jakarta, Bangkok, Hanoi, Seoul, and Tokyo. To date, C40 has organized several workshops for its members and other cities where good examples were showcased and discussed. Working with the Clinton Climate Initiative, the purchasing power of the member cities can be pooled to obtain price advantage of products and services to reduce carbon emissions. C40 holds its summit every two years, with the next in Seoul in May 2009.⁴⁷ Although it is a relatively new initiative, the extensive international political and financial backing suggests it holds significant potential.⁴⁸

7.4.3 Focusing greater attention on process

Clearly some Asian cities are making substantial efforts to address climate change. Cities are also participating in and starting dialogue processes, but early experience suggests close attention must be paid to the structure, financing, and political leadership of these initiatives. There are major opportunities for success, but significant learning needs to take place. Four key initiatives include:

- Develop training systems that enable mayors and city officials to structure cooperation initiatives and drive results. This learning needs to take place in mega-cities, secondary cities, and smaller cities to harness top-down and grassroots, bottom-up initiatives;
- Discuss the creation of regional rapid response networks as part of adaptation planning and disaster relief, and promote resilience to the food and water security threats of climate change;⁴⁹
- Explore whether environmental trading schemes may be possible on a regional scale for carbon, other air pollutants, and water; and
- Publish a handbook on establishing an emissions inventory and setting targets. It should include recommended standards, best practices, and successful action plans with a focus on co-benefits and sustainable development policies. A useful example is the World Bank's recent primer on building climate resilient cities in East Asia.⁵⁰

7.5 GLOBAL NEGOTIATORS: ENCOURAGING ALTERNATIVES TO NATIONAL GHG COMMITMENTS

As stated previously, cities also have large-scale, low-cost opportunities for mitigation and are already exercising their leadership and decision-making roles to cooperate amongst themselves and move ahead of national governments. Using urban regions instead of national targets as the basis and scale for commitments in the post-2012 agreement offers one way for non-Annex I countries in Asia to make a meaningful contribution to emission reductions.

Negotiations for the post-2012 climate change regime face many challenges with the wide development gap between Annex I and non-Annex I countries. While it is accepted that negotiations must proceed on the basis of common but differentiated responsibilities, there are doubts as to whether stricter national targets in developed countries alone will deliver sufficient emissions reductions to avoid dangerous climate change. This has led to agreement that large developing countries—such as China, India, and many others in Asia—will also need to make measurable, reportable and verifiable commitments. At this stage, national-level, voluntary targets for carbon reduction, energy efficiency, or renewable energy seem to be the most likely outcome of this process. It has been suggested that Asian countries can in fact become change agents by using their own emissions reduction and sustainable development plans as the basis for negotiation at the Conference of Parties in Poznan, Poland in December 2008 (COP 14) and Copenhagen in December 2009 (COP 15) [*Ed.: see Chapter 1*].

Whatever the outcome of the negotiations, national-level commitments are not necessarily the only way to produce good emissions reduction results. Whether they are voluntary or mandatory commitments, they will have to be met at city, regional and industry levels. This makes urban regions and their governments key actors for ensuring the agreement produces meaningful results.

A good example is China, where the national government has established energy and climate change policies requiring energy efficiency targets to be met by 2010 and renewable energy targets to be met by 2020. The national authorities are pushing the country's large state-owned enterprises to improve energy efficiency, and also requiring party and government officials nationwide to improve environmental performance.⁵¹ However, to produce meaningful reductions, cities, regions, and industry sectors will all need to pull in the right direction. The more developed cities and regions, such as Hong Kong and the Pearl River Delta and Shanghai and the Yangtze River Delta, should be expected to lead the way and produce significant results.

Although it is beyond the scope of this paper to present a detailed description of specific targets and regulatory mechanisms for the post-2012 regime, there are several guiding principles by which an overall framework could be structured:⁵²

- **City and regional level plans**—Allow national governments of large developing countries in Asia, such as China, India and Indonesia, to apply city and regional level greenhouse gas reduction plans within set timeframes as their commitment under the new regime. Start by allowing them to focus on demonstration cities and regions, the success of which can then be scaled-up nationally.

For example, the Chinese government could consider committing to targets in the first phase (2012–2016) to reduce energy use from buildings in major cities such as Beijing, Shanghai, and Guangzhou, as well as energy efficiency improvement in power plants in the Pearl River Delta region in Guangdong Province and Hong Kong. National and provincial authorities could develop the targets in the same way they have developed existing energy targets, and the plans could be reviewed and agreed upon in UNFCCC negotiations. In the next phase (2016–2020), the commitments could be expanded to cover more cities and industries across the country. There have already been numerous calls for a ‘Madisonian system’ of climate policy where the best ideas and solutions are tested at a more local level and then scaled-up to the national or global level.⁵³ Smaller cities would benefit from the dissemination of technology and ideas. The increased focus on dissemination outlined in section 7.4.3 will also allow developed cities in countries such as Japan to provide significant help towards meeting national binding greenhouse gas commitments.

- **CDM Reform**—Streamline low-cost urban mitigation opportunities such as building energy efficiency, transport, and co-benefits projects within the CDM framework.

Although some examples exist, such as the Delhi Metro, the CDM Executive Board would greatly expand their scope by speeding up the approval process and helping cities develop methodologies for these preferred projects. Smaller cities and regions could be targeted at first and then the more successful solutions could be scaled-up.

- **GHG inventories and adaptation assessments**—Require the least-developed countries in Asia to oversee and enforce the creation of greenhouse gas inventories and adaptation assessments in their urban areas. Although overall and per-capita

emissions in these countries are currently low, these assessments would lower their business-as-usual emissions trajectory and help set them on a low-carbon development pathway that de-couples growth from carbon emissions. This is a vital investment in the future, so that when these cities become concentrations of population and wealth in Asia they will have lower per-capita emissions and be more sustainable than earlier developing cities. This assessment would also support a co-benefits strategy that improves environmental health and helps reduce vulnerability to natural disasters.

Financing and support for these inventories and assessment could be provided from an international fund with mandatory contributions from Annex I countries, or from a levy on certain types of CDM projects. This could be similar to the fund that was proposed by Mexico in Bonn in June 2008.⁵⁴

7.6 CONCLUSION

The United Nations has long recognized the importance of cities and towns. Its *Human Settlements Programme*, HABITAT, is a dedicated agency created to promote socially and environmentally sustainable towns and cities with the goal of providing adequate shelter for all.⁵⁵ Therefore, it makes sense for cities to be further integrated into the UN framework for addressing climate change, which is one of the central challenges to global sustainable development in urban areas.

The environmental, climate change, and development issues facing urban areas are so challenging because they cut across numerous fields of analysis and the variety of roles and functions of urban areas.

Climate change is global, and urbanization is a global phenomenon, but Asian cities face unique challenges and opportunities because of their high vulnerability, their importance for reducing emissions, and their role as regional centres of wealth and population. These issues are imposed on top of more immediate domestic concerns such as economic growth, providing adequate food, water, and shelter for residents, and reducing air. Their shared capacity to act is low compared to the scale of problems they face, but, as centres for dialogue, governance and decision-making, cities have a unique ability to take action and make it stick. Many financial centres in Asia are also the headquarters for large corporations and commodities exchanges, giving them a unique ability to pursue voluntary beyond-the-state initiatives and stimulate regional market-based solutions.

These roles give urban areas in Asia the unique ability to make a much greater contribution to achieving sustainable development on the global scale. Just as importantly, they provide a way for developing Asia to meaningfully contribute to the global greenhouse gas reduction effort and help the post-2012 agreement reach its goal of avoiding the dangerous impacts of climate change.

Chapter 8

Energy Efficiency, Technology and Climate Change: The Japanese Experience

Shigeru Sudo

Recommendations

Asian governments

- Learn from the Japanese experience on promoting energy efficiency, including the importance of strong regulations and a conservation-minded society.
- Pursue an integrated policy approach to energy efficiency, economic development, and climate change.
- Increase cooperation in regional and global initiatives for transfer of energy efficient technologies.

Climate negotiators

- Encourage the use of sectoral reductions and technology funding contributions as one type of commitment in the post-2012 regime.
- Create a technology fund for developing countries to draw on for energy efficiency projects.
- Promote collaborations on energy efficiency beyond the UNFCCC process, such as the Asia Pacific Partnership on Clean Development and Climate (APP).

8.1 PROMOTING ENERGY EFFICIENCY: THE JAPANESE EXPERIENCE

The importance of improving energy utilization efficiency is widely recognized throughout the world, because it is expected, on a mid-term to long-term basis, to have a major impact on the promotion of both energy security and countermeasures against global warming. Energy issues and environmental issues are like two sides of a coin. From the viewpoint of energy security, a decrease in demand from improved energy efficiency gives the effect equivalent to an increase in supply.¹ From the viewpoint of global warming, it simultaneously brings about a decrease in carbon dioxide (CO₂) emissions by reducing energy consumption. Energy efficiency has been widely identified as one of the largest low or negative-cost opportunities for greenhouse gas (GHG) reduction around the globe.²

From a business standpoint, there are additional reasons why increasing energy efficiency should be a central goal in developing and developed countries. Benefits for business include better risk management, overall cost savings and revenue increases, improved public image, and better access to capital.³

Japan is widely seen as a global leader in the field of energy saving, and is regarded as one of the most energy efficient countries in the world. Compared to Japan, the United States and China use two and eight times as much energy per unit of Gross Domestic Product (GDP) respectively.⁴ Japan is also increasingly committed to sharing its energy efficient technologies with developing and developed countries in Asia and around the world as a central part of its global warming strategy.⁵ This includes supporting the use of sectoral targets by developing countries in the post-2012 climate change regime, and participation in a multilateral technology fund.⁶

Given the large benefits that have been identified and the presence of a global leader in the region that is pursuing cooperation and technology transfer, Asian countries—especially developing—do not seem to be taking full advantage of available energy efficiency opportunities. For example, China has struggled to meet its energy efficiency targets.⁷ Asian countries are faced with a variety of barriers that will be addressed later in this chapter, including lack of access to capital, a lack of opportunities, and institutional problems.⁸ As well, concerns have been raised that the potential for energy efficiency gains has been overstated.

This chapter aims to explore these concerns, with a focus on Japan, and briefly provide a critical assessment of potential lessons for developing and developed countries in Asia and around the world. Given the close relationship between energy efficiency and global warming, and its potential applications in the post-2012 regime,

it is important to assess potential strategies that will enable Asian governments and climate negotiators to move forward on energy efficiency. The chapter proceeds with a series of key questions:

- Why has Japan achieved such a high level of energy efficiency?
- How has Japan achieved such a high level of energy efficiency?
- What barriers do other countries—especially developing countries—in Asia and around the world face in the pursuit of an energy efficient, low-carbon society?
- How can Japan's commitment and success be harnessed to overcome these barriers as part of a post-Kyoto global climate change strategy?

8.2 WHY HAS JAPAN ACHIEVED SUCH A HIGH LEVEL OF ENERGY EFFICIENCY?

Japan's initial experience on promoting energy efficiency can provide valuable background for countries attempting to reform their energy policy. However, although technology and regulatory structures may be transferable, other countries—particularly developing ones—are unlikely to share the conservation culture that underlies some of the success of Japan's policies.⁹ As discussed below in section 8.5, learning transferable lessons from Japan may require looking at its more recent energy efficiency and climate strategy.

Firstly, market mechanisms have played a large role in energy saving by driving up energy prices. In the oil crisis of the 1970s, when Japan relied on imports for most of its energy resources, price hikes were passed on to consumers in the cost of oil products, electricity and gas. As a result, companies shifted to a more energy efficient industrial structure and intensified the development of energy saving technologies.¹⁰ Consumers followed by choosing energy saving equipment and appliances.

However, these energy price shocks affected many countries around the world that did not respond in the same way as Japan (i.e. by dramatically increasing energy efficiency). In contrast with Japan, the United States in particular has a political climate that makes it difficult to push through federal government regulations on energy. Passing a comprehensive climate change bill has also proved to be quite challenging.¹¹ The key differences seem to have been Japan's near complete lack of domestic energy resources, the density of its urban areas,¹² and society's willingness to accept regulations and pursue voluntary measures.¹³ It is difficult to determine exactly what has caused the success of regulations and high energy prices, but one of the primary factors appears to be Japan's culture of avoiding waste.¹⁴

The phrase '*Mottai Nai*' meaning 'too good to be wasted' is increasingly uttered among the Japanese people, and many insist that Japan should try to communicate this phrase to the rest of the world.¹⁵ However, consumerism was prevalent during the early 1970s, and Japan is known for its excessive packaging, so there have been questions as to how applicable this phrase is in practice.¹⁶ It is important to acknowledge this national culture exists to some extent, and that the world would benefit from changed values. However, the difficulty of transferring a conservation ethic suggests that an analysis of Japan's regulatory and technological structure may prove more valuable.

8.3 HOW HAS JAPAN ACHIEVED SUCH A HIGH LEVEL OF ENERGY EFFICIENCY?

Although Japan's culture of conservation is important, energy efficiency improvements have been driven by strong government regulation and supported by voluntary initiatives.

Since 1979, the *Act Concerning the Rational Use of Energy* under the then Ministry of International Trade and Industry has provided the overarching framework under which energy regulations for specific industries have been made. The law has been revised numerous times over the years, with the most recent revision in August 2005.¹⁷ Voluntary initiatives among different industries such as the *Keidanren* Voluntary Action Plans have also been successful in achieving energy efficiency improvements and greenhouse gas reductions (see Box 8.1). Over the past several decades, energy efficiency measures have largely been concentrated on the mass energy-consuming industries, and more recently on the commercial and residential sectors.

Box 8.1 Keidanren Voluntary Action Plans¹⁸

- Initiated in 1996.
- 10% below 1990 levels by 2010 is the goal for industrial emissions.
- Begins with reporting of emissions and energy efficiency levels from companies and industries, then setting voluntary improvement targets.
- 44% of national emissions included among participating companies.
- 2.2% below 1990 emissions levels by 2010 is the current projection.
- Expansion is underway to include transport and commercial sectors.
- Stricter targets and large Clean Development Mechanism (CDM) purchases recently announced by companies.

Future plans potentially include a mandatory system that is integrated with emissions trading.

In the electrical appliance industry, companies have been actively working to promote the development and popularization of regenerative heat systems, CO₂ heat pump water-heaters, and high efficiency commercial air conditioners that use heat pump technology. These technologies limit CO₂ emissions by saving energy on the demand side and also by levelling the load on the supply side. The industry plans to continue increasing demand-side management initiatives as well, including providing information that helps customers to develop energy saving activities and proposing new measures via energy diagnoses.¹⁹

Following the first oil crisis, the steel industry made full use of the world's most advanced technologies to achieve energy savings of approximately 20 per cent during the 1970s and 1980s. It has subsequently achieved one of the highest levels of efficiency in the world. Energy saving efforts initially focused on improving productivity through the elimination and integration of certain production processes, and the introduction of large-scale waste energy recovery equipment. Despite increased energy needs driven by the pursuit of high added value and environmental protection measures during the 1990s, energy savings were still realized by introducing better waste energy recovery equipment, achieving higher efficiency of in-plant power generation equipment, and the recycling of plastic waste materials. Rapid adoption of advanced waste energy recovery equipment and the industry's comprehensive technological capabilities in production and operations have been keys to continued improvement.²⁰

However, Japan is certainly not perfect with regards to energy efficiency; in many cases information is neither widespread nor clear. In addition, energy use has continued to increase in the residential, commercial, and transport sectors, hindering Japan's ability to meet its Kyoto Protocol target. More recent efforts have focused on these areas, such as the adoption of 'Top Runner' energy efficiency standards for household appliances and office equipment (see Box 8.2). The 'Top Runner' programme has already been widely studied by other countries for potential adoption, including China and the EU. A concerted effort is also being made to promote the use of insulating materials in new building construction.

Box 8.2 Top Runner Programme²¹

- Introduced in the *Revised Rational Use of Energy Law* in April 1999.
- Includes some passenger vehicles and most home appliances.
- Requires manufacturers to achieve the highest available standard of energy efficiency within a set number of years.
- Has dramatically improved energy efficiency of consumer products.
- Frequently updated and expanded to include new products.
- Companies whose products have not reached this standard will face public naming-and-shaming as well as monetary penalties.

8.4 WHAT BARRIERS DO OTHER COUNTRIES FACE?

Energy efficiency measures have consistently been identified as one of the most promising opportunities for large scale GHG reduction throughout the world, especially in relatively inefficient developing countries, and particularly in their buildings and transport sectors [*Ed.: see Chapter 7*]. While it may seem promising to learn from Japan's experience to achieve greater energy efficiency throughout Asia,²² there are significant political and economic challenges and barriers to domestic improvements and technology transfer—both general and country-specific.²³

Common barriers to energy efficiency improvements in Asia's industries include low awareness of opportunities by top management and decision-makers; a lack of knowledge and information, including poor monitoring systems; a lack or perceived lack of financing for projects; and limited legislation and poor enforcement of regulations.²⁴ The most affected countries, which include China, India, Thailand, and Indonesia, will be discussed below in further detail.

From a technology standpoint, it is difficult for developing countries to develop highly efficient energy technologies such as zero emission coal-fired power generation, advanced nuclear power,²⁵ or domestically manufactured fuel cells in pursuit of low-carbon development.^{26, 27, 28} Furthermore, assuming transfers of these technologies could occur, there are economic, social and political hurdles to their introduction and dissemination. These include the lack of technical capacity to utilize introduced technologies, lack of appropriate laws and regulations, defective administrative structures, and insufficiently developed market conditions.²⁹

Moving to country-specific barriers, one of China's most pressing policy-making challenges is the difficulty for the central government to enforce laws that require im-

Box 8.3 China's energy efficiency and pollution targets³⁰

China 11th Five Year Plan (2006–2010) has a 20% national reduction target in energy intensity, which is measured in terms of energy consumption per unit of GDP.

Achieving this target would reduce China's CO₂ emissions by about 1.5 billion tons per year by 2010, making this target one of the most globally significant GHG reduction efforts. If the European Union were to achieve its 8% reduction target under the Kyoto Protocol, it would lower annual emissions from 2008 to 2012 by about 335 million tonnes.

China's 11th Five Year Plan also has a 10% national reduction target for major pollutants from 2006 to 2010. Efforts will be focused on heavy industry (power, iron and steel, and petrochemicals), transportation, construction, and buildings. This will require energy efficiency investment, government incentives, and structural change in energy intensive industries.

China has also shown it is willing to close power plants, thereby sacrificing some economic growth to achieve these targets. Many projects to improve energy efficiency can also provide economic benefits in a region, as a large number receive credits through the CDM.

However, recent reports have shown that energy intensity is stable or even rising—calling into question China's ability to achieve these targets without a major increase in effort. Implementation of targets at the provincial and local level continues to be a major barrier.

Box 8.4 The potential for energy efficiency improvements in India³¹

A recent study by researchers at the Lawrence Berkeley National Laboratory has assessed major energy efficiency opportunities in India. They concluded that there are large-scale energy efficiency improvement opportunities with existing technologies, and targets that are likely to be achievable within their current policy framework.

India already has a major programme for energy efficiency standards and labelling including minimum efficiency performance standards and category labels for refrigerators and air conditioners. European Commission categories are used for motors, and distribution transformers also have efficiency categories.

These four products account for about 27% of delivered electricity consumption in India, and have realistically achievable levels of efficiency improvement between 12% and 60% within the near future. According to the researchers, this would reduce total electricity consumption in India by 4.7% by 2020. This would save over 74 million tons of oil equivalent, over 246 million tons of carbon dioxide emissions, and US\$8.1 billion.

The major barrier to achievement of these targets has been identified as inadequate enforcement of existing programmes. Utility demand-side management programmes, financial incentives, and publicity campaigns are suggested to promote further improvements.

plementation by provincial governments and companies. They may not be ready to comply with the new energy saving standards—based on the Japanese Energy Saving Law—that were proposed by the central government (see Box 8.3).

Furthermore, India is also facing challenges of inadequate enforcement of existing standards (see Box 8.4). The good news is that if existing policies and targets can be enforced, these voluntary commitments can make a major contribution to the global GHG reduction effort on the same scale as mandatory commitments made by many developed countries (see Box 8.3 and 8.4).

In Indonesia regulatory hurdles to obtaining financing for energy efficiency improvements for industry, and the perceived lack of cost-effective opportunities are both identified as key barriers. In Thailand, significant obstacles have been presented by ineffective coordination between different government ministries responsible for energy policy, since they often have misaligned or competing objectives.³² Even well developed cities such as Hong Kong have been slow to capture energy efficiency opportunities [Ed.: see Chapter 7], while some such as Singapore have been pursuing energy efficiency for years (see section 8.5).

Both general and country-specific barriers will not be easy to overcome. However, Japan's recent linking of energy efficiency and climate policy, and participation in international collaboration efforts, could provide valuable and applicable lessons.

8.5 HOW CAN JAPAN'S SUCCESS BE TRANSFERRED TO OTHER COUNTRIES?

There are two key lessons that have emerged from Japan's recent policy efforts on energy, technology, and climate:

- (1) Adopting an integrated policy approach to energy, economic development, and climate change; and
- (2) Active participation in and strengthening of regional and international technology cooperation partnerships.

8.5.1 *Integrated policy approach on energy and climate change*

One of the major barriers to energy efficiency in many developing countries has been identified as a lack of coordination on energy, economic development, and climate change. Recognizing the international leadership opportunities it can adopt in

climate change and energy efficiency, Japan has begun to pursue an integrated strategy in these areas. In June 2008 the government announced that Japan will continue seeking energy efficiency improvements in pursuit of a low-carbon society, in which 'extremely efficient, clean production systems are introduced', 'extremely efficient use of energy at homes and offices are promoted' and the 'use of energy sources which do not emit carbon dioxide are promoted'.³³

The inclusion of sectoral targets in then Prime Minister Yasuo Fukuda's plan—announced in a special address at the World Economic Forum—also indicates the potential to integrate these climate and energy goals with economic development:³⁴

- (1) Halve world GHG emissions by 2050;³⁵
- (2) Achieve a 30 per cent energy efficiency improvement in the world by 2020;
- (3) Mid-term GHG reduction targets for individual countries are established by global agreement, while each country sets its own industrial and sectoral goals to achieve these targets;
- (4) In pursuit of international equality, review the benchmark year of 1990 for countries such as Japan that rapidly improved energy efficiency before 1990;

Box 8.5

Summary of the *Cool Earth—Innovative Energy Technology Program*³⁶

On 5 March 2008, the Ministry of Economy, Trade and Industry (METI) announced its *Cool Earth—Innovative Energy Technology Program*, a plan for innovative technology development that includes twenty-one technologies from five areas.

The central technologies are solar power generation with drastically reduced production costs through adoption of new materials, high efficiency industrial production processes, electric cars that do not emit any CO₂, advanced solar and nuclear power generation, and carbon capture and storage technology.

These new technologies can be divided into two large categories: *energy-saving technologies* that retain conventional functions but reduce the amount of energy consumption needed to maintain them, and *low-emission energy source technologies* that generate the same amount of energy but reduce the amount of GHG emitted.

The plan also demonstrates a process for the development of each technology. On the strength of these technologies, METI estimates that about 60 per cent of Japan's proposed 50 per cent global reduction by 2050—about 40 billion tons—will be achievable. The implementation of this plan, therefore, is consistent with Japan's long-term global objective, and represents an integrated energy and climate strategy.

- (5) Establish a new global funding mechanism with European and North American countries, in addition to Japan's US\$10 billion, so that developing countries can actively participate in the efforts of reducing GHG emissions; and
- (6) Promote transfer of Japan's advanced environmental technologies to developing countries.

Furthermore, Japan's domestic technology research programme has been brought under its climate change strategy, and many of these technologies directly target energy efficiency. They are also intended to enhance the technology transfer to developing countries called for in item (6) above. Box 8.5 outlines this new *Cool Earth—Innovative Energy Technology Program*.

Some have criticized Japan for presenting an unfeasible plan, given its inability to achieve its current Kyoto target, and also for trying to reduce its responsibility, given the suggested change in baseline and focus on sectoral targets.³⁷ However, Japan has valid concerns regarding the fact that it started improving energy efficiency earlier than many other developed countries, and sectoral targets have been gaining support as a way for developing countries to make commitments that align their development and climate concerns.³⁸

Other Asian countries, such as Singapore, which has recently brought its energy efficiency efforts under the umbrella of a larger climate change body, have begun to recognize the benefits of an integrated strategy.³⁹ It is important for other countries in Asia—particularly large developing countries—to pursue an integrated approach, in order to make sure energy, development, and climate policies work in the same direction [*Ed.: see Chapter 3 for a detailed discussion of an integrated 'co-benefits' strategy*]. This will also allow them to harness the international political and financial capital behind climate change to strengthen their primary goals of development and energy security [*Ed.: see Chapter 7 for a discussion of how this can be achieved in urban areas*].

8.5.2 Improving global energy efficiency through technology cooperation and transfer

Technology cooperation and transfer is an essential component for promoting increased energy efficiency throughout Asia and the world, and Japan is emerging as a leader in this field. Japan is primarily pursuing a sectoral approach that uses structures of cooperation centred on different industries.⁴⁰ Its approach combines domestic technology development, regional cooperation, multilateral funding, and the integration of sectoral targets as commitments from developing countries in the post-2012 agreement.

One of the main objectives of the *Cool Earth—Innovative Energy Technology Program* is to domestically develop and internationally diffuse more innovative technologies to produce more substantial reductions in global GHG emissions (see above at section 8.5.1).

This domestic technology development feeds into regional initiatives such as the Asia Pacific Partnership (APP), which prepares international teams by industry sector, (such as steel, electricity, and cement) to encourage technology research, collaboration, and transfer. Japan has continued to promote the use of a sectoral targets approach to be used for the setting of international technology standards, and potentially to determine commitments from developing countries in the post-2012 regime.⁴¹ After the Bali Conference of Parties (COP 13) in December 2008, more countries—including China and the United States—have expressed support for this sectoral approach. Since many valuable activities such as the APP lie outside the UN process, one of the principle challenges will be how to incorporate this type of global shared commitment into the post-Kyoto agreement.^{42, 43, 44}

However, when an innovative technology is to be spread within Asia or worldwide, a major problem arises as to who should bear the cost. As one of the principal exporters of this technology, Japan is expected, at the G8 Summit and elsewhere, to help establish a framework for supporting environmental and energy saving measures in developing countries [*Ed.: see Chapter 9 for a discussion of clean technology and trade issues*].⁴⁵ To help resolve some of these cost issues, Japan is committed to providing financing for this technology transfer either independently or through the UNFCCC process.⁴⁶

There is also the danger that if all technologies are created in Japan, and shared with the region and the world, newly emerging clean tech industries in developing countries could be crowded out. These domestic industries must be supported through education and training programmes, by helping countries to pursue economic growth and learn to manage the advanced technology needed to build a low-carbon society at the same time.⁴⁷

Beyond the Cool Earth plan, the APP, and even the Kyoto regime, several other initiatives could play an important role in improving energy efficiency throughout Asia. These include the United Nations Environment Programme's Energy Efficiency Guide for Industry in Asia, which includes a detailed guide and information portal. The project encourages partners from the developed world and Asia to collaborate on improving industrial energy efficiency.⁴⁸ The World Business Council for Sustainable Development (WBCSD) is also pursuing a number of global initiatives in the area of energy efficiency, targeting buildings and electrical utilities in particular.⁴⁹

Japan's approach is especially valuable because it targets industrial technology, increasing the potential to align economic growth and climate goals in the developing world. Other developed countries in Asia and around the world should continue to increase the opportunities for transfer. Developing countries should more actively participate in these processes and remove barriers for the acquisition and adoption of new technologies. Forming a base for these new initiatives, global carbon markets should continue to be key drivers of technology transfer [*Ed.: see Chapter 10*], and emerging international technology funds should provide support as well [*Ed.: see Chapter 1*].

8.6 CONCLUSION

Overall, Japan's position on climate change and the improvement of energy efficiency is that both 'hardware' technology and 'software' regulation and societal change are essential for the success of energy saving policies. In addition, developed countries' assistance in enhancing developing countries' efficiency in the use of resources will ease demand pressures on the market and improve global energy security.

High resource prices resulting from the tight energy market and unstable energy supply often constrain economic development, and preserving valuable domestic resources through efficient energy consumption is as important as securing stable imported energy supplies. Improvement in energy use efficiency also contributes to alleviating global warming by reducing GHG emissions. Therefore, it is one of the most effective strategies for aligning development and climate policy goals.

For developing countries to establish a low-carbon society, it is desirable that they seek alternatives to the fossil-fuel dependent, energy-intensive industrial structure and life-style followed by developed countries in the past. Rather, they should introduce an energy saving and energy efficient economic structure. This is key, especially when establishing electrical and transport networks in rural areas that currently have low GHG emissions.

Although Japan's past experience with promoting energy efficiency has been supported by strong regulation, advanced technology, and a conservation-minded society, many of these aspects may not easily translate to developing (or developed) countries in Asia.

Instead, Japan's more recent approach of aligning their climate change, energy, and development strategies, and international technology cooperation, present a more effective strategy for how its energy efficiency success can be transferred to other countries.

Chapter 9

Trade, Climate Change and Asia

Simon Tay and Phir Paungmalit

Recommendations

Governments, the World Trade Organization (WTO), and negotiators

- Align climate and trade goals so that they are mutually supportive of sustainable development.
- Increase research and cooperation on the design and implementation of mutually supportive climate and trade policies.
- Give full consideration to the latest climate science and do not only focus on what is thought to be politically feasible.
- Revise issues of legality under the WTO, if necessary based on this evidence.
- Implement a uniform approach to taxation of energy and greenhouse gas emissions, particularly with respect to border adjustments for exports and imports.
- Take measures to facilitate the wide diffusion of climate-friendly technologies and services within the current trade regime, and start a serious discussion about how to eliminate fossil fuel subsidies.

9.1 INTRODUCTION

As climate change has risen near the top of the international political agenda, developing countries are increasingly concerned about its threats to their plans for economic growth and poverty alleviation.¹ Since climate change results primarily from the greenhouse gas (GHG) emissions of energy use, it is driven by increasing global economic activity and consumption. Tackling climate change, therefore, will likely involve fundamental restructuring of the world's energy production systems with profound implications for global trade, finance, and economics. Because of this, economic and trade officials are taking on an increasingly greater role in making climate change policy, bringing with them a different perspective on both the issues and potential solutions.

In the past, from the economic point of view, energy-related GHG emissions were not seen as pollution, but a necessary outcome of economic activity. Even as scientific understanding has grown, emissions from normal economic activities are generally seen as positive. The new economic perspective classifies GHG emissions as a market failure,² stemming from the lack of a GHG price and the lack of property rights over the atmosphere—a classic ‘tragedy of the commons’ problem. From this perspective, governments should fix the problem with taxes, regulations, or market mechanisms. However, in many cases national government intervention exacerbates the problem, such as through continued subsidies for fossil fuel industries that distort the true cost of their use and send consumers the wrong price signal.

Similarly, international trade policy can provide barriers and solutions to addressing the problem of climate change. On one side, without sufficient environmental safeguards in place, trade liberalization may speed up climate change by facilitating the production and consumption of GHG-intensive goods. In addition, global competitiveness concerns could cause some countries to delay action on climate change if standards are not applied equally for all. However, on the other side, freer trade generally promotes higher national incomes, providing countries with finances to undertake emissions abatement, including the research and development of advanced technology. International trade also increases global competitiveness, theoretically driving increased efficiency and reduced waste on the global scale.

After 15 years of discussion, even the most basic characteristics of the relationship between trade and the environment—including climate change—remain unsettled. Understanding the relationship is essential for Asia, both in its role as a key trading bloc and a key player in the post-2012 climate agreement.

This chapter examines this relationship, with the aim of identifying how trade and climate change policies can be aligned and positive steps can be taken. First, it addresses the general question of whether trade is good or bad for climate change. Next, it highlights important legal and policy linkages between the international regimes governing international trade and climate change. It concludes by emphasizing the importance for Asian countries to understand trade liberalization's positive and negative impacts on climate change, and the need for regulatory changes to produce positive economic and climate outcomes.

9.2 IS TRADE GOOD OR BAD FOR CLIMATE CHANGE?

Trade flows and liberalization have four key impacts on climate change, both positive and negative: product effects, scale effects, structural effects, and direct effects.³

Product effects stem from the way trade liberalization affects technology transfer and the production processes used to make traded goods.

Whether the product and technology effects of trade liberalization will have a positive or negative effect on the environment will largely depend on how marketplace conditions drive the availability and choice of technology. This includes prices for energy, carbon and other resources, and the strength of national environmental regulations.

On one hand, trade liberalization has facilitated the international movement of highly carbon-intensive goods. A prime example is coal, which from a climate change mitigation perspective would ideally never be traded or used in place of other sources such as natural gas. Trade allows coal to be exported to Asian countries where clean coal technology, more efficient plants, or strong enforcement of environment regulations are not available.⁴ Trade liberalization may also harm ‘more environmentally-friendly and socially valuable traditional production methods’.⁵

On the other hand, trade liberalization may promote the more rapid spread of environmentally friendly technologies, reducing the amount of pollution per unit of economic output. Solar, wind, and transportation are all areas in which Asian countries have benefited from technology transfer from the developed world. This transfer also helps Asian companies compete in these sectors, as they have done for cars and electronics. Technology transfer has helped India become the world's fourth-biggest producer of wind power,⁶ and its solar yield is also bigger than any country except the United States.⁷ Foreign producers are likely to transfer cleaner technologies abroad

when trade agreements support an open market and a business climate more conducive to investment, which was one of the prime objectives of the Doha round of WTO negotiations.⁸ Trade liberalization can also provide the revenue that allows firms to accelerate capital turnover and invest in more efficient plants, technologies and processes. However, given the decades-long cycles of infrastructure investment, there will likely be a substantial time lag before technology diffusion and new funding make a meaningful impact on emissions reductions. In light of potentially dangerous climate ‘tipping points’ that may be approaching, policy interventions will be needed at the global and local level to speed up the process.

The *scale effect* arises from the increase in economic activity driven by trade.

The combination of rapid economic growth and environmental degradation in China, Indonesia, and Thailand are examples of the negative scale effect, since nearly all economic activity damages the environment through the extraction of resources, the use of energy, or the creation of waste and pollution—including GHG emissions. Strong regulations to prevent this damage are rarely in place during the rapid early stage of development, and these effects have made large developing countries in Asia key actors in the fight against global climate change. In addition, in some cases wealth translates into greater pollution by facilitating increased consumption and high per-capita emissions.

Trade liberalization can also be positive, increasing efficiency by allowing more goods to be produced with the same set of natural resources, labor, machines and technology. This principle of comparative advantage is often cited as a fundamental reason for free trade, and can lead to lower overall energy use and emissions. Furthermore, trade also makes people wealthier, and in contrast to the negative effects noted above, in many cases increased wealth drives public demand for stronger environmental protection—assuming governments respond to public demands.⁹ Trade with countries whose consumers demand climate-friendly goods—such as hybrid cars—can also produce positive effects when exporters respond by creating new products or sectors. However, in a world of potentially dangerous climate change, the time lag between high emissions levels and changes in attitudes significantly weakens this positive effect.

The *structural or composition effect* refers to industrial restructuring when a country enters the world market, causing it to produce more of the goods it makes well or has in abundance and to trade these goods for others.

Clearly, linking domestic production to international demand can have positive or negative effects depending on whether a country’s economic situation favors the production of high or low carbon-intensive goods. Without strong environmental regulations, trade can easily drive unsustainable GHG emissions, as seen in many production and export-oriented economies in Asia. Policies must be designed to ease the process of restructuring and opening, otherwise liberalization can easily work against environmental protection and sustainable development.¹⁰ Since one country’s exports are another country’s imports, trade is often associated with a relocation of pollution problems. This emphasizes the importance of restructuring Asia’s energy sector to improve efficiency and promote conservation for sustainable growth.

Direct effects are caused by trade itself, rather than the economic or legal changes it brings about. The most obvious effect is increased GHG emissions from transporting goods by truck, ship, rail, or air between the increasingly distant points of production and consumption. Studies of the environmental effects of the European Union’s internal market predicted that this would dwarf all other environmental impacts.¹¹ Although Asia’s role in this effect is well-known on the global scale, it also should be increasingly aware of the impacts of transport within the region.

The overall impact of trade on climate change is not clear-cut. However, the more important point is that increased liberalization reinforces the need for countries to increase cooperation on trade and climate policy. In Asia, it is likely that increased trade and growth without appropriate economic and environmental policies will have adverse impacts on climate change. In this increasingly integrated world, Asia will need to review its environmental and trade policies to ensure development can be economically and ecologically sustainable. The next section will explore potential solutions by assessing the political and legal conflicts, and potential synergies, between the international regimes of the WTO and UNFCCC.

9.3 LEGAL AND POLICY INTERACTION

International trade and climate change are governed by two distinct bodies of international law. International trade law is embodied in the General Agreement on Trade and Tariffs (GATT) and the World Trade Organization (WTO). The growing number of regional and bilateral trade agreements are also governed by these global regimes. The global climate change regime is governed by the 1992 United Nations Framework

Convention on Climate Change (UNFCCC) and its 1997 Kyoto Protocol. There are also ongoing efforts to negotiate a follow up agreement to the Kyoto Protocol. This new agreement is believed to go considerably beyond the existing Kyoto Protocol in terms of its content and the number of parties. Therefore, as most states will be subject to both regimes, the potential exists that these two systems of law of trade and climate change will increasingly interact and, unless reconciled, come into conflict.¹²

The Kyoto Protocol provides considerable flexibility for countries to design domestic regulations to address climate change and—if necessary—meet their targets. These include measures in the energy and agricultural sectors, new technology and industrial reforms, and phasing out tax and duty exemptions and other subsidies which ‘run counter to the objective of the Convention and application of market instruments’.¹³ Countries can also use the Kyoto Protocol’s market-based flexible mechanisms—the Clean Development Mechanism, Joint Implementation, and Emissions Trading—which allow Annex I countries to purchase emission reductions credits that can be used to meet their targets and allow non-Annex I countries to host projects that produce these credits.

Indeed there are legal and political-economic concerns related to the interaction between international trade and climate regimes. First, it is claimed that WTO rules circumscribe the tools available for climate change policy-making, including trade measures that encourage participation in and enforcement of multilateral environmental agreements. WTO rules also provide legal cover for foreign countries to challenge domestic climate change policies that interfere with their trading rights. Second, by increasing mobility of industries and global competitiveness, the perceived economic impacts of trade liberalization may make it more difficult to develop domestic political support for stronger climate regulations.¹⁴

From the trade perspective, there are potentially severe implications that arise from climate policy, both as it exists, and as it may be developing for a post-Kyoto regime. One of the main arguments from free trade advocates is that environmentally related trade measures of any kind are potentially dangerous, as they could lead to hidden protectionism. This is often the main argument of many countries in Asia when facing new environmental measures of developed countries.

One example is the threat by France last year to impose border taxes on imports to account for carbon costs when the exporting country has failed to impose a carbon price.¹⁵ If this is done, its proponents argue, the international playing field will be level for carbon, and no country will be able to benefit from being a ‘carbon haven’. On the other hand, there are concerns that actions such as that threatened by France would be unilateral impositions on the environmental standards of other countries. They would

be tantamount to illegitimate, protectionist measures taken in the name of climate change, which in reality shore up non-competitive domestic sectors from foreign competition. However, international trade lawyers generally accept that the WTO should not be used as a safe haven to circumvent climate obligations that are, in principle, equally binding on WTO members that are also party to the UNFCCC.¹⁶

This is one example of potential conflict between the two regimes. Others include tariffs, border tax adjustments, labelling, subsidies, and environmental goods:

Tariffs: There have been calls for the use of penalty tariffs and sanctions in the post-Kyoto climate regime as a guard against non-compliance. However, this policy could conflict with current WTO law, whereby members negotiate tariffs on a ‘most-favored nation’ basis¹⁷ and tariff preference could not be granted based on a countries’ climate change policy. The WTO’s ‘Enabling Clause’ could provide an exception—as it allows a preferential tariff whose purpose is to promote development in developing countries.¹⁸ However, if this clause is to be used, it needs to be explicitly stated in the post-Kyoto regime.

A preferential tariff scheme based on climate change mitigation performance could provide a strong incentive for developing countries in Asia to take action. However, discussions on this issue in the WTO have made little progress to date. Although the debate is seemingly just about the details of which goods and services to include—those with clear technological benefits or all less-carbon intensive goods—similar negotiations in the WTO over trade preferences for least developed nations have proven intractable, and indicate the difficulty of this type of negotiation.

Border Tax Adjustments (BTAs): There are several benefits of introducing a ‘carbon tax’, which has led many countries to consider this policy at the national or regional level. Taxes can be used to reduce energy demand, promote more efficient technology, and encourage the shift to cleaner energy, and also convey the same incentive to all emitters. However, many countries worry that their carbon taxes will disadvantage domestic producers relative to un-taxed foreign competitors.

However, in a highly contentious move, several developed countries have proposed BTAs to offset the perceived threat to competitiveness of the stronger targets likely to be included in the post-2012 agreement. Two examples are the United States’ *Lieberman-Warner Climate Security Act*¹⁹ and Mr. Sarkozy’s proposal to the European Union.²⁰

BTAs can be imposed on imports or be granted to exports as tax relief, with the aim of levelling the industrial playing field. For example, the European Union could impose an internal tax on carbon emissions, causing the price of energy-intensive

goods to rise. However, producers may complain that Chinese firms are being given a competitive advantage because they are not subject to this tax, leading the EU to impose tax on goods imported from China equal to the additional cost of domestic manufacturing (see Box 9.1).

The WTO regime has guidelines for how governments can employ these taxes. BTAs are normally accepted under the GATT,²¹ but the main legal issues are whether the BTA is applied equally to imports and domestic products, whether it targets individual countries, and whether it is simply an extension of domestic climate policy.²²

The first question is whether the tax would be regarded as a ‘product (indirect tax)’ that may be imposed on imports, or whether it is classified as a ‘producer (direct tax)’ that may not.^{23, 24} In other words, a tax that can be applied to imports must be an ‘internal tax or other internal charge of any kind ... applied, directly or indirectly, to... products’.²⁵ The second question is whether it can be applied to energy inputs, as there is ongoing debate about whether the WTO permits BTAs based on the production method rather than just the final product.²⁶ The legality would depend on the specific design of the measure, but the international reaction to such a scheme—especially among exporting countries in Asia—is expected to be strongly negative, and would likely provoke a WTO challenge.²⁷

The potential imposition of BTAs has two major implications for post-Kyoto negotiations. First, they could increase resentment among developing countries about ‘green imperialism’ and cause them to back away from the negotiating table. Secondly they may also be a domestic political necessity to enable the EU and United States to take stronger action on climate change. At the least, the geopolitical implications of a BTA scheme need to be more carefully considered, as it is currently uncertain whether, overall, it would be helpful or harmful to the post-Kyoto regime.²⁸

Standards and labelling: Mandatory energy-related standards or ‘technical regulations’ have been and will continue to be a key instrument for meeting the objectives of the UNFCCC and Kyoto Protocol. The WTO Technical Barriers to Trade (TBT) Agreement allows these standards, but regulates their application. Similar to BTAs, it is uncertain whether standards for production efficiency—such as California’s restriction on the purchase of high-carbon electricity from out of state—are allowed, since most current standards target end-use efficiency, such as automobile fuel economy, industrial manufacturing, and building energy efficiency standards.

Energy-related labelling is another policy instrument used by many countries to address climate change, and the TBT Agreement is also relevant to these schemes. Once again, controversy exists over whether the WTO permits labels to contain rules about

Box 9.1

Whose GHG is it? – The case of China’s exports²⁹

China’s economic development is driving a rapid increase in GHG emissions, and export manufacturing has largely driven its economic development. A study by the Tyndall Centre for Climate Change Research estimated that net exports accounted for 23 per cent of Chinese greenhouse gas emissions in 2004—the equivalent of more than double the UK’s emissions or the whole of Japan’s.

With most of these exports headed for developed countries, it could be argued that almost 6 per cent of Chinese carbon emissions are from goods produced for the US market—the top export destination for Chinese goods. This is roughly equivalent to annual emissions in Australia or France.

However, countries such as the US continue to argue that industrialized economies should not be required to take on legally binding targets unless emerging economies like China and India also adopt some kind of commitments.

These realities suggest that emissions accounting within national borders—as is done under the Kyoto Protocol—may be inadequate for assigning responsibility for carbon emissions. The Tyndall Centre report proposes that carbon policies should focus on consumption instead of production, which makes sense in the absence of a binding global agreement.

One goal of a broader adjustment scheme is to force consumer prices for goods to reflect the harm that the production of those goods causes the planet; it links responsibility to carbon consumption, not production. For example, the *Lieberman-Warner Climate Security Act* proposes a tradable permit system that applies equally to domestic producers and imported goods. This would cause products that are more emissions-intensive to cost more, regardless of where they are made.

In the above example, the plan would likely impose an immediate cost on Chinese producers and American consumers by driving up the cost of imports. However, the alternative of trying to convince the Chinese government to adopt binding carbon caps will likely be impossible in the near term, because such an approach would render a much greater overall economic cost for China.

production methods as opposed to physical characteristics.³⁰ Both product standards and standards based on process and production methods (PPMs) can also present obstacles for developing country exporters, who need better information on relevant regulations.³¹

Subsidies: Subsidies are one of the most clear-cut areas where trade and climate change regulators agree, as both oppose perverse energy subsidies. From a climate change mitigation perspective, they artificially lower the costs of fossil fuels, thus driving up GHG emissions. A recent United Nations Environment Programme (UNEP) report estimates that governments spend as much as US\$300 billion a year in subsidies that encourage consumption and discourage efficiency.³² The subsidies delay the transition from dirty energy to more climate-friendly sources of power. Many countries in Asia have these perverse subsidies, including China, India, Indonesia, the Philippines, and Thailand. For example,

the UNEP estimates the Indonesian government's direct spending on petroleum products and electricity at about US\$13 billion in 2007. This is close to one-quarter of the country's budget and 5 per cent of its GDP, and more than spending on health and education combined.³³ However, changes in the world oil market are making Asian governments more willing to review subsidies. In the long term, opportunities may exist to promote climate objectives through the WTO by agreeing to reduce or phase out fossil fuel subsidies.

However, some subsidies can be used to correct market failures. For example, there are those that pay for previously unrewarded environmental benefits—such as subsidies for developing and disseminating renewable energy sources that reduce overall GHG intensity of a country's energy mix. When the impacts of climate change are accounted for, these subsidies move prices closer to the true social cost of energy use.

It is uncertain whether subsidies to achieve climate objectives would be permitted by the WTO Agreement on Subsidies and Countervailing Measures (SCM). This Agreement prohibits subsidies that are specific to a particular industry or firm; are provided on the basis of export performance (known as export subsidies) or on the use of domestic over imported inputs (known as local content subsidies);³⁴ or those subsidies that cause injury to foreign competitors. However, the Agreement on SCM recognizes subsidies that are desirable, including some that help firms meet environmental regulations.³⁵

Subsidies for climate change purposes could fall under Article 8 of the SCM Agreement, which was intended to allow WTO members to capture positive environmental externalities and prevents them from challenge in the WTO.³⁶ In the future, members could consider using this category for climate-change related subsidies, since they are exempt from being challenged under the WTO.

Climate-friendly goods and services: Environmental goods and services (EGS) were singled out for attention in the negotiating mandate adopted at the Fourth Ministerial Conference of the WTO in November 2001.³⁷ This negotiation aims to improve market access for EGS, and is likely to have implications for countries meeting their Kyoto objectives. Lowering trade barriers should bring EGS prices closer to world market prices, making them more affordable to industry and individuals and bringing down overall climate mitigation costs. Lowering barriers can also facilitate access to EGS, contributing to UNFCCC technology transfer mandates.

However, negotiations are currently bogged down in definitional issues over whether EGS includes 'low-carbon' goods and services.³⁸ An alternative approach to redefine and simplify the negotiations in terms of problem areas has been suggested, including singling out EGS relevant to the Kyoto Protocol and proceeding with liberalization.³⁹

However, many developing countries in Asia are concerned that trade liberalization may not increase export opportunities, as developed countries who dominate the international market for EGS would derive the greatest commercial gains from liberalization. Developing countries derive most of the environmental benefits, while countries that lack purchasing power or have other import priorities will see negligible benefits.⁴⁰ Developing countries could feel that they can gain similar environmental benefits outside of these WTO negotiations through autonomous liberalization.

While Asian countries have common concerns regarding the impacts of EGS liberalization, their views are also divergent because of varying economic growth levels, domestic capacities, and environmental concerns.⁴¹ Each country needs to tailor its WTO negotiating strategy on EGS to reflect these concerns, and efforts to liberalize EGS must be carried out in this development context. This would imply that Asian economies' approach in WTO EGS negotiations should only be to promote liberalization in EGS sectors that they need, have the capacity to absorb, or can export at competitive levels.⁴² This requires a careful assessment of the necessity for liberalization, the timing and extent of liberalization, and the economic sectors to be affected. The assessment process should include national and regional consultations on the pros and cons of various liberalization approaches, and should also explore special and differential treatment. This includes the possibility of linking tariff reductions with access to and transfers of environmental technologies and methods.⁴³

9.4 CONCLUSION

Climate change is widely seen as the biggest challenge to sustainable development ever faced by the international community. In order to ensure global participation, it is becoming clear that measures to address climate change need to be compatible with economic growth objectives. This challenge also demands national and international solutions. At a minimum, international regimes for trade and climate change should be able to function independently under their mandates with minimum conflict, but ideally they will be mutually supportive. From the perspective of Asian countries, this chapter analyses how policies in the two regimes interact and how trade liberalization might affect climate change goals.

First, trade liberalization has both positive and negative impacts on climate change mitigation. For Asia, under the business-as-usual scenario the short-term impacts of freer trade on climate change will likely be negative by increasing economic growth and energy use, and thus GHG emissions. In the longer-term, fre-

er trade may help countries shift from immediate economic growth goals to more long-term sustainability goals, increase public demand for environmental quality, and promote more efficient allocation of resources. However, making these positive changes fast and deep enough to address a problem as serious as climate change will require significant alterations to existing climate, trade, and economic institutions and policies at the national and international levels.

Second, many national climate change policies will interact with WTO rules by modifying competitive conditions. Moreover, examining the WTO's 'tool box' of rules can be useful to ensure predictability, transparency, and fair implementation of climate change measures. The ability of trade and climate regimes to work together depends on whether goals can be aligned. Further research is needed to design trade and climate measures that are politically feasible, legal under the WTO, and effective. Greater attention should also be dedicated to the impacts of trade policy decisions on the current international climate change negotiations.

In the short term, the key priority for WTO members regarding the linkage of trade and climate change should be to facilitate a uniform approach to taxation of energy and greenhouse gas emissions, particularly with respect to BTAs for exports and imports. This will help avoid the perception that climate measures could be used as an excuse for protectionism and discrimination. The WTO should also seriously consider the issue of phasing out fossil fuel subsidies. In addition, the WTO should address the remaining trade barriers on climate-friendly goods and services, in order to reduce the cost of investing in clean production technologies and environmental and climate management systems. On this particular issue, if the negotiations are to be successful the interests of developing countries in Asia must be taken seriously. Finally, trade liberalization and climate change measures should be included within a broader package of complementary initiatives such as technical and financial assistance.

In short, trade and trade agreements have major impacts on the current and future international climate regimes. As a key global trading bloc, Asia needs to be aware of these impacts and its WTO rights, obligations, and constraints with regard to climate change policies.

The core issue that must be resolved is how to reinvent Asia's trade and climate policies—in an increasingly integrated world—in a way that ensures a sustainable scale of economic activity and respects ecological limits. Protecting the capacity of ecological systems to sustain life is equally important to Asian countries as it is to western countries. Strengthening and aligning the mechanisms and institutions for climate change and international trade will help achieve this global goal.

Chapter 10

Carbon Markets and Emissions Trading in Asia

Roger Raufar

Recommendations for carbon markets and flexible market mechanisms

Asian local officials

- Explore the Clean Development Mechanism (CDM) market opportunities available to local governments—e.g. landfill gas, energy efficiency and renewable energy projects—and seek to use the carbon market to help fund such projects.
- Design and pilot-test regulatory frameworks for employing market-oriented environmental management techniques to address local environmental protection and climate change—a co-benefits strategy.

Asian regional leaders

- Promote the use of clean technology to meet the region's increasing energy needs, and support the role of international greenhouse gas (GHG) markets to provide capital for such purposes.
- Begin discussions about how Asia might create regional market demand for GHG reductions, not just provide supply.

Negotiators

- Recognize that Asia will have to play an increasing role in obtaining GHG reductions, but that it needs sufficient time to make the transition to market-oriented environmental management. Asia needs to begin making environmental commitments to speed up this process.
- Developed economies should continue to provide market support by allowing CDM credits to be used for meeting emissions targets, in order to assist Asia's transition to market-based environmental management.
- Maintain the market-oriented framework in the Kyoto Protocol as the primary tool for promoting international investment, but focus on longer term institutional and policy frameworks, as they are more important than near term reform provisions.

10.1 INTRODUCTION

The international community has invested considerable effort and resources in establishing the institutional infrastructure to accomplish emission reductions within a market framework under the Kyoto Protocol, although the reductions to date have been relatively modest. The goal of the Kyoto Protocol is to achieve a 5.2 per cent reduction in greenhouse gas emissions for Annex I countries from a 1990 baseline. It is clear from recent reports of the Intergovernmental Panel on Climate Change (IPCC), however, that dramatically larger emissions reductions are needed. Emissions reductions of the order of 70 or 80 per cent—from both developed and developing countries—may ultimately be necessary to achieve the stated objective of the UN Framework Convention on Climate Change (UNFCCC) of 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'.¹ [*Ed.: Chapter 1 in this volume provides a more detailed discussion of the latest science and what it will take to achieve this objective*].

It is also apparent that a significant portion of those future reductions will have to come from Asia. Therefore, it is suggested in this chapter that:

- Markets must play a key role in addressing GHG emission reductions in Asia;
- The Kyoto Protocol carbon market has been helpful in providing capital for GHG improvements in the region;
- Developed economies should continue such support (in the form of market demand through the CDM) over the near and medium term;
- Asia must develop emission reduction market demand of its own over time (instead of just providing supply), and a first step is to develop domestic emission markets to tackle its own localized environmental problems; and
- Such Asian emissions markets should have different design characteristics than those employed in North America and Europe.

The following sections address these individual items in turn.

10.2 THE NEED FOR MARKETS

The role of markets was a contentious issue in the negotiations of the Kyoto Protocol. Disagreement over how flexible to make the ‘flexible mechanisms’—CDM, Joint Implementation (JI), and International Emissions Trading (IET)—during the Conference of Parties (COP) process led to a major schism between American and European negotiating teams.² The Americans had achieved considerable success with their market-based acid rain control programme, and had initially proposed the idea of ‘realistic, verifiable and binding’ targets with a market-based ‘international trading regime’ at COP 2 in Geneva in 1996. The American position was based on the premise that addressing global warming would be an expensive and long-term undertaking—literally changing the energy infrastructure of nations—and therefore it was critical that any control programme be economically efficient. Further, carbon dioxide (CO₂) appeared to be the perfect pollutant for such an international market, since it did not matter where the pollutant was emitted or where it was controlled—within about three weeks the pollutant was homogeneously mixed within the atmosphere. There were no immediate public health or toxic threats from its emission—individuals actually emit CO₂ in respiration—so ‘hot spot’ or pollutant loading concerns did not exist. Thus, the American negotiators wanted liberal use of markets to accomplish reductions.

The Europeans, however, believed that control actions should begin at home. Countries like the United States had per capita CO₂ emissions fully five times the world average,³ and the Europeans felt that significant reductions could not be accomplished unless this disparity was tackled head-on. The Kyoto Protocol made clear that ‘trading shall be supplemental to domestic actions’; the European negotiators sought to codify this in the form of ‘supplementarity provisions’, whereby a specific percentage (50% in negotiations) of emissions reductions had to occur from domestic control activities.

The battle over supplementarity led to a major negotiating breakdown at COP 6 in The Hague in November 2000, and the American negotiating team left without reaching an agreement. President George W. Bush subsequently decided to withdraw from the Kyoto Protocol entirely. The Europeans later agreed to the Kyoto Protocol carbon market with the general ‘flexible’ approach originally sought by the Americans in order to attract Japan, Canada, Russia, and other major non-European Union players. There are self-imposed limits on the use of carbon credits within the EU Emissions Trading Scheme (ETS), but countries outside the EU are free to employ market-based mechanisms to achieve their entire Kyoto Protocol compliance target.

Asia largely watched the tussle between the American and European negotiators from the sidelines. Most developing countries in the G77 and China were sceptical about the value and use of artificially constructed markets in emissions. Since they had no reduction commitments (unlike Annex I countries), they did not anticipate the need to voluntarily participate in such markets. During the debate there was still considerable unfamiliarity on the part of Asian negotiators about both the nature and role of such markets. Many viewed it—and some still do—as just some type of Wall Street scheme for making money on carbon reduction deals.

In reality, however, the development of such markets has been part of a strategic shift in environmental management that has been occurring over the past three decades.⁴ The shift has two important components:

1. A shift from an engineering to economic world view; and
2. A shift from price to quantity mechanisms.

The principal characteristics of this transition are noted in Figure 10.1.⁵ The engineering approach (commonly referred to as ‘command and control’ regulation) sets environmental quality standards, and then uses technology-based standards to

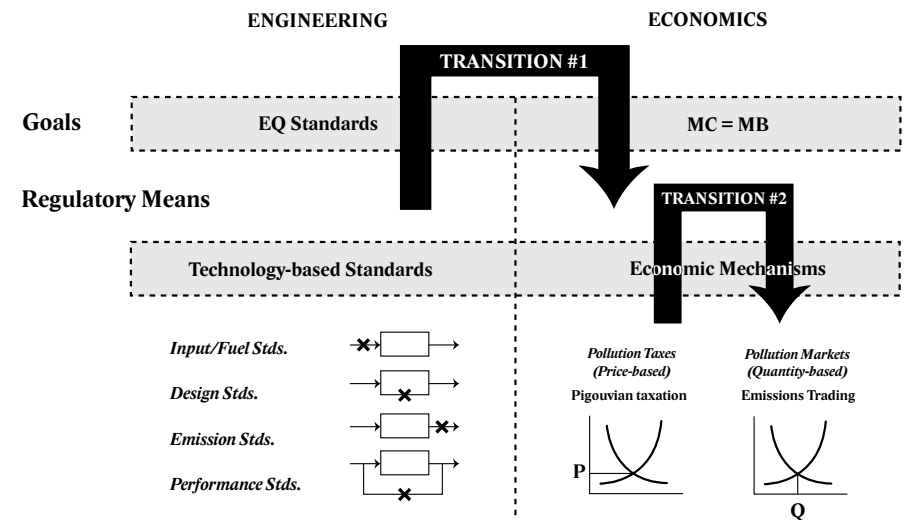


FIGURE 10.1: Engineering vs. economic worldviews⁶

achieve them. Modelling is used to link environmental quality standards and the technology requirements. In the economic worldview, however, the goal is to develop an environmental programme in which marginal costs and marginal benefits of abatement are equal. Economists offer two means of getting there: using prices (e.g. Pigouvian taxation)⁷ or quantities (e.g. emissions trading).

The first transition in Figure 10.1 is not really a full transition—it is only occurring in the bottom part of the frame, the part outlining regulatory means. Most governments do not have sufficient confidence in economists' ability to identify marginal costs and benefits to use this approach for setting environmental goals. However, they are willing to use the regulatory tools economists offer—pollution taxes and emissions trading—to accomplish the original command/control goals.

There are several reasons why such a transition from technology to economic regulatory means is occurring:

1. The economic tools allow the government to focus on setting environmental targets, rather than dictating engineering standards as shown in Figure 10.1 (lower left section);
2. They are economically efficient, since those with the lowest marginal costs provide the control;
3. This efficiency can in turn influence 'real world' goal-setting, allowing more purchase of environmental protection; and
4. Pollution always imposes a cost, leading polluters to continuously seek means of reducing it.

The second transition, from price- to quantity-based instruments, is considerably more controversial, and even today there are many governments (and economists) who tend to favour price-based instruments. Governments have employed taxation for millennia, and are very comfortable with its use. Strictly speaking, this is not an either/or dilemma; each instrument has useful characteristics and is the appropriate tool for specific applications, and all will be necessary to achieve pollution control in Asia. In the longer run, however, the political economy characteristics of quantity-based systems offer some help in this task, and they are a major reason why this shift is ongoing. Quantity-based systems offer the ability to readily and creatively address distributive characteristics and wealth transfers, thereby minimizing political resistance to the new pollution control programmes necessary to tackle Asia's environmental problems.

10.3 CARBON MARKETS PROVIDE CAPITAL

The 2007 World Energy Outlook Reference Scenario of the International Energy Agency (IEA) shows that developing countries in Asia will require US\$6.3 trillion for energy supply investment over the 2005–2030 period—by far the largest demand of any region in the world. China alone will require US\$3.7 trillion—18 per cent of the world's total investment. Energy demand in ASEAN countries is expected to more than double by 2030.⁸ India will see comparable energy growth rates, and its power generating capacity (most of it coal-fired) is expected to more than triple in the same period.⁹ Currently the world's fifth largest emitter of energy-related CO₂ emissions, India is expected to surpass Russia and Japan by 2015 and move into third place behind China and the United States.

In coming decades, Asia will also face one of the most daunting problems identified in the World Summit on Sustainable Development, held in Johannesburg in 2002: access to energy. Of the roughly 1.6 billion persons living in today's world without electricity, more than 900 million live in Asia.¹⁰ Energy growth will thus continue to be an important factor in Asia's development, and the type of new energy provided will have environmental and GHG implications that last for generations.

Capital raised in GHG markets is targeted at this problem. The market size for project-based (primary) transactions under the CDM was approximately US\$2.4 billion in 2005, US\$5.8 billion in 2006, and \$7.4 billion last year.¹¹ Asia is responsible for a majority of Certified Emission Reduction (CER) sales—more than two-thirds in recent years—and China alone accounted for 73 per cent of deals done under the Kyoto Protocol in 2007.¹²

Through the end of May 2008, the Chinese government had approved 1,337 GHG reduction projects under the CDM. Of these, 214 had reached the registration stage in the project cycle, and 44 projects had received issued CERs.¹³

Wind power is an example of how the CDM has assisted in moving developing countries in the right direction for energy development. More than 15 per cent of the 1,337 projects in China are wind energy, and with a total capacity development projected well above 10 gigawatts (GW).

China's National Development and Reform Commission (NDRC) set wind power renewable energy goals for the country in mid-2006, with targets of 5 GW for 2010 and 30 GW for 2020. The first goal was exceeded by the end of 2007, and the second may be reached as early as 2012—a full eight years ahead of schedule.¹⁴

Exactly how much of China's recent success concerning wind power can be attributed to CDM is closely tied to the debate about additionality—but the fact that 205 wind power projects have already obtained approval, and the country is moving much, much faster than its original goals, suggest that it played a considerable role.¹⁵

10.4 CONTINUED MARKET DEMAND FROM DEVELOPED ECONOMIES IS NECESSARY

The CDM market that has assisted China is not without its problems, and these have been well documented in a number of reports.¹⁶ Two such concerns are the large role that hydrofluorocarbon (HFC) destruction played in the early stages of the market's development and the considerable problems with additionality (see Boxes 10.1 and 10.2).

Questions about next steps invariably must deal with the fundamental question: Should we build upon the Kyoto Protocol, or change the framework? If the answer is to change the framework, then some type of alternative must be proposed. There are numerous such proposals in the climate change literature, often relying on emission taxes, technology standards, climate funds, voluntary commitments, and the like.¹⁷ [Ed.: Chapter 11 provides a detailed discussion of the danger with many of these proposals, and the best way to move forward post-2012].

If the answer, on the other hand, is to build upon the Kyoto Protocol, then the next step is reform—and proposals are similarly diverse, often including:

- *Operational reforms*—designed to address problems within the existing market system (e.g. bottlenecks in the review of projects by the CDM Executive Board, and the proper role of Designated Operational Entities);
- *Sectoral reforms*—designed to target large emitters (e.g. the power sector, metals industry, chemicals) and other significant actors (e.g. forestry), with the hope of bringing such sectors in developing countries into the emissions reduction framework;
- *Benchmarking reforms*—designed to simplify the project analysis or review process, affect the project mix, and minimize additionality concerns;
- *Temporal reforms*—designed to provide market stability for longer-range investment decisions, and allow for technological development and transformation;
- *'Policy inclusion' reforms*—designed to incorporate broader country-wide policies, especially in developing countries, such as sustainable development and GHG reduction policies into the carbon market framework; and
- *'Programmatic' reforms*—designed to broaden the nature of projects to include larger-scale programme implementation.

Several recent reports from Asia have fallen within the 'policy inclusion' group, arguing that sustainable development policies and measures should be incorporated into the CDM framework.¹⁸ One example, by Rae Kwon Chung, is based upon the incorporation of 'unilateral emissions reductions', and is outlined in Box 10.3.

Box 10.1 HFC Destruction

In 2005, a handful of HFC destruction projects made up fully two-thirds of the CDM marketplace.¹⁹ They were the 'low hanging fruit'—it has been estimated that less than €100 million worth of pollution control for this chemical generated €4.7 billion worth of carbon credits.²⁰ This is an important result of the initial market design. Emissions markets are artificial—they are created and designed by governments.²¹ In the case of HFCs, the key decision occurred in 1997, when the United States proposed to expand the Kyoto Protocol's purview beyond the initial focus on combustion-related CO₂ and methane to include GHG industrial chemicals. Little consideration was given to the ramifications for CDM and the potential international carbon market.

These new markets then did what they are supposed to do, however: they found the cheapest, easiest, fastest, and simplest way to generate credits. China had initially announced it would favour energy efficiency and renewable energy for CDM projects—but it quickly changed its mind when the amount of funding available from HFC and other industrial chemicals became apparent. However, China decided to tax those transactions heavily (65% for HFC destruction; 30% for N₂O), and channel the revenues into a CDM Fund for sustainable development projects.

Box 10.2 Additionality

The problem with additionality is more difficult, since it is a structural element of the credit generation.

When emission credits were first utilized in the US air pollution programme in the mid-1970s, the emission reductions had to meet four criteria: they were required to be quantifiable, enforceable, permanent, and *surplus*. Surplus emission reductions were defined as beyond the command/control requirements to meet the ambient air quality goal. As in Figure 10.1, those requirements were designed to be technology-based standards—so determining the baseline was a straightforward regulatory technology analysis.

Under CDM, however, the baseline became counterfactual—a 'what-would-have-happened' in the host country scenario. Surplus became 'additionality'—a requirement that the project would not have been financially viable or happened without carbon credit revenue. This is determined on a project-by-project basis using baseline methodologies and an additionality tool approved by the CDM Executive Board, and verified by third party auditors.

The difficulties associated with such a complex scheme have been documented, and it is clear there have been implementation problems. An evaluation of 93 randomly chosen CDM registered projects by Öko-Institut e.V. (prepared for WWF) suggested that 'additionality is unlikely or questionable for roughly 40% of the registered projects' and that 'these projects are expected to generate about 20% of the CERs'.²²

Box 10.3**Market-based climate regime and ‘Unilateral Emissions Reductions’
by Rae Kwon Chung²³****Background**

- **Measurable, reportable, and verifiable actions from large developing countries:** a critical element of a post-2012 framework.
- **Cannot be imposed in short and medium term:** must be supported by developed countries.
- **Climate regime:** needs to provide the incentives—including money and technology—and a framework for developed country support.

‘Unilateral Emission Reductions’ (UERs)

- **Large developing countries already taking voluntary actions:** China’s 20 per cent energy efficiency improvement of GDP in 11th Five Year Plan.
- **Public sector financing/technology stimulation is not enough:** this scheme would mobilize vast amounts of funding in the private sector.
- **A new flexible mechanism could be added to award credits—called UERs—for the amount of reduction below business-as-usual projections produced by these actions.**
- **Annex 1 countries could take on an additional commitment to buy a certain number of credits, creating a global market for UER credits.**
- **Overall cost of reductions would be cheaper:** China (US\$20 per ton CO₂) vs. Japan (US\$234).
- **Essentially a large expansion of current flexible mechanisms to channel large amounts of funding and technology from developed to developing countries and promote sustainable development objectives.**

Issues

- **UERs and CERs could converge if CDM is expanded.**
- **UERs need a streamlined, less rigorous approval process:** this could lead to price differentiation among credits, and could be alleviated through discounting of less desired projects.
- **Would represent real reductions if Annex 1 countries agree to ‘additional’ target.**
- **Can also ‘multiply’ credits for favourable projects that promote more long-term sustainable development.**
- **Least Developed Countries and Small Island Developing States (LDCs and SIDSs) could receive a percentage of credits as funding for adaptation.**

This way, the proposal could address four key components of post-2012 framework: **mitigation, financing, technology transfer, and adaptation.**

This chapter similarly falls within the Kyoto Protocol reform camp. There is obviously a learning curve in any such endeavour—particularly one as comprehensive in scope as the reduction of greenhouse gases—and the carbon market has a number of positive attributes to build upon. CDM has ensured the participation of major developing countries in the Kyoto Protocol process. Developed countries have the most important role in mitigating GHG emissions in the near term, but the true test in future years will be to mitigate emissions from major developing countries. It has introduced environmental management norms that have been lacking in many developing countries—such as environmental accountability of projects, transparency in reporting, and third-party validation and verification. Those who have worked on environmental projects in developing countries in the pre-Kyoto Protocol era recognize the importance of this learning process.²⁴ Finally, the CDM also introduced the market-oriented way of thinking about environmental management (noted in 10.1) to developing countries—one that is likely to be critical in addressing domestic environmental concerns as well.

Seen in a longer-term framework, environmental markets must play a key role in the decades- (and centuries-) long process of tackling global warming and changing the energy infrastructure of nations. Developing countries will need to use such markets to address their domestic air pollution concerns—and eventually they will use such markets to put a price on carbon. As Richard Schmalensee of MIT wrote, ‘When time is measured in centuries, the creation of durable institutions and frameworks seems both logically prior to and more important than choice of a particular policy program...’²⁵

In this context, the overriding task of developed countries is to help developing countries make this long transition to market-oriented forms of environmental management—where carbon reduction demand as well as supply can be obtained in Asia.

China and India, although crucially important in the climate change discussion today, together contributed less than 10 per cent of the CO₂ emitted during the period 1850–2002—emissions leading to the high concentrations found in the atmosphere today.²⁶ They need time to construct the market-oriented institutional framework already found within the developed world. This fact also raises serious equity concerns regarding a future climate change framework [*Ed.: which is discussed in detail in Chapter 6 in this volume*]. Further, while the European Union and United States market programmes will have important implications for CO₂ emissions in future years, their ultimate success is unlikely if they ignore the tremendous projected growth in emissions from Asia.

There is thus a basis for continued support of Asian market development over the near and medium term—if not for historical or moral reasons, then merely in self-interest. Their own efforts will be swamped if these projected emissions are not adequately addressed.

The current picture is not encouraging. The European Union has been carrying a significant burden in this task over recent years by providing the bulk of demand for CERs during the EU ETS Phases I and II. However, the EU's proposed Phase III approach outlined in January 2008 is more circumspect about allowing international credits, seeking to foster European action on renewables and mitigation activities.

Signals from the United States are also worrisome for Asian market proponents. The Regional Greenhouse Gas Initiative (RGGI) in the north-eastern United States allows only domestic offsets. Federal US climate legislation awaits the next President, but recent Congressional efforts strictly limited the role of international offset provisions.

Given the initial market problems and scale of GHG reductions required, benchmarking and sectoral reforms seem more promising—but such aspects of the Kyoto Protocol reforms matter less than three underlying facts: Asia will have to play a key role in reducing GHG emissions; the region needs time to develop the market-oriented environmental management infrastructure necessary to address its environmental problems; and developed countries should—and have a self-interest in—helping Asia to make that transition.

10.5 ASIA NEEDS DOMESTIC EMISSION MARKETS TO TACKLE ITS OWN LOCALIZED ENVIRONMENTAL PROBLEMS

Asia has a number of existing serious environmental problems, some of which—such as air pollution—could benefit from market-based solutions. A 2005 report in *Nature* showed that concentrations of nitrogen dioxide in the atmosphere over China had risen by 50 per cent over the previous decade, and the build-up was accelerating.²⁷ Chemical measurements conducted by the United Nations Environment Programme (UNEP) in 2002 found that as much as 75 per cent of the 'Asian Brown Cloud' was due to anthropogenic sources, and an estimated 40,000 fires occurred in South-East Asia in 2006. Fires from peat and forest lands in Indonesia were so great in 1997 that they emitted an amount of carbon equivalent to 13 to 40 per cent of the mean annual global carbon emissions from fossil fuels.

Local air pollution is causing tremendous economic and environmental damage throughout Asia. The World Bank and China's State Environmental Protection Agency [*Ed.: now the Ministry for Environmental Protection*] have estimated that outdoor air pollution in China caused 350,000 to 400,000 premature deaths per year, while indoor air pollution added another 300,000.²⁸ Economic estimates of the damage from pollution are staggering: in many cases they wipe out all the benefits from economic growth.²⁹

Not surprisingly, air pollution control makes economic sense. A retrospective economic analysis of the US *Clean Air Act* over the period 1970–1990 estimated the value of benefits to be US\$22.2 trillion for costs of approximately US\$0.5 trillion. For every dollar spent on air pollution control, Americans received approximately US\$45 of value in terms of reduced mortality, morbidity, and other negative impacts.³⁰ Even today, the value of more comprehensive programmes in the United States exceeds US\$25 of benefits per dollar of control.³¹ [*Ed.: Chapters 3 and 7 in this volume provide a more detailed discussion of the problem of air pollution in Asia and potential approaches—beyond markets—to control it*].

A conservative analysis of control efforts in the power sector in China found that 'the quantifiable health and non-health benefits of controlling SO₂ emissions from existing power plants will outweigh the costs by a ratio of more than 5 to 1 with significant additional benefits that were not assessed.'³² Further, the latter analysis found that those same benefits could be obtained at lower costs—by at least 16 per cent—if China implemented a quantity-based market approach to accomplish such controls.³³

China is aware of the advantages of quantity-based approaches, and has instituted a number of pilot projects to explore their potential application.³⁴ However, these have not been particularly successful. Instead of copying the United States and European approaches, it is time to develop an Asian approach to market-based pollution control.

10.6 ASIAN-BASED EMISSIONS MARKETS WILL BE DIFFERENT THAN NORTH AMERICA AND EUROPEAN EMISSIONS MARKETS.

Given environmental, political, and social conditions within Asia, a number of principles should guide the development of Asian environmental markets:

10.6.1 *Real-time control to protect public health*

In the early 1970s, when states in the United States were developing air pollution control plans, they typically included 'episode action plans'. These described actions to be taken in the event that air pollution levels became too high. Many power plants initially developed 'intermittent control strategies' designed to protect public health until full-control programmes were implemented. Beijing's actions for the 2008 Olympics—shutting down polluting facilities in a five-province region for several weeks to

protect the health of athletes—can be seen in the same light. Indeed, scientists are treating this as a ‘one-of-a-kind chance to study the large-scale effort in a uniquely urban laboratory.’³⁵ Given the radical changes in both monitoring and modelling capabilities and computer and information technologies since the early 1970s, an Asian control programme could similarly be designed around real-time public health protection in its early stages.

10.6.2 *A technological focus on compliance*

Non-compliance is a major problem with the legal and regulatory environmental management framework in Asia. The NDRC in China recognizes that even after flue gas desulphurization units had been installed in power plants, in 60 per cent of cases they are not operated because non-compliance penalties are lower than operating costs of the equipment.³⁶ Ensuring environmental compliance through governmental institutions is not as strong in Asia as in Europe and the United States, but it may be possible to use technology to assist in this effort.

For example, predictive emissions monitoring using control room data may allow the estimation of emissions even if continuous monitors are not reporting (typically because the scrubber is not working).³⁷ Remote sensing (including use of mobile phone sensors), third-party verification systems, and a host of similar technologies might be used to radically change monitoring capabilities within Asian market systems.

10.6.3 *Attention to the role of distributive issues in order to assist economic development*

One of the principal reasons for the price to quantity transition noted earlier was the distributive impact of Pigouvian taxation. Pollution taxes take money out of the private sector and transfer it to the public sector. This is why governments are so favourable to taxation schemes—and environmentalists look to the large funds that become available from carbon taxes for climate-related activities. Quantity-based schemes can minimize such wealth transfers by ‘grandfathering’ pollution allowances, thereby reducing political resistance to the pollution control requirement. The United States’ acid rain market-based programme adopted such an approach, as did the early stages of the EU ETS.

But why give allowances to the polluters for free? The EU ETS found that large power companies could receive a considerable windfall with such an approach,³⁸ and the size of the giveaway under carbon markets is much larger than for acid rain. Thus,

carbon regulatory programmes in both the United States and Europe now include provisions for auctioning allowances. However, full-scale auctioning would produce distributive characteristics similar to those of Pigouvian taxation.

The key advantage of such quantity-based markets—and an important reason for the second transition—is that there are a wide range of options between a full-scale giveaway and a full-scale auction. The options in that range should not have a significant impact upon the efficiency of the pollution control decision by individual market participants, and Asian policy-makers can use the distributive impacts of emission markets to address sustainable development concerns.

10.6.4 *Eventual introduction of carbon pricing*

While developing countries in Asia can take interim steps to improve energy efficiency, use renewable energy, implement greenhouse gas mitigation measures through regulation, and participate in CDM and (potentially) sectoral and/or other carbon market activities, the ultimate goal is the same as markets in the European Union and United States—to deal with the externality effects of GHGs by putting a price on their emissions in Asia.

This will ultimately occur in an efficient and progressive way if Annex I countries recognize the importance of Asian environmental market development in achieving the objectives of the UNFCCC, assist in laying the institutional framework needed for environmental market development within the region, and provide support for such market development with continued demand for Asian carbon supply over the near and medium term.

In the longer term, however, it will be Asia’s responsibility to develop robust regional markets. The region must ultimately ensure that the environmental impacts of all pollutants—whether localized or global—are fully reflected in the market decisions of the rapidly growing Asian economies.

Chapter 11

The Global Deal: Deadlock or Default?

Thomas C. Heller

Key objectives of a Copenhagen agreement

- Build climate institutions that are more capable of effective risk management and productive carbon investment by making them more adaptable, flexible, and open to external input than their Kyoto predecessors; and
- Begin exploring more comprehensive development strategies for sustained growth and well-being in economies where carbon is no longer treated as free.

Key recommendations for negotiators to achieve these objectives

Short-term

- Evaluate the probability and risks of an ineffective, ‘default’ agreement that does not adequately manage climate risks; and
- Avoid creating or continuing poor quality institutions and incentives, which are difficult to disrupt once private and public actors have adapted their behaviour to them.

Medium-term

- Focus on the design of institutions and mechanisms that will better manage the risks of ineffective implementation of a reformed post-2012 climate regime;
- Outline the principles and initial composition of institutions that can learn, respond to, and manage the regulatory errors in the post-2012 agreement; and
- Ensure there are external organizations with the capacity to monitor, evaluate, report on and improve the performance of regulations.

Long-term

- Launch a process to explore, evaluate and map the paths to better carbon productivity that can be analysed and sustained by outside actors in the long term;
- Recognize that carbon productivity is driven by the general economic and regulatory factors that determine the character of input markets; and that many of these broader political and market forces may be increasingly unstable relative to expectations formed in the past decades; and
- Think about how financial markets, commodity price increases, or national development models will create challenges or opportunities for carbon management that are not addressed by more climate-centric analyses.

11.1 KYOTO PROTOCOL: THE BASE FOR A STRONGER AGREEMENT

The Kyoto Protocol was always intended to be a limited and temporary foundation for a comprehensive international climate regime, and it has served that purpose by establishing some basic principles for the evolution of that regime. These include the concepts of cap-and-trade, the principle of common but differentiated responsibilities, and the importance of both mitigation and adaptation. However, it is also clear that Kyoto is too narrow in the nations and activities it regulates, and that its institutions cannot assure effective management of carbon risks. These principles and shortcomings of Kyoto form the basis for the current international climate change negotiations.

This chapter examines the state of negotiations for Kyoto's successor. It first provides an overview of the 'global deal' that appears to be the most likely outcome of current negotiations. Next, it analyses the key political factors driving this outcome. This political analysis reveals an alternative perspective on current negotiations, including specific limitations that could lead to an agreement that appears to be robust, but in reality fails to adequately manage large-scale climate risks. Finally, it describes the key elements of the different approach that is needed to ensure an environmentally robust and politically adaptable climate regime.

11.2 THE 'GLOBAL DEAL'

The next negotiating round of the United Nations Framework Convention on Climate Change (UNFCCC) began in Bali in December 2007 and is scheduled to be completed in Copenhagen in 2009. The image of a 'global deal' has come to dominate the debate over the expected outcome of this process, and it is thought that skilful diplomacy will be needed to break free of a deadlock in the negotiation of a post-2012 climate regime. Following is a detailed commentary on what is on the negotiating table today, while another set of broader questions on an alternative approach to climate risk management will be largely reserved for other forums. This approach should place greater emphasis on the unstable dynamics of resource markets and the policies for growth and security that fundamentally drive carbon emissions.

The components of the global deal are often discussed in ways that magnify the potential conflicts surrounding agreement.¹ The discussion is increasingly dominated by the following components:

(a) Harmonized commitments by Annex I nations—There is agreement that all nations should commit to long-term carbon reduction goals consistent with stabilization of emissions in the range of a global 2 °C increase. This implies a long-range goal of annual emissions of two tonnes per capita globally—an 80 to 90 per cent reduction below 1990 levels by 2050 for industrial nations—and a peaking of emissions growth by 2020 for major emerging market countries, with a 20 per cent average reduction from 2020 to 2050. Therefore, it is argued that industrial nations should accept mid-range emissions targets 20 to 40 per cent below their 1990 output. In addition, major emerging market nations, including China and India, should commit to accept mandatory targets after 2020.²

(b) Expanded and deepened carbon offset markets—Carbon markets between developed and developing countries have operated under the Kyoto Protocol through the Clean Development Mechanism (CDM). CDM credits generated so far have been concentrated in large-scale projects with the intention of reducing waste emissions from industrial gases and methane and, in smaller scale projects, in renewable energy generation. The Copenhagen agenda suggests extending these mechanisms to a wider range of projects including energy efficiency, transportation, forestry, policy reform (programmatic CDM), and technology development. It also suggests the mechanisms be amended to reduce the transaction costs associated with project approval, monitoring, and verification to increase the quantity of offset volumes traded. Advocates of carbon market growth argue that while the quality of CDM assets has been poor in its initial operation, all markets are uneven in their early years and learning by regulators will eliminate sub-prime assets over time. In this regard, they stress the political and economic importance of transferring more financial and technological resources to more developing countries by expanding the volumes of flows and the categories of activities that qualify as CDM-eligible [*Ed.: see Chapter 10 for further discussion of market mechanisms*].

(c) Additional advanced technology-development mechanisms—Because it is perceived that national commitments in the coming period will not generate carbon prices sufficient to provide incentives for the development of far from commercial technologies, many have argued that the global deal should include new mechanisms for advanced technology development. These multilateral technology funds, composed of contributions from Annex I countries, would likely be administered by international financial institutions (IFIs) such as the World Bank or the Global Environmental Facility. However, in past experience, such international funds have been used overwhelm-

ingly on subsidies to enhance cross-border diffusion of already commercial technologies. It has rather been national systems of innovation that enact policies intended to accelerate technology development by subsidizing the proof of scientific concept and engineering demonstrations, without a focus on downstream transformation.

(d) Additional adaptation funding—It has been widely recognized that, in the interest of equity, a multilateral fund for transferring financial resources to the countries that are poorest and most vulnerable to climate change damage is necessary [*Ed.: see Chapter 6*]. Although the governance of these prospective funds is contested in the UNFCCC negotiations,³ descriptions of the global deal offer little detailed attention regarding which agencies, operating under which canons of development assistance practice, should have the power to decide how these funds can most productively be used.

11.3 THE LIMITS OF THE GLOBAL DEAL

The problem with the image of a global deal is not that it is too ambitious, but that it is too conventional. It seeks to follow the logic of basic economics: it begins with a normative objective, defines policy tools to achieve it, and relies on market institutions to do so at the lowest possible cost. If implementation problems arise, they are labelled barriers and some non-economist is advised to remove them.

The actual climate negotiation process is much more political, however, because the frame of debate and set of solutions are defined by complex and opaque interactions among public institutions, often at national and international levels. Since most policies will have been created within this framework, private organizations and other governments will have adapted to its incentives. For a political economic analysis, the embedded institutional systems that regulate energy and land use—the drivers of greenhouse gas emissions—are an essential part of human social organization whose dynamics must be taken into serious account if an international climate regime is to be effective.

11.3.1 *The key arguments of a political economic analysis*

First, all international agreements are products of, at least, a two level game.⁴ In this game, national policies and measures often take precedence over international actions. Because most governments are reluctant to ignore their international

commitments, these national desires will be particularly relevant in the formation of international regimes like the Copenhagen climate agreement. In addition, domestic policies are the outcomes of complex interactions between public agencies and their allied private interests pursuing what are often competing policy objectives. Therefore, when cooperative international agreements are built from national policies, politically embedded solutions are likely to dominate despite international obligations that attempt to override them.

Second, organizational studies have found that public institutions are rarely simple agents of the people who are supposed to be their principals.⁵ Institutions are self-interested, will develop internal identities tied to their missions, and will seek to defend and even expand the boundaries of their jurisdictions. Political institutions are also generally less subject to competitive constraints than private firms and can often only be reformed by a new voting coalition. At certain times—such as when economic conditions are under pressure to change—the formation of these coalitions can be difficult due to the influence of actors who obtained power in prior political bargains. Therefore, a political analysis attends more to the power of the past than does normative economics.

Third, political economy analyses private firms differently from normative economics. Private organizations, especially in industries built upon the last vintage of commercial technologies and market structures, also have core businesses they do not want to abandon. Studies have shown that leading firms in a certain industry rarely maintain their prominence across waves of fundamental technology change.⁶ However, power to influence policy reforms better adapted to emerging technologies lies more with existing successful organizations than their new competitors.

Finally, political economy suggests that regulation, which is quite necessary in certain cases, presents opportunities for private and public actors to pursue their organizational goals. Regulation is a primary driver of agency desires to expand their authority into new areas and private desires to manipulate legal rules to earn more than competitive profits (rent-seeking), which occur at any level of government with a regulatory structure. Political economy calls for constructing international institutions with the capacity to implement rules, understand how these rules may be exploited in different national markets and regulatory systems, and internalize this expertise to learn to correct this unwanted behaviour.

11.4 AN ALTERNATIVE PERSPECTIVE ON THE 'GLOBAL DEAL'

Viewed from the perspective of this political economic analysis, an alternative viewpoint on the negotiation process is that there is a much smaller risk of deadlock than is implied in discussions of a prospective global deal. This perspective argues that there will be a predictable—'default'—agreement at the end of the Copenhagen process, and that it will only differ from the proposed global deal with regard to the commitment components. The negotiations will likely still conclude in the waning hours of the Conference of Parties in Copenhagen (COP 15), but the celebration of this last minute, dramatic agreement will belie the substance of the deal that is won. The bottom line of a default perspective turns on the forecast that a likely Copenhagen outcome is not the lack of a deal, but a bad deal. Its weakness will lie in a failure to build regulatory institutions of sufficient capacity to ensure that the quality of the national compliance measures will effectively reduce the actual risks of climate change.

To be specific, an alternative view of the likely climate deal differs from the existing global deal over the issue of national commitments for 2020, especially in the mid-range targets among developed countries. Rather than harmonized targets based on climate risks, developed countries will likely offer their legislated national climate programmes as their commitments. The European Union (EU) has already put forward its draft domestic programme, whose final form will be the basis for its international offer. It proposes a 20 per cent unilateral reduction in emissions below 1990 levels by 2020 and an additional 10 per cent reduction if other Annex I countries make comparable offers. However, the United States will not enact national legislation that reduces emissions to levels below its 1990 baseline by 2020 and accelerates reductions thereafter. Japan may insist on its own national methods—policies and measures rather than internal markets—to reduce emissions. Debates will centre on what absolute quantities of emissions reductions or costs per tonne of mitigation or mitigation percentages below otherwise expected emissions levels represent comparable efforts between the Annex I emitters. The history of negotiating climate agreement suggests it would be far better if these rough pacts were worked out in advance of Copenhagen in the G7 process rather than in the UNFCCC forum.⁷

However, the default perspective also suggests that major emerging market countries will not accept firm obligations—or a 'commitment to commit'—to national targets after 2020.⁸ If developed countries have not agreed to a uniform level of mid-range mitigation commitments, emerging market nations will likely insist that they are released from any obligation to conform to the previously discussed IPCC 2 °C scenario. Rather they will negotiate around the concept of reportable,

verifiable, and measurable national climate actions—possibly without the character of international legal status—and dependent on financial or technical support commitments from Annex I nations.

Most significantly, a default perspective suggests that, in the context of extended negotiations focused principally on the comparability of differentiated mid-range commitments among developed nations (along with the implications of these contested differentiations for the future commitment of major developing nations), the portfolio of North–South issues will once again receive scant attention. Without serious analysis or argument, it will be easy to slide into agreement on expanded and lower cost forestry and carbon markets—with a mandate for future meetings to work out operational details—and on conventional technology and adaptation funds, with some concessions to additional developing country input and many complaints over inadequate scale. There will also be abstract specification of a long-term target for 2050, with considerable hedging in wording about implications for developing and emerging market countries.

In summary, the default outcome of the Copenhagen process is likely a package of:

- (1) Diverse, if roughly comparable, national legislative programmes;
- (2) Specific climate action policies in emerging market nations;
- (3) An expanded CDM; and
- (4) Relatively small and IFI-administered technology and adaptation funds.

This default agreement is fundamentally an aggregation of non-cooperative or unilateral positions taken by leading Annex I and emerging market nations. It combines national offers based strictly on domestic interests in advanced industrial parties, (WTO-like) compensated deals with key developing countries built upon a base of national action programmes consistent with their internal development goals, and growth in the jurisdiction and scope of established climate institutions. Although it would have a larger scale and scope, this would still be a continuation of political business-as-usual.⁹

11.4.1 *The risks and dynamics of a weak agreement*

The alternative perspective argues that the real danger is not failure to reach any agreement; it is likely that a global deal will be a weak and symbolic agreement that does much less than it appears to manage climate risks. Its gains are already on the table in the national climate legislation in Annex I countries and national climate

change measures in emerging market nations that are taken for domestic economic and political reasons. These reasons include popular demand for action, but also result from energy security concerns, industrial policy, and special interest regulations that are drawn under the umbrella of climate. The default climate deal appropriates the gains from these national actions and packages them in the UNFCCC process. There is nothing exceptional about this mode of action, as most effective international regimes are built from national positions among small numbers of parties that share common interests or the possibility of gains from trade.¹⁰

This mode of action can also pose serious negotiating challenges for countries such as Germany that would like to set high targets but are unsure of their ability to achieve them (see Box 11.1). At the same time, these negotiating challenges are magnified when combined with the more worrisome risks that a default Copenhagen deal will not learn from Kyoto, but persist in ignoring the insights of political economy and the expected behaviours consistent with those insights (see section 11.2 for a full discussion).¹¹ Some of these effects are internal to the national systems where domestic climate programmes, policies, and measures are undertaken. Since carbon prices or policies must be artificially established, climate actions always involve national regulation and there will always be some degree of successful rent-seeking. National carbon prices for different activities will vary as programmes for market division, subsidies, and mandatory standards are added to more comprehensive carbon taxes or cap-and-trade systems. Emissions permits will be given out at less than cost and financial proceeds from taxes or permits will be distributed outside general budgets. These transfers may be inequitable or wasteful—and drive up the cost of achieving targets—but they do not by themselves increase the risk of failure to achieve climate targets.

It is more dangerous to the international climate system that political economic effects will create incentives that misallocate and waste the scarce political and financial resources devoted to climate change and undermine the promised performance of national systems. These risks are concentrated in the less controversial components of the global deal—the expansion of carbon markets and the establishment of multilateral technology funds—but they introduce the danger that the default agreement will lack substantive impact.

11.4.2 An alternative perspective on carbon markets

Highly uneven development underlies the principle of common but differentiated responsibilities that precludes all countries from taking the same commitments to mitigate carbon emissions. Therefore, some form of carbon finance is a necessary element

Box 11.1

The commitment conundrum in Germany

There are few nations that might claim a more profound commitment to a low carbon economy than Germany. Just as Europe has assumed larger reduction burdens than other Annex I economies, Germany has accepted a larger share of the EU's total responsibility. However, the uncertainty about the environmental performance of climate institutions, especially in the effectiveness of carbon finance, can create dilemmas in the creation of domestic and international negotiation strategies.

German national and international strategy:

- Created aggressive renewables programmes through both a well-designed feed-in tariff and portfolio standards;
- Implemented comprehensive standards and incentives for energy efficiency in buildings, appliances and transportation;
- Pledged to close its nuclear power plants;
- Engaged in a serious political debate about a moratorium on new coal-fired generation until carbon-capture and sequestration can be added; and
- Talked of an end game with a global cap-and-trade system based on a per capita distribution of carbon allowances.

2008 national energy plan proposes:

- 40 per cent emissions reduction by 2020 against a 1990 baseline;
- 30 per cent of electricity production from wind and solar;
- An intelligent grid to move power efficiently and flexibly, and
- No extensions of existing nuclear licences.

Problems have emerged in delivering this ambitious programme:

- Taxes on automobile CO₂ emissions and heightened efficiency standards for new and existing buildings were cut in internal bargaining;
- Electricity grid in North Germany is inadequate despite plentiful offshore wind power, has legal issues, and is up for sale by its owner;
- Unclear prospects and business plans to finance and build the pipeline network to move sequestered carbon dioxide from plants to identified storage sites; and
- Growth in demand is exposing the need for new power supply, and coal is favoured because the price of natural gas is linked with oil.

The strategic conundrum for Germany:

- It must commit to EU and Copenhagen mitigation commitments despite uncertainties about its ability to meet them;
- If it is able to comply, Germany could be a net seller of permits into the EU Emissions Trading System (ETS), while if it is not, Germany would need to buy permits externally;
- German experts and officials do not support expansion of the CDM market because of distrust of its performance and a desire not to undercut incentives of EU firms to invest in new technologies;¹²
- However, if it may end up a potential buyer, Germany may take an optimistic stance on CDM to enhance the supply of credits and hedge the risk of high prices;
- The deeper the German mitigation commitment and risk of needing to buy permits, the stronger the political pressure to believe that the carbon market will overcome its past mistakes (see Box 11.2).

The dilemma of pushing for more ambitious international commitments is that these idealized solutions may, in practice, leave the global climate worse off than a realistic international position and the pursuit of national programmes beyond what has been promised.

Box 11.2 Carbon Finance in Practice

Because a quality financial mechanism that links advanced industrial and developing countries is essential to the success of a post-Kyoto climate regime, it is important to consider the experience and prospects of the CDM as the principal vehicle for carbon market growth.

Article 12 (CDM) of the Kyoto Protocol—created a global, integrated carbon market that allows actors in Annex I countries to buy legal permits to offset carbon they emit by financing projects in countries without caps that reduce business-as-usual emissions.

CDM Executive Board (EB)—acts as a regulator to define the general principles of the system, approve methodologies, and certify credits as tradable financial assets based on the level of the project's reduction below business-as-usual emissions.

CDM projects—explosive growth in recent years, concentrated in the same emerging market economies—China and India—generally those that are more able to organize businesses in international markets.¹³

Groups interested in maintenance of CDM—

- Financial firms, usually in Annex I countries, that make money developing projects and/or trading the financial assets they produce;
- Firms and governments in developing countries, who implement CDM projects and profit from payments and taxes associated with the credits sold; and
- Firms and states in Annex I countries buying CDM offsets to comply with their Kyoto commitments at the lowest overall cost, including Japan, Norway, and the EU.

Early problems with CDM—unexpected volumes of emissions reductions from the mitigation of HFC-23, a by-product associated with the production of industrial coolants.¹⁴ Overstated baselines and sale prices much higher than the costs of mitigation induced some eligible firms to expand production simply to generate more CDM credits. In China, the government has noted these problems and imposed a 65 per cent tax on these credits. This problem also represents a substantial waste of the scarce funds for climate mitigation and, because of criticism, the EB froze the quantity of such projects. This example can be cited as proof that CDM markets can be corrected, but it is hard to believe that regulators can keep up with new types of sub-prime assets generated by project developers and others who profit from these markets.

Recent CDM challenges—emerging market countries such as China and India are eligible to receive CDM credits from virtually any new power plant, based on the difference with a business-as-usual baseline derived from a standard coal plant on the existing electricity network.¹⁵ In principle, there is nothing wrong with such expansive CDM programmes, but the economics of these plants has not been influenced by the incremental financing from CDM sales.¹⁶ The growth of more costly gas, hydro and advanced vintage coal plants occurs without any incentive from the outside because it is consistent with China's domestic energy and industry goals. The good case, in theory, for international transfers to support Chinese gas and cleaner coal plant development, is undercut in practice by the regulatory incapacity of CDM to discern the complex dynamics of sectoral development.¹⁷ Local and expert knowledge of the internal dynamics of national energy sectors and ability to influence these dynamics is needed to target funding at the margins where global and national forces are already pushing domestic power systems.

of an efficient and equitable climate regime. Financial incentives to realize collective global gains around the margins of developing country domestic policies will also often have greater effectiveness than expending such resources in countries with legal carbon commitments. It is more difficult to make these investments on the right margins and without wasting carbon finance assets. Under the Kyoto Protocol, the CDM offset market has been assigned this function. However, inadequate regulation of the CDM market has yielded offsets from projects that would have likely happened even without the financial incentive of carbon trading.

Even when the offsets are genuine, the main results are that, in return for financial transfers to developing countries, CDM buyers have continued with a business-as-usual approach, emitting greenhouse gases at levels higher than domestic constraints, at low cost, and facing limited incentives to confront long-run behavioural change or invest in more costly technology improvement (see Box 11.2 for a discussion of the CDM's performance to date). If expansion of CDM in the Copenhagen agreement does not improve regulatory performance, deeper commitments made by Annex I nations will lack substance, since poor quality carbon credits may be substituted for effective compliance.

An expansion of CDM in the default system—with the deficiencies discussed in Box 11.2—will increase financial incentives for more actors to influence the system and make it more difficult for regulators to assess which projects would not occur without additional funding. Expanding markets also attracts the interests of buyer nations by lowering carbon compliance costs and induces seller nations to alter—and likely slow down—their national environmental policies to create a larger stock of CDM assets.¹⁸ Anticipation of rising carbon prices only increases political pressure on regulators to lower transaction costs by relaxing registration, validation or verification procedures, or to increase the categories of qualified projects to allow an expanding supply of CDM assets to help keep down compliance prices. These are serious considerations that may threaten to drain the substantive content of a Copenhagen agreement.

Before dramatically scaling up global carbon markets, it is vital for negotiators to consider which other financial mechanisms might have the capacity, incentives, and information to more effectively counter the predictable behaviour of firms and states in regulated markets—and whether these mechanisms should be general or targeted for particular opportunities in forests, energy efficiency, transport, waste gases, or fuel switching.¹⁹

11.4.3 *An alternative perspective on multilateral funds*

Finally, while the global deal proposal of technology support beyond expected carbon prices is essential for climate risk management, it is uncertain whether it is best implemented through existing IFIs. There is significant distrust among developing countries for this administration of international funds, and—by their own evaluations—the performance of such funds has often been lacking. In addition, the past emphasis on the diffusion of known technologies and a prospective focus on upstream science and applied engineering of technology policies and subsidies are not well tailored to the market transformations required for wide-scale conversion to new energy systems.

Mitigating climate risks will require proceeding much faster with the downstream dimensions of energy and transport systems. This includes building and financing infrastructure; defining and assigning liabilities for uncertain environmental costs; and creating new business models and risk sharing mechanisms that cut across existing industry expertise. Moreover, since the energy and land use sectors are always regulated, idiosyncratic national patterns of industrial organization, state ownership, and market concentration will influence how innovative and commercially sustainable markets evolve. Instead of repeating past mistakes, more systematic consideration of the structure of institutions that rank and allocate public investments in technology will help ensure that resources available to drive down the costs of innovations that enhance climate mitigation are well spent.

11.5 A DIFFERENT APPROACH TO CLIMATE CHANGE

Years of solid research on the engineering of carbon mitigation have eliminated basic mysteries about the essential elements of a climate risk management system.

A recent McKinsey report outlined the familiar formula as:

- Capture energy efficiency opportunities;
- De-carbonize energy sources;
- Accelerate the development and deployment of new energy technologies;
- Preserve and expand the world's carbon sinks; and
- Change the attitudes and behaviours of managers and consumers.²⁰

The report also alluded to the magnitude of this challenge in practice. It argued that to reach a 2 °C scenario, an eightfold increase is needed in carbon productivity from US\$870 (of GNP) per ton of CO₂e today to US\$7,300 per ton in 2050.²¹ Serious

Box 11.3 A different approach to climate change

The first track:

- Concentrates on widening the reach of climate actions and programmes being negotiated and tightening the quality of the institutions overseeing the mechanisms used to pursue these programmes;
- Recognizes that the willingness of industrial nations to provide financial and technical support for the actions of developing countries depends on the effectiveness of institutions that ensure the productivity of these resources;
- Remains climate-centric in its issues and policy tools by attempting to constrain emissions through mechanisms like national caps, sectoral policies and measures, and carbon taxes; and
- Aims to improve performance of the Kyoto climate architecture by paying more systematic and careful attention to the impacts of regulation, in order to reach the highest carbon productivity that such climate-centric institutions are capable of.

The second track:

- Aims at more radical, less climate-centric strategies;
- Begins with the proposition that emissions levels are the product of climate specific policies and institutions and the broader production and consumption patterns of national and transnational systems;
- Explores the effects of alternative national development plans by assessing their indirect impacts on greenhouse gas emissions;
- Argues that non-climate centric factors can be more substantial drivers of carbon performance than climate specific actions;²²
- Acknowledges, when carrying out these analyses, that national development programmes will evolve in global economies that will have been restructured due to systemic instabilities in commodity and financial markets;²³ and
- Recognizes that while carbon prices and technology innovation will be essential elements of climate risk management, the extreme depth of transformation required by climate change necessitates action at the same systemic level.

debate remains concentrated on the feasibility and distribution of the costs of managing this transition to a low-carbon economy. As outlined above, Kyoto has been too narrow in the nations and activities it regulates, too weak in its institutional quality, and too limited in its scope and ambitions. However, it would be self-defeating to take on all of these inadequacies simultaneously in the Copenhagen agreement.

Therefore, the primary objectives of the Copenhagen agreement should be to:

- **First track**—Build climate institutions that are more capable of effective risk management and productive carbon investment by making them more adaptable, flexible, and open to external input than their Kyoto predecessors; and
- **Second track**—Open the exploration of more comprehensive development strategies for sustained growth and well-being in economies where carbon is no longer treated as free.

This reformed approach to the Copenhagen process can be imagined as running simultaneously along two tracks. The first track might be characterized as ‘widening and tightening’, while the second track might be described as ‘growing out of carbon’. These two tracks of a different approach to climate change have different objects of analysis, different timelines in which they might be consequential and different forums in which they can be applied. They are outlined in greater detail in Box 11.3.

11.5.1 Short-, medium-, and long-term strategies to meet these objectives

Achieving these objectives through the Copenhagen process will require short-, medium-, and long-term action from a variety of actors.

In the short-term—The primary goal is to avoid creating poor quality institutions and incentives, which are difficult to disrupt once private and public actors have adapted their behaviour to them. The first step is to place a reality check—factual and conceptual—on the political processes already underway. If an ineffective default outcome is as likely an end to the current negotiating processes as the resolution of a deadlock, the first stage of the Copenhagen process should focus on evaluating the probability of such a result.

In the medium-term—The focus should be on the design of institutions and mechanisms that will better manage the risks of ineffective implementation of a reformed post-2012 climate regime. The Copenhagen agreement should outline the principles and initial composition of institutions that can learn, respond to, and manage the regulatory errors in the post-2012 agreement. It will be important in the implementation period to ensure there are external organizations with the capacity to monitor and evaluate the performance of regulations and to feed these observations back into the process of institutional evolution.

In the longer term—One main objective of negotiators should be to launch a process to explore, evaluate and map the indirect paths to better carbon productivity that can be analysed and sustained by outside actors in the long term. Negotiators should recognize that carbon productivity is driven by general economic and regulatory factors that determine the character of input markets; and many of these broader political and market forces may be increasingly unstable relative to expectations formed in the past decades. In addition, they should think about how financial markets, commodity price increases and their international distributional effects, or national development models and their social and environmental liabilities will create challenges or opportunities for carbon management not addressed by more climate-centric analyses.

LIST OF ABBREVIATIONS

AAU – Assigned Amount Unit
ADB – Asian Development Bank
APP – Asia Pacific Partnership on Clean Development and Climate Change
A/R – afforestation and reforestation
AR4 – Fourth Assessment Report (IPCC)
ASEAN – Association of South East Asian Nations
CCS – carbon capture and storage
CDM – Clean Development Mechanism
CER – Certified Emissions Reduction
CH₄ – Methane
CNCCP – China's National Climate Change Programme
CO₂ – carbon dioxide
COP – Conference of Parties
COP 13 – 13th Conference of Parties in Bali, Dec. 2007
COP 14 – 14th Conference of Parties in Poznan, Dec. 2008
COP 15 – 15th Conference of Parties in Copenhagen, Dec. 2009
ENSO – El Niño–Southern Oscillation
ERU – Emissions Reduction Unit
EU ETS – European Union Emissions Trading Scheme
G7 – Group of Seven
G77 – Group of 77 developing countries in United Nations
G8 – Group of Eight
GEO4 – Global Environment Outlook 4
GHG – greenhouse gas
GNP – gross national product
GW – gigawatt
HABITAT – United Nations Human Settlements Programme
HCFC-22 – chlorodifluoromethane
HFC – hydrofluorocarbon
HFC-23 – fluoroform
ICLEI – Local Governments for Sustainability (International Council for Local Environment Initiatives)
IEA – International Energy Agency
IET – international emissions trading
IFI – international financial institutions
IPCC – Intergovernmental Panel on Climate Change
JI – Joint Implementation
LDC – least-developed country
METI – Ministry of Economy, Trade and Industry (Japan)
MOP – Meeting of Parties
N₂O – nitrous oxide
NDRC – National Development and Reform Commission (China)
NO_x – nitrogen dioxide
OECD – Organisation for Economic Co-operation and Development
PFC – perfluorocarbon
PM₁₀ – particulate matter with a diameter of 10 micrometres or less
REDD – reducing emissions from deforestation and forest degradation
RGGI – Regional Greenhouse Gas Initiative
SEPA – State Environmental Protection Agency (China)
SF₆ – sulphur hexafluoride
SO₂ – sulphur dioxide
SO_x – oxides of sulphur
TSP – total suspended particulates
UNDP – United Nations Development Programme
UNEP – United Nations Environment Programme
UNFCCC – United Nations Framework Convention on Climate Change
US EPA – United States Environmental Protection Agency
WTO – World Trade Organization

NOTES

CHAPTER 1

- 1 UNFCCC (2008) 'Full Text of the Convention: Article 3', *United Nations Framework Convention on Climate Change* <http://unfccc.int/essential_background/convention/background/items/1355.php>, accessed 23 July 2008.
- 2 When the terms 'Asia', 'region' or 'regional' are used in this paper, they refer to the geographic region extending in the north from China and Korea to include all ASEAN countries in the south, and from India, Bangladesh, and China in the south-west to Japan in the east.
- 3 A number of other organizations have argued for the need to align climate change and development objectives. One thorough and recent example is a white paper released by the Institute for Global Environmental Studies (IGES): Hamanaka, H. et al. (2008) *Climate Change Policies in the Asia-Pacific: Re-uniting Climate Change and Sustainable Development*, Hayama, Japan: Institute for Global Environmental Studies, <<http://www.iges.or.jp/en/pub/pdf/whitepaper/whitepaper2.pdf>>
- 4 The Bali Road Map adopted at the Conference of Parties in Bali in 2007 (COP 13) includes a number of decisions that represent greater efforts to reaching a post-2012 agreement. It includes the Bali Action Plan, which charts the course for a new negotiating process designed to tackle climate change with the aim of completion by the end of 2009. It also includes the AWG-KP negotiations, the launch of the Adaptation Fund, the Article 9 review of the Kyoto Protocol, as well as decisions on technology transfer and on reducing emissions from deforestation. Refer to <http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf> for the Action Plan.
- 5 UNFCCC (2008) 'UN Climate Change Negotiations Speed Up at Accra', 27 Aug. <http://unfccc.int/files/press/news_room/press-releases_and_advisories/applications/pdf/closing_press-release-accra.pdf>; and Doyle, A. (2008) 'Rich or Poor? New Faultline in UN Climate Talks', *Reuters*, 28 Aug. <<http://africa.reuters.com/wire/news/usnLS644425.html>>
- 6 There have been various definitions proposed for 'avoiding dangerous climate change'. The Department for Environment, Food and Rural Affairs (DEFRA) in the United Kingdom has attempted to define what preventing dangerous climate change might mean: 'Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner': DEFRA (2008) 'Avoiding Dangerous Climate Change' <<http://www.stabilisation2005.com/background.html>>, accessed 21 July 2008.
Dr James Hansen of NASA's Goddard Institute for Space Studies is more specific and graphic. He focuses on the metrics for dangerous climate change in terms of ice sheet disintegration leading to global sea level rise, large-scale extermination of plant and animal species, and regional climatic disruptions that result in the increase of extreme events and freshwater shortages. Hansen describes the challenge in terms of 'preserving creation—the planet on which civilization developed': Hansen, J. (2008) 'Global Warming 20 Years Later—Tipping Points Near', presentation at the National Press Club, House Select Committee on Energy Independence & Global Warming, Washington DC, 23 June.
- 7 Previously, it had been thought that the most serious consequences of global warming could be avoided if global average temperatures rose by no more than 2 °C above pre-industrial levels—although global mean temperature has already risen 0.7 °C since 1900—and greenhouse gas levels in the atmosphere could be stabilized between 450 and 550 ppm CO₂e: Stern, N. (2007) *The Economics of Climate Change—The Stern Review*, Cambridge, UK: Cambridge University Press, 63.

The measurement of CO₂e includes other greenhouse gases besides carbon dioxide. It should be noted however, that even if atmospheric concentrations of all greenhouse gases are included, the reported figures do not show the full radiative impact, as there are heating effects from albedo change and atmospheric particulates. Temperature-driven changes in the atmospheric concentration of water vapour are also usually omitted from consideration.

However, recent work indicates that the situation is likely more urgent than previously thought. Hansen et al. argue that climate forcing is determined mostly by CO₂ levels, and propose a target of 350 ppm CO₂ (not CO₂e) to avoid the most dangerous impacts of climate change. This target could be revised up or down mostly because of uncertainty over non-CO₂ reduction levels. See Hansen et al. (2008) 'Target Atmospheric CO₂: Where Should Humanity Aim?', *Atmospheric and Oceanic Physics*, submitted 7 April 2008 <<http://arxiv.org/abs/0804.1126>>

- 8 The 2006 Stern Review noted that stabilization in the 450 to 550 ppm CO₂e range would require emissions to be at least 25% below 2005 levels by 2050. The 2007 Fourth Assessment Report (AR4) of the International Panel on Climate Change (IPCC) noted that the total warming effect due to GHGs emitted by human activities stood at 455 ppm CO₂e in 2005, and continues to rise. If only carbon dioxide concentration is measured, the level stood at 379 ppm in 2005. Various scenarios project further increases of between 25% and 90% CO₂e by 2030 and beyond, and doubling of pre-industrial levels of GHG would likely commit the Earth to a rise of between 2 °C and 4.5 °C—the IPCC's best estimate is 3 °C—in global mean temperatures: IPCC (2007) *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Pachauri, R. K. and Reisinger, A. (eds.), IPCC, Geneva, Switzerland.

Furthermore, the latest scientific data indicates that a 2 °C temperature rise may still produce dangerous impacts. Emerging research has warned that the climate can reach points that amplify feedback mechanisms of the other natural systems, spurring large, rapid and non-linear changes including the melting of the polar ice, the melting of mountain glaciers, the loss of species due to shifting climatic zones, and ocean acidification leading to massive loss of marine life. One of the key messages of an updated paper by Stern in May 2008 was that the situation is likely more urgent than indicated in the original *Stern Review*. Instead of a cost of 1% of global GDP to avert dangerous climate change, the new report also suggests that necessary reductions may fall in the 2% range, and require more rapid action: Stern, N. (2008) *Key Elements of a Global Deal on Climate Change*, London, UK: The London School of Economics and Political Science.

If seen from this perspective, the G8 accord issued in July 2008 that proposes halving global emissions by 2050 is far from enough. Collectively, the G8—Britain, France, Germany, Italy, Canada, USA, Japan, and Russia—accounts for 13% of world population and 43% of the GHG emissions. Except for the USA and Russia, the other countries have made a non-binding pledge in 2007 to halve GHG emissions by 2050. At the G8 summit in Japan in June 2008, emerging economies—Mexico, Brazil, China, India and South Africa—reportedly challenged the developed economies to cut GHG emissions by 80% by 2050: BBC News (2008) 'Summit Approves Climate "Vision"', 9 July <<http://news.bbc.co.uk/1/hi/world/asia-pacific/7496703.stm>>

The Stockholm Environment Institute, Stockholm Resilience Centre, and the Tällberg Foundation are also working on a major science research initiative to inform the Copenhagen process. They have invited world-renowned scientists to join their endeavour. A paper was discussed at the Tällberg Forum 2008 on 24–26 June 2008, entitled *Steering Away from Catastrophic Thresholds: Planetary Boundaries for Human Survival: see*

- <<http://www.stockholmresilience.org/research/networks/planetaryboundaries.4.39aa239f11a8dd8de6b80007063.html>> for more information. For a graphic description of a hotter planet and threat to human survival, see Lynas, M. (2008) *Six Degrees: Our Future on a Hotter Planet*, Harper Perennial.
- 9 Because the largest share of historical and current GHG emissions are from developed countries, and per capita emissions in developing countries are still relatively low, emissions from developing countries will be allowed to grow to meet their social and development needs.
 - 10 IPCC (2007) 'Summary for Policy-makers', in *Climate Change 2007: Synthesis Report*, contribution of Working Groups I, II and III to the *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Pachauri, R. K. and Reisinger, A. (eds.), IPCC, Geneva, Switzerland, 19 <http://www.ipcc.ch/pdf/assessment-report/ar4_syr_spm.pdf>
 - 11 Tickell, O. (2008) *Kyoto2: How to Manage the Global Greenhouse*, London: ZedBooks. Companies would be required to account for their entire supply chain to the most upstream level of production, and a series of global caps would be imposed to gradually reduce emissions based on the latest science. The funding from this global auction would be channelled back into mitigation of GHG emissions and adaptation to the impacts of climate change, particularly in vulnerable and developing countries.
 - 12 For example, see Stern, 2008 (above); and Blair, T. and The Climate Group (2008) *Breaking the Climate Deadlock: A Global Deal for Our Low-carbon Future* <<http://www.theclimategroup.org/assets/resources/BTCDDJune08Report.Fin.pdf>>. This report was prepared for the 2008 G8 Summit, and includes 10 'building blocks': a global target, an interim target, developed world commitments and carbon markets, developing world contributions, sectoral action, financing, technology, forests, adaptation, and institutions and mechanisms of action. A further report will be submitted to the 2009 G8 Summit discussing how these building blocks can be put together in a global agreement.
 - 13 UN General Assembly (1987) *Report of the World Commission on Environment and Development*, 11 Dec. <<http://www.un.org/documents/ga/res/42/ares42-187.htm>>
 - 14 The Climate Prosperity Project has been put forward by Global Urban Development: <<http://www.globalurban.org>>
 - 15 Developing countries are seeking ways to merge the development and climate change discussion and to create an integrated strategy for achieving both objectives. An International Steering Committee was formed in July 2008 by a number of concerned diplomats, officials, and experts from various countries and institutions, which seeks advice from an International Expert Group drawn from different disciplines.
 - 16 This was first launched in 2006 by Japan's Ministry of the Environment: <<http://www.env.go.jp/en/earth/ecoasia/congress/2006june/pdf/07.pdf>>. Japan has proposed 6 focal points:
 1. Create an Asian system to collect and analyse information relating to the environment by using satellites in order to build capacity for environmental management;
 2. Promote photovoltaic technology, energy conservation, and efficiency;
 3. Secure a grand vision on production and consumption of biofuels;
 4. Promote sound import and export of wastes;
 5. Foster human resources and capacity building in environmental management; and
 6. Innovate an Asian eco-lifestyle.
 - 17 Many organizations are working on forest issues. A useful summary document of the various policy options and instruments can be found in GLOBE International's G8 Illegal Logging Dialogue. Refer also to Richards, M. and Jenkins, M. (2007) *Background Paper: Policy Options for Innovative Financing of SFM*, Globe International G8 Illegal Logging Dialogue Finance Working Group, May 2007 <<http://www.globeinternational.org/content.php?id=3:19:0:653:0>>

- 18 China's renewable energy transition has been mostly driven by national policy measures such as feed-in tariffs and targets, but CDM has provided an extra economic stimulus. The Chinese government clearly views CDM as a valuable tool to support its renewable energy efforts, and has encouraged energy companies to participate. See Bartolucci, F., Oliver, P., Jie, S. and van Sambeek, E. (2008) *The Value of Carbon in China: Carbon Finance and China's Sustainable Energy Transition*, WWF and Ecofys Azure International <<http://www.wwf.org.hk/eng/pressreleases/20080721.php>>
- 19 The Adaptation Fund was established to finance adaptation projects and programmes in developing countries. The Fund is to be financed with a share of proceeds from CDM project activities (share of proceeds amounts to 2% of Certified Emissions Reductions (CERs) issued for a CDM project activity) and receives funds from other sources: Pew Center on Global Climate Change (2008) 'Pew Center Summary of COP13' <http://www.pewclimate.org/docUploads/Pew%20Center_COP%2013%20Summary.pdf>
- 20 The concept of the 'negawatt' was first proposed in 1976 by Amory Lovins of the Rocky Mountain Institute. This technique works by investing to reduce electricity demand instead of investing to increase electricity generation capacity. This 'virtual generation' method promotes growth of supply by improving the efficiency of existing electrical equipment rather than by building new power stations: Lovins, A. (1989) *The Negawatt Revolution: Solving the CO₂ Problem* <<http://www.ccnr.org/amory.html>>
- 21 The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) is an international agreement administered by the WTO that sets minimum standards for many forms of intellectual property regulation: WTO (2008) 'TRIPS material on the WTO website' <http://www.wto.org/english/tratop_e/TRIPS_e/TRIPS_e.htm>
- 22 The US opposed the creation of a new fund, while the G77 bloc of countries had lobbied for a specific Technology Fund. Developing countries are concerned that the global governance regime is focused on making progress in the areas most important to developed countries, which are mitigation and financing.
- 23 Mortished, C. (2008) 'Shell Issues Stark Challenge to Politicians', *Times Online*, 15 Feb. <http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article3371862.ece>
- 24 The SBSTA counsels the COP on matters of climate, the environment, technology, and method. It meets twice a year.
- 25 The SBI helps review how the UNFCCC is being applied. It meets twice each year.
- 26 The AWG-KP is mandated to report to each Meeting of the Parties on the status of its work and have its results adopted by the COP at the earliest possible time. This is to ensure that there is no gap between the first and second commitment periods of the Kyoto Protocol.
- 27 At COP13 in Bali, a process was launched to enable the implementation of the UNFCCC through long-term cooperative action up to and beyond 2012, in order to reach an agreement at COP15. It was decided that the process would be conducted by a new subsidiary, the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA), which shall complete its work in 2009 in time for COP 15.
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CHAPTER 2

- 1 UNFCCC <http://unfccc.int/essential_background/convention/background/items/2853.php>
- 2 National Development and Reform Commission People's Republic of China (NDRC) (2007) *China's National Climate Change Programme* <<http://en.ndrc.gov.cn/newsrelease/P020070604561191006823.pdf>>
- 3 NDRC, 2007 (above).
- 4 United Nations (2007) 'Carbon dioxide emissions (CO₂), metric tons of CO₂ per capita', *Millennium Development Goals Indicators* <<http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=751&crd=>>, accessed 23 July 2008.
- 5 Mukherjee, K. (2008) 'India focuses on renewables in new climate plan', *Reuters*, 30 June <http://www.reuters.com/article/homepageCrisis/idUSBOM258316._CH_.2400>
- 6 See UNFCCC (2007) 'Report of the co-facilitators of the dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention', FCCC/CP/2007/L.7/Rev.1 <http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_act_p.pdf>
- 7 Sydney APEC Leader Declaration on Climate Change, Energy Security and Clean Development 2007.
- 8 Singapore Declaration on Climate Change, Energy and the Environment 2007 and Chairman's Statement of the 3rd East Asia Summit Singapore, 21 Nov. 2007.
- 9 See Singapore Declaration on Climate Change, Energy and the Environment 2007.
- 10 NDRC (2007) *Medium and Long-Term Development Plan for Renewable Energy in China* <<http://www.chinaenvironmentallaw.com/wp-content/uploads/2008/04/medium-and-long-term-development-plan-for-renewable-energy.pdf>>
- 11 *The Economist* (7 June 2008), 28.
- 12 *The Economist* (7 June 2008), 29.
- 13 See Government of India (2008), *National Action Plan on Climate Change* (NAPCC) <<http://pmindia.nic.in/Pg01-52.pdf>>
- 14 See Bjorklum, I. (2005) 'China in International Politics of Climate Change', *The Fridtjof Nansen Institute*, 19.
- 15 Baker, P. (2004) 'Russia Backs Kyoto to Get on Path to Join WTO', *Washington Post*, 22 May.
- 16 *The Economist* (7 June 2008), 27–30.
- 17 Economy, E. (1997) 'Chinese Policy-making and Global Climate Change: Two-front Diplomacy and the International Community', in *The Internationalization of Environmental Protection*, Schreurs, M. A. and Economy, E. (eds.), Cambridge, UK: Cambridge University Press, 19–41.
- 18 Harrison, K. and McIntosh Sundstrom, L. (2007) 'The Comparative Politics of Climate Change', *Global Environmental Politics*, 7 (4): 15–16.
- 19 Guri, B. (2004) 'Sources of Influence in Climate Change Policy-making: A Comparative Analysis of Norway, Germany, and the United States', Dr. Polit thesis submitted to the Department of Political Science, University of Oslo <<http://www.cicero.uio.no/media/2274.pdf>>
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- 21 Harris, P. G. (ed.) (2003) *Global Warming and East Asia: the Domestic and International Politics of Climate Change*, London and New York: Routledge, 5.
- 22 Sprinz, D. and Vaahoranta, T. (1994) 'The Interest-based Explanation of International Environmental Policy', *International Organization*, MIT press, 4 (1): 79.
- 23 Bang, G., Heggelund, G. and Vevatne, J. (2005) 'Shifting Strategies in the Global Climate Negotiations', Joint Report by FNI and CICERO, FNI Report 6/2005/CICERO Report, Oslo, 24.

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- 25 Harris P. G. and Yu, H. Y. (2005) 'Environmental Change and the Asia Pacific: China Responds to Global Warming', *Global Change, Peace and Security*, Routledge, 17 (1).
- 26 Massachusetts Institute of Technology (MIT) (2007) *The Future of Coal*, MIT Press <<http://web.mit.edu/coal/>>, 8.
- 27 Fargione, J. et al. (2008) 'Land Clearing and the Biofuel Carbon Debt', *Science*, 319(5867): 1235–1238.
- 28 See Vogel, D. (2003) 'Representing Diffuse Interests in Environmental Policy-making', in *Do Institutions Matter? Government Capabilities in the United States and Abroad*, Weaver, R. K. and Rockman, B. A. (eds.), Washington, DC: Brookings, 237–271.
- 29 MIT (2003) *The Future of Nuclear Power*, MIT Press.
- 30 PEACE (2007), *Indonesia and Climate Change: Current Status and Policy*, 58.
- 31 PEACE, 2007 (above), 57.
- 32 Harris, 2003 (above), 27.
- 33 Harris, 2003 (above), 5.

CHAPTER 3

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- 2 See Clean Air Initiative (CAI)-Asia (2006) 'Air Quality in Asian Cities' <http://www.cleairnet.org/caiasia/1412/articles-59689_AIR.pdf>
- 3 British Petroleum (BP) (2006) *Statistical Review of World Energy 2006* <<http://www.bp.com/productlanding.do?categoryId=6842&contentId=7021390>>
- 4 UN Dept of Economic & Social Affairs (DESA) (2007) *World Population Prospects. Population database, 2006 revision* <<http://esa.un.org/unpp>>
- 5 World Bank (2008) *Towards a Strategic Framework on Climate Change and Development for the World Bank Group: Consultation Draft*.
- 6 Krupnick, A., Burtraw, D. and Markadya, A. (2000) *The Ancillary Benefits and Costs of Climate Change Mitigation: a Conceptual Framework* <<http://www.oecd.org/dataoecd/31/46/2049184.pdf>>
- 7 For a full discussion of the different definitions of 'co-benefits', refer to: Castillo, C. K. G. et al. (2007) *The Co-Benefits of Responding to Climate Change: Status in Asia*, US EPA, Manila Observatory, and CAI-Asia, June.
- 8 Carbon dioxide; methane (CH₄); sulphur hexafluoride (SF₆); nitrous oxide (N₂O); perfluorocarbons (PFCs); and hydrofluorocarbons (HFCs) are included under Kyoto.
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CHAPTER 4

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CHAPTER 5

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CHAPTER 6

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- Some of the arguments in this paper are drawn from a joint paper prepared with Hans Opschoor for the UN Committee on Development Policy (CDP) <<http://www.un.org/esa/policy/devplan/>>. I am grateful to CDP members, especially Hans Opschoor, for comments and advice. I am also grateful for comments to Munir Akram, Franck Amalric, Alan AtKisson, Bob Berg, Matthew Chadwick, Charlie Heaps, Christer Holtsberg, Sivan Kartha, Eric Kemp-Benedict, Asad Khan, Jomo K. S, Steve Marglin, Adil Najam, Johan Rockström, and Anders Wijkman. They are not responsible for any errors of judgment or fact.
- The reason for the separation of climate and development objectives is an interesting question but would be the subject of a separate paper. Suffice it to say that climate analysis has, quite understandably, been dominated by climate scientists, mainly those with experience in the institutional and political context of industrialized countries. As such, the development perspective has remained at best a marginalized voice in this debate. Although the IPCC in particular has tried to attract scientists from other disciplines, especially economics, and from different geographical regions, it has not been very successful in attracting sufficient numbers of experts in *development theory or practice*. One indication of this failure is the inability to organize a special IPCC report on climate change and sustainable development. More generally, the literature on the links between climate change and sustainable development remains sparse, unfocused, and fragmented.
- See for example Agarwal, A. and Narain, S. (1991) *Global Warming in an Unequal World: A Case of Environmental Colonialism*, New Delhi: Centre for Science and Environment. Agarwal and Narain proposed equitable global emission rights as a comprehensive solution. The idea has four facets. First, excessive carbon emissions were caused by a tragedy of the commons, which could be corrected by explicit creation of emission rights. Second, since emissions were correlated with income, equal per capita rights would ensure that current inequalities would not get frozen in time. Third, in the interim, the compensation from over-emitting rich countries to under-emitting poor countries would provide income transfers to stimulate development. Fourth, the need for payment would provide an incentive to both rich and poor countries to opt for low-emission solutions.
- A simple thought experiment can illustrate this point. Imagine a world in which all countries have roughly similar standards of living. The climate challenge in such a world would differ fundamentally from the one that exists today. Indeed, most of the policy options being considered would be quite appropriate to such a world. They would involve setting negotiated emissions targets for each country, as was done under the Kyoto Protocol, and instituting mechanisms to ensure compliance. In the context of development, however, the situation is completely different, since for developing countries, the highest policy priority continues to be that of economic growth and poverty eradication.

6 In 2004, the aggregate global income was estimated to be about US\$40.96 trillion, equivalent to US\$6,411 per capita (all figures are for 2004). This income is distributed extremely unequally. Over a quarter (US\$11.17 trillion, or 28 per cent) is accrued in a single country, the United States, whose population is only 4.6 per cent of the total; while India, with almost 4 times the population (17 per cent of the total), earns less than one-sixteenth as much (US\$681 billion, i.e. 1.6 per cent of the total).

The first Human Development Report illustrated this inequality vividly in the form of the famous champagne glass image, which showed that the poorest 20 per cent of the global population earned only 1.4 per cent of the global net income, as against the 82.7 per cent of the income accrued by the richest 20 per cent, a ratio of 1:60. This inequality appears to be widening rather than narrowing. In 2004, the ratio of the incomes of the poorest and richest quintiles was estimated to be over 90 per cent.

For purposes of the climate challenge, it is useful to distinguish between the bowl of the champagne glass, which depicts the richest 20 per cent of the world's population, and the stem, which comprises the remaining (poor) 80 per cent. As Ashok Khosla once remarked, the ultimate goal of the development agenda is to widen the stem relative to the bowl, so that in the end it begins to look more like a beer mug! To make a simplistic generalization, it could be said that the Kyoto Protocol pertains mainly to the bowl, not only because it exempts the stem from obligations so as to not inhibit its widening, but also because it is rooted in the institutional conditions specific to the bowl. The inequality in income is also associated with huge variations in institutional, social, and political parameters. Policies that work well in one set of circumstances often turn out to be inappropriate or ineffective in other conditions. Unfortunately, since the stem now contributes half the carbon emissions, which are growing much faster than the rest, there is a need to think of the policy agenda in the light of the conditions and priorities of the stem.

See United Nations Development Programme (1990) *Human Development Report 1990*, New York: Oxford University Press <<http://hdr.undp.org/en/reports/global/hdr1990/chapters/>>

7 *First World*: Also known as the North, or the OECD countries, which comprise Western Europe, North America, Oceania, Japan, and South Korea (although Singapore, Taiwan, and Hong Kong, should in fairness also be included). More than three quarters (77.5 per cent) of the income accrues to the 15 per cent of the population in this category, at an average of US\$33,052 per capita.

Second World: This is also occasionally referred to as the East, or as 'economies in transition'. It comprises the former socialist countries of Europe (non-EU) and Central Asia. It constitutes a small minority (5 per cent) of the world's population, and receives 2.2 per cent of the global income, at an average of US\$2816 per capita.

Third World: This group is increasingly referred to as the South, or the global South, or developing countries, or 'the Group of 77 plus China'. They constitute the overwhelming majority (81 per cent) of the world's population, but command only a fifth (US\$ 8.5 trillion) of the world's income, at an average of US\$1,648 per capita. This comes to a little over a half of that of the Second World, and one-twentieth of that of the First.

8 The distinction between the incremental nature of growth and the discontinuous nature of development was first made by Josef Schumpeter. To illustrate this point, Schumpeter uses the idea of travel between two regions. At first, a wagon travels along the road; as the load increases, other wagons are added; and then still more. But no matter how many wagons are added, it does not become a railroad. The adding of wagons is growth; the railroad is development.

See Schumpeter, J. (1911) *The Theory of Economic Development*, (Trans. R. Opie, 1934), New York: Oxford University Press.

9 See for example Raskin, P. et al. (2002) *Great Transition: The Promise and Lure of the Times Ahead*, Boston: SEI-B/Tellus Institute <http://www.tellus.org/seib/publications/Great_Transitions.pdf>

10 See for example: IPCC (2007) 'Summary for Policy-makers', in *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Solomon, S. et al. (eds.), Cambridge, UK and New York, USA: Cambridge University Press;

Stern, N. (2007) *The Economics of Climate Change—The Stern Review*, Cambridge, UK: Cambridge University Press;

Bierbaum et al. (2007) *Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable*, report prepared by the Scientific Expert Group Report on Climate Change and Sustainable Development for the United Nations Department of Economic and Social Affairs; and

Banuri, T. and Opschoor, H. (2007) 'Climate Change and Sustainable Development', Working Paper No. 56, October, New York: United Nations Department of Economic and Social Affairs.

11 Similarly, in moving from temperature goals to emission targets we take as given the baseline scenario 'IS92a' of the IPCC's Special Report on Emissions Scenario (SRES), in which current emissions of 35 billion tonnes of carbon dioxide (GtCO₂) are expected to increase to 75 GtCO₂ by the end of the century, giving cumulative century-long emissions of about 5,500 GtCO₂. In contrast, the goal of stabilizing carbon concentration at 450 ppm translates into an emissions 'budget' of only 2100 GtCO₂ over 100 years. Changing the targets, for example to 550 ppm and 3 °C, or the driving scenarios would change some of the details but not the main argument or ultimate recommendations of the paper.

12 Adapted from IPCC (1994) *Special Report: Radiative Forcing of Climate Change and An Evaluation of the IPCC IS92 Emissions Scenarios*, in United Nations Committee for Development Policy (2007) 'The International Development Agenda and the Climate Change Challenge'.

13 UN-Energy (2005) *The Energy Challenge for Achieving the Millennium Development Goals*, United Nations.

14 See International Energy Agency (2006) 'World Energy Outlook 2006 Edition', Paris.

15 See Pacala, S. and R. Socolow (2004) 'Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies', *Science*, 305: 968–972.

A wedge 'represents an activity that reduces emissions to the atmosphere that starts at zero today and increases linearly until it accounts for 1 GtC/year [3.67 GtCO₂] of reduced carbon emissions in 50 years. It thus represents a cumulative total of 25 GtC [92.5 GtCO₂] of reduced emissions over 50 years'. Thus 7 stabilization wedges could account for 650 GtCO₂ of emissions over 50 years. This would provide a breathing space to develop additional technologies in order to bring about further cuts in emissions in the next 50 years.

The number of wedges needed depends on the cuts that need to be made. If the aim is to keep emissions at current levels, and if, under business as usual, emissions are growing at 1.5 per cent per year, 7 wedges would exactly offset the effect of this growth, thus keeping emissions constant. If emissions were to grow at 2 per cent per year, then 10 wedges would be needed, and if 3 per cent, then 18 wedges would be needed. If deeper cuts were called for (e.g. the goal of halving emissions by 2050, as announced at the G8 summit) it would mean deploying a proportionately larger number of wedges.

16 While these will continue to be desirable, relying on them for bending the curve on carbon emissions might not be the wisest course of action. Like limiting population growth, these actions are well worth pursuing but if past experience is any guide, they are not likely to be easy to bring about.

17 A major obstacle to the accelerated adoption of renewable technologies is the persistence of subsidies to fossil fuels, unreliable and unpredictable policy incentives, and unclear signals. The public sector may need to make a clear and irreversible decision on providing infrastructure that will generate long-term and consistent incentives for renewable technologies. One example of such a decision would be an investment programme to construct a 'hydrogen grid', which would enable renewable energy plants of varying scales to create a fuel that would have a ready market.

- 18 From this perspective as well, additional measures would be required to minimize the level of disruption, ensure that development momentum is not compromised, and to protect the interests of countries that depend on such resources. This is not impossible but requires considerable additional thought. On the other hand, it could also be argued that the ultimate result of all the other measures would also be to reduce to a trickle the extraction of fossil fuels. In other words, this approach is simply a short cut to the result that would be produced through other measures and approaches.
- 19 The carbon tax will cause disruption through the price mechanism; in other words, its impact would be similar to that of the oil price shocks in the 1970s. These shocks produced a significant slowdown in the global economy, and also affected the growth process adversely. More importantly, unlike the oil price shocks, the additional revenues would accrue to the tax machinery rather than oil or coal producers. As such, this policy too cannot be applied in isolation, and would need additional compensatory policies in order to mitigate adverse impacts. In principle, most ecological tax reform schemes attempt to aim for revenue and distributional neutrality through up-front transfers. However, in a dynamic system, where the concern is not only with initial impact but also growth rates, the programme can become complicated very quickly.
- 20 The main difference between the two depends on the basis for allocating emission rights. If the emission rights were allocated on the basis of historic use (i.e. in proportion to current emissions), then the emission rights system would be exactly identical to a global cap-and-trade system. This would militate against the development agenda. On the other hand, if the rights are allocated, for example, on an equal per capita basis, it would be less biased against poor countries than a global cap-and-trade system, and therefore be more supportive of the development agenda. Because of the implications for international redistribution, there was considerable initial resistance from rich country governments to any mention of emission rights. This resistance might be less universal in rich countries today, as evidenced by some recent statements.
- 21 In other words, the first step in the argument would be the identification of strategic public infrastructure investment that can create incentives for a switch to non-carbon alternatives. Reverting to the discussion on technological options, the countries of the world could unite in instituting an investment programme in the areas thrown up by the technology discussions.
- 22 This was not an immediate outcome. In fact, the discussions went through two sequential phases. The first was motivated by issues of responsibility and oriented mainly towards the discussion of emission rights. The second phase was premised on a tacit recognition of differential capacity and therefore calling for voluntary targets. However, behind both of these the conceptual framework was still that of a carbon market.
- 23 Agarwal and Narain, 1991 (above).
- 24 The consensus over responsibility did not lead to a clear programme of action. Fresh negotiations started after the first meeting of the Conference of Parties (COP 1) in 1995, and culminating at COP 3 in Kyoto, involved a subtle shift in language, from responsibility to capacity. While studiously omitting any talk of property rights, the agreement shifted the discussion to voluntary action, albeit framed in the form of emission targets. Its response to the development agenda consists of two tracks. First, while industrialized countries, termed Annex B Parties, agreed to national emission targets, developing countries (non-Annex B Parties) are exempted from immediate obligations. Second, it introduces the CDM, which, in theory can encourage voluntary climate action in the exempted countries.
- 25 Reprinted in Agarwal, A. et al. (2001) *Poles Apart: Global Environmental Negotiations 2*, New Delhi: Centre for Science and Environment.
- 26 The Manhattan project analogy is used advisedly. Its purpose is to suggest that the world needs a dedicated public investment, organized globally, to facilitate the rapid deployment of existing technologies in order to respond effectively to a gathering crisis. It is a different approach from that of massive resource transfers (either as foreign aid or as compensation for greenhouse gas abatement).

- 27 This idea is not lacking in political support from mainstream leaders. For example, the proposal by the former Japanese Prime Minister, entitled Cool Earth 50, already reiterates the right of developing countries to economic growth and poverty eradication, and goes on to propose an investment programme in carbon capture, clean coal, nuclear safety, and energy efficiency. To this end, it offers to establish a new financial mechanism to support such investment. Even in the US, where political opinion has been slow to move in this direction, there are indications of a shift.
- 28 Since the structural adjustment experience is being offered simply as an analogy for the climate challenge, it is not necessary to go into the details of the adjustment crisis. Very briefly, however, the origins of the crisis date back to the 1970s, when commodity price shocks forced developing countries to borrow internationally in order to pay for imports. This borrowing was made possible by the sudden increase in the availability of international credit (produced largely by the excess liquidity generated by the current account surpluses of oil exporting countries). The result was that countries were able to maintain their consumption levels and to some extent their growth momentum. However, when the commodity price shocks turned out to be persistent rather than transitory, the debt exposure began to increase exponentially. This was compounded by the shocks coming from the financial market. Initially, the international financial market had helped offset the impact of the commodity shocks by providing hitherto unprecedented amounts of capital to developing countries. By the late 1970s, however, the financial market had turned adverse, in part because of internal economic pressures in the United States, and in part because of the belated recognition of the persistence of the economic crisis. For an analysis of the political economy of adjustment, see Haggard, S. and Kaufman, R (eds.) (1992) *The Politics of Economic Adjustment: International Constraints, Distributive Economics and the State*, Princeton, NJ: Princeton University Press.
- 29 Many commentators have noted the similarity of this crisis with that of the 1930s, when several countries were affected adversely by a combination of a global recession and a decline in international liquidity. However, unlike the 1930s, when external shocks produced heterodox policy solutions, the 1980s saw the imposition of a single policy view, often with indifferent effectiveness in addition to being socially inequitable and environmentally damaging. The policy response to this pressure is referred to as 'structural adjustment'. The conventional response, instituted under the active guidance of the International Monetary Fund (IMF) and the World Bank, often exacerbated rather than resolved the crisis. It consisted of a rollback of the state's developmental and distributive commitments, including cutting of government expenditures, increasing taxation, devaluation, and monetary tightening. This remedy was supposed to be neutral but proved to be highly regressive, and, not surprisingly, it produced both adverse impacts and opposing pressures. Concerns began to emerge with regard to two groups, the rural and urban poor. The former were most vulnerable but easy for policy makers to ignore. However, their situation generated an ethics-driven backlash against the policy. A more balanced approach, synthesized in the acclaimed volume by Cornia, Jolly and Stewart, sought as indicated in its title and subtitle, to bring about adjustment with a human face, which meant protecting the vulnerable and promoting growth: Cornia, G., Jolly, R. and Stewart, F. (1987) *Adjustment with a Human Face: Protecting the Vulnerable and Promoting Growth*, Oxford: Clarendon Press. The second group was on the whole less vulnerable but more visible, more capable of organizing political opposition, and therefore difficult to ignore politically. See Nelson, J. (1992) 'Poverty, Equity, and the Politics of Adjustment', in Haggard and Kaufman, 1992 (above).
- 30 As a rule of the thumb, about 8 GtCO₂e adds one part per million to carbon concentration.
- 31 There are other parallels. In case of structural imbalances, many policy-makers delayed action in the hope that the problem was merely cyclical and would disappear when the global business cycle resumed its upward momentum. In climate change, significant segments of

the policy community have similarly sought to delay action in the vain hope that the problem would simply disappear of its own accord. However, delay has its costs. The longer action is delayed, the higher the cost in the form of human welfare as well as environmental integrity.

- 32 Frankel, J. (2006) 'Formulas for Quantitative Emission Targets', forthcoming in Aldy, J. and Stavins, R. (eds.) *Architectures for Agreement: Addressing Global Climate Change in a Post Kyoto World*, Cambridge University Press.

CHAPTER 7

- 1 UN-Habitat (2004) 'State of the World's Cities 2004–5: Globalization and Urban Culture'.
- 2 UN-Habitat, 2004 (above). By 2015 the South Asian urban agglomerations of Delhi, Mumbai, and Dhaka are projected to be among the five largest in the world, and by 2020 two-thirds of South-East Asia is projected to live in one of only five mega-urban regions. 288 million Chinese are expected to move to urban areas by 2030, with urban residents making up 58% of the overall population.
- 3 McKinsey Global Institute (2007) *Preparing for China's Urban Billion*, 17.
- 4 For example, see Gavron, N. (2007) 'The Role of Cities in Tackling Climate Change', in Sustainable Development International and United Nations Environment Programme (eds.) *Climate Action*, London: Sustainable Development International <http://www.climateactionprogramme.org/images/uploads/book_pdfs/climate_action_book_lowres.pdf>
- 5 Lebel, L. et al. (2007) 'Integrating Carbon Management into the Development Strategies of Urbanizing Regions in Asia: Implications of Urban Function, Form, and Role', *Journal of Industrial Ecology*, 11: 61–81.
- 6 See <<http://www.c40cities.org/>>
- 7 Former Deputy Mayor of London Nicky Gavron has highlighted this implementation role of cities: Gavron, N. (2008) 'Driving Change', in *Our Planet*, magazine of the United Nations Environment Programme, February <<http://www.unep.org/ourplanet/2008/FEB/en/toc.asp>>
- 8 Satterthwaite, D. et al. (2007) 'Adapting to Climate Change in Urban Areas', IIED Human Settlements Discussion Paper Series <<http://www.iied.org/pubs/display.php?n=1&l=7&s=HSDP>>, accessed 10 June 2008.
- 9 Nicholls, R. J. et al. (2008) 'Ranking Port Cities with High Exposure and Vulnerability to Climate Extremes: Exposure Estimates', OECD Environment Working Papers, No. 1, OECD Publishing, doi:10.1787/011766488208
- 10 The climate change vulnerability of cities includes both 'direct' and 'indirect' impacts. Direct impacts include infrastructure damage, property damage, and population displacement from rising sea levels and more intense rainfall, and disproportionately rising temperatures caused by the urban heat island effect. When most people think of vulnerability, exposure, risk, or adaptation to climate change in cities, they tend to concentrate on these direct effects. Most quantitative and qualitative adaptation research and impact studies have focused on these impacts, and been disproportionately conducted in coastal cities that are believed to be most seriously affected.
- 11 UNEP (2007) *Global Environmental Outlook 4: Environment for Development*, 247–258.
- 12 UNEP Regional Resource Centre for Asia and the Pacific (2005) *State of the Environment 2005: Dhaka City* <<http://www.rrcap.unep.org/pub/soe/dhakasoe05.cfm>>
- 13 Loh C. et al. (2008) *A Price Too High: The Health Impacts of Air Pollution in Southern China*, Hong Kong: Civic Exchange <http://www.civic-exchange.org/eng/upload/files/200806_pricetoohigh.pdf>
- 14 Asian Development Bank and the Clean Air Initiative for Asian Cities (CAI-Asia) Center (2006) *Urban Air Quality Management: Summary of Country/City Synthesis Reports Across Asia* <<http://www.adb.org/Documents/Reports/Urban-Air-Quality-Management/overview.pdf>>, 7.

- 15 UNEP, 2007 (above), 247–8.
- 16 Stern, N. (2006) *The Economics of Climate Change—The Stern Review*, Cambridge, UK: Cambridge University Press; and Enkvist, P., Naucler, T. and Rosander, J. (2007) 'A cost curve for greenhouse gas reduction', *The McKinsey Quarterly* <<http://berc.berkeley.edu/flyers/McKinseyQ.pdf>>
- 17 Natural Resources Defense Council (NRDC) (2008) *China's Clean Energy Project: Green Buildings* <<http://www.nrdc.org/air/energy/china/greenbuildings.asp>>
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Recent initiatives on green buildings in Hong Kong include China Light and Power Group's 'Sky Woodland' project; see Jim, C. Y. (2006) 'CLP Sky Woodland: Ecological Contribution to our Compact City' <https://www.clpgroup.com/Media/RelArc/2006/archive/Documents/SkyWoodlandeng.pdf>
- 18 World Business Council for Sustainable Development (2008) *Energy Efficiency in Buildings: Business realities and opportunities* <http://www.wbcsd.org/DocRoot/kPUZwapTJKNB-F9UJaG7D/EEB_Facts_Trends.pdf>
Norris, M. (2008) 'Beijing Looks to 'Green' Buildings to Cut Emissions' <<http://www.npr.org/templates/story/story.php?storyId=89575832>>
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English People's Daily Online (2007) 'China to amend law to reduce energy consumption' <http://english.peopledaily.com.cn/200706/24/eng20070624_387207.html>
- 19 English People's Daily Online, 2007 (above).
- 20 McKinsey Global Institute, 2007 (above), 6–7.
- 21 There are key players on co-benefits in Asia and around the world: the Clean Air Initiative (CAI)—Asia, the US Environmental Protection Agency's (EPA) Integrated Environmental Strategies initiative in Japan and China, the Institute for Global Environmental Studies and Ministry of the Environment in Japan, the World Resources Institute, the California Air Resources Board, the G8, the World Bank, the CDM and Urban Air Quality initiative, and the Chinese national government. For an overall of current actors and policies please see: Castillo C. K. G. et al. (2007) *The Co-Benefits of Responding to Climate Change: Status in Asia*, US EPA, Manila Observatory, and CAI—Asia: June.
- 22 Wilbanks, T. J. et al. (2007) 'Industry, settlement and society', in *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry, M. L. et al. (eds.), Cambridge, UK: Cambridge University Press, 374.
- 23 IPCC (2007) 'Summary for Policy-makers', in *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry, M. L. et al. (eds.), Cambridge, UK: Cambridge University Press, 7–22.
- 24 Gorer et al., 2008 (above).
- 25 Dawson, R. J. et al. (2006) *A Blueprint for the Integrated Assessment of Climate Change in Cities* (Draft, Version 1.2), <http://www.tyndall.ac.uk/publications/working_papers/twp104.pdf>
- 26 For a thorough discussion of the export of pollution to other cities and regions, including in Japan and Korea, please see Bai, X. (2002) 'Industrial relocation in Asia: a sound environmental management strategy?', *Environment*, 44: 8–21.
- 27 Tokyo Metropolitan Government (2007) *Tokyo Climate Change Strategy*; and Seoul Metropolitan Government (2007) *Environment of Seoul*.
- 28 See Tokyo Metropolitan Government, 2007 (above).
- 29 See press release, UNFCCC (2008) 'UN Climate Change Negotiations Speed Up at Accra', 27 Aug. <http://unfccc.int/files/press/news_room/press-releases_and_advisories/>

- applications/pdf/closing_press-release-accra.pdf>; and Doyle, A. (2008) 'Rich or Poor? New faultline in UN climate talks', *Reuters* 28 Aug. <<http://africa.reuters.com/wire/news/usnLS644425.html>>
- 30 See Seoul Metropolitan Government, 2007 (above).
- 31 National Climate Change Committee (2008) *Singapore's National Climate Change Strategy*.
- 32 Singapore has also recently hosted the 2008 World Cities Summit and launched a Centre for Liveable Cities focused on promoting sustainable development: <<http://www.worldcities.com.sg/main.htm>>
- 33 See <http://www.c40cities.org/bestpractices/buildings/dongtan_city.jsp> for more information.
- 34 See Leape, J. P. (2008) 'Low carbon, high hopes', WWF International, 30 June <<http://www.wwfchina.org/english/loca.php?loca=531>>
- 35 Chong, Y. Y. (2007) 'Asia carbon exchange sees growth after slow start', *Reuters*, 23 March <<http://uk.reuters.com/article/oilRpt/idUKSP9215120070323>>
- 36 Times of India (2008) 'MCX kicks off carbon trading', 22 Jan. <http://timesofindia.indiatimes.com/Business/India_Business/MCX_kicks_off_carbon_trading/rssarticleshow/2719388.cms>
- 37 China Daily (2008) 'Environment and energy exchanges launched', 6 Aug. <http://www.china.org.cn/business/2008-08/06/content_16143784.htm>
- 38 Climate Exchange Plc. (2008) 'China National Petroleum Corporation Assets Management Co. Ltd, the City of Tianjin and the Chicago Climate Exchange have signed an agreement to jointly engage in the business of emissions trading in China', 31 July <http://www.chicagoclimatex.com/news/press/release_20080731_CNPCAM.pdf>
- 39 Carbon Finance (2008) 'Hong Kong Exchange to list CERs next year', Fulton Publishing Ltd, 20 Aug. <<http://www.carbon-financeonline.com/index.cfm>>
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- 41 For example, see the recent Copenmind Mindflow WWF Denmark Session <<http://www.copenmind.com/copenmind/mindflow/wwf-denmark-session>>
- 42 See <<http://www.iclei.org/index.php?id=global-about-iclei>> for more information.
- 43 See <<http://www.iclei.org/index.php?id=772>> for a full membership list.
- 44 See <<http://www.iclei.org/index.php?id=800>> for a full description of the program.
- 45 UNEP, 2007 (above), 67
- 46 Betsil, M. M. and Bulkeley, H. (2004) 'Transnational Networks and Global Environmental Governance: The Cities for Climate Protection Program', *International Studies Quarterly*, 48: 471–493.
- 47 See <<http://www.c40cities.org/cities/>> for a complete list of participants. C40 has also highlighted best practises in several Asian cities, including Jakarta's Bus Rapid Transit system and China's Dongtan eco-city: see <http://www.c40cities.org/bestpractices/transport/jakarta_bus.jsp> and <http://www.c40cities.org/bestpractices/buildings/dongtan_city.jsp> for a more detailed description.
- 48 China has also recently stepped in to establish the Global Mayors Forum in 2008 with the gathering to be held in Hong Kong in September 2009. Its mission is to promote exchanges and cooperation between cities in China and the world. The forum aims to use the global gathering of mayors to push sustainable development and for cities to partner with each other. Partners include ICLEI and other associations of cities from around the world. See the Global Mayors Forum website <<http://www.g-mforum.org/>> for further information. The origination of a city-based cooperation organization in China is also a promising sign for the potential of these initiatives in the Asian region.
- 49 In creating this network it will be useful to build on existing initiatives such as the Asian Disaster Preparedness Centre. See <<http://www.adpc.net/v2007/>> for further information.

- 50 This report focuses on adaptation, particularly reducing the vulnerability of cities and risk management for climate-related disasters. However, this report will not be effective without increased discussion and dialogue among Asian cities on how to carry out the plans it calls for. It is vital to combine research with initiatives such as the C40 cities and ICLEI to promote communication among city officials.
- World Bank (2008) 'Climate Resilient Cities: 2008 Primer, Reducing Vulnerabilities to Climate Change Impacts and Strengthening Disaster Risk Management in East Asian Cities'.
- 51 China Daily (2007) 'China Sets Renewable Energy Target', 27 Feb. <<http://www.china.org.cn/english/environment/200892.htm>>
- Li, Z. (2006) 'China's Energy Intensity Climbs Despite Targets; Policy-makers Under Pressure to Boost Energy Savings', Worldwatch Institute, 17 Aug. <<http://www.worldwatch.org/node/4463>>
- Also see China's 11th Five Year Plan, which includes a section on environmental policy and resource conservation: National Development and Reform Commission (NDRC) (2006) *The Outline of the Eleventh Five Year Plan* <http://en.ndrc.gov.cn/hot/t20060529_71334.htm>; and Chinese Government's Official Web Portal (2007) 'Cabinet Unveils Environmental Protection Plan' <http://english.gov.cn/2007-11/27/content_816819.htm>
- 52 These urban-scale commitments would no doubt raise significant equity issues regarding greenhouse gas accounting and industrial relocation. See Bai, 2002 (above).
- 53 Prins, G. and Rayner, S. (2007) 'Time To Ditch Kyoto?', *Nature*, 449: 973–975 <<http://www.nature.com/nature/journal/v449/n7165/full/449973a.html>>
- 54 Xinhua (2008) 'UN Climate Change Conference Fails to Reach Concrete Agreement' <<http://www.ccchina.gov.cn/en/NewsInfo.asp?NewsId=12699>>
- 55 See <<http://www.unhabitat.org/>> for further information.

CHAPTER 8

- 1 This has been referred to as the 'negawatt' approach to energy policy. Instead of investing in increased supply, investing in reduced demand can bring about a larger increase in available energy supply at a lower overall cost. This is especially true if environmental costs such as GHG emissions are included. See Lovins, A. (1989) *The Negawatt Revolution: Solving the CO2 Problem* <<http://www.ccnr.org/amory.html>>
- However, improvements in efficiency may not always lead to overall decreases in demand, especially in rapidly developing countries. Known as 'rebound effects', which occur if companies choose to keep resources expenditures constant, increasing output and energy use because of greater efficiency. This would encourage economic growth, but could also maintain or even increase overall environmental impacts. See Sorrell, S. (2007) 'The Rebound Effect: an Assessment of the Evidence for Economy-Wide Energy Savings from Improved Energy Efficiency', London: UK Energy Research Centre <<http://www.ukerc.ac.uk/Downloads/PDF/07/0710ReboundEffect/0710ReboundEffectReport.pdf>>
- 2 Enkvist, P., Naucler, T. and Rosander, J. (2007) 'A Cost Curve for Greenhouse Gas Reduction', *The McKinsey Quarterly* <<http://berc.berkeley.edu/flyers/McKinseyQ.pdf>>
- 3 Niederberger, A. A. et al. (2007) 'Energy Efficiency in China: The Business Case for Mining an Untapped Resource', *Greener Management International*, March.
- 4 2005 figures for Total Primary Energy Supply per unit of GDP (TPES/GDP) in select Asian countries and the United States in tonnes of oil equivalent per US\$1,000 at year 2000 values (toe/thousand 2000 US\$): Korea 0.34, Thailand 0.64, Indonesia 0.86, India 0.83, Japan 0.11, China 0.91, and the United States 0.21. See International Energy Agency (IEA) (2008) 'Statistics and Balances' <<http://www.iea.org/Textbase/stats/index.asp>>
- However, concerns have been raised about the use of these overall numbers when making a

direct comparison of energy efficiency. Some have argued that population density, housing size, and other factors should be taken into account. Otherwise, policy-makers could be misled about the potential for energy efficiency improvements, which may not be as large as these overall economy-wide statistics would indicate, without major changes in industry and infrastructure. This is particularly true in the case of Japan, with high population density that facilitates widespread use of public transport, widespread use of nuclear energy, high energy prices for industry, and small living spaces. Industry and technology-specific comparisons should prove more useful. See Searl, M. and Starr, C. (1992) 'Japan: Not an Energy Efficiency Model', *Physics Today*, February: 95–7.

Total primary energy supply (TPES) = indigenous production + imports - exports - international marine bunkers ± stock changes. For the World Total, international marine bunkers are not subtracted from TPES.

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23 However, as stated previously, the link between improved energy efficiency and reduced environmental impacts, such as carbon emissions, could be endangered by potential rebound effects. These effects must be taken into account when assessing the potential scale of energy efficiency improvements and their impact on carbon emissions: see Sorrell, 2007 (above).

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25 Although it is—debatable—one of the most promising options for large-scale, base-load clean power generation in developing countries, the introduction and dissemination of nuclear power technologies has been limited to Argentina, Brazil, Chile, China, India, South Korea, Mexico, and South Africa. Should there be restrictions on choosing the nuclear option, the introduction and dissemination of energy efficiency technologies is another attractive option for low-carbon growth in developing countries.

26 Although many developing countries are already 'low-carbon' because of their low per-capita emissions levels, these levels are rapidly increasing with economic development, and will continue to do so based on countries' growth plans. The objective is not to reduce emissions by constraining development, but to improve energy efficiency so development can be achieved at a much lower environmental cost than previous industrialization.

27 Reducing dependence on fossil fuels for power generation is one of the most important aspects in this pursuit of low-carbon development. In addition, in many rural areas of developing countries, clean power could minimize the health damage of widespread biomass

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- Where electrification is advanced and modern electricity service networks are established, introduction and transfer of hydro-power, geo-thermal power, solar power, wind power, and off-grid distributed power technologies, which are indispensable for a low-carbon society, are also becoming more and more important for protecting public health.
- 28 There is also the potential for rural areas in developing countries to 'leapfrog' across fossil fuels to higher levels of clean technology. Technology 'leapfrogs' occur when a country skips intermediate technologies in the path from low to high-tech development levels. Although successful examples such as the cell phone are often identified, there has been some debate over the potential for these leapfrogs to drive clean technology adoption in developing countries. However, there does seem to be some significant potential for this type of technology transformation in areas such as green buildings and renewable energy. See Rajghatta, C. (2003) 'US Blue Over India's Green Title', *The Times of India*, 26 Nov. <<http://timesofindia.indiatimes.com/articleshows/msid-323347,Curpg-4.cms>>
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- Item (3) is drawn from the Asia Pacific Partnership on Clean Development and Climate, which Japan has been eagerly promoting jointly with the United States, Australia, South Korea, China, India, and Canada: <<http://www.asiapacificpartnership.org/>>
- 35 Prime Minister Fukuda announced 'The Fukuda Vision' on 9 June 2008, in preparation for the G8 Summit. He proposed to launch emissions trading on a trial basis in autumn 2008, and by 2050, reduce domestic GHG emissions by 60–80% from current levels, as well as unveiling new initiatives to curb climate change. However, the Environment Unit

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- 43 Although the Europeans have commented that this approach is useful, they have also been insisting that national emissions reduction targets based on the top-down approach should be used, since bottom-up reliance on efficiency of sectors alone would not ensure sufficient global GHG emissions reductions.
- The Japan–China Summit Meeting was held 6–10 May 2008 in Tokyo by Yasuo Fukuda, Prime Minister of Japan, and Hu Jintao, President of China. After the meeting, Japan expressed the importance of the sectoral approach in deciding each country's overall climate change target and China expressed that this approach is an important means of carrying out CO₂ reductions.
- 44 Furthermore, adopting this sectoral approach would require detailed data collection and forecasting of all major GHG emitters—including developing countries—a challenging task that would necessitate a long preparation period to start the system. This could cause serious difficulties for the successful negotiation of a global agreement by the end of 2009, a target agreed upon at the Bali COP. However, the bottom-up approach is meaningful in providing a benchmark for measures to be taken by individual countries in realizing global top-down reduction targets.
- The 17th Japan–European Union Summit Meeting was held on 23 April 2008 in Tokyo, and included participation from Yasuo Fukuda, Prime Minister of Japan, Janez Jansa, Prime Minister of Slovenia in his capacity as President of the European Council, and Jose Manuel Barroso, President of the European Commission. At the meeting, it was confirmed that with respect to the subject of climate change, which will be one of the most important items at the forthcoming G8 Hokkaido Toyako Summit, Japan and the European Union would continue to cooperate in the establishment of a post-2012 framework.
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- 48 See United Nations Environment Programme Division of Technology, Industry and Economics (2006) 'Energy Efficiency Guide for Industry in Asia' <<http://www.energyefficiencyasia.org/index.html>>
- 49 See WBCSD (2008) 'Energy and Climate' <<http://www.wbcd.org/templates/TemplateWBCSD5/layout.asp?type=p&MenuId=NjY&doOpen=1&ClickMenu=LeftMenu>> and WBCSD, (2008) 'Energy Efficiency in Buildings' <<http://www.wbcd.org/templates/TemplateWBCSD5/layout.asp?type=p&MenuId=MTA5NA&doOpen=1&ClickMenu=LeftMenu>>

CHAPTER 9

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CHAPTER 10

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- 29 See, for example, Wen, Z. and Chen, J. (2008) 'A Cost-Benefit Analysis for the Economic Growth in China', *Ecological Economics*, 65: 2; and Shanghai Daily (2006) 'Pollution Costs Equal 10% of China's GDP', 6 June.
- 30 See the discussion about these data in Davies, J. C. and Mazurek, J. (1998) 'Pollution Control in the United States: Evaluating the System', *Resources for the Future*, Washington, DC.
- 31 US EPA (2005) *Regulatory Impact Analysis for the Final Clean Air Interstate Rule*, EPA-452-R-05-002, Washington DC.
- 32 US-China Joint Economic Research Group (2007) *Economic Analyses of Energy Saving and Pollution Abatement Policies for the Electric Power Sectors of China and the United States: Summary for Policy-makers*, US-China Joint Economic Study.
- 33 US-China Joint Economic Research Group, 2007 (above), ii.
- 34 These have occurred most notably in Taiyuan, Jiangsu, and Hong Kong SAR/Guangdong province. See Morganstern, R. et al. (2004) 'Emissions Trading to Improve Air Quality in an Industrial City in the People's Republic of China', *Resources for the Future Discussion Paper* 04-16, April; and Wang J. et al. (2004) 'Controlling Sulfur Dioxide in China: Will Emissions Trading Work?' *Environment*, 46: 5, June. The central bank recently drew up tentative plans for a domestic emissions trading scheme that would cover a wide range of pollutants, from GHG to water pollutants (see Reuters, 9 June 2008), and it is expected that a power-plant programme for acid rain control will be included in the 12th Five Year Plan.

- 35 Associated Press (2008) 'Pollution Curbs Turn Beijing into an Urban Lab', *MSNBC*, 4 Aug. <<http://www.msnbc.msn.com/id/25998974/>>
- 36 Sun, X. (2006) 'Authorities Work on SO₂ Trade System', *China Daily*, 14 Sept. <http://www.chinadaily.com.cn/china/2006-09/14/content_688449.htm>
- 37 Reinermann, P. (2006) 'The Maturation of a Technology: Predictive Emissions Monitoring', *Chemical Engineering*, July, 50–55.
- 38 The companies receive the allowances for free, but then incorporate their market price into the electricity charge for ratepayers.

CHAPTER 11

- 1 A recent high quality, but representative example is Stern, N. (2007) *The Economics of Climate Change—The Stern Review*, Cambridge, UK: Cambridge University Press.
- 2 These objectives are consistent with scenarios described by the Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report. They are recognized in the UNFCCC negotiating process in the preamble to the Bali Action Plan, preamble and footnote 1, Decision 1/P.13, at FCCC/CP/2007/6/Add.1, p. 3. See <http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf> for the Action Plan.
- 3 The principal contest is over whether developing countries should have relatively autonomous control over how these monies are allocated and spent.
- 4 Putnam, R. D. (1988) 'Diplomacy and domestic politics: the logic of two-level games', *International Organization*, 42(3): 427–460.
- 5 For a general introduction to the literature on organizational theory and its applications to institutional economics, see Scott, W. R. (1987) *Organizations: Rational, Natural and Open Systems*, Englewood Cliffs, New Jersey: Prentice-Hall; Powell, W. W. and DiMaggio P. J. (1991) *The New Institutionalism in Organizational Analysis*, University of Chicago Press. For more specific application to climate institutions and policy, see Heller, T. (2008) 'Climate Change: Designing an Effective Response', in Zedillo, E. (ed.), *Global Warming: Looking Beyond Kyoto*, Brookings Institution Press.
- 6 Beinhooker, E. D. (2007) *The Origin of Wealth*, London: Random House, 323–348.
- 7 Past practice in key UNFCCC Conferences of the Parties has been characterized by extended debate about the relative commitments of the industrial nations that overshadows and takes serious attention away from North–South issues. The afterthought provisions about obligations between developed and developing countries end up being drafted in as ambiguous standards open to profound differences in interpretation and recrimination over inadequate implementation.
- 8 Advocates of the global deal suggest that emerging market nations are more likely to commit to comprehensive national caps on their emissions if prompted by either incentives or sanctions. If these nations are offered substantial 'headroom' or a quantity of allowances that exceeds their business-as-usual emissions trajectories—whether measured in absolute tonnes or in terms of energy or carbon intensity—they will be attracted by the financial transfers implicit in such permit allocations. Alternatively, if they do not make such commitments, they may be threatened with trade measures that restrict the imports of goods originating from their industries. Each of these proposals is quite problematic. Unconditional financial transfers at substantial scale from Annex I nations to rapidly growing, increasingly competitive emerging economies will be opposed by Western politicians. Trade measures are legally uncertain, will be in all cases complex and expensive to administer, and will be disruptive of already fragile global trading systems.
- 9 The principal threat to this default agreement is the problem of competitiveness; or the perceived inadequacy in Annex I countries of the national climate actions put forward by emerging market nations in industrial sectors like steel or aluminium. However, this

- threat is not specific to the default case; it applies to any global agreement. In this alternative perspective, the competitiveness issue does not raise the likelihood of a more aggressive global deal; it merely lowers the chance that even the default agreement is reached in Copenhagen.
- 10 Victor, D. (1998) '“Learning by Doing” in the Nonbinding International Regime to Manage Trade in Hazardous Chemicals and Pesticides', in Victor, D., Raustiala, K. and Skolnikoff, E. (eds.), *The Implementation and Effectiveness of International Environmental Commitments: Theory and Practice*, MIT Press.
- 11 For further discussion of these principles, see below and Heller, 2008 (above).
- 12 See Commission of European Communities (2008) 'Proposal for a Decision of the European Parliament and of the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas reduction commitments up to 2020', COM (2008) 17 final, 2008/0014 (COD), Brussels, 23.1.2008 <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0017:FIN:EN:HTML>>
- 13 Wara, M. W. and Victor, D. G. (2008) 'A Realistic Policy on International Carbon Offsets', Program on Energy and Sustainable Development Working Paper #74, Stanford University. (Notes 11, 12 and 13 equally draw on analysis discussed in this same paper).
- 14 Each unit of HFC-23 produced is 11,700 times more powerful a greenhouse gas than a comparable unit of CO₂. Destroying even small volumes of this by-product generates enormous numbers of CDM certificates. CDM authorization has two distinct effects on these productive activities. The first effect stems from overstating the baseline of HFC-23 emissions against which mitigated amounts are computed. In an optimally organized firm, it is possible to reduce the HFC-23 by-product to 1.4% of total production. By allowing a business-as-usual emissions baseline over 1.4% to firms in developing countries, CDM established incentives for entrepreneurs to set up an inefficient industrial process to produce more of the by-product, whose mitigation could be sold in global markets. The second effect is to overpay for both the inflated (false) and the real by-product reductions that are produced in this uneconomic process system. At a CDM traded price of €9 per ton CO₂ equivalent, HCFC-22 firms in non-Annex I countries were paid €2.90 to compensate their actual abatement cost of €0.03.
- 15 Officials in China and India are developing large numbers of major electric power plants whose emissions will be less than those of a pulverized coal baseload facility. They plan to submit these plants for CDM crediting. In 2007, in effect, all Chinese greenfield wind, hydro and natural gas-fired combined cycle power plants were CDM qualified under the rules approved by the EB. The creditable amounts are the emissions differentials between those facilities and the standard 300-megawatt Chinese-manufactured coal plant that has been the workhorse of the last vintage (1990–2005) of Chinese power development. In September 2007, the EB accepted a new methodology approving the registration of the next generation of ultra-supercritical coal-fired installations whose efficiency in fuel consumption, and thereby its emissions profile, is substantially improved over the older sub-critical dominant technology. The terms of the regulator's ruling would include the authorization of CDM credits from the less experimental Chinese supercritical coal plants since their average efficiencies also surpass the baseline levels of 35–36% efficiencies of the existing electricity network.
- 16 The hydro and gas projects were developed because of fuel diversification and regional factors normal in large-scale energy systems. Wind is constructed under both a broad renewable portfolio standard and a per-kilowatt price premium. Some facilities of the new generation of ultra-supercritical coal plants were completed just as they were approved for CDM. Well more than 30 supercritical coal plants are being built across China at present.
- 17 The collective good eligible for external contribution should be incremental changes across the margins where global and national forces are already pushing the domestic power systems without CDM or other transnational mechanisms. The regulatory problem in deter-

mining what is additional is especially difficult because tariffs in underlying energy markets are themselves nationally or more locally regulated. A CDM project can be made to appear additional or dependent on international subsidies by lowering the internal returns through tariff adjustment that anticipates CDM funding. See Schneider, L. (2007) 'Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement', report prepared by Öko-Institut for WWF <http://assets.panda.org/downloads/oeko_institut_2007____is_the_cdm_fulfilling_its_environmental_and_sustainable_developme.pdf>

- 18 The first period of the CDM has also been criticized for even productive carbon assets being overpriced, undermining incentives for long-term technology and behavioural change, and serving as a poor means to install a price cap in national carbon markets.
- 19 This is equally the case for the new Bali Road Map issue of structuring carbon finance packages that may accompany packages of national actions and international supports.
- 20 Oppenheim, J., Naucler, T. and Beinhocker, E. (2008) 'The Carbon Productivity Challenge: Curbing Climate Change, Sustainable Economic Growth', McKinsey & Company, June, 20–40.
- 21 This increase is described as comparable to the full cumulative increase in labour productivity since the Industrial Revolution. Carbon productivity is defined as 'the amount of GDP produced per unit of carbon equivalents (CO₂e) emitted'. For further discussion, see <http://www.mckinsey.com/mgi/publications/Carbon_Productivity/index.asp>
- 22 In countries such as China, emissions will depend heavily on whether it continues with energy intensive manufacturing, fragmented financial markets and exceptional national savings or moves toward more quality goods, further financial reform and increased domestic consumption, and not on whether it enacts national caps or other climate specific measures.
- 23 This work might start with the place of near-zero price carbon (and correspondingly low cost energy) in relation to other growth capital under existing development models. The historical fact of zero price carbon has influenced the predominant Western patterns of production, sectoral composition, spatial organization, consumption preferences, and the evolution of technology portfolios.

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