

# Asian Aspirations for Climate Regime Beyond 2012



Energy Security and Developmental Needs  
Clean Development Mechanism  
Technology Development and Transfer  
Adaptation to Climate Change

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## Foreword

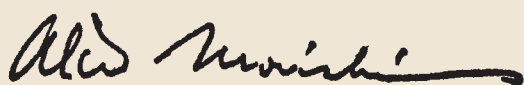
Climate change is a major environmental challenge for the entire world in general, and the Asia-Pacific region in particular due to its high vulnerability and limited adaptive capacity. A growing body of evidence suggests that impacts of climate change are already evident in many parts of the Asia-Pacific region. However, owing to competing priorities such as poverty alleviation, health, and education, policy makers have not yet considered the issue seriously in national development planning.

The international community has undertaken several initiatives to discuss strategies to address climate change but negotiators from the Asia-Pacific region have often remained on the sidelines of such discussions. There is now a widespread feeling among Asian stakeholders that the current climate regime does not adequately address their interests, concerns, and developmental aspirations. At the same time, it is widely accepted that the success of the future climate regime rests on policies and measures adopted in the region.

With a view to fostering constructive thinking and consensus-building on ways to strengthen the current climate regime, the Institute for Global Environmental Strategies (IGES) organised a series of national consultations and a region-wide seminar in 2005. Based on such consultations, a report entitled "Asian Perspectives on Climate Regime Beyond 2012" was published and presented at the COP11 and CSD-14. It is gratifying to note that the publication was well received and appreciated by stakeholders in the region as well as international climate negotiators.

In order to discuss the region-wide priorities for strengthening the climate regime in detail, a second round of consultations was held in 2006 on a sub-regional basis in Northeast Asia (Beijing, 3-4 July 2006), Southeast Asia (Bangkok, 19-20 July 2006) and South Asia (Delhi, 9-10 August 2006). Four specific themes of high relevance to the region – *energy security and developmental needs, clean development mechanism, technology development and transfer, and adaptation* – were discussed. This report summarises the findings from the second round of consultations.

While the decision to conduct the consultations was entirely that of IGES, the task would not have been possible without effective cooperation from several partner organisations in the region. I would especially like to thank the staff of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the Energy Research Institute (ERI) of China, and The Energy and Resources Institute (TERI) in India for facilitating the process, and request their continued cooperation in the future. I hope that the report will provide useful guidance towards constructing a more effective, pragmatic, and flexible climate regime. IGES solicits comments on this report regarding the improvements that should be considered over the months and years ahead.



Prof. Akio Morishima

President and Chair of the Board of Directors

Institute for Global Environmental Strategies (IGES)

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We thank the experts in various countries who kindly responded to our questionnaires, without whom this report would have been incomplete. We also wish to acknowledge with thanks the support from the Global Environmental Research Fund of the MOEJ (H-064).

## Abbreviations and Acronyms

ADB	Asian Development Bank	IMF	International Monetary Fund
AF	Adaptation Fund	IPCC	Intergovernmental Panel on Climate Change
AfDB	African Development Bank	IPHE	International Partnership for the Hydrogen Economy
AIDS	Acquired Immuno Deficiency Syndrome	IPR	Intellectual Property Rights
AIM	Asia Pacific Integrated Model	LDCF	Least Developed Countries Fund
AOSIS	Alliance of Small Island States	LDCs	Least Developed Countries
APERC	Asia Pacific Energy Research Centre	M2M	Methane to Markets Partnership
APP	Asia-Pacific Partnership on Clean Development and Climate	MDGs	Millennium Development Goals
AWG	Ad-hoc Working Group of Parties	METI	Ministry of Economy, Trade and Industry, Japan
Btu	British thermal unit	MLF	Multilateral Fund for the implementation of the Montreal Protocol
CBD	Convention on Biological Diversity	MOP	Meeting of the Parties (to the Kyoto Protocol)
CCAP	Center for Clean Air Policy, USA	MW	Mega Watt
CCD	Convention to Combat Desertification	NAPA	National Adaptation Programmes of Action
CCS	Carbon Capture and Storage	NDRC	National Development and Reform Commission
CDM	Clean Development Mechanism	NGO	Non Governmental Organisation
CDM-EB	CDM Executive Board	NSSD	National Strategy for Sustainable Development
CDT	Climate-wise Development Treaty	ODS	Ozone Depleting Substances
CERs	Certified Emission Reductions	OECD	Organisation for Economic Co-operation and Development
CGIAR	Consultative Group on International Agricultural Research	OPEC	Organization of Petroleum Exporting Countries
CNG	Compressed Natural Gas	PAMs	Policies and Measures
CO <sub>2</sub>	Carbon dioxide	ppmv	parts per million by volume
COP	Conference of the Parties	PPP	Purchasing Power Parity
CSD	Commission on Sustainable Development	PRSPs	Poverty Reduction Strategy Papers
CSLF	Carbon Sequestration Leadership Forum	R&D	Research and Development
CTI	Climate Technology Initiative	RE	Renewable Energy
DNA	Designated National Authority	RPS	Renewable Portfolio Standard
ecbi	European capacity building initiative	SBSTA	Subsidiary Body for Scientific and Technological Advice
EGTT	Expert Group on Technology Transfer	SCCF	Special Climate Change Fund SD Sustainable Development
EIA	Energy Information Administration	SIDS	Small Island Developing States
ENB	Earth Negotiations Bulletin	TERI	The Energy and Resources Institute, India
EPA	U.S. Environmental Protection Agency	TRIPS	Trade-Related Aspects of Intellectual Property Rights agreement of the World Trade Organisation
EU	European Union	TT:CLEAR	Technology information clearing house
EU-ETS	European Union Emissions Trading Scheme	UNCED	United Nations Conference on Environment and Development
G-77/China	The Group of 77 and China	UNDP	United Nations Development Programme
G8	Group of Eight	UNEP/RISO	United Nations Environmental Programme/ Risoe Centre, Denmark
GCI	Global Commons Institute	UNFCCC	United Nations Framework Convention on Climate Change
GDP	Gross Domestic Product	UNU-IAU	United Nations University-Institute for Advance Studies
GEF	Global Environment Facility	VARG	Vulnerability and Adaptation Research Group
GEM	group of emissions markets	WBCSD	World Business Council for Sustainable Development
GGFR	Global Gas Flaring Reduction Partnership	WDI	World Development Indicators
GHG	Greenhouse Gas	WSSD	World Summit on Sustainable Development
GISS/NASA	Goddard Institute for Space Studies/National Aeronautics and Space Administration	WTO	World Trade Organisation
GLOF	Glacial Lake Outburst floods	ZETT	Zero-Emission Technology Treaty
GNI	Gross National Income		
GNP	Gross National Product		
Gt	Giga tonne		
HFCs	Hydrofluorocarbons		
HIV	Human Immuno Deficiency Virus		
IAs	Implementing Agreements		
IATAL	International Air Travel Adaptation Levy		
ICCTF	International Climate Change Task Force		
IEA	International Energy Agency		
IES	Integrated Environmental Strategies		
IGCC	Integrated Gasification Combined Cycle		
IASA	International Institute for Applied Systems Analysis		

## EXECUTIVE SUMMARY

1. The Institute for Global Environmental Strategies (IGES) organised the second round of Asia-Pacific consultations on the post-2012 climate regime at sub-regional level in Northeast Asia (Beijing), Southeast Asia (Bangkok) and South Asia (New Delhi). The aim of these consultations, including questionnaire surveys, interviews with key informants, and literature surveys, was to discuss and prioritise options to strengthen the future climate regime under four specific themes of high priority to the region, namely, *energy security and developmental needs, clean development mechanism (CDM), technology development and transfer, and adaptation*.
2. Participating stakeholders (policy-makers, private sector representatives, NGOs and academia) emphasised that discussions on the design of the post-2012 climate regime should consider Asian interests and priorities more effectively than before, especially in view of the region's growing influence on energy demands and GHG emissions due to rapid economic and population growth rates.
3. Several participants noted that ratification of the Kyoto Protocol was an indicator of their country's seriousness to address climate change, and that its abandonment by 2012 would be a global tragedy. The Protocol served as one of the major drivers for policy formulation on climate and energy issues in several Asian countries, especially in the establishment of new institutions [e.g. Designated National Authorities (DNA) for CDM] and the promulgation of new regulations for energy conservation. Stakeholders cautioned, however, that the success of the Protocol in either reducing GHG emissions worldwide or improving the coping capacity of populations in Asia has been limited to date.
4. Most countries in the region have not yet declared a specific national position on the post-2012 climate regime due to various barriers. Participants appreciated the IGES initiative to provide a regional platform to exchange views among stakeholders with different perspectives on the post-2012 climate regime. Some participants suggested that the best available structure for the future regime is the continuation of the Kyoto-style framework, but complemented by pluri-lateral agreements engaging the USA. Other participants preferred an inclusive (with all Annex I parties) and mandatory climate regime, rather than a cluster of voluntary efforts.
5. Even though the terms "energy" and "development" were referred to in several articles of the UNFCCC and the Kyoto Protocol, participating stakeholders noted that the efforts to reflect Asian concerns on energy security and developmental needs in international climate negotiations have been far from satisfactory. The future climate regime, therefore, should identify and facilitate the most pragmatic measures to mainstream climate concerns in energy and development planning, and support implementation of integrated development and climate strategies at various levels. Indeed, the success of the future climate regime rests on the extent to which it can assist in transforming the region's social and economic structures toward low carbon societies, while addressing genuine regional concerns on energy security and development.

6. Improving energy security and access through maintaining affordable energy supplies is crucial for achieving economic development and realising climate benefits in Asia. Strategic international cooperation through effective investments, policies and measures to improve energy efficiency and promote renewable energy sources plays a key role in achieving lower future GHG emissions in the region and in reducing the vulnerability of both regional and global energy security. Since energy security is an issue on which both developing and developed countries share common interests, the future climate regime should facilitate further development of climate-friendly energy policies through sharing good practices, setting standards and guidelines, building adequate human and institutional capacities, and initiating new partnerships for regional collaboration. The CDM can be a supplemental source of financing clean energy in the region, but the mobilisation of resources outside the Convention is crucial.
7. Participants noted that the future climate regime could never be effective unless it reflects the diversity in developmental needs and priorities of Asian countries, as unsustainable development in the region will certainly lead to high GHG emissions from energy, transport, agriculture, and forestry sectors that will exacerbate climate change. Future regime discussions, therefore, should focus more on social and economic aspects of co-benefits from mitigation policies, with a view to help achieving the millennium development goals (MDGs) by the least developed countries (LDCs) and provide assistance to increase the economic and environmental efficiency for newly industrialised countries. Operational support from the climate framework, for example, through maintaining a registry of SD-PAMs (sustainable development policies and measures) and identifying PAMs with synergies between SD benefits and GHG mitigation, is critical to address the mainstreaming of climate risks in the development agenda.
8. Many stakeholders stressed that provision of an early, credible signal on continuity of CDM and ensuring the value of Certified Emission Reductions (CERs) after 2012 are vital because CDM activities have just gained momentum in the region with many projects requiring long gestation times and high capital costs. Indeed, the absence of financial benefits from post-2012 CER would reduce the viability of many CDM projects in the region. Options for an early signal include (a) unilateral declaration by Annex I countries to extensively utilise post-2012 CER including towards meeting their targets for the first commitment period, (b) extension of the period of the next commitment to beyond 10 years instead of the five years, and (c) proactive support for post-2012 CERs by multilateral financial institutions.
9. Participants underscored the need for (a) widening the scope of CDM from the current project-based activity to sector-, programme- or policy-based CDM, (b) redressing geographic inequity within the region, and (c) enhancing SD benefits from CDM. A sector-based approach could benefit the region in many sectors and enable greater participation by developing countries in climate efforts but problems such as baseline setting, monitoring, and potential leakage must be resolved. Many participants considered that expeditious registration of small-scale projects and support for bundled projects, coupled with the creation of carbon funds targeting micro-scale CDM activities in LDCs and SIDS are crucial to improve the geographic reach. Further, developmental co-benefits from CDM must be quantified and financially supported separately, so that the total value of the

projects with high SD benefits but yielding low CERs could compete well with those yielding high CERs. In addition, the future regime may strengthen SD assessment of CDM projects by creating a registry system for SD-PAMs and integrating into the approval process of the CDM Executive Board (CDM-EB).

10. Stakeholders emphasised the need for employing innovative financing approaches to cover underlying finance needs of CDM projects in the region. Some options suggested include: strengthening synergies in the private sector between Annex I and non-Annex I countries through bilateral business agreements; utilising ODA for CDM implementation especially during the early stages and in countries that are not financially attractive to investors from the perspective of project financing, and utilizing multi-source funding effectively to spread risk among several institutions.
11. Participants expressed serious concerns on the ability of the climate regime to facilitate the development and transfer of clean technologies in the region. Since technology is a cornerstone of several non-UNFCCC initiatives, which have potential to provide the necessary paradigm shift to reduce GHG emissions in selected industries, building synergies between the UNFCCC and non-UNFCCC initiatives is crucial. For instance, the climate regime can provide CDM opportunities in methane recovery and additional income for project developers, while the methane to markets (M2M) initiative and/or the Asia-Pacific Partnership (APP) can provide access to necessary technologies. Likewise, technologies for carbon capture and storage (CCS) may be transferred through APP, if the future climate regime makes CCS projects eligible for CDM. The future regime should also facilitate synergies among the North-South and South-South technology cooperation and transfer initiatives, especially in the field of adaptation.
12. Many participants emphasised the need for treating critical low carbon technologies as global public goods and for enhancing the flexibility of the intellectual property rights (IPR) regime. Some of the options to be pursued in Asia include extensive collaboration in the early stages of technology development leading to joint ownership of IPRs with developed countries, and creation of a multilateral technology acquisition fund, which could be structured to buy-out IPRs and make privately owned, climate-friendly technologies available for deployment in developing countries. The establishment of an international code of compulsory licensing for low carbon technologies along the lines of approaches taken for HIV/AIDS is also worth pursuing.
13. Stakeholders noted that ensuring additional finance through innovative public and private support mechanisms is critical to make the currently available technologies commercially competitive. The future climate regime should play a facilitative role in determining the incremental costs associated with acquisition of clean technologies relevant to Asia and in documenting the success stories of various policy instruments that can offset the higher overall costs of emerging technologies.
14. Participants stressed that the future climate regime should enhance the focus on adaptation to a similar level, if not more, as that of mitigation because several countries in the region are already facing the impacts of climate change. Designing a separate protocol on adaptation may enhance its profile, but the process may require considerable resources and time in terms of negotiation. The

future climate regime can facilitate discussions on an adaptation protocol in a more formal way to obtain views of different Parties and establish an exploratory committee, if necessary.

15. Participants recognised that a combination of both “top-down” support and “bottom-up” engagement approaches is crucial to advance the adaptation agenda and urged that the future climate regime should facilitate identification of pragmatic options for mainstreaming adaptation concerns in development planning in Asia both at policy and operational levels.
16. Since the demand for adaptation funds can increase in the future as climate change proceeds in the region, participants stressed that the agenda for adaptation financing in the future climate regime will need further honing and clarity. Participants noted the need for (a) enlarging the funding base and developing flexible but clear guidance to access adaptation funds, (b) differentiating between actions that can be funded inside and outside the climate regime, and (c) creating market mechanisms and incentives for the private sector to involve them in adaptation efforts. Options for establishing a mandatory global funding scheme, which is tied to both past and current GHG emissions by various countries, may need to be explored as a high priority.
17. We strongly hope that a blueprint for the future climate regime from an Asian perspective can be developed by pursuing the various options listed above. Both creativity and innovation are necessary, however, to implement such options effectively in order to realise the ultimate objectives of the Convention.

## SUGGESTIONS FOR STRENGTHENING THE CLIMATE REGIME BEYOND 2012 FROM AN ASIA-PACIFIC PERSPECTIVE

1. Discussions on the design of the post-2012 climate regime should respect and reflect interests, priorities and aspirations of the Asia-Pacific region more effectively than the present regime, especially in view of the region's growing influence on energy demands and GHG emissions due to its rapid economic and population growth rates.
2. Future regime negotiations should strengthen linkages among energy security, developmental needs and climate protection through ensuring the promotion of integrated development and climate actions in Asia. Operational support from the future climate regime for further development of climate-friendly energy policies, and identification of policies and measures with synergies between development benefits and GHG mitigation is critical.
3. Removing the uncertainties on continuity of CDM beyond 2012 by providing a clear, credible signal through unilateral declarations by Annex I countries and multilateral financial institutions is vital to achieve the ultimate goal of low carbon economies in the region. Discussions on widening the scope of CDM from the current project-based activity to sector-, programme- or policy-based CDM, redressing geographic inequity within the region, and enhancing developmental benefits from the CDM activities should be accelerated, with a view to promoting effective participation of all developing countries in mitigation efforts.
4. Options such as building synergies with non-UNFCCC initiatives, especially in high GHG emitting industries, and creating new mechanisms that would defray the costs of developing clean technologies should be explored to facilitate the rapid development and transfer of technologies in the region. Discussions should focus on strengthening existing international technology cooperation agreements and developing rational approaches for treatment of intellectual property rights for low carbon technologies.
5. Options for redressing the wide imbalance between mitigation and adaptation should be explored through initiating discussions on the merits and demerits of an adaptation protocol and on ways to encourage both public and private sector investments in adaptation. Mainstreaming adaptation concerns in development planning is crucial to enhance the coping capacity of vulnerable ecosystems and communities in the region.
6. Forging new approaches that draw upon the above options is surely a challenge. However, since framing the current climate regime required substantial resources to date, the future focus should be more on removing its weaknesses rather than attempting to design a completely new framework. The revised framework should be flexible enough to accommodate diverse national circumstances and permit a wide range of commitments and actions that could vary in time, form and stringency. Reaching an agreement on a post-2012 framework that is considered fair and equitable to all countries in the region may be a big goal, but not reaching an agreement at all in the near future could be more perilous for the entire world in general, and the Asia-Pacific region in particular.

# Introduction

Ancha Srinivasan

Climate change is undisputedly a critical challenge for the entire world. This challenge takes on even greater proportions in the Asia-Pacific region, which, due to its high dependence on climate-sensitive sectors such as agriculture and water resources, makes it highly vulnerable to climate change. As pointed out in our earlier publication “Asian Perspectives of Climate Regime beyond 2012 – Concerns, Interests and Priorities” (available online at <http://www.iges.or.jp/en/cp/report13.html>), several Asian stakeholders, including policy makers, strongly feel that international climate negotiations to date have not adequately considered Asian concerns and interests. The reasons may be several: lack of high policy priority to climate change in Asian countries, inadequate negotiation capacity, lack of awareness of the potential impacts of climate change at local and national levels, and so on. At the same time, it is widely accepted internationally that the success of any future climate regime will rest on the policies and measures adopted by Asian countries in the areas of both mitigation and adaptation. It is against this background that the Institute for Global Environmental Strategies (IGES) launched a consultation process with key Asian stakeholders, in 2005. A detailed description of the rationale for initiating this consultation process is given in the above-mentioned report.

*Success of any future climate regime will rest on the policies and measures adopted by Asian countries.*

## 1.1 Goals and objectives of the consultation process

### 1.1.1 Goals

The two broad goals of the IGES consultations in the Asia-Pacific region are to promote a new and constructive thinking process on future actions against climate change beyond 2012, and to contribute to the shaping of a future climate regime that reflects the concerns and developmental aspirations of the region.

### 1.1.2 Objectives

The consultation process, which runs over two years, has four specific objectives:

- (a) To facilitate a dialogue on national concerns, aspirations and priorities in relation to global climate stabilisation goals
- (b) To discuss progress in efforts against climate change as a basis for identification of future actions that can protect the global climate without dangerous impacts on socio-economic systems
- (c) To assess the view points of key stakeholders (policy makers, experts and others) on how discussions on future climate regime should evolve based on national circumstances and developmental priorities, and
- (d) To define pathways to effectively engage Asian countries in shaping of the climate regime

## 1.2 Methodology

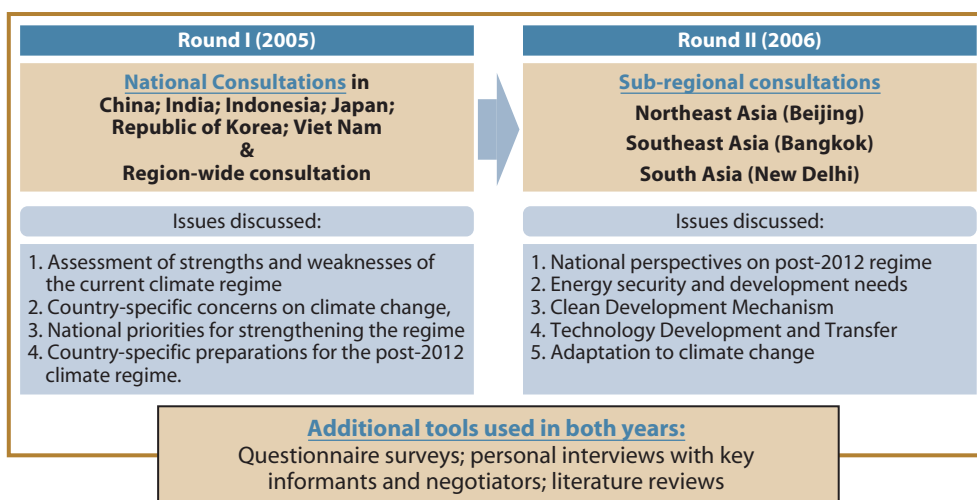
Two rounds of stakeholder consultations have been held to date (Figure 1.1). In 2005,

national consultations in China, India, Indonesia, Japan, Republic of Korea, and Viet Nam, as well as a region-wide consultation were held. In this first round, participants assessed strengths and weaknesses of the current climate regime and identified issues to be resolved at the international level. The discussion also focused on country-specific concerns on climate change, national priorities for strengthening or restructuring the regime, and country-specific preparations, if any, for the post-2012 climate regime. In addition, we employed literature reviews, interviews and questionnaire surveys to widen the scope and nature of consultations. IGES published a report on the outcomes of the consultations, which was disseminated at both the COP11/COPMOP1 held in Montreal, Canada and at the 14<sup>th</sup> Session of the United Nations Commission on Sustainable Development (CSD-14) held in New York, USA.

In the second round, consultations were held on a sub-regional basis in Northeast Asia (Beijing, 3-4 July 2006), Southeast Asia (Bangkok, 19-20 July 2006) and South Asia (Delhi, 9-10 August 2006). After briefly discussing the national perspectives on climate change regime in general, the specific means towards strengthening the future climate regime was discussed, focusing on four specific themes: *energy security and developmental needs, the clean development mechanism, technology development and transfer, and adaptation*. Under each theme, specific concerns of Asian countries that were highlighted in the first round were further pursued, and major proposals to strengthen climate regime in order to address such concerns were reviewed. A lead discussant (usually, an academic with substantial related research experience) and a panel comprising policy makers from various countries discussed the opportunities for strengthening various proposals. As in the first round, we reviewed recent published and unpublished literature, and collected information through questionnaire surveys and interviews with experts to validate our findings.

*The second round of IGES consultations were held on a sub-regional basis and discussed four specific themes: energy security and developmental needs, the clean development mechanism, technology development and transfer, and adaptation.*

**Figure 1.1 Modalities of IGES Consultations on Climate Regime Beyond 2012**



The participants of the second round of consultations considered the following questions in discussions under each of the four themes.

- (a) Have we considered all relevant proposals of the post-2012 climate regime under each theme? What are their strengths and weaknesses and do you see the need for making new proposals?

*Insufficient attention to the interests and priorities of Asian countries is considered a major drawback of the current regime.*

- (b) Most of the proposals on a future regime relating to mitigation of climate change come from climate change policy researchers and practitioners based in Europe and North America. Do you think that they adequately reflect the concerns and aspirations of Asia?
- (c) Do some of the proposals address Asian concerns more adequately than others? If so, how can we strengthen them further to make them acceptable to all parties, including Annex I countries, at international negotiations?
- (d) What innovative ways and means are necessary to further engage Asian countries in shaping the future climate regime?

### 1.3 Findings from Round I consultations

Round I consultations revealed that all participants recognised various achievements of the current climate regime through the UNFCCC and the Kyoto Protocol, but expressed strong concern over the progress of implementation of decisions reached at these discussions. Most of the stakeholders in Asia expressed a concern that past negotiations were not transparent and did not adequately consider views of Asian countries. Participants noted that insufficient attention to the interests and priorities of Asian countries, despite a growing recognition that efforts to control GHG emissions from the region are a major determinant of the success of the climate regime, was a major drawback of the current regime.

On a national basis, many countries recognised that developmental concerns, especially related to energy security, were largely ignored in current climate negotiations although climate and energy are both sides of the same coin. Participants in countries such as the Republic of Korea expressed a concern on maintaining industrial competitiveness in a carbon-constrained world. Many countries expressed that the current climate regime is not yet equitable in terms of burden sharing and that the future regime must consider basic human needs as well as historical responsibility and capability to reduce GHG emissions. Given the fact that only 238 persons from the Asia-Pacific region, as against 1,760 from the EU and USA, contributed to the Third Assessment Report of the IPCC, participants noted the strong need for strengthening both scientific and negotiating capacities in the region.

Participants generally agreed that the future climate regime must focus on ways to (a) integrate climate concerns in a developmental context, (b) streamline the CDM procedures (c) focus more strongly on adaptation, (d) facilitate technology development and transfer, and (e) strengthen the capacities of climate negotiators, businesses, and financial and legal institutions in the region. However, differences were evident on specific ways to (a) consider equity, (b) involve developing countries in GHG mitigation efforts, (c) strengthen CDM, (d) facilitate technology deployment in different countries, and (e) finance adaptation efforts. For example, large developing countries such as China, India, and Indonesia identified that the future regime must focus on streamlining CDM to facilitate the flows of technologies and finance, while least developed countries (LDCs) and small island developing states (SIDS) from the region expressed the need for enhancing focus on adaptation and preferential financing mechanisms.

*The international negotiators at the UNFCCC also agreed to focus their discussions on largely similar themes for the next two years.*

## 1.4 Challenges for the future climate regime

The first round of consultations identified several challenges for the future climate regime, including but not limited to, the following eight elements:

- (a) Strong leadership by developed countries in terms of the need for commitment to far deeper reductions, and for providing greater opportunities to developing countries for utilising the power of the market
- (b) Ways to demonstrate and strengthen linkages between development and climate through reconciling global strategies with local realities in different countries
- (c) Involvement of developing countries in mitigation efforts in a progressive and staged manner, based on equity
- (d) Streamlining of the CDM to reduce uncertainties, improve efficiency and ensure contributions to sustainable development
- (e) Creating the appropriate incentives for technology development and transfer
- (f) Developing innovative financing options through building synergies both within and outside the UNFCCC
- (g) Moving from rhetoric to focused actions on adaptation, and
- (h) Strengthening human and institutional capacities in the region to address both mitigation and adaptation more effectively than before.

## 1.5 Round II consultations and outline of the report

As explained above, the objective of the Round II consultations in 2006 was to further advance the frank exchange of opinions of policy makers, academia and the private sector on specific issues of high priority as identified from the first round of consultations. Since developmental priorities, CDM, technology and adaptation were repeatedly mentioned in Round I consultations, we chose to base the Round II consultations on the same themes. It is worth noting that the international negotiators at the UNFCCC also agreed to focus their discussions on largely similar themes as part of the "dialogue on long-term cooperative actions" for the next two years. It is sincerely hoped that the outcomes of the current round of consultations will directly feed into such an important process at the international level.

This report presents a summary of what has been learnt through the second round of consultations, interviews, and questionnaire surveys with policy makers and climate policy researchers across the Asia-Pacific region. National perspectives of different countries on current and future regime are briefly presented in Chapter 2. In Chapters 3 to 7, major proposals for strengthening the climate regime beyond 2012 are discussed critically. Chapter 3 considers how the future climate regime must integrate discussions on energy security and developmental concerns. Chapter 4 identifies ways to strengthen CDM in the current and future climate regime, while Chapter 5 focuses on technology development and transfer. Chapter 6 highlights various ways to advance adaptation to climate change. Major conclusions of the consultations are given in the final chapter.

# National Perspectives on Climate Regime Beyond 2012

Ancha Srinivasan

This chapter examines how stakeholders from various Asian countries perceive climate change and consider the Kyoto Protocol as a driver for national climate policy. It also explores the status of national positions on post-2012 climate regime with a view to identifying crucial elements for building a post-2012 climate regime from the perspective of different countries in the region. The presentations made by representatives of various countries in the “national perspectives” session of different consultations held on a sub-regional basis, as well as around 78 completed questionnaires by participants form the basis of this chapter.

*The Asia-Pacific region as a whole is not adequately prepared to cope with adverse impacts of climate change.*

## 2.1 Impacts of and preparedness for climate change

### 2.1.1 Regional impacts and preparedness of the region as a whole

Empirical research on climate change impacts in the Asia-Pacific region is still limited (Mendelsohn 2006). However, it is now widely accepted that the region is highly vulnerable to climate change especially because national economies in the region are largely dependent on climate-sensitive sectors such as agriculture, forestry, fisheries and tourism, and the region hosts a large number of poor populations with low adaptive capacity. Furthermore, the region has several ecosystems threatened by climate change, which have large implications for social and economic development in many countries of the region (IGES 2005a). The Third Assessment Report of IPCC, for instance, showed that nearly 67% of the glaciers in the Himalayan and Tianshan mountain ranges retreated in the past decade, and that the frequency of forest fires increased, particularly in the Boreal Asia region (IPCC 2001b). Both these factors have significant implications for the development of water and agricultural sectors in many Asian countries. Most of the participants and those who responded to questionnaire surveys (85%) reported that the region as a whole is not adequately prepared to cope with adverse impacts of climate change, despite its high vulnerability.

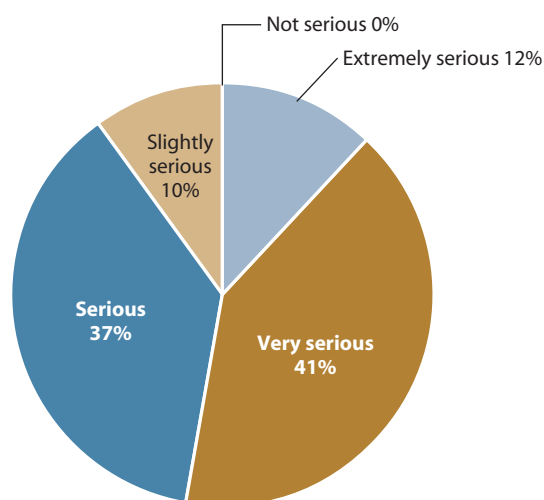
### 2.1.2 Impacts on specific countries and preparations to cope with specific impacts

Our earlier report on Asian perspectives of climate regime beyond 2012 identified several adaptation-related changes in countries such as China, India, Indonesia, Viet Nam, and the rest of Asia-Pacific (for details refer to pages 11, 14, 22, 25, 36, 52 and 60) (IGES 2005a). Most of the participants of our consultations and respondents to the questionnaire surveys (90%) reported that serious impacts of climate change are already evident (Figure 2.1) in different sectors and/or ecosystems, with a majority of participants reporting adverse consequences on water and agriculture sectors. The impacts are manifested in the form of increased frequency and intensity of extreme climate events such as floods, droughts, tropical cyclones, tidal surges, and gradual sea level rise leading to salt-water intrusion, salinity and drainage congestion. For example, participants from Bangladesh noted the occurrence of frequent winter droughts, and coastal as well as

riverine flooding with significant impacts on national food security, while those from India reported severe water stress and scarcity leading to reduced rice and wheat yields, and changes in transmission boundaries of diseases such as malaria, dengue, and yellow fever. Nearly 92% of participants of our consultations reported that countries have initiated some policies and measures to cope with such impacts (Table 2.1) but they recognise that such measures are perhaps inadequate to cope with the problem. The measures largely include preparation of policy documents such as National Adaptation Programmes of Action (NAPA), disaster management plans, and enhanced research on adaptation in agriculture and health sectors. A few participants (e.g. Bhutan) reported that efforts to mainstream climate concerns in development planning are in progress. Some participants (e.g. the Philippines) reported that communication of information on impacts of climate change to vulnerable sections of their societies is limited and further proactive support of such efforts is vital.

*Preparation of National Adaptation Programmes of Action (NAPAs), disaster management plans and enhanced research on adaptation in agriculture and health sectors are some of the measures currently in progress.*

**Figure 2.1 Perceptions of questionnaire respondents on severity of impacts of climate change in the Asia-Pacific region**



**Table 2.1 Measures to cope with impacts of climate change in selected Asia-Pacific countries**

Bangladesh	Preparation of NAPA; construction of flood and cyclone shelters, coastal embankments, rainwater harvesting, saline tolerant crops; drainage control
Bhutan	NAPA 2006 highlighting actions such as artificial lowering of Thorthomi lake, early warning systems, rainwater harvesting, landslide and flood control; mainstreaming climate change adaptation in national planning
Cambodia	Completion of NAPA and identification of additional adaptation programmes of action
Indonesia	Setting up of a special division on adaptation within the ministry and a working group on adaptation
Maldives	Integrating adaptation in infrastructure development; relocation of people from vulnerable islands to less vulnerable area; protection of coastal areas including airport
Mongolia	Phase 3 of National Action Plan on Climate Change listing various adaptation measures
Nepal	Water resources development plan
Philippines	Early warning systems and provision of seasonal climate advisories; public awareness activities; risk management framework including national hazard planning and stakeholder consultations; integrated impact and vulnerability assessment in most vulnerable regions; hazard mapping
Sri Lanka	Development of drought resistant and flood-tolerant crops and changing cropping patterns; sector-based adaptation plans; rainwater harvesting; rehabilitation of irrigation infrastructure
Thailand	Emergency response measures to cope with droughts and floods
Viet Nam	Vulnerability and adaptation assessments in selected sites; assessment of technology needs for adaptation; disaster management plans and adaptation framework

*Participants noted that the success of the Kyoto Protocol in either reducing GHG emissions worldwide or improving the coping capacity of vulnerable populations in Asia has been limited to date.*

### **2.1.3. Impacts on specific ecosystems and efforts to cope with such impacts**

Article 2 of the UNFCCC refers to prevention of dangerous anthropogenic interference with the climate system within a timeframe sufficient to allow ecosystems to adapt naturally to climate change. Most participants (83%) reported that forest, coastal, and mountain ecosystems in their countries are facing severe impacts of climate change. For example, participants reported bleaching of coral reefs in the Maldives and erosion of beaches in Sri Lanka with widespread negative impacts on the tourism industry, while participants from China, Bhutan and Nepal reported increasing glacier melting and retreat, and occurrence of Glacial Lake Outburst Floods (GLOF). Respondents to the questionnaire (64%), however, noted that very few actions were taken specifically to enhance the coping capacity of natural ecosystems. Many countries have biodiversity conservation plans and participants noted the need for mainstreaming climate concerns in such efforts.

## **2.2 Assessment of the Kyoto Protocol as a driving force for national climate policy and to achieve sustainable development**

### **2.2.1 Assessment of the Kyoto Protocol versus other multilateral environmental agreements at the international level**

Interviews with experienced international negotiators from the region revealed that the Montreal Protocol was largely successful in implementing the measures to eliminate the production and use of ozone-depleting chemicals internationally, while the Kyoto Protocol spurred only modest steps toward stabilising GHG emissions. They identified that the lack of willingness of the USA to participate in the latter was the major factor behind such disparity. Sunstein (2006) noted that the very different payoff structures of the two agreements and the radically different self-interested judgments of the USA were major factors. However, nearly all participants confirmed that the Kyoto Protocol represents a very important first step towards stabilisation of global climate, despite its very small immediate impact on the climate, simply because of the very short timescale and relatively modest GHG emission reduction targets. Participants also agreed that further improvements are possible to enhance its effectiveness. Some participants (e.g. India) noted that any alternative agreement to the current regime acceptable to the USA would be less ambitious than the Protocol, while others (e.g. Sri Lanka) noted the need for building synergies among multilateral environmental agreements for climate change, biodiversity and desertification.

### **2.2.2 Assessment of the Kyoto Protocol versus other multilateral environmental agreements at the national level**

Nearly all governments of the Asia-Pacific region ratified, accepted, acceded or approved the Kyoto Protocol. Most of the participants and respondents to the questionnaire survey (96%) reported that Kyoto Protocol ratification was an indicator of their country's seriousness on climate change. However, many participants (82%) qualified the statement by noting that the success of the Kyoto Protocol in either reducing GHG emissions or improving the coping capacity of vulnerable populations in respective countries has been limited to date. Some participants (e.g. Cambodia) noted that ratification of the protocol is one of the major ways to promote private investment in renewable energy,

energy efficiency, afforestation/reforestation activities and appropriate technologies. Several participants noted that actions to implement the Montreal Protocol were relatively straightforward and involved decision making by a few institutions at the national level, while policies and measures envisioned under the Kyoto Protocol need quite extensive cooperation of several ministries and stakeholders.

### **2.2.3 Assertion of national concerns in UNFCCC and Kyoto Protocol discussions**

Most of the respondents of the questionnaire survey (95%) noted that Asian governments were serious or very serious about addressing climate change domestically because of strong negative implications of climate change on sustainable development efforts. However, many participants (around 70%) noted that Asian countries, in general, failed to assert their national developmental concerns in international climate discussions to date. This conclusion corroborates last year's findings that Asian negotiators remained largely on the sidelines of international climate negotiations and that Asian interests and developmental aspirations were largely ignored in international climate negotiations. Participants highlighted the need to raise such concerns and priorities at the international level far more effectively than before.

### **2.2.4 Initiatives taken by selected countries before and after ratification of the Kyoto Protocol**

Despite the fact that climate change policies per se are not yet a high priority in most of the Asian developing countries, the ratification of the Kyoto Protocol seemed to have had a positive effect, as nearly 73% respondents noted that the Protocol served as a major driving force of their national climate and energy policies (Table 2.2). Some participants, however, noted that the Kyoto Protocol is at most only one of the several driving forces of national policy (e.g. Thailand). Several countries established institutions and promulgated new regulations to deal with climate change. The creation of inter-ministerial committees on climate change (e.g. Cambodia, Sri Lanka, the Philippines), establishment of Designated National Authority (DNA) in almost all countries, development of national CDM implementation strategies including establishment of CDM study centres (e.g. Sri Lanka) and formulation of NAPAs in LDCs (e.g. Bangladesh, Bhutan, Cambodia, Maldives, Mongolia) have been the most evident. Several countries reported policies and measures to improve energy efficiency (e.g. energy intensity standards and targets in China, establishment of Bureau of Energy Efficiency in India) and promote renewable sources of energy (e.g. China, India, the Philippines, Indonesia, Sri Lanka, Thailand) including alternate fuels (CNG, biogas, biofuels). In some countries, efforts to integrate climate concerns in development planning are also evident. National energy policies of Sri Lanka and Viet Nam, for example, integrated CDM potential in the planning of various sectors.

*The Kyoto Protocol served as a major driving force of the national climate and energy policies in the Asia-Pacific region.*

**Table 2.2 Institutional arrangements, and implemented policies and measures by selected Asian countries coinciding with the ratification of the Kyoto Protocol**

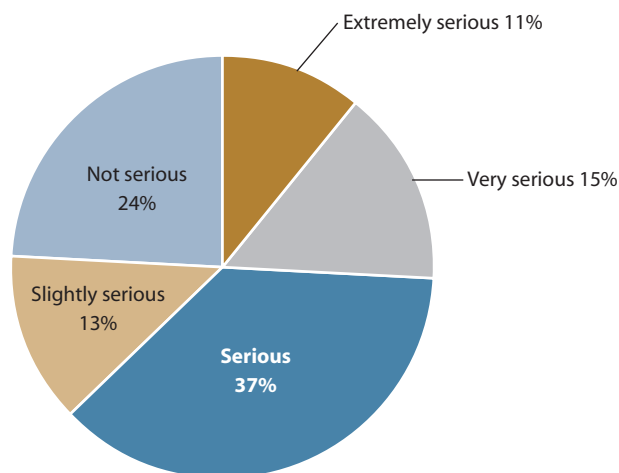
Cambodia	Creation of national climate change committee; completion of NAPA
China	Mandatory energy efficiency standards for building construction through promulgation of the Designing Standard for Energy Conservation in Civil Building (Jan. 2006)
Indonesia	Issuance of regulations regarding national energy mix, energy efficiency, biofuels, etc.
India	Establishment of Bureau of Energy Efficiency; renewable energy targets
Japan	Establishment of Laws to promote global warming prevention activities to achieve the Kyoto targets including 3-stage approach
Lao PDR	Establishment of Climate Change Steering Committee, DNA for CDM
Malaysia	Clean coal technology for coal plants; renewable energy targets, and tax incentives for energy efficiency; mainstreaming energy efficiency in development plans
Maldives	Creation of Ministry of Environment, Energy and Water; establishment of National Energy Authority to undertake energy resource assessment to estimate the potential of renewable energy
Mongolia	National programme on renewable energy (June 2005)
Myanmar	Establishment of National Commission for Environmental Affairs; promotion of the use of CNG, biogas and biofuels; implementation of greening projects in 13 sub-divisions of the country
Philippines	Policy frameworks on renewable energy and energy efficiency and development of alternate fuels
Republic of Korea	Third National Action Plan specifying 90 tasks for GHG mitigation
Singapore	National climate change strategy (in progress); co-funding of energy audits for industries; building efficiency standards, labels, and green vehicle rebates
Sri Lanka	Establishment of DNA and development of national CDM policy framework; integration of CDM potential in National Energy Policy; setting a target that at least 10% of new energy should be from renewable sources
Thailand	Energy strategy plan of 2005; establishment of Greenhouse Gas Management organization, Promotion of renewable energy development under CDM

*Abandonment of the Kyoto Protocol would seriously affect national climate policy and carbon trading, including implementation of market mechanisms such as CDM.*

### 2.3 Implications of the abandonment of the Kyoto Protocol on national climate policy and evolution of market mechanisms in the region

Several participants of our consultations noted that abandonment of the Kyoto Protocol at this stage would be a tragedy for the international efforts to address climate change, as considerable resources have been invested in the process to date. Many participants observed that the necessary momentum to develop market mechanisms has just picked up as evidenced by registration of 421 CDM projects with a total of 680 million CERs (Certified Emission Reductions) by 2012, and issuance of 21.5 million CERs by the CDM Executive Board as of November 2006 (UNFCCC 2006b). Naydenova (2006) reported that aborting the CDM would indeed be a waste of initial investments, as the legal, methodological, technical and institutional infrastructure is already in place and the carbon market is a fact. The CDM market has gained momentum in the Asia-Pacific region too, as can be seen by the host-country approval of as many as 164 CDM projects in China as of 9 November 2006 (<http://cdm.ccchina.gov.cn/english/NewsInfo.asp?NewsId=1323>), worth a potential 89 million CERs a year, and 400 projects in India by Sep. 2006. A high number of participants (84%) noted that the future climate regime must be built on such strong elements of the protocol while removing the existing weaknesses. Nearly three-fourths of the respondents to the questionnaire reported that abandonment of the Kyoto Protocol would seriously affect national climate policy and carbon trading, including implementation of market mechanisms such as CDM (Figure 2.2). Participants from countries such as Viet Nam reported that it would adversely affect national policy for renewable energy and energy efficiency while those from the Maldives noted that it might have extremely serious consequences on their national adaptation policy.

**Figure 2.2 Perceptions by respondents of questionnaire on severity of impacts of abandonment of the Kyoto Protocol on national policy and market mechanisms in the Asia-Pacific region**



A significant number (~24%) of participants noted, however, that abandonment of the protocol might not adversely influence national climate policy. They observed that new carbon markets would develop with or without the Kyoto Protocol, due to the existence of several carbon funds initiated by the multi-lateral institutions such as the World Bank and the linkage directive of the European Union’s Emissions Trading Scheme (EU-ETS) to CDM activities in developing countries. Further, some participants argued that, since the actual Kyoto Protocol in force now is so far removed from its original design, due to non-participation by the USA and Australia, and limited environmental effectiveness, a re-assessment of the actual impacts of the protocol on national climate policies and market mechanisms would be prudent. Participants from Bhutan, for example, noted that abandonment of the Kyoto Protocol would not seriously affect their national climate policy, as the country is a net sequester with about 70% of geographical area under forests, and is committed to conserve forests and use hydropower for its energy needs even without the Kyoto Protocol in place. Likewise, participants from the Philippines noted that the country is committed to the Philippines Clean Air Act, which stipulated participation in emissions trading.

## 2.4 Status of the development of national positions on post-2012 climate regime

### 2.4.1 Marginal role of the Asia-Pacific region in influencing international climate discussions

The consultations revealed a general concern among participants (78%) that the Asia-Pacific region is not playing its due role in influencing the outcomes of international climate negotiations. Some participants observed that deep divisions within the G77+China, along different interest groups, partly contributed to the lack of a sound regional policy for a post-2012 climate regime. The consultations revealed that most countries in the region, including large developing countries such as China and India or Annex I countries such as Japan, have yet to declare a specific national position on post-2012 climate regime, although 25 out of 76 respondents noted that some efforts along these lines are in progress. For instance, participants from Cambodia reported initiation of discussions at the technical and policy levels, while Indonesian

*Most countries in the region have yet to declare a specific national position on post-2012 climate regime.*

representatives reported the establishment of a special working group to consider post-2012 issues. Most countries in the region have thus appeared to adopt a “wait and see” approach. There is a widespread informal consensus, however, that efforts to mitigate and adapt to climate change should be more pronounced than in the current regime.

#### **2.4.2 Major barriers identified in developing a specific national position on post-2012 climate regime**

The consultations revealed that uncertainty of the positions of various Annex 1 parties, and the lack of adequate and capable staff members and funding in concerned ministries of most developing countries were major reasons for the slow progress in formulating a national position on a post-2012 climate regime. Some participants (e.g. Cambodia, Mongolia) reported that the lack of a regional platform for developing a common position among Asian countries and poor policy coordination among various ministries, and between government and other stakeholders within each country were major barriers. Other barriers include the lack of attaching high priority to climate policy issues, lack of awareness of global negotiation issues among both policy makers and the private sector, limited attention by the national media on implications of post-2012 regime discussions on national policy, and lack of technical capacity. Participants from some countries (e.g. the Philippines and Cook Islands) reported that lack of sufficient funds for addressing climate change issues and concerns, including those attending negotiations, have dampened intensive discussions on future climate regime at the national level.

#### **2.4.3 Efforts of countries to involve key stakeholders in developing a national position**

Participants noted that formal discussions to develop a national consensus on a post-2012 regime were not initiated in most countries but efforts to engage key stakeholders in informal discussions were evident. The NGOs and academic institutions in various countries have largely coordinated such efforts to date, often with indirect support from advisory panels to the national governments. Participants reported that informal discussions with businesses and industries are ongoing on a limited scale in some countries (e.g. India, Japan, Malaysia, Thailand). Inter-ministerial meetings at the governmental level, which are usually held in connection with CDM approval processes at DNA, seemed to have facilitated a degree of understanding on post-2012 issues in countries such as China, Indonesia, India, Republic of Korea, the Philippines and Viet Nam. Participants noted that discussions with key stakeholders on post-2012 climate regime issues have yet to begin, however, in countries such as Bangladesh, Bhutan, Cambodia, Lao PDR, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Singapore, and Sri Lanka.

## **2.5 Elements crucial for a successful post-2012 climate regime**

### **2.5.1 Major common elements identified across the region/sub-regions**

Most of the participants (95%) reported that consideration of Asian developing country concerns (e.g. sustainable development, energy security, poverty eradication) more proactively than in the current regime, and strengthening the CDM by giving a clear signal for its continuity beyond 2012 are crucial for building a successful post-2012 climate regime. A large majority of participants (76%) noted that the future climate

*Consideration of Asian concerns more proactively than in the current regime is crucial for building a successful post-2012 climate regime.*

regime should be based on the current regime that embodies the principles outlined in Article 3 (e.g. common but differentiated responsibilities) but it should have stronger compliance mechanisms with Annex I countries committing to deeper reductions and targets that are more credible than in the current regime. Some participants noted that the current regime takes a more *what-to-do* approach, rather than offering the more practical and needed *how-to* elements, and that its efficacy could be greatly enhanced if carbon revenues could provide greater incentives in the future regime. The need for building clear linkages of climate regime with achievement of sustainable development or Millennium Development Goals (MDGs) was also recognised.

Many participants (55%) noted the need for bringing the USA into the future climate regime. Some participants (e.g. India) argued that the best available structure for the future regime is the continuation of the Kyoto-style framework, but complemented by plurilateral agreements engaging the USA (e.g. Asia-Pacific Partnership, G8 agreements). Other participants (e.g. Bhutan), however, preferred to see an inclusive and mandatory climate regime with emission reduction commitments by all Annex I countries, rather than a cluster of voluntary efforts, in view of the risk and non-uniform nature of the latter. Ensuring consistent, stable and predictable funding, and facilitating technology transfer and adaptation through more active commitment were often identified as crucial for the success of the future climate regime. A few participants (16%) noted the desirability of having long-term targets for GHG concentrations or temperature rise either on a global- or ecosystem-basis. A few participants (13%) noted that demonstrating that economic development need not be hindered through GHG mitigation efforts in developing countries would be crucial to make further progress.

*Some participants argued that the best available structure for the future climate regime is the continuation of the Kyoto-style framework, but complemented by pluri-lateral agreements engaging the USA (e.g. Asia-Pacific Partnership, G8 agreements).*

### **2.5.2 Country-specific interests on specific elements of the future climate regime**

There was widespread interest on ways to strengthen market mechanisms in the future climate regime. Most of the participants (92%) noted the need for extending and strengthening the CDM beyond 2012 by shortening the gestation period of CDM activities, simplifying the CDM approval process, promoting small-scale CDM projects, and reducing transaction costs. Participants from China, India, and Indonesia noted the need for widening the scope of CDM into a programmatic or sector level in the future climate regime, so that resources generated through such CDM activities might be utilised for supporting adaptation efforts. Participants (e.g. India) noted that expansion of the scope of CDM would enable Annex I parties to adopt deeper emission reduction targets at reasonable cost and allow equitable burden sharing among Annex I parties, while promoting greater participation by developing countries. Participants from Singapore, for example, argued for a longer second commitment period to provide certainty to the CDM process, while those from Viet Nam and China sought for more flexibility in CER trading among Annex I and non-Annex I countries. A few participants noted the need for creating stronger incentives for CDM activities with high sustainable development benefits, and ensuring a better geographical distribution of CDM activities. Participants from Cambodia, Lao PDR, Mongolia, Nepal, and Sri Lanka, for example, sought for further simplification of CDM modalities for LDCs and SIDS, including reduction of processing fees and preferential treatment in the project approval process. Representatives from SIDS, however, cautioned against over-simplification of the CDM approval process in order to protect environmental integrity of the concept. Participants from the Philippines cautioned that market mechanisms should not be the principal means for financing or technology transfer.

***Most countries in the region argued for deeper reduction targets by Annex I parties while ensuring no gap between the commitment periods.***

On the role of Annex I countries in the future climate regime, most countries in the region argued for deeper reduction targets by Annex I parties while ensuring no gap between the commitment periods. A few participants (e.g. India) also noted that future efforts towards more equitable sharing of the global commons would build confidence in the climate regime. In terms of the role of developing countries in the future regime, some participants (e.g. China and India) cautioned that non-Annex I parties should not have binding targets in the second commitment period. They emphasized that both the Convention and the Protocol have already appropriately defined the role of developing countries and that there is scope for more proactive implementation. Some participants (e.g. China) cautioned against over-burdening the mandate of the Ad-hoc Working Group of Parties (AWG) by introducing issues (e.g. sustainable development, technology, adaptation, bunker fuels) other than the topics of duration and targets for Annex I parties during the second commitment period, and the necessary amendments to the articles of the Kyoto Protocol to reflect such targets. On the other hand, some participants (e.g. Japan) noted that changing circumstances with respect to economy and GHG emissions since 1990 must be considered in determining the nature and type of commitments or involvement of various parties to the UNFCCC. The Japanese participants called for designing an effective framework to bring about maximum GHG reductions by all major countries in accordance with their own capabilities, and coordinating the discussions among dialogue on long-term cooperative actions, AWG, and review of Article 9 of the Kyoto Protocol. Participants from Bangladesh and Mongolia also stated that major non-Annex I developing countries should take on commitments for emission reduction without compromising their right for development. Participants also recognised the need for supporting voluntary emission reduction efforts in developing countries through creation of additional mechanisms. The need for creating additional incentives for participation of developing countries through appropriate treatment of biomass and bioenergy in the future regime was also noted.

Participants from countries such as Bangladesh, Nepal, Lao PDR, Cambodia, Mongolia, and the Maldives noted the need to strengthen the current mechanisms and explore additional mechanisms for facilitating adaptation in the future climate regime. Some participants (37%) felt it was necessary to design an additional protocol with stronger commitments, while others (34%) felt such efforts would prove frustrating and divert attention from mitigation efforts. Some participants (e.g. the Philippines) argued for increasing the share of proceeds from CDM activities towards supporting adaptation efforts. On technology issues, some participants (e.g. the Philippines) noted the need for active involvement of developing countries in technology development to ensure that it is adapted to local conditions.

The questionnaire surveys also allowed us to collect a few responses from countries outside the Asia-Pacific region. Some respondents saw the desirability of redefining the concept of “developing country,” as some developing countries under current classification are richer with higher per capita emissions than those in some developed countries. They suggested that a regrouping of countries would benefit the low-income developing countries, LDCs and SIDS. A few respondents suggested that all market mechanisms should be extended to all countries willing to take a cap, while some others suggested the need for changing consumption patterns and for discouraging or even halting the funding by multi-lateral financial institutions to support fossil fuel-based industries.

## 2.6 Concluding remarks

The foregoing discussion showed that most of the countries in the Asia-Pacific region are yet to develop or declare a specific national position on the future climate regime. However, participants in our consultations agreed that the region's imperative for the post-2012 climate change policy should be on establishing a global alliance on a truly common and shared international climate change policy. The discussions emphasised that the future climate regime should focus on a few main elements, such as ways to consider Asian interests in terms of energy security and developmental concerns in the climate regime, and ways to strengthen the CDM, technology development and transfer, and adaptation. The following chapters explore such elements and opportunities for strengthening the future climate regime.

*The Asia-Pacific region's imperative for the post-2012 regime should be on establishing a global alliance based on a truly common and shared international climate change policy.*

# Energy Security and Developmental Needs

Kazuhisa Koakutsu and Rie Watanabe

with contributions from K. Tamura, A. Srinivasan, H. Kimura, K. Iyadomi, T. Sudo and J. Ichihara

*There are many points of intersection and interdependencies among the agendas of climate change, development and energy security.*

## 3.1 Introduction

This chapter explores the linkages among energy security, developmental needs and climate change, and their implications for the post-2012 climate regime. After examining references to energy and development issues in the current climate regime, the relationships among climate change, development and energy security in an international and Asian context are discussed. Following an assessment of twenty proposals for strengthening the future climate regime in terms of their consideration of energy security and developmental needs, the perspectives of various stakeholders on such issues are summarised. A few options for strengthening the climate regime from the viewpoints of energy security and developmental needs are then put forward.

### 3.1.1 Climate change, development and energy security (CDE)

Until recently, climate change, development, and energy have been pursued as separate themes in policy and research, perhaps due to the various reasons listed below (Huq et al. 2006).

- Differences in disciplines (e.g. natural sciences vs. social sciences) and stakeholders involved (e.g. environmental agencies vs. energy, finance and planning agencies)
- Differences in temporal scale (climate change is addressed in terms of 100 years or so whereas development and energy issues are addressed in the time scale of 10 to 20 years)
- Differences in geographic scope and data certainty (climate change covering global and regional scales with some degree of uncertainty in data while development and energy communities focusing on national and regional conditions with relatively high degree of confidence in data).

The international community, however, has begun to note that there are many points of intersection and interdependencies among the agendas of climate change, development and energy security ever since the introduction of the concept of “sustainable development” in Brundtland report of the World Commission on Environment and Development in 1987. The adoption of Agenda 21 by the UN Conference on Environment and Development in 1992, the Millennium Declaration by the UN General Assembly in 2000, the Johannesburg Plan of Implementation (JPOI) by the World Summit on Sustainable Development (WSSD) in 2002, and the Gleneagles G8 summit held in 2005 are some of the key milestones. The JPOI, for example, called for improved access to reliable and affordable energy services for rural development sufficient to facilitate the achievement of the Millennium Development Goals (MDGs).

### 3.1.2 Development and energy security issues in the current climate regime

The need to address the problem of climate change and respond to the priority needs of developing countries to achieve sustained economic growth and eradicate poverty is one of the guiding principles that govern the implementation of the UNFCCC and its Kyoto Protocol. There are many provisions referring to development and energy issues in

the Convention (e.g. Preamble, Article 2, Article 3.4 and Article 4.1c), the Protocol (Article 10 and Article 12.2) as well as various decisions by the Conference of Parties (COP) (Box 3.1). As stipulated in Article 3.4 of the UNFCCC, the right of “sustainable development” for all countries is guaranteed under the Convention. The CDM under the Kyoto Protocol is also aimed at promoting sustainable development in developing countries.

Notwithstanding the above provisions, discussions on developmental and energy issues in international climate negotiations have been inadequate. Beg et al. (2002), for example, noted that developmental issues *per se* were not the focus of negotiations for a long time, even though climate change is clearly relevant to priority developmental needs such as poverty alleviation, food security, and access to basic services such as energy and education. Likewise, concerns on energy security were not the focus of climate discussions for a long time. One senior climate negotiator from India, who participated in our consultations, noted that energy issues were not of high priority or proportionally less pressing at the time of framing the Convention in 1992, as the world had already reasonably adjusted to the energy crises of 1973 and 1979. During those years, actions were taken to control oil prices with little regard for any environmental concerns.

*As stipulated in Article 3.4 of the UNFCCC, the right of “sustainable development” for all countries is guaranteed under the Convention.*

**Box 3.1 Selected references to development and energy issues in the current climate regime**

UNFCCC	Kyoto Protocol	COP Decisions
<p><b>Preamble:</b> Recognizing that all countries, especially developing countries, need access to resources required to achieve <u>sustainable social and economic development</u> and that, in order for developing countries to progress towards that goal, their <u>energy consumption will need to grow</u> taking into account the possibilities, for achieving <u>greater energy efficiency</u> and for controlling greenhouse gas emissions in general, ....</p> <p><b>Article 2:</b> The ultimate objective ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. 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 <u>economic development</u> to proceed in a <u>sustainable</u> manner.</p> <p><b>Article 3.4:</b> Parties have a right to, and should, promote <u>sustainable development</u>. Policies and measures to address climate change should be appropriate for the specific conditions of each Party and should be <u>integrated with national development</u> programmes, taking into account that <u>economic development</u> is essential for adopting measures to address climate change.</p> <p><b>Article 4.1. (c):</b> Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the <u>energy</u>, transport, industry, agriculture, forestry and waste management sectors.</p>	<p><b>Article 10:</b> All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, without introducing any new commitments for Parties not included in Annex I, but reaffirming existing commitments under Article 4, paragraph 1, of the Convention, and continuing to advance the implementation of these commitments in order to achieve <u>sustainable development</u>, taking into account Article 4, paragraphs 3, 5 and 7, of the Convention,</p> <p><b>Article 12.2:</b> The purpose of the <u>clean development mechanism</u> shall be to assist Parties not included in Annex I in achieving <u>sustainable development</u> and in contributing to the ultimate objective of the convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.</p>	<p><b>Decision 10/CP.2:</b> The guidelines for the preparation of initial communications by Parties not included in Annex I to the convention: In order to emphasize the importance of <u>the link between climate change and sustainable development</u>, request that non-Annex I Parties should seek to include programmes relating to <u>sustainable development</u> in their initial national communications. Source: UNFCCC/CP/1996/15/Add.1</p> <p><b>Decision 1/CP.8:</b> Parties have a right to, and should, <u>promote sustainable development</u>. Policies and measures to protect ..., taking into account that <u>economic development</u> is essential for adopting measures to address climate change. Source: UNFCCC/CP/2002/7/Add.1</p>

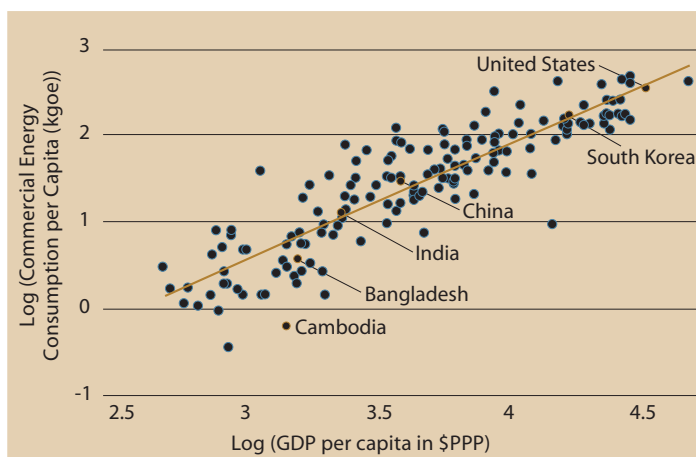
*In many countries, there can be tension when trying to ensure energy supplies to meet growing energy needs while reducing the share of fossil fuels to mitigate climate change.*

### 3.2 Inter-linkages among climate change, development and energy security

Climate change, development and energy security are tightly linked. While energy is a major driving force of economic development and poverty reduction, it is also the cause of climate change, which in turn adversely affects the health and livelihoods of the poor. Viewed from a national growth perspective, there is a strong correlation between economic development (as reflected by GDP) and energy consumption (Figure 3.1). A part of the explanation for such a strong correlation is that most economic activity would be impossible without energy (Feinstein 2002). Energy consumption and GHG emissions are again strongly correlated, thereby implying a strong association between economic development and GHG emissions (IPCC 2001a). The challenge is to decouple economic growth and GHG emissions, so that low carbon societies can be built without adverse impacts on development and climate.

The objectives of enhancing energy security and mitigation of climate change, however, are often conflicting due to our society's high reliance on fossil fuels as main sources of energy. In many countries, there can be tension when trying to ensure energy supplies to meet growing energy needs while reducing the share of fossil fuels to mitigate climate change. Such tension may be alleviated partly by policies and measures aimed at reducing demand for fossil fuels, or using cleaner fossil fuels, promoting diversification of fuel types and sources by using renewable sources of energy, and improving energy efficiency (Table 3.1). Incentives for the development of clean technologies and international cooperation for climate-friendly investments may also help in resolving the conflicts. Finding synergies between energy policy goals and actions on addressing climate change, while ensuring social and economic development is, therefore, a global challenge.

**Figure 3.1 Correlation between energy consumption and GDP**



Source: Modi et al. 2005

**Table 3.1 Selected list of policies and measures with multiple benefits of enhancing energy security, mitigating climate change and contributing to economic development**

Issue	Policies and Measures
Renewable sources of energy	Setting targets for renewable energy (e.g. Renewable Portfolio Standards).
	Subsidies for renewable energy based electricity (e.g. feed-in tariff, photovoltaic roof-top programme)
	Promotion of research and development (R&D) on renewable energy
	Shifts to smaller-scale and distributed technologies through funding renewable- based distributed generation systems in rural areas
Fuel diversification	Setting targets for bio-fuel use (e.g. 5% blending with gasoline)
	Diversify energy mix away from oil (e.g. switching from oil to natural gas); development of alternative fuels
Energy efficiency improvement	Setting legislative measures for energy efficiency
	Setting mandatory targets for energy efficiency (e.g. vehicle fuel efficiency standards, building energy standards, energy labeling standards for appliances; energy monitoring).
	Subsidies for energy efficient technologies; Higher taxes for larger vehicles
	Funding R&D for energy/carbon efficient demonstration/pilot projects.

The level of (economic) development is not only related to mitigation of climate change. It is one of the main determinants of vulnerability to climate change (e.g. Smit et al. 2001). Developing countries are thus more vulnerable to climate change due to their high reliance on climate-sensitive sectors, such as agriculture, and populations in those countries have less means to defend themselves against the vagaries of the weather.

In view of such strong interdependencies, the triad of interests – climate change, developmental priorities and energy security – must be addressed in an integrated manner.

### 3.2.1 International context

Recently, the international community has become increasingly aware of the links among climate, development, and energy, and the need for dealing with these three issues collectively and coherently. This is because of many factors including rising oil prices, growing energy interdependence among countries, and the evermore severe impacts of climate change. Recent estimates by IEA indicate that global energy consumption is projected to increase by 71 percent from 2003 to 2030 from 421 quadrillion Btu (2003) to 722 quadrillion Btu (2030), and global GHG emissions from 21.2 billion Mt (1990) to around 43 billion Mt (2030), with the developing countries expected to overtake OECD in the 2020s. Fossil fuels continue to supply much of the energy used worldwide, and oil remains the dominant energy source. Further, it is expected that US\$ 16-17 trillion will be invested in the energy sector from 2000 to 2030, of which around US\$ 5.8 trillion will be invested in electricity supply to extend access to electricity to about 2 billion people in developing countries (IEA 2006). Even with such investments, it must be noted that 1.5 billion people will still lack access to electricity in 2030. Indeed 50% of available energy is currently used by 15% of the world population while 1.6 billion people do not have access to electricity, with most of them in South Asia and Africa. Therefore, the effect of new investments in energy will not effectively decrease the number of people without access to energy services. It means that a significant proportion of the global community will continue to suffer from under-development.

*The triad of interests – climate change, developmental priorities and energy security – must be addressed in an integrated manner.*

*Fossil fuels continue to supply much of the energy used worldwide, and oil remains the dominant energy source.*

***Asia has a huge appetite for energy to fuel such rapid economic development. Over the quarter of century, Asia's CO<sub>2</sub> emissions will most likely double.***

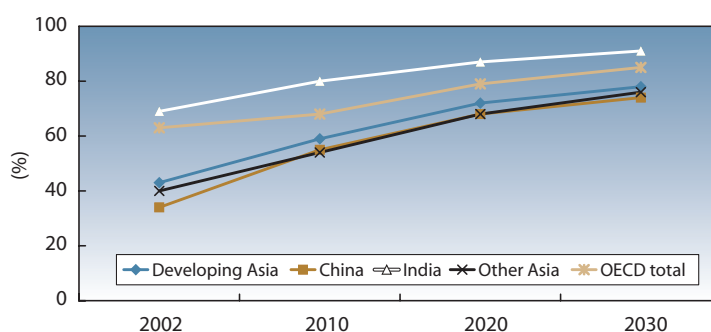
### **3.2.2 Asian context**

Asia faces challenges on all three fronts: climate change, development and energy security. The impacts of climate change in Asia are becoming evident in the form of an increased frequency of extreme climate events (e.g. droughts, floods, tropical cyclones), salt water intrusion into aquifers in coastal areas, glacier melting, and so on. A large number of people dependent on agriculture, fisheries, tourism and other climate sensitive sectors are vulnerable to such impacts. In terms of economic development, a large proportion of population is still poor, especially in South Asia. In terms of energy security, rising oil prices, increasing dependence on the Middle East and a great imbalance between energy demand and supply are the main points of concern.

Asia has a huge appetite for energy to fuel such rapid economic development. Recent projections by IEA indicate that energy demand in Asia excluding Japan and Republic of Korea would grow at an average annual rate of 3.7% per year from 2003 to 2030 (the highest in the world). The increasing share of fossil fuels would mostly meet such high growth rate for energy. However, it must be noted that per capita energy consumption levels in Asia are still very low (around 60% of the world average) as compared with other regions of the world. Over the quarter of century, Asia's CO<sub>2</sub> emissions will most likely double from 8.9 Giga tonne (Gt) to 18.1Gt, with its share sharply increasing from 38% to 47% from 2002 to 2030 (IEA 2004). Although the region has abundant coal and natural gas reserves, the dependence on oil is likely to double from 43% to 78% by 2030 (Figure 3.2). Currently, the region accounts for 36% of the global primary oil demand. Developing Asia's oil demand in 2030 (40 million barrels per day - mb/d) is expected to exceed that of the USA and Canada combined (28 mb/d) (UNESCAP 2006). APERC (2006) projects that developing Asia will increasingly rely on foreign energy resources, particularly oils from middle eastern countries and that countries such as China, Indonesia, Malaysia, and Viet Nam will become net energy importers in 2030.

In terms of economic development, Asia has been experiencing rapid economic growth since the 1950s, with an aggregated regional GDP growth rate of 7% (ADB, 2006). The real income per capita increased sevenfold during 1950 to 2005 and its share of world trade doubled during 1970-2005 (IMF 2006). However, there exists a wide range of development stages and a variety of development paths in Asia. For example, Singapore and the Republic of Korea have nearly reached the "developed country" status, as they graduated from the ODA recipient status. Malaysia is on the way to reaching such a level. On the other hand, Bangladesh, Bhutan, Cambodia, Lao PDR, Mongolia, Myanmar and Nepal remain as LDCs. Although China and India are currently enjoying fast economic growth rates of more than 8% per annum, poverty remains a major issue, as 47% of Chinese and 81% of Indians still make a living with less than two dollars a day (World Bank 2005). Furthermore, 54% of India's population of a billion plus currently have no access to electricity, and 42% have no access to clean cooking fuels (Government of India 2001). It is important to note such disparities in development status and other national circumstances while discussing the involvement of Asian developing countries in efforts to prevent climate change.

**Figure 3.2. Future oil import dependence in Asian countries**



Source: IEA 2004

### 3.3 Asian concerns on energy security and development in current climate regime

Asian countries are facing a number of challenges in energy security – access, availability, affordability, and efficiency. Indeed IGES consultations and questionnaire surveys in 2005 showed that many Asian countries were concerned about energy security and other developmental priorities such as poverty alleviation (IGES 2005a). Depending on national circumstances, the order of priority of developmental concerns varied. Burgeoning energy demand in emerging Asian markets due to rapid economic growth fuelled serious concerns on energy security, especially in China, India, Republic of Korea and Viet Nam. Stakeholders from Viet Nam were also concerned about food security, while those from Indonesia were strongly concerned about desertification and deforestation.

Insofar as energy security is concerned, most of the participants and respondents to the questionnaire were concerned about the imbalance between energy demand and supply, excessive dependency on oil imports, and vulnerability of oil price and supply. The Asia-Pacific region currently produces 23 mb/d while it consumes 29 mb/d (UNESCAP 2006). Access to an affordable energy supply is extremely limited in many parts of Asia. For example, Cambodia, DPR Korea, Myanmar, Afghanistan, Bangladesh, India and Nepal did not achieve 50% of the electrification rate in 2002 (Table 3.2). In 2002, about 1 billion people did not have access to electricity in developing Asia (IEA 2004). Even if the region has significant energy-related investments for building infrastructure by 2030 - approximately US\$126 billion for additional cumulative investment to meet MDG goals between 2003-2015 - almost 800 million people will remain without access to modern energy services, particularly in South Asia (IEA 2004).

*Asian countries are facing a number of challenges in energy security – access, availability, affordability, and efficiency.*

*In 2002, about 1 billion people did not have access to electricity in developing Asia.*

**Table 3.2 Access to electricity in various Asian countries**

Country	Electrification rate (%)	Population without electricity (million)
Northeast Asia		
China	99	12.9
Republic of Korea	100	-
Mongolia	90	0.3
Southeast Asia		
Indonesia	52	100.5
Myanmar	5	46.4
Viet Nam	79	16.3
Cambodia	18	11.3
Philippines	89	8.7
Thailand	91	5.5
Malaysia	97	0.7
Singapore	100	-
South Asia		
Bangladesh	26	101
India	44	583
Nepal	26	18
Pakistan	53	68
Sri Lanka	66	7

Source: IEA 2004

*The proposals broadly fall into three categories based on target setting and number of criteria used in each proposal.*

### 3.4 Approaches and proposals for strengthening the climate regime through addressing energy security and development issues

This section examines twenty proposals, which address different elements of energy security and/or development in the context of the post-2012 climate regime (Table 3.3). The proposals broadly fall into three categories based on target setting and number of criteria used in each proposal: top-down approaches, which set a specific target within a given timeframe to stabilise global climate; bottom-up approaches without such a target; and mixed approaches that include elements of both top-down and bottom-up approaches. The extent to which each proposal considered energy security and/or development issues was rated from zero (no consideration) to +++ (high consideration)<sup>1</sup>. For example, if a proposal employed a single indicator such as energy intensity or carbon intensity, it was scored + (low consideration) for energy security. If several indicators relevant to energy security were used (e.g. supporting renewable technology), higher scores were given. A similar approach was used for scoring “development-focused” proposals.

1. The assessment of the proposals based on the number of indicators is highly subjective. Therefore, caution is necessary in interpretation of the results. Nevertheless, the exercise provides us with some useful insights as to which proposals consider energy and/or development issues more comprehensively than the others.

**Table 3.3 Salient features of proposals for strengthening the future climate regime with reference to consideration of energy security and developmental needs**

**A1. Top-down approaches: criteria used for allocation of GHG emission reductions**

Proposals	Time Frame	Principle	Main Features	Target	Extent of consideration of the issues		
					Energy Security (ES)	Development (DEV)	Climate Change (CC)
Brazilian proposal (UNFCCC-AGBM 1997) (Brazilian Ministry of Science and Technology 2000)	1990-2020	Historical responsibility	(1) Burden-sharing approach based on cumulative emissions and its impact on global temperature increase. (2) Establishment of the Clean Development Fund based on proceeds from non-compliance fee of US\$10 per tCO <sub>2</sub> eq from Annex I countries, of which 10 % is used for adaptation projects in developing countries.	Annex I countries are to reduce emissions by 30% below 1990 levels by 2020	0	+	+++
Contraction and Convergence (Meyer 2000)	40-100 years	Precautionary and equity principles (equal per capita entitlements)	(1) Specification of permissible level of global emissions at a safe level (no higher than 450 ppmv CO <sub>2</sub> eq) to establish a global emissions budget ("Contraction"). (2) Sharing of the emissions budget until per capita emissions converge by agreed year ("Convergence")	To stabilize atmospheric concentration of greenhouse gases (GHG) no higher than 450 ppmv CO <sub>2</sub> eq by 2100.	0	0	+++
Expanded "Common but Differentiated" (Gupta and Bhandari 1999)	Up to 2100	Equal per capita entitlements	(1) Before 2025: Developing country targets determined on carbon emissions per capita basis, allowing increased emissions in all developing countries except South Korea, Saudi Arabia, Singapore, and UAE. Developed countries given specific targets (e.g. a 5% reduction by 2010 and 25% reduction by 2025 from 1990 levels with adjustments based on a country's carbon intensity.) (2) After 2025, allocation is based on GHG emissions per capita (3) Convergence toward 0.5 to 0.75 tons of carbon emissions per capita	To stabilize atmospheric GHG concentrations at an agreed level (e.g. 550 ppmv CO <sub>2</sub> eq) over a long term period (e.g. 2100).	+	0	+++
Per capita allocation (Agarwal et al. 1999)	Up to 2100	Equal per capita entitlements	(1) Determination of an allowable level of global emissions ("emission budget") (2) Allocation of the budget per capita ("per capita entitlements") (3) Promotion of a zero carbon energy system, not the perpetuation of the current fossil fuel system. (4) Resources from emission trading to help reduce the cost of renewable energy technologies to a level that is competitive with fossil fuel technologies.	GHG concentration no higher than 400ppm	+	0	+++
Ability to Pay (Jacoby et al. 1999)	1990-2150	Capacity (Ability to pay)	(1) Setting long-term atmospheric constraint (2) Determination of short-term target based on simulation model (3) Differences in emission reduction obligations are related to differences in per capita income (4) Full implementation of international emission trading	long-term atmospheric stabilization (550ppmv by 2150)	0	+	+++

Legend: +++: high consideration; ++: moderate consideration; +: low consideration 0: no consideration

**Table 3.3 (continued)**

**A2. Top-down approaches: Multiple Criteria**

Proposals	Time Frame	Principle	Main Features	Target	Extent of consideration of the issues		
					ES	DEV	CC
Broadening the Climate Regime (Torvanger et al. 2005)	Up to 2100	Capacity Responsibility Development Governance	Differentiation of countries based on <i>when</i> (to take on commitments) and <i>what</i> (commitments to take on) (1) Capacity-Responsibility (CR) index defined as the sum of emissions per capita and GDP per capita (2) Human Development Index (HDI) (3) Governance Index (e.g. political stability, regulatory quality, and corruption) (4) Institutional affiliation index (e.g. members of OECD)	(1) 550 ppmv or 650 ppmv target (2) Stage 1 with no commitments, stage 2 with intensity target, and stage 3 with absolute emission reduction targets (proportional to per capita emissions)	+	+	++
Further Differentiation (Swedish Environmental Protection Agency 2002)	2013-2022	Wealth and opportunity to reduce emissions	Differentiation based on: (1) Opportunity (energy intensity) (2) Capacity (GDP per capita), and (3) Responsibility (historical, current or future emissions)	(1) binding and absolute (Developed countries) (2) binding indexed (Wealthier developing countries) (3) non binding (Least developing countries)	+	+	++
Global Triptych (Groenenberg et al. 2003)	2013-2020	Sectoral responsibility	The convergence of per capita emissions in three sectors: power, energy-intensive industries, domestic (residential and transportation). Differentiation based on (1) Energy efficiency level for power and industry sectors (2) GHG emissions per capita for household sectors	Absolute national targets 550 ppm atmospheric concentration	++	+	++
Keep it simple, stupid (KISS) (Gupta 2003)	Long-term (indefinite)	Ability Responsibility Vulnerability	Differentiation of countries into 12 categories based on three criteria: (1) GNP per capita (2) CO <sub>2</sub> emission per capita (3) Human Development Index (HDI)	Convergence on agreed per capita emissions: (1) Stabilization target (2) Reduction target (3) Limitation target	0	+	++
Soft Landing in Emissions Growth (Blanchard et al. 2001)	2010-2030	Ability Responsibility	Differentiation based on (1) ability to pay (per capita income) (2) causal responsibility (emissions per capita)	550 ppm by 2030 (1) Fixed binding national emission targets (2) Stabilization targets by different dates	0	+	++

Legend: +++: high consideration; ++: moderate consideration; +: low consideration 0: no consideration

**B. Bottom-up approaches**

Proposals	Time Frame	Principle	Main Features	Target	Extent of consideration of the issues		
					ES	DEV	CC
Sustainable Development Policies and Measures (SD-PAMs) (Winkler et al. 2002)	Not specified	Development first	(1) Focus on national policy and measures for sustainable development; (2) Listing of measures in an international registry; (3) Financing through CDM and GEF (4) Quantification of the effects of policies and measures on GHG emissions (energy efficiency measures, etc.) (5) Mandatory PAMs when the country becomes "middle income" as measured by emission intensity (emissions per GDP) and income (GDP per capita).	No specific emission target for developing countries	+	+++	+

Legend: +++: high consideration; ++: moderate consideration; +: low consideration 0: no consideration

**Table 3.3 (continued)**

**B. Bottom-up approaches (continued)**

Proposals	Time Frame	Principle	Main Features	Target	Extent of consideration of the issues		
					ES	DEV	CC
Multi-sector Convergence (Sijm et al. 2001)	2010 (base year)-2100 (convergence year)	Fairness (Need, Capacity, Responsibility)	(1) Bottom-up and sector-oriented approach (seven energy related sectors); (2) Convergence of per capita entitlements; (3) Gradual participation of Non-Annex I countries; (4) Consideration of special national circumstances	Global sector emission standards (GSES) Global per capita emission targets	+	++	++
Multi-stage (Berk and den Elzen 2001)	Up to 2100	Capacity Responsibility Need	Four-stage approach (1) No commitments; (2) Decarbonization (GHG Intensity target); (3) Stabilization of absolute emissions; (4) Reduction of absolute emissions. Four criteria for differentiation (1) GDP per capita (2) GHG intensity target (3) GHG stabilization target (4) GHG reduction target	(1) GHG intensity targets (2) Stabilization of absolute emissions (3) Reduction of absolute emissions with emission trading	+	+	++
Human Development Goals with Low Emissions (Pan 2003, 2004)	Not specified	Satisfy basic human needs Limit luxurious emissions	Targets set through bottom-up, country-driven process, involving an assessment of a country's development goals, specification of general socio-economic and environmental targets, and identification of low carbon technology paths.	Three types of targets: (1) Voluntary targets with no regrets reductions; (2) Conditional commitment with technology and finance assistance; (3) Obligatory commitments to limit excessive emissions	+	++	+
Portfolio Approach (Benedick 2001)	Short to medium	Technology centered	(1) Fuel-efficiency standards for automobiles industry (2) Technology targets for power generation and fuel refiners (e.g. renewable technology and carbon sequestration technology) (3) Carbon tax to finance public sector energy R&D	Not specified	++	0	+
International agreements on energy efficiency (Ninomiya 2003)	Not specified	Technology Complimentary	Countries to negotiate international energy efficiency standards for (1) Major appliances in the residential and transportation sectors (2) Production processes in major industries (iron and steel, petrochemicals, paper and pulp, non-ferrous metals, and non-metallic minerals). (3) Establishment of global research and development fund	Not specified	++	0	+
Orchestra of treaties (Sugiyama et al. 2004)	Short term (emissions) and long term (technology change)	Sovereignty Technology and development Enhance cooperation Long-term technological change	Treaties among like-minded countries (1) Group of Emissions Markets (GEMs) for low-cost mitigation; (2) Zero Emission Technology Treaty (ZETT) for long-term technological change; (3) Climate-wise development treaty (CDT) to promote development, technology transfer and adaptation (4) UNFCCC protocols and mechanisms, including emission monitoring protocol, information exchange protocol, and targeted funding.	Not specified.	+	+	+

Legend: +++: high consideration; ++: moderate consideration; +: low consideration 0: no consideration

**Table 3.3 (continued)**

**C. Mixed approaches**

Proposals	Time Frame	Principle	Main Features	Target	Extent of consideration of the issues		
					ES	DEV	CC
Global Framework (CAN 2003)	Up to 2050	Per capita emissions Responsibility Ability National circumstances	Institutional set up (1) Kyoto track (legally-binding absolute targets) for developed and developing countries which agreed to graduation criteria (2) Decarbonization track (clean technologies) including large emitting developing countries (3) Adaptation track (providing financial resources) for LDCs	To keep global temperature below 2C° • Carbon intensity targets • Stabilization targets • Absolute emission reductions targets	+	+	++
Graduation and Deepening (Michaelowa et al. 2003)	2013-2017	Polluter pays principle Ability to pay	Differentiation of both Annex B and non-annex B countries. (1) "Graduation index" (GI) calculated according to per capita emissions and per capita GDP with institutional setting (e.g. member of OECD). (2) Developing countries without emission targets pledge to implement either ex-ante intensity target and/or country wide policy & measure CDM (3) Intensity targets for international marine transport	550ppm by 2050 Absolute national emission targets for Annex B countries Targets for developing countries depending on GI compared with Annex B average.	+	+	++
South-North Dialogue (Ott et al. 2004)	Not specified	Responsibility Ability Opportunity	Differentiation of countries into six groups based on multiple indicators: (1) Cumulative emissions for the 1990-2000 period, (2) Per capita GDP, (3) Human development index, (4) Emissions intensity, (5) Per capita emissions, (6) Emissions growth rate Newly industrialized countries (NICs), Recently industrialized developing countries (RIDCs), and LDCs implement sectoral CDM and non-binding renewable energy and energy efficiency targets.	• Kyoto-like targets for Annex I • Non-binding targets for NICs and RIDCs • Adoption of SD-PAMs by LDCs	++	+	+

Legend: +++: high consideration; ++: moderate consideration; +: low consideration 0: no consideration

*The top-down approaches usually emphasise "climate first" philosophy in that they typically specify a long-term climate stabilisation target with some flexibility for actions in the short term.*

**3.4.1 Top-down approaches**

The top-down approaches usually emphasise "climate first" philosophy in that they typically specify a long-term climate stabilisation target with some flexibility for actions in the short term and allocate GHG emission targets to the countries or groups of countries on the basis of defined criteria and rules. The focus is more on differentiation aspects of future action rather than an in-depth consideration of energy and/or development issues. There are two types of top-down approaches depending on the number of criteria: those with a single criterion for allocation of GHG emission reductions and those with multiple criteria. The approaches employing multiple criteria have more flexibility than the former in achieving the target. They consider development-related indicators, such as the emissions per capita, GDP/GNP per capita, and human development index, in order to differentiate emission reduction commitments.

**3.4.2 Bottom-up approaches**

Based on the understanding that developing countries have more immediate and pressing challenges than mitigating climate change, the bottom-up approaches usually

emphasise “development first” philosophy, and the emission reduction targets are not determined in advance. The bottom-up approaches employ policies and measures (PAMs), which could be either voluntary or pledged officially in an UNFCCC registry. The ‘commitments’ to reduce GHG emissions may be established by agreeing on such approaches and indicators as technology and performance standards, types of technology, research and development agreements, sectoral targets (national/transnational), and SD-PAMs (den Elzen and Berk 2004). These approaches have more flexibility to incorporate energy- and development-related measures, although the effectiveness of attaining a climate stabilisation target within a given timeframe remains uncertain.

Bottom-up approaches can support national development planning and policies while addressing global emission reductions. SD-PAMs approach, for example, focuses on national policies and measures to achieve sustainable development and on integration of development and climate actions. “Human Development Goals with Low Emissions” (Pan 2003) is also based on similar principles as SD-PAMs. The “Multi-sector Convergence” (Sijm et al. 2001) and “Multi-stage” (Berk and den Elzen 2001) approaches define emission targets from the bottom-up while accommodating diverse national circumstances. A few proposals focus more on technology standards and targets than the other approaches.

*The bottom-up approaches usually emphasise “development first” philosophy, and the emission reduction targets are not determined in advance.*

### **3.4.3 Mixed approaches**

Mixed approaches are a combination of both top-down and bottom-up approaches with a greater degree of flexibility in implementation. These include “Global Framework” (CAN 2003), which establishes three tracks for emission mitigation and stabilisation, as well as adaptation. The “Graduation and Deepening” approach (Michaelowa et al. 2003) relies mostly on the differentiation of countries based on the ‘ability to pay’ principle with a different target setting for the “polluter pays” principle. The “South-North Dialogue” (Ott et al. 2004) uses six differentiation indicators of which emission intensity and emissions growth rate are of relevance to energy security, while GDP per capita and the Human development index may be relevant to measure development progress.

### **3.4.4 Preliminary assessment of approaches**

The top-down approaches with a single criterion (emissions per capita) had very few indicators of direct relevance to energy security and development, as the approaches focus only on achieving a long-term global emission stabilisation. The top-down approaches with multiple criteria and mixed approaches had similar scores for consideration of energy security, development and climate change. However, there will be some degree of uncertainty with such approaches as to whether they will achieve the ultimate objective of stabilising global GHG. The bottom-up approaches used many different indicators and targets directly relevant to energy security and development. From the Asian developing countries’ perspective, the bottom-up approaches may be preferred because these approaches aim at bringing more direct developmental benefits to the community and the country as a whole. The challenge for bottom-up approaches is, however, to ensure monitoring to achieve climate policy objective of stabilising GHG.

*From the Asian developing countries’ perspective, the bottom-up approaches may be preferred.*

*Developing countries consider that it is a holistic concept comprising issues of energy availability, access, affordability and efficiency.*

*Developing countries have taken several measures for improving energy security through promotion of energy efficiency and renewable energy.*

## 3.5 Perspectives of various stakeholders

### 3.5.1 Energy security

Energy security is the foundation for economic and social development, but it is often interpreted in many ways. Some (mainly developed) countries interpret energy security in terms of managing the risks of a shortage of energy supplies or a partial or complete disruption of energy supplies (Egging and Oostvoorn 2004), while others (mainly developing countries) consider that it is a holistic concept comprising issues of energy availability, access, affordability and efficiency. Energy security concerns influence the choice of future paths of climate change abatement strategies by all countries (Huntington and Brown 2004). Energy security can be treated as a competition and a zero sum game between developed and developing countries, as both groups are currently competing for the same resources (East West Institute 2006). Such competition affects the price development and poses incalculable risks for foreign and security policies of various countries.

Given that more than 50% of rural populations in Asia do not have access to affordable energy services, many countries set targets for improving access to electricity in national development plans. Participants in our consultations noted that the generation of electricity based on fossil fuels would obviously increase GHG emissions from the region, and that an international regime should support the efforts of Asian countries in reducing their reliance on fossil fuels, if GHG mitigation were to be the main goal.

Some participants (e.g. China, India, and the Philippines) noted that developing countries have taken several measures for improving energy security through promotion of energy efficiency and renewable energy. China, for example, recently introduced the concept of the green GDP in its planning and is aiming for a "society of energy saving and environmental protection" with a circular economy, energy saving and the increased use of renewable energies. For example, the 11th Five-year Plan of China set a national target to improve energy intensity by 20% and increase its fuel ethanol output by three times the current level by 2010 to reduce the country's dependence on imported oil and to boost the income of hundreds of millions of farmers. NDRC publicised energy efficiency data and criteria of all provinces in 2005 to incorporate an energy efficiency aspect into GDP growth (NDRC 2006). In response to this national plan, the Beijing government plans to reduce the share of energy consumption of coal to 65 million tones and increase the share of renewable energy from the current 1% to 4% in their 11th Five Year Energy Plan. Seven percent of India's power generation capacity is renewable, with about 5,500 megawatts of wind power installed, but it plans to increase the share of renewable sources in total power generation to 15% by 2032. Indonesia set a target for the share of energy from renewable sources (5% by 2020) in its national energy policy. However, several countries (e.g. Sri Lanka, Viet Nam) mentioned that insufficient financial and technological resources hindered the development of indigenous energy sources, and emphasised the need for considering differences in national circumstances including social and economic developmental status and sources of domestic primary energy. The energy security concerns in Asia can also be addressed partly through introducing policy options such as vehicle fuel efficiency standard, energy labeling of appliances, differentiated vehicle and fuel taxation to support the market for cleaner fuels and vehicles, and carbon tax (Asia Pacific Research Centre 2003, UNU-IAS 2006).

*Developed countries, in general, consider that concerns about energy security are merely of national concern.*

For developed countries, on the other hand, the primary concern about energy security is to secure uninterrupted supplies of energy at a constant price and volume. Developed countries, in general, consider that concerns about energy security are merely of national concern and that an international regime could only play a limited facilitative role in sharing knowledge on clean energy policies, and low-carbon technology development and deployment. Such measures will help not only curb GHG emissions but will also deliver the co-benefits of improving energy security, industrial efficiency, and air quality. Countries such as Japan implemented policies and measures for improving energy efficiency of the economy since it faced the first energy crisis in the early 1970s.

International climate negotiations can facilitate international cooperation in energy security issues. The future climate regime can promote the development of clean energy policies in both developed and developing countries, for instance through establishment of a clearinghouse or database of good practices on energy efficiency and renewable energy, energy management and technology development. It can also provide support in identifying options for mainstreaming climate policies in energy development planning.

Some participants in our consultations (e.g. China) stressed that visionary approaches are necessary to address energy security concerns in the future climate regime. They emphasised that the share of nuclear power in energy should be considerably improved, and that new mechanisms of enforcement for adoption of clean technologies are crucial to minimise the adverse impacts of energy consumption on the environment. Some participants (e.g. Republic of Korea, India, Sri Lanka) noted that energy access, rather than energy supply, should be the focus of international climate discussions. A few participants (e.g. Indonesia) noted that the current investment situation is not conducive to the development of climate-friendly energy sources. They suggested that rationalisation of subsidies for fossil fuels in both developed and developing countries is crucial to minimise the impacts on climate. A few participants (e.g. India) stressed the need for considering the external impact of the energy security agenda of one country on the energy security of other countries and cautioned that the success of the future climate regime would be dependent on reconciling such externalities. Some participants (e.g. Sri Lanka) emphasised the need for integrating energy security concerns in CDM policy at both national and international levels. However, others (e.g. India) noted that CDM may not fully address all components of energy security. The participant mentioned that policies for promoting renewable energy and energy efficiency would only ensure physical security of resources, rather than economic security (access to affordable energy sources). Some participants (e.g. Bhutan) noted that the future climate regime should develop guidelines for integrating development principles in national energy policies. Several participants (e.g. China, India, Indonesia) noted that the future climate regime should also facilitate positive changes in energy consumption, especially in Annex I countries, through providing an array of options for climate-friendly lifestyles.

### **3.5.2 Developmental needs**

Most of the participants in our consultations stressed that both the Convention and the Kyoto Protocol failed to offer support to meet the goals of sustainable development in developing countries. They noted that inadequate support to integrate climate and development actions was the major reason for the lack of progress in addressing the

***Poverty alleviation is a major challenge in many Asian countries but development paths taken to address this challenge vary with each country.***

***Participants in our consultations stressed that the developed countries should set far stricter reduction targets in the future regime than those agreed in the Kyoto Protocol.***

issue of climate change. Some participants (e.g. India) noted that developmental needs were considered purely of national domain and such considerations may have hindered the progress, and recommended that more effective communications between climate and development communities would be crucial to make further progress. However, some participants cautioned that we should not expect the future climate regime to solve all development related problems. Some participants (e.g. Republic of Korea) argued that climate change is usually discussed from the perspective of developed countries without linking it to developmental needs such as poverty, health, energy access and education. It is often considered merely as a global environmental problem rather than as a problem with wide implications for national and local development.

Poverty alleviation is a major challenge in many Asian countries but development paths taken to address this challenge vary with each country. However, most countries preferred to follow the industrial development model of developed countries, which is the root cause of climate change. Inducing national governments to adopt alternative development paths such as becoming a low carbon society remains a major challenge. The concerns on sustainable development vary depending on national circumstances and thus concerns on climate issues differ widely. For example, countries moving from a largely agriculture-based economy to an industry-based economy are concerned about energy security and safety issues, while countries that are primarily dependent on agriculture and other activities are concerned about the impacts of climate change on their ability to reach developmental goals.

Developmental status and historical responsibility of a country with GHG emissions was the fundamental criterion for determining its commitments for GHG mitigation. In view of the apparent failure of Annex I countries to reduce GHG emissions since 1990, participants in our consultations stressed that the developed countries should set far stricter reduction targets in the future regime than those agreed in the Kyoto Protocol. Insofar as large developing countries are concerned, some participants (e.g. Indonesia, some LDCs) preferred in stages participation in the future regime while others (e.g. China, India) expressed reservations on setting any emission reduction targets for non-Annex I countries. The latter suggested that equity should be the main principle for the future climate regime, as per capita emissions in large developing countries are far less than in developed countries. Srivastava (2006) noted that adopting policies and measures aimed at promoting sustainable development is a more appropriate form of “meaningful participation” for India in the climate agenda, than setting quantified emission reduction objectives. Pan (2004) suggested that the global community should reconsider the suitability of taking carbon targets as a goal, because focusing solely on emissions targets would simply ignore development goals.

### ***3.5.3 Perspectives on the proposals for strengthening climate regime***

Several participants in our consultations (e.g. Republic of Korea, India, Indonesia) noted that many of the proposals for strengthening the future climate regime did not address energy security and development needs for three reasons: (a) Most of the proposals were top-down and were developed from a global perspective, rather than local perspective. If the proposals were developed on the basis of local circumstances, co-benefits could be more effectively exploited. (b) Climate change regime was largely created by the developed countries with little involvement of the developing countries, and (c) so far,

climate change has been considered merely as an environmental issue in negotiations although it involves several economic and energy-related interests. They suggested that there should be an opposite approach for the new regime so that it considers local perspectives and involve developing countries more effectively and that economic and energy considerations should be the basis.

Some participants (e.g. Thailand) stressed that most of the proposals made do not reflect realities at the grassroots level, and are merely the products of passionate academic discussion. They suggested that strengthening the capacity of Asian policy makers and other stakeholders in understanding and analysing the strengths and weaknesses of various proposals is crucial. Some participants also expressed concern that discussions on the future climate regime are becoming too complex to understand, and that many Asian negotiators are feeling marginalised in such discussions. There is a clear need for capacity strengthening for Asian negotiators.

Developing countries, in general, preferred that equity and per capita emissions (an indirect indicator of developmental status) should be the basis for determining emission reduction commitments under the future climate regime. Indeed, successful implementation of a collective human response toward climate change requires sustained collaboration from all sovereign nation states. This means that cooperative and effective outcomes are more likely made when all parties feel that the situation is fair (Munasinghe 2000). On the other hand, developed countries generally consider that broadening the group of countries with emission reduction targets is crucial to strengthen the effectiveness of the future climate regime (Berk and Elzen 2001). Many participants in our consultations noted that the environmental effectiveness of the current regime is limited because it suffers from the lack of flexibility in time, form and stringency of targets and the number of countries accepting such targets. Several participants (e.g. Indonesia) noted the need for optimising top-down and bottom-up approaches.

Most of the participants and respondents to the questionnaire (80%) strongly supported the “Global Framework” proposed by Climate Action Network (2003) perhaps because it gives a clear set of guidelines for emission reduction commitments based on developmental status. Several respondents (60%) preferred the “SD-PAMs” proposal made by Winkler et al. (2002) perhaps because it involves (a) identification of policies and measures that could lead to more sustainable development based on domestic priorities, and (b) international support to pay for the additional costs of the sustainable policies. However, some participants were concerned that such national development plans are not international pledges, hence cannot be supported through the international climate regime. Some participants expressed a concern about the incompatibility of SD-PAMs with CDM modalities. Many participants agreed that CDM provides some opportunities for Asian countries to transform their energy investments gradually and that current CDM needs to be strengthened further by bringing more local perspectives on energy (e.g. availability of indigenous energy sources) and development.

A major challenge in global climate change negotiations is to find a scheme for differentiation of GHG mitigation commitments among countries that can be accepted as “fair” by most of the governments (Sijm et al. 2001). Among the top-down approaches, two proposals with multiple criteria “Broadening the Climate Regime” by Torvanger

***There should be an opposite approach for the new regime so that it considers local perspectives and involve developing countries more effectively and that economic and energy considerations should be the basis.***

*Mainstreaming energy security concerns in climate negotiations and integrating climate concerns in energy planning at national and local levels may be the most practical approaches to address climate change.*

et al. (2005) and “Further Differentiation” by the Swedish Environmental Protection Agency (2002) received endorsement by nearly half of the respondents. It is perhaps because both proposals refer to ‘capacity’ as defined by GDP per capita and ‘historical responsibility’ as measured by cumulative emissions per capita. Many participants in our consultations repeatedly expressed their preferences for equity in ‘emission rights’ and focus on economic development.

### 3.6 Options for strengthening the future climate regime from the perspective of energy security and developmental needs

#### 3.6.1 Addressing energy security concerns in the future climate regime

A coherent policy to address energy security and climate change should include measures such as demand reduction, clean fossil fuels, promotion of renewable sources of energy, and incentives for the development of clean technologies (Egging and Oostvoorn 2004). Since both developed and developing countries share interests in global energy security, mainstreaming energy security concerns in climate negotiations and integrating climate concerns in energy planning at national and local levels may be the most practical approaches to address climate change. The future climate regime should facilitate development of climate-friendly energy policies through sharing good practices, setting energy and fuel efficiency standards and guidelines, building adequate human and institutional capacities, and initiating new partnerships for regional collaboration. UNFCCC can consider supporting mechanisms similar to NAPA for mainstreaming climate concerns into energy planning.

Setting domestic energy efficiency targets to reduce final energy consumption, promoting renewable energy to reduce the use of fossil fuels, and promoting investment in clean energy will help improve regional and global energy security (Shrestha 2006). Insofar as setting domestic targets for energy efficiency are concerned, China made impressive gains through setting highly laudable targets in its 11<sup>th</sup> 5-year plan. Indeed, a great potential exists for energy efficiency improvement in several Asian countries. As Table 3.4 shows, one survey estimated that given the current industrial structure of China and India, if they were to adopt U.S. and Japanese technology, they could improve their industrial carbon intensity dramatically.

**Table 3.4 Carbon intensity of industry (Million Metric Tons of Carbon Equivalent per billion 1997 US\$ gross output)**

	Existing technologies (pre 2000)	With USA technology and own country industry mix	With Japanese technology and own country industry mix
China	0.318	0.096	0.046
India	0.388	0.201	0.082

Source: Adapted from Bernstein et al. (2003)

In addition, a few countries in the region established policy frameworks for the promotion of renewable energy sources by setting target and Renewable Portfolio Standards (RPS). They include Thailand (8% of total primary energy by 2011), India (10% of added electric power capacity), China (10% of electric power capacity by 2010, 5% of primary energy by 2010, and 10% of primary energy by 2020), and the Philippines (4.7MW increase in total existing capacity) (Shrestha 2006). However, many countries have not

yet introduced standards or target for the promotion of RE. The future climate regime may facilitate in achieving such targets or standards through establishing certification systems. Policies and measures for the promotion of renewable energy may be shared in a registry set up by the UNFCCC, so that all developing countries in the region can benefit from such policies.

Despite the efforts to promote renewable sources of energy, many Asian countries will remain dependent on indigenous fossil fuels such as coal and oil, with wide implications for air pollution and climate change. Therefore, advances in clean coal technology and CCS offer a new hope for coal to continue a major role in energy security in the climate change context (Shrestha 2006, Macnaughton 2006, Hu et al. 2006). In this context, synergies with other non-UNFCCC initiatives such as the Asia-Pacific Partnership on Climate Development and Climate (APP), Future Gen (gasification of coal, hydro power supply for fuel cells), and Carbon Sequestration Leadership Forum may be explored, as such initiatives focus primarily on clean technologies. The future climate regime can also help in facilitating investments in clean energy through various flexibility mechanisms that created the carbon market.

### **3.6.2 Addressing developmental concerns in the future climate regime**

Identifying and exploiting the simultaneous local environmental and developmental co-benefits of mitigation policies and measures is one of possible routes forward in addressing developmental needs in the context of an international climate regime. Such an approach will also be key to stimulating the interest of developing countries in mitigation efforts.

For example, GHG emissions from the transportation sector in Asian countries have significant repercussions for the climate system as well as social development, in terms of air pollution and associated health problems. One case study in China showed that by 2020, a domestic policy mix to alleviate city traffic congestion and avoid excess national oil dependence could lower energy use by 78%, compared to a business-as-usual scenario (Ng and Schipper 2005). The future climate regime also can help in developing and disseminating information on internationally consistent benchmarks in major industrial sectors, such as fuel efficiency standards for the automobile industry.

Whilst co-benefit analysis has been so far limited to transportation and energy efficiency, analysis of co-benefits in other important climate-sensitive sectors, such as agriculture, forestry and tourism, could be useful from an Asian perspective. The environmental co-benefits of GHG mitigation in agriculture sector are especially large. They include, for instance, reduction in erosion (Plantinga and Wu 2003), reduction in phosphorus and nitrogen runoff (Schneider 2000), improvement in water quality (Pattanayak et al. 2005), increase in species diversity, air pollution control, watershed protection, and increased soil fertility and prevention of land degradation. Its socio-economic co-benefits comprise increases in farm income (McCarl and Schneider 2000), new job opportunities, social infrastructure development, recreation enhancement, and health benefits.

The future climate regime can promote co-benefits of climate policies in several ways. More comprehensive and explicitly linked to an international climate regime is the SD-PAMs proposal (Bradley and Baumert 2005, Winkler et al. 2002). Another approach

*Identifying and exploiting the simultaneous local environmental and developmental co-benefits of mitigation policies and measures is one of possible routes forward in addressing developmental needs in the context of an international climate regime.*

is to pursue more rigorous consideration/recognition of co-benefits of mitigation policies under the current international mechanisms, such as the CDM. In determining sustainable development benefits of CDM projects, co-benefits of GHG mitigations should be assessed more thoroughly.

Regardless of which form of linkage to international regime would be taken, three suggestions could be made to promote the deployment of the co-benefit approach (Tamura 2006a). First, an action-oriented international scheme, including pilot projects, is useful to demonstrate actual co-benefits of GHG mitigation. Second, rather than focusing solely on environmental co-benefits, it is important to identify socio-economic co-benefits of mitigation policies in order to convince policymakers in developing countries, where climate change mitigation is not yet a high priority. Thirdly, any international co-benefit programme should take a participatory approach in order to sufficiently meet various needs, since different interests and concerns are observed at the different levels of governments as well as across geographical areas.

***Another approach to integrate developmental issues in climate regime is to establish a clear interface between climate change and the Millennium Development Goals (MDGs).***

Another approach to integrate developmental issues in climate regime is to establish a clear interface between climate change and the Millennium Development Goals (MDGs). This approach is perhaps most appropriate for LDCs, as they remain the least preferred destinations for development-related investment under market-based mechanisms such as the CDM. The latest report on progress in achieving the MDGs in Asia-Pacific pointed out that whilst the region as a whole was on track to meet the large majority of MDG targets, the LDCs in the region were off track to achieve targets related to poverty alleviation, mortality improvement, forest cover, and CO<sub>2</sub> emissions per capita (UNESCAP et al. 2006). In global terms, the current GHG emissions from LDCs are practically negligible due to the low level of industrialisation, but for many Asian LDCs, the additional impacts of extreme events associated with climate change poses a fundamental challenge to their development objectives, including the achievement of the MDGs (Reid and Alam 2005).

In this context, one suggestion is that PAMs in LDCs, which are designed to achieve MDG targets and simultaneously consider the potential impacts of climate change on their achievement, be recognised as “projects” eligible for receiving favourable funds. This may be an MDG version of the SD-PAMs proposal, and can provide incentives to include an assessment of links between development and climate change. Without such incentives, LDCs are likely to pay little attention to long-term climate change threat. Before this proposal is formalised, however, several challenges remain, in particular, as to the uncertainty of climate change impacts as well as how it is paid for. However, this approach could potentially address the interests and concerns of LDCs, which are often sidelined in international climate negotiations. It should be noted that the MDGs could be used to identify major development themes and related indicators to be covered in integrated development and climate strategies for specific sectors (Davidson et al. 2003). Table 3.5 depicts a preliminary trial of developing such linkage in the agricultural sector. This sort of exercise helps us to think how to reconcile immediate development priorities with the more long-term objectives presented by the climate change threat.

In order to address energy security and developmental concerns of Asian developing countries, strengthening the integration of national energy policy and climate policy, and assessment of energy security in the context of climate change impacts should be

incorporated in National Communications to the UNFCCC. The LDC Fund can support the LDCs to prepare National Energy Security Programme of Action (NESPA).

**Table 3.5 An example of MDG-related development objectives and integrated development and climate indicators in the agricultural sector**

	Project objectives	Development/climate indicators	MDGs
Agro-forestry projects for local farmers	- Job opportunities	→ Income increase	} MDG target 1
	- Drought/saline resistance crops	→ Reducing vulnerability to the impacts of climate change	
	- Protecting soils	→ Productivity improvement	
	- Efficient use of fertiliser	→ GHG emissions control	- MDG target 9

Notes: MDG target 1 aims at halving population below US\$ one per day. MDG target 9 aims at integration of development into national policies. CO<sub>2</sub> emissions per capita are one of the indicators for achieving target 9.

### 3.7 Concluding remarks

Climate protection, energy security (sufficiency, stability, affordability) and economic development are closely related. In order to achieve progress on the first, especially with respect to framing a future climate regime, the concerns with respect to the latter two components must be considered. How to achieve economic development while reducing energy consumption is the immediate challenge for all countries in the region. Identification of policies and measures (PAMs) that enhance both energy security and climate protection while contributing to local economic and social development is perhaps the first step to be implemented in all countries. International climate regime can facilitate such efforts by serving as a forum to share experiences from various countries. Depending on national circumstances, each country may further need to prioritise integrated climate and development actions that contribute to improving energy security. The future climate regime and especially the Annex I Parties should support such national efforts through facilitating flows of necessary technologies (e.g. clean coal technologies) and finance, for example through the development of an efficient and equitable international carbon market, to realize those integrated actions. The changes in energy consumption behaviour in Annex I countries are also necessary. Developing countries should then declare such domestic actions as non-binding commitments in the international climate regime as a way forward to build the trust between developed and developing countries. With such joint efforts, a new framework for climate protection can succeed in realising the development and energy goals of all countries.

Ignoring energy security and development needs of Asia in designing the international climate regime may or may not affect sustainable development in Asia, but it will certainly affect the future of the global climate regime adversely.

*Identification of policies and measures (PAMs) that enhance both energy security and climate protection while contributing to local economic and social development is perhaps the first step to be implemented in all countries.*

# Clean Development Mechanism

Hitomi Kimura, Ancha Srinivasan and Keisuke Iyadomi

## 4.1 Introduction

This chapter examines the status and evolution of the Clean Development Mechanism (CDM) and summarises the major concerns of Asian countries regarding its implementation. Various proposals to strengthen the CDM in the current and the future climate regimes are reviewed and several options to move forward are proposed with a view to promoting more effective participation of Asian countries in GHG mitigation.

### 4.1.1 Origin and meaning of the CDM

The concept of CDM arose from a proposal in mid-1997 by Brazil called the “Clean Development Fund (CDF)” – a compliance mechanism under which Annex I countries defaulting on binding emission targets would contribute to a fund to facilitate technology transfer to developing countries. During the later stages of COP3 discussions, a few Annex I countries introduced the concept of CDM as a counter-proposal to the CDF. The CDM was then endorsed as one of the flexibility mechanisms under Article 12 of the Kyoto Protocol to provide cost-effective emission reductions for Annex I countries while contributing to sustainable development in developing (Non-Annex I) countries through enabling the transfer of clean technologies and finance. The scheme permits developing countries to sell tradable Certified Emission Reductions (CERs) generated from approved CDM activities and then permits Annex I countries to use such CERs to comply with their GHG emission reduction targets under the Kyoto Protocol. If CDM is effectively implemented, it has the potential to become a strong tool to address climate change as the only mechanism of cooperation between developed and developing countries under the Kyoto Protocol. The entry into force of the Protocol in February 2005 is considered, therefore, to be a significant first step to reduce the growth of GHG emissions worldwide (UNFCCC 2005a, UNFCCC 2006c).

### 4.1.2 Current status

As of November 2006, the CDM Executive Board (CDM-EB) registered as many as 421 CDM projects, with an expected delivery of more than 680 million CER by 2012. If all the 1300 projects in the pipeline materialise, about 1.5 billion CERs (tCO<sub>2</sub>e) may be issued by 2012 (UNFCCC 2006b). The CDM market grew rapidly from February 2005 with the coming into force of the Kyoto Protocol, the approval of the decision on unilateral CDM, and the launch of the EU ETS linked with CDM/JI. Owing to the limited time available before the commencement of the first commitment period (2008-2012), many Annex I Parties, such as the EU, Japan and Canada with an estimated demand of 1.6, 0.8 and 1.3 billion tCO<sub>2</sub>e respectively (IETA 2005a), are expected to accelerate their efforts to acquire CER, rather than relying solely on expensive domestic options or purchasing hot air from Russia and the economies in transition. In addition, ERU from JI can only be acquired from 2008, whereas CER from CDM could be obtained from 2000 from the “prompt-start” projects. Despite rapid progress in project registration, there are serious concerns over the slow implementation of CDM projects and the mismatch between CER supply and demand.

*The CDM market grew rapidly from February 2005 with the coming into force of the Kyoto Protocol, the approval of the decision on unilateral CDM, and the launch of the EU ETS linked with CDM/JI.*

### 4.1.3 International negotiations and institutional progress on CDM

The major decisions on CDM took place at COP7 in 2001 and at COP11 and COP/MOP1 in 2005 (Table 4.1). It is worth noting that CDM is continuing to evolve with several options, which gives strong hope that it could be further strengthened in the future.

**Table 4.1 Evolution of the CDM in the international climate regime** (Relevant decision numbers are given in parentheses)

COP3 (1997)	<ul style="list-style-type: none"> <li>Parties to the UNFCCC adopted the Kyoto Protocol and flexibility mechanisms including CDM, JI, IETS (1/CP.3)</li> </ul>
COP4 (1998)	<ul style="list-style-type: none"> <li>Schedule for Plan of Action to establish the Kyoto Protocol</li> </ul>
COP7 (2001)	<ul style="list-style-type: none"> <li>Agreement on Marrakech Accords on rules/procedures (17/CP.7)</li> </ul>
COP9 (2003)	<ul style="list-style-type: none"> <li>Adoption of procedures on afforestation/reforestation CDM (19/CP.9)</li> <li>Establishment of the CDM Executive Board (CDM-EB) for Project registration, and Issuance of CERs, Methodology Panel for CDM Methodology approval, and accreditation of Designated Operational Entities (DOEs)</li> </ul>
COP10 (2004)	<ul style="list-style-type: none"> <li>Recommendation for prior examination of energy efficiency and transport methodologies by CDM-EB (12/CP.10)</li> </ul>
COP/MOP1 (2005)	<ul style="list-style-type: none"> <li>Entry into force of the Kyoto Protocol and official adoption of the Marrakech Accords, thereby making CDM a reality.</li> <li>CDM-EB agreed to register "Programme of Activities" as a single CDM project if approved baseline and monitoring methodologies are used to define the appropriate boundaries, avoid double-counting, and account for leakage. However, local/regional/national policy or standards cannot be considered as the CDM. Bundling of several large-scale activities at multiple sites into one project is also permitted. (7/CMP.1)</li> <li>CDM-EB was invited to review simplified modalities and procedures of small-scale CDM, and consider Carbon Capture and Storage (CCS) for CDM (7/CMP.1)</li> <li>Extension of the registration deadline for CDM projects hoping to derive CERs from activities initiated between 1 January 2000 and 18 November 2005 to 31 December 2006.</li> <li>Parties agreed to bridge the financing gap of the CDM-EB by pledging US\$ 8.2 million. Share of CDM proceeds for administrative expenses of CDM-EB was set as \$0.1 for the first 15,000 CERs issued to a project per calendar year and \$0.2 for the remaining amount.</li> </ul>

*There is a strong concern that several CDM projects in the region without many sustainable development benefits are getting registered, and that the application of sustainable development criteria has been lax at both national and international levels.*

## 4.2 Barriers in the implementation of CDM in Asia

There was a broad consensus in IGES consultations held in 2005 that the future design of CDM should consider interests, priorities and concerns of the Asia-Pacific region more effectively than before, and that CDM should be strengthened further. The consultations revealed that slow progress in CDM implementation in the region was primarily due to the low priority given to climate change and CDM in many Asian developing countries, and poor incentives for the private sector (IGES 2005a). The barriers to CDM implementation may be grouped into seven categories, as discussed below.

### 4.2.1 Barriers related to sustainable development (SD) benefits

CDM is designed to achieve the twin goals of reducing GHG emissions and contributing to SD in developing countries (Chatterjee 2000). The decision as to whether a CDM project effectively contributes to SD rests with the host countries. Many Asian countries, therefore, developed SD criteria for screening using economic, social, environmental, and technological indicators. However, there is a strong concern that many projects in the region without many SD benefits are getting registered, and that the application of SD criteria has been lax at both national and international levels. It is widely felt that DNAs in some countries still lack the capacity to set appropriate SD criteria, and that the national governments fail to recognise the opportunity to integrate the CDM into the national SD agenda and engage the private sector in the CDM (Murdiyarso 2004). Poor

*The lengthy and complicated approval process by the CDM-Executive Board at the international level, and the lack of human and institutional capacity at the national level are major institutional barriers for CDM.*

coordination among ministries concerned with environmental and developmental issues has been identified as a reason, although DNAs in most countries have representatives from development-related ministries. Another reason is the limited number of CDM methodologies available especially in the energy efficiency and transportation sectors, which usually have larger SD benefits (Michaelowa 2005).

It is important to note, however, that different Asian countries have begun to adopt different methods to promote SD through CDM. While some countries (e.g. Nepal) took proactive efforts to support registration of projects (e.g. biogas) with SD benefits to a wider range of stakeholders, other countries (e.g. China) adopted policies such as the introduction of differential CER tax (65% for HFC, 30% for N<sub>2</sub>O and 2% for renewable-based projects) in order to indirectly promote projects with large SD benefits.

#### **4.2.2 Institutional barriers**

At the international level, the lengthy and complicated approval process by the CDM-EB, mainly due to lack of finance and human resources, has long been criticised by project developers as a major factor in the slow implementation of CDM (IGES 2005a). While an additional US\$8.2 million was pledged and a decision for allocating a share of proceeds to administrative costs was taken at the COP/MOP1 (Decision 7/CMP.1) to strengthen the institutional capacity of CDM-EB, it is not easy to ensure such financial contribution, as the budget for COP/MOP itself is yet under-funded by US\$4-4.5 million (Point Carbon 2006c).

At the national level, procedural and institutional problems of DNA in host countries are acting as a barrier. While some countries (e.g. India) have been approving projects on a fast-track basis, considerable delays in the approval are evident in several countries. A delay in DNA establishment also contributed to slow progress in some countries (e.g. Indonesia, Thailand, and the Philippines). The lack of human and institutional capacity in DNAs of host countries (e.g. Lao PDR, Mongolia, Pakistan, Thailand) to process project proposals also contributed to the delay in implementation.

Several host countries in the region still lack the knowledge and capacity to implement CDM due to lack of local experts to create Project Idea Notes (PIN) and Project Design Documents (PDD). The lack of knowledge to develop CDM projects based on previously conducted feasibility studies is another barrier.

#### **4.2.3 Technical barriers**

***Baseline setting and methodology:*** Many participants in our consultations noted that it is not technically easy to set up baselines for various CDM projects. This is partly due to the limited number of approved methodologies in sectors where Asian countries have been interested. For instance, only 15 energy efficiency related CDM methodologies were approved (as of 14 September 2006) out of a total 61 methodologies submitted (UNFCCC 2006b). Likewise, even though eight biofuel-related methodologies were submitted, none was approved, and as many as 13 out of 17 forestry methodologies were rejected in the first attempt (UNEP 2006). Attempts to consolidate methodologies are in progress, but consolidation may reduce the incentives to develop new methodologies (Michaelowa 2005).

***Additionality:*** The idea that a project is additional – that it would not have occurred in the absence of the CDM – is critical to the success of the CDM. However, proving additionality has been found to be complex in several CDM projects of Asian countries. Many investors complained that additionality is too ephemeral or cumbersome to be applied at the project level (Salter 2003). Some countries (e.g. India) argued in our consultations and in international negotiations that it should not be necessary to prove additionality for certain types (e.g. renewable energy) of CDM projects (UNFCCC 2006d). However, it must be noted that non-additional CERs generated by relaxing the additionality criteria may not necessarily lead to economic gains for developing countries, even if they could acquire additional credits. Other adverse impacts might be an increase in global GHG emissions, reduction of social surplus through the trading of additional CER, and decrease in new CDM projects with higher marginal cost of reduction (Asuka and Takeuchi 2004). In our earlier consultations, SIDS (e.g. Cook Islands) emphasised that further relaxation of additionality would sacrifice the environmental integrity of CDM (IGES 2005a). Careful discussions on relaxing additionality requirements are, therefore, necessary. Some countries in the region (e.g. China) were concerned about financial additionality, especially in terms of utilising ODA for CDM.

#### **4.2.4 Technological barriers**

CDM is often considered as an additional source of Foreign Direct Investment (FDI) that can facilitate the transfer of climate-friendly technologies, although FDI flows do not necessarily guarantee implementation of CDM (Niederberger and Saner 2005). Several stakeholders in our consultations reported that progress in the transfer of technology through CDM is far from satisfactory (IGES 2005a) as there were few examples of successful technology transfer (UNFCCC 2005a). One of the reasons for limited technology transfer through CDM may be that the costs of modern technologies such as photovoltaic and wind power are still more expensive than conventional technologies (World Bank 2006a, Sonntag-O'Brien and Usher 2004) and the difference in costs often exceeds the CER revenue generated through CDM. Participants from developing countries noted that the private sector in the developed countries, which invested substantial resources in technological development, might be hesitant to transfer technologies due to the fear of losing their international competitiveness. On the other hand, developed countries are concerned about technology mismatch and the lack of appropriate capacity to absorb the advanced technologies in developing countries. Further, some developing country representatives (e.g. China) considered that the long protection period of 20 years for intellectual property rights (IPRs) of technologies under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) is another barrier for technology deployment through CDM. Lesser (2002) noted that most climate-friendly technologies would be outdated at the end of 20 years.

#### **4.2.5 Financial barriers**

***Lack of underlying finance:*** Our consultations showed that several Asian countries (e.g. Indonesia) face difficulties in procuring underlying finance for CDM projects due to both country-specific and CDM-specific risks (IGES 2005a). For example, in India, where unilateral CDM projects predominate, difficulties in procuring underlying finance are especially great because of high reliance on domestic capital. Lack of the right incentives to the private sector in some developing countries served as a barrier to investment

*Careful discussions on relaxing additionality requirements are necessary.*

*Lack of the right incentives to the private sector in some developing countries served as a barrier to investment in CDM projects.*

in CDM projects. While it is assumed that the sale of CERs from a CDM project usually enhances the prospects of investment, the financial additionality criteria imposed on CDM projects appear to make them less attractive to commercial banks. Further, CDM support services fall under the category of project finance, an area which is not yet a key strategic area of business for many Asian banks.

**High transaction costs:** Most of the participants in our consultations (e.g. Cambodia, China, India, Indonesia, Mongolia, Sri Lanka) confirmed that high transaction costs of CDM projects from the time of PDD development to the issuance of CER have become a major barrier to effective CDM implementation in Asia. This is especially true in small-scale CDM projects, as it is estimated that projects generating below 20,000 annual CERs cannot cover their transaction costs. The problem becomes yet more serious in small unilateral CDM projects that have no Annex B participation before registration and thus have problems in mobilising finance (Michaelowa 2005). Many participants noted that the high expectations that the bundling of projects would reduce transaction costs did not come true in the Asia-Pacific region. The possibilities of bundling projects together are rather limited, especially in countries such as the Lao PDR and Cambodia. The lack of designated operational entities (DOEs) in developing countries is another barrier contributing to high transaction costs. Indeed, there are only three developing country DOEs (two from Republic of Korea and one from South Africa) among the total 16 DOEs.

**Low price of CER:** Several participants in our consultations pointed out that the low CER price (ranging from US\$5 to 10) is often a strong disincentive to mobilise domestic finance for the CDM projects. Very low price for ICER or tCER appears to make the sink CDM projects infeasible. The higher risk of CDM projects was considered a major reason for the large difference between the prices of CER and EUA (Lecocq and Capoor 2005). Many participants (e.g. China, India, Indonesia, Republic of Korea, and Viet Nam) noted the need for maintaining a reasonably stable price of CER and wondered why the CER price remains low despite the fact that the demand for CER, and the cost of reducing emissions in Annex I countries continues to be high.

*The low CER price is often a strong disincentive to mobilize domestic finance for the CDM projects.*

#### **4.2.6 Legal barriers**

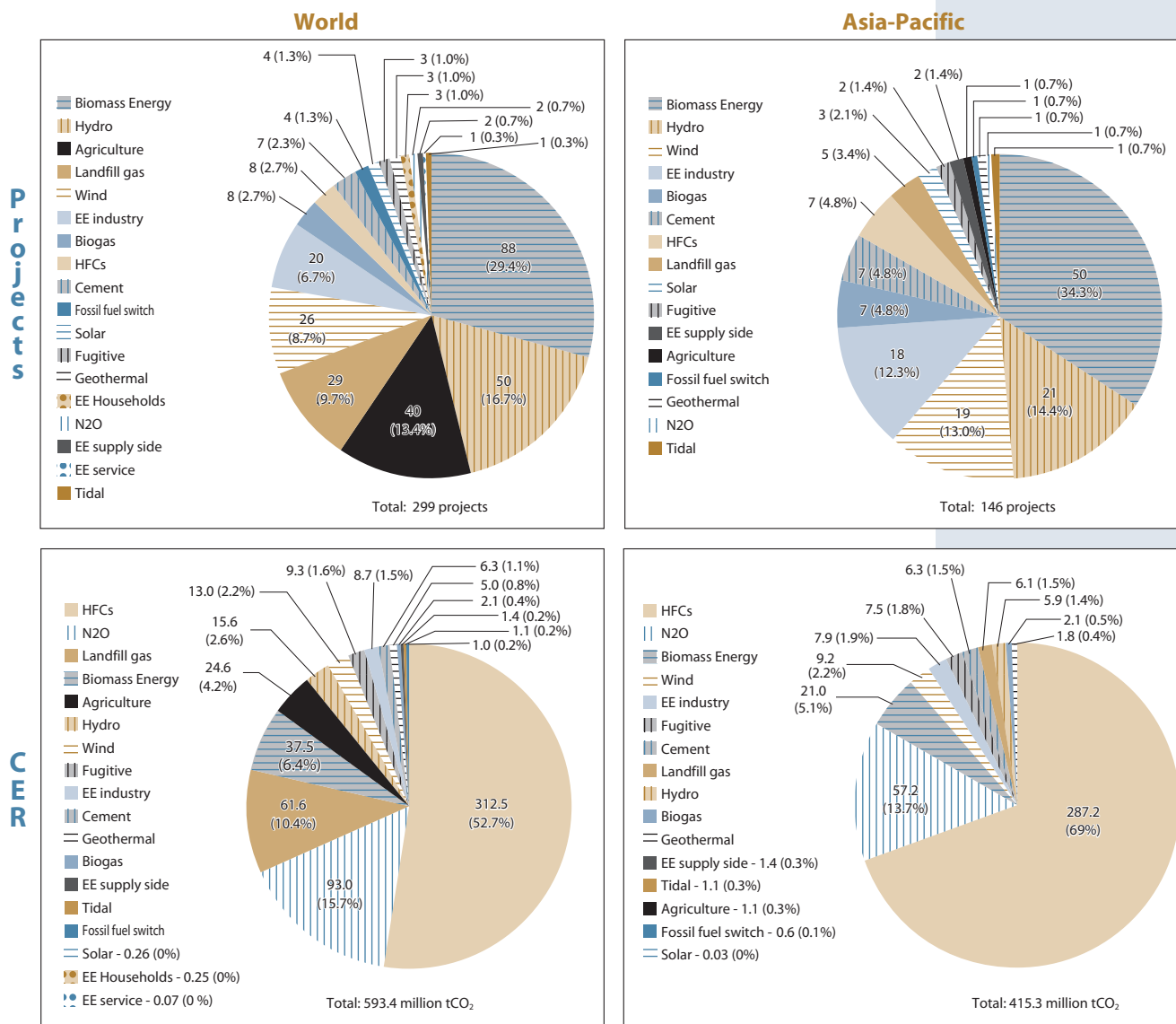
In addition to the conventional risks such as regulatory (legislative change), political (war, riots, nationalisation policy or institutional change), and economic (foreign exchange risk, currency crisis) risks, CDM projects face many legal risks because of uncertainty over the continuation of CDM beyond 2012, failure of project developers to issue CERs, incompatibility between domestic legislation and the Kyoto Protocol, non-compliance with legal requirements of the CDM, and irregular additional changes to the rules (UNEP 2004). Participants in our consultations agreed that the uncertainty of the value of CER generated after 2012 due to the lack of an agreement on the continuity of CDM beyond 2012, especially, is a serious risk to long-term projects with high capital costs (e.g. forestry). Such uncertainty is already driving many project developers in Asia to rely on short-term projects, and CER buyers to limit their purchases up to 2012. Furthermore, since the Marrakech Accords do not define CER ownership, it is unclear if CER is considered as a sovereign right or a private right (UNEP 2004). The differences in interpretation in various countries create further legal incompatibilities and uncertainties.

#### 4.2.7 Barriers with reference to the scope of CDM

**Inequitable sector and geographic distribution:** Participants in our consultations, especially those from Southeast Asia and various LDCs and SIDS in the region, expressed strong concern over uneven distribution of CDM projects in various sectors, particularly in terms of the total CER generated (Figure 4.1). On a world-wide basis, over 50% of total CER are expected to come from eight HFC projects, while 488 biomass projects are expected to contribute only 6.4% of total CER (as of 14 September 2006). Likewise, twenty projects aimed at energy efficiency improvements are expected to generate only 1.5% of total CER. Such uneven distribution among different sectors is even more highly evident in the Asia-Pacific region, as more than two-thirds of total CER in the region was from non-CO<sub>2</sub> projects. The fact that the majority of CER are expected to come from projects generating low-cost reductions of non-CO<sub>2</sub> gases, such as elimination of N<sub>2</sub>O or HFC, suggests that CDM encourages project proponents to seek out the cheapest emission reductions, not the most robust development benefits (Baumert and Goldberg 2006).

*The uneven distribution among different sectors is even more highly evident in the Asia-Pacific region, as more than two-thirds of total CER in the region was from non-CO<sub>2</sub> projects.*

**Figure 4.1 Sector-wide distribution of registered CDM projects and associated CER up to 2012 in the world and the Asia-Pacific region (as of 14 Sep. 2006)**

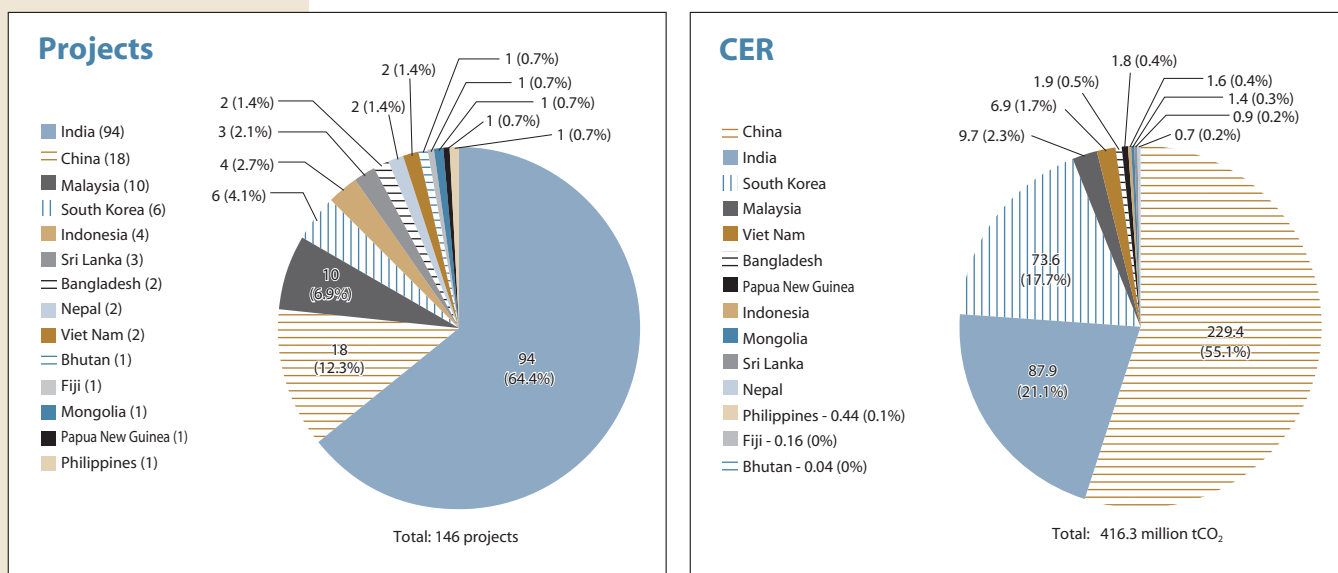


Source: UNEP 2006

**Geographic inequity of CDM projects within the Asia-Pacific region was another concern expressed by many countries.**

Inequitable per capita distribution of CER in the world was also evident. The highest per capita CER was in Latin America (0.54) and the lowest in the Asia-Pacific region (0.25) due to its larger population (UNEP 2006). Geographic inequity of CDM projects within the Asia-Pacific region was another concern expressed by many countries (e.g. Bhutan, Nepal, Cambodia, Mongolia, Thailand, the Philippines). As of 14 September 2006, 146 out of total 299 registered CDM projects were in the Asia-Pacific region, accounting for 49% of the number, and 70% of the total CER up to 2012. Three countries (China, India and Republic of Korea) accounted for 81% of total registered projects in the region with 94% of CER until 2012 (Figure 4.2). In contrast, only one project each from Bhutan, Cambodia, Fiji, Mongolia, Nepal, Papua New Guinea, and the Philippines was registered. There were no registered projects from countries such as Lao PDR, Maldives, Myanmar, Pakistan, Singapore and Thailand (UNEP 2006). Such inequity is not due to the lack of DNA, as most of the countries in the region have DNA. While some host countries (e.g. Bangladesh) have established mechanisms for improving geographic distribution of CDM projects within the country, no such mechanism exists at the international level.

**Figure 4.2 Country-wise distribution of registered CDM projects and associated CER up to 2012 in the Asia-Pacific region (as of 14 Sep. 2006)**



Source: UNEP 2006

Although CDM-EB created a few incentives (e.g. free registration of projects with <15,000 CER per year, exemption from 2% share of proceeds for adaptation, and bundling to reduce transaction costs) for small-scale projects, which are usually prevalent in LDCs and SIDS, they did not seem to help in reducing geographic inequity. The inequity in geographic distribution of CDM projects in favour of large countries was also perhaps due to recent changes in bilateral capacity building programmes, which changed their role from pure assistance to strategic CER procurement by developed countries (e.g. Japan).

A concentration in the distribution of unilateral CDM projects was also evident. Of the 71 unilateral CDM projects in the Asia-Pacific region, as many as 61 were in India (10 large [>50,000 CER per year] and the remaining small [<50,000 CER per year] CDM projects (UNFCCC 2006b). Indeed 354 out of 402 CDM projects that received host country

approval in India were unilateral (UNEP 2006) and most of them were in biomass sector. In the Republic of Korea and China, however, only a few projects based on HFC23 and methane account for production of large CER.

**Absence of a sector-based approach:** Several participants in our consultations (e.g. China, India, Indonesia, Viet Nam) expressed that the current project-based framework of CDM is limiting its potential for decarbonisation in developing countries. It may be associated with the lack of effective linkages between CDM and national developmental priorities in different sectors. Many have argued that the current CDM is incapable of supporting government policies or a wider range of programmes, which can have a much more significant transformative effect on the economy (e.g. Figueres 2005). Participants felt that many Asian countries would be able to participate more actively in the CDM if a wider scope of LULUCF activities were allowed.

*The current project-based framework of CDM is limiting its potential for decarbonisation in developing countries.*

### 4.3 Major proposals for strengthening CDM

Several proposals were made to overcome the above-listed barriers in CDM both on a short-term (before 2012) and a long-term basis (after 2012) (Table 4.2). Since most of the proposals were short-term solutions, the focus of recent discussions at UNFCCC shifted from the restructuring of CDM on a long-term basis to short-term solutions (Figueres 2005).

**Table 4.2 List of proposals for strengthening CDM in climate regime**

Name of the Proposal	Main Features	Remarks (strengths and weaknesses)
<b>I. Proposals to address barriers related to sustainable development (SD)</b>		
1. CDM Gold Standard (Gold Standard 2006)	<ul style="list-style-type: none"> <li>SD benefits of a project are scored on a scale ranging from -2 (poor) to +2 (best).</li> <li>Simplified process for micro-scale projects (&lt;5,000 tCO<sub>2</sub>e) to reduce transaction costs through relaxing the number of stakeholder consultations.</li> <li>Includes ODA additionality tool to check for diversion of ODA.</li> </ul>	<ul style="list-style-type: none"> <li>Favours projects with high SD benefits and its wider use may improve geographical equity.</li> <li>Rating is questionable to quantify SD benefits accurately.</li> <li>Burden of additional documentation.</li> </ul>
2. Expanded CDM (Hiraishi 2005)	<ul style="list-style-type: none"> <li>Consideration of benefits beyond CER from CDM projects.</li> <li>Multi-source financing to realise additional co-benefits (including adaptation) from CDM.</li> </ul>	<ul style="list-style-type: none"> <li>Quantification of co-benefits in terms of equivalent CER is challenging.</li> </ul>
3. Sustainable Development Policies and Measures (SD-PAMs) (Winkler et al. 2002)	<ul style="list-style-type: none"> <li>Mandatory provisions to incorporate GHG emission reduction plan in development plans of the developing countries.</li> <li>Qualifies SD aspect of credits based on three criteria – project eligibility, additionality/baseline and contribution to SD – in addition to current requirements for CDM.</li> <li>Emission reduction initiatives under SD-PAMs may be funded under the existing mechanisms, including CDM and GEF.</li> <li>Countries share successful cases and approaches.</li> </ul>	<ul style="list-style-type: none"> <li>Useful to promote SD benefits of policies.</li> <li>Coordination with current national reporting systems is a strength.</li> <li>Objective assessment of SD is challenging and additional screening may increase the burden.</li> </ul>
<b>II. Proposals to address institutional barriers</b>		
4. Strengthening of institutional capacity for CDM-EB (Sugiyama et al. 2005, Michaelowa 2005, IETA 2005b)	<ul style="list-style-type: none"> <li>Increase funding and strengthen the institutional capacity so that CDM-EB gets professional support, hastens the approval process, and develops methodologies without a concrete project activity.</li> <li>Nomination to the Board based on agreed terms of reference, resulting in a mix policy, business, regulatory and technical expertise, as well as regional perspective.</li> <li>Establishment of indicators to measure the success of the CDM-EB.</li> </ul>	<ul style="list-style-type: none"> <li>Additional burden for Annex I countries.</li> <li>Vague explanation on indicators effectiveness of CDM-EB.</li> </ul>
5. Shortening of application process (Michaelowa 2005)	<ul style="list-style-type: none"> <li>Duration from the date of request for registration to the date of registration by the CDM-EB to be reduced from eight to four weeks.</li> </ul>	<ul style="list-style-type: none"> <li>Insensitive to uneven workload by CDM-EB due to dynamism of CDM project activity.</li> </ul>
6. Capacity building (Michaelowa 2005)	<ul style="list-style-type: none"> <li>Focus on institutional capacity building in low-income countries should be increased.</li> </ul>	<ul style="list-style-type: none"> <li>To what extent capacity building leads to real CDM projects is unclear, given the high investment risks in LDCs.</li> </ul>

**Table 4.2 (continued)**

Name of the Proposal	Main Features	Remarks (strengths and weaknesses)
<b>III. Proposals to address technical barriers</b>		
7. Streamlining of additionality testing (Michaelowa 2005)	<ul style="list-style-type: none"> <li>Streamlining through (a) defining criteria for additionality in detail, (b) simple barrier tests, and (c) deleting steps 4 (common practice analysis) and 5 (proof of CER revenue overcoming barriers).</li> <li>Investment tests should consider the risk faced by premium projects in developing countries.</li> <li>Projects that are the first of its kind in a host country, projects with an internal rate of return below the interest rate of commercial banks, and projects with longer payback period than the usual payback period for projects in the same sector, should be considered additional.</li> </ul>	<ul style="list-style-type: none"> <li>Contributes to simplification of CDM procedure and reduction of transaction cost.</li> </ul>
8. Development of new methodologies	<ul style="list-style-type: none"> <li>Development of methodologies in sectors, such as transport and energy efficiency (METI 2005, IISD-CCAP-CC&amp;D 2005), CCS (Scott 2006) should facilitate policy-based and sector-based CDM.</li> </ul>	<ul style="list-style-type: none"> <li>Leads to an increased number of projects in sectors with large development benefits.</li> </ul>
9. Development of multi-project baselines	<ul style="list-style-type: none"> <li>Standardisation of baselines for each sector, sub-sector or technology leads to reduction of transaction costs (Sugiyama et al. 2005, Sathaye et al. 2004, Ellis and Bosi 1999).</li> </ul>	<ul style="list-style-type: none"> <li>Demerit of testing additionality for each project remains.</li> </ul>
<b>IV. Proposal to address barriers for technology development and transfer</b>		
10. Technology transfer CDM (IGES 2005a, cited by Cosbey et al. 2005a)	<ul style="list-style-type: none"> <li>Credits in return for transfer of a technology that is used in different sectors, as part of emissions quota transactions.</li> </ul>	<ul style="list-style-type: none"> <li>Design and necessary prerequisites for its implementation are unclear, as estimation of the amount of credits that could be gained through transfer of a single technology is challenging.</li> </ul>
<b>V. Proposals to address financial barriers</b>		
11. Reducing transaction costs through various means	<ul style="list-style-type: none"> <li>Establishment of country based DOEs (IGES/UNDP 2006) for validation and verification process.</li> <li>Simplified modalities and procedures for expeditious registration.</li> <li>Upfront payments for the cost of PDD preparation and feasibility studies (METI Japan 2005).</li> <li>Bundling of projects.</li> </ul>	<ul style="list-style-type: none"> <li>Country based DOEs can strengthen capacity of the host countries.</li> <li>Technical difficulties for bundling increase validation cost (Bhardwaj et al. 2004).</li> <li>Legal constraints on CER ownership among project owners in the bundle may prevent wider use of bundling.</li> </ul>
12. Carbon funds by World Bank, ADB and UNDP	<ul style="list-style-type: none"> <li>Prototype Carbon Fund (PCF), Bio Carbon Fund (BCF), Community Development Carbon Fund (CDCF), ADB's CDM Facility, UNDP's MDG Carbon Facility assist in providing start-up funds and mediating ERPA's.</li> </ul>	<ul style="list-style-type: none"> <li>Funds directly contribute to poverty alleviation and SD at local levels.</li> </ul>
13. Use of ODA for underlying finance and relaxation of financial additionality	<ul style="list-style-type: none"> <li>Change of the current rules on use of ODA to improve flexibility in interpretation of financial or investment additionality principle (Dutschke and Michaelowa 2003).</li> </ul>	<ul style="list-style-type: none"> <li>No clear guidelines on the use of ODA for underlying finance are available.</li> <li>May increase CDM activities by LDCs and SIDS, which rely on ODA.</li> </ul>
14. Establishment of ESCO (Energy Service Company) Fund (METI Japan 2005)	<ul style="list-style-type: none"> <li>Expected to contribute to the development of energy efficiency or energy conservation projects or related methodologies.</li> </ul>	<ul style="list-style-type: none"> <li>ESCO can develop large scale CDM projects and mobilise energy efficiency investment from developed countries.</li> <li>Capacity building is necessary to develop financing expertise.</li> </ul>
15. Debt Carbon Swap Initiative (Asuka 2002)	<ul style="list-style-type: none"> <li>Exchange of debt by ODA recipients for CERs based on the idea of Debt-for-Nature Swaps.</li> </ul>	<ul style="list-style-type: none"> <li>Diversion of ODA for generation of CER may become a concern.</li> </ul>
<b>VI. Proposals to address legal barriers</b>		
16. Unilateral declaration to ensure the value of CERs after 2012 (Michaelowa 2005)	<ul style="list-style-type: none"> <li>Even without any international agreement, major Annex B countries declare unilaterally to buy CERs after 2012.</li> <li>Allows the use of post-2012 CER for complying with targets of the first commitment period under the Kyoto Protocol.</li> </ul>	<ul style="list-style-type: none"> <li>Market demand for CERs will improve.</li> </ul>
17. Use of Export credit insurance (Asuka and Takeuchi 2004)	<ul style="list-style-type: none"> <li>Reduce the risk of CDM investment through currently available insurance systems.</li> </ul>	<ul style="list-style-type: none"> <li>Insurance alone may not cover all risks associated with the project.</li> </ul>
<b>VII. Proposals to overcome the scope-related barriers (sector and geographic reach)</b>		
18. Sector (sub-sector/ cross-sector/ regional) CDM (Samaniego and Figueres 2002)	<ul style="list-style-type: none"> <li>Scope of CDM expanded from the current project-based activities to sector-based activities by creating sector-specific or cross-sector policies to reduce GHG emissions in line with national development priorities, and CERs are counted across the sector.</li> <li>Proposal expects to drastically increase the CERs supply and reduce transaction costs.</li> <li>Perverse incentive not to adopt policies and measures can be avoided.</li> <li>In addition to sector CDM (e.g. modernisation of cement industry), there are sub-sector (e.g. conversion of natural gas-fueled electricity generation plants to combined cycle), cross-sector (e.g. combination of cleaner transportation and more efficient lighting in one city), and regional (e.g. departure from the BAU emission scenario in one city or other geographic region) CDM (Cosbey et al. 2005b).</li> </ul>	<ul style="list-style-type: none"> <li>Supports emissions monitoring and reporting systems in developing countries (Cosbey et al. 2005a).</li> <li>Technical problems in setting baseline, monitoring and additionality testing.</li> <li>Wide-coverage of activities extend the range of stakeholders, which makes coordination difficult. (Sugiyama et al. 2005, Michaelowa 2005, Figueres 2005).</li> </ul>

**Table 4.2 (continued)**

Name of the Proposal	Main Features	Remarks (strengths and weaknesses)
19. Policy-based CDM (Ghana and other DCs, 2005, Bosi and Ellis 2005)	<ul style="list-style-type: none"> <li>While sector CDM is initiated by the private sector, policy CDM is initiated by the host government (Cosbey et al. 2005b).</li> <li>Emission reduction under policy CDM would be measured against a situation without such policy.</li> </ul>	<ul style="list-style-type: none"> <li>Contributes to a drastic increase of CER, but the CER revenues flow to the government, while the cost of complying with the policy falls on the private sector (IGES/UNESCAP 2006).</li> <li>Governments may delay the implementation of proactive mitigation policies if they expect approval of policy-based CDM.</li> </ul>
20. Product CDM (Matsuo 2006)	<ul style="list-style-type: none"> <li>Allows crediting of CER for energy efficiency products, for example.</li> </ul>	<ul style="list-style-type: none"> <li>Some proposals were submitted to CDM-EB, but no product CDM is registered as of October 2006.</li> </ul>
21. CDM+ Policies (CCAP 2004)	<ul style="list-style-type: none"> <li>Rather than policy CDM, CDM+ Policies is proposed consisting of public policy CDM+, regulatory CDM+, financial CDM+, voluntary CDM+.</li> <li>Expected to increase the number of participants by increasing various choices.</li> </ul>	<ul style="list-style-type: none"> <li>Confusing array of options to governments.</li> <li>Details of implementation are unclear.</li> </ul>
22. No-lose countrywide policies and measures CDM (Michaelowa et al. 2003)	<ul style="list-style-type: none"> <li>Emission targets for developing countries whose combined per capita emissions and per capita income (weighted equally) pass an agreed graduation threshold.</li> <li>Developing countries that are big emitters but do not graduate into absolute national targets could choose between an ex ante intensity target with emission trading, or use of countrywide, policies and measures CDM.</li> </ul>	<ul style="list-style-type: none"> <li>Details of implementation are unclear.</li> </ul>
23. Renewable energy-based CDM and nuclear energy based CDM (India)	<ul style="list-style-type: none"> <li>Ensure eligibility of all renewable energy projects for CDM without testing for additionality.</li> <li>Widen the scope of CDM to include nuclear energy-based projects, as nuclear energy is primarily a climate-friendly energy source.</li> </ul>	<ul style="list-style-type: none"> <li>Expected to contribute to sustainable development and energy security.</li> <li>Environmental and security concerns restrict reaching an international agreement on nuclear energy CDM.</li> </ul>
24. Wider definition of LULUCF (FEALAC 2006) and avoidance of deforestation (UNFCCC 2005b)	<ul style="list-style-type: none"> <li>Enhance the scope of CDM to cover a wider range of LULUCF activities.</li> <li>An "optional protocol" involving a group of developed and developing countries and expansion of the CDM to permit crediting of activities to reduce deforestation.</li> </ul>	<ul style="list-style-type: none"> <li>Arguments against allowing deforestation avoidance activities in CDM include high uncertainties of GHG-reduction estimates, the potentially large scale of credits, non-permanence, and leakage concerns (Bonnie et al. 2000, Marland et al. 2001, Schlamadinger et al. 2004).</li> </ul>
25. High CER allocation for specific countries (IGES 2005a)	<ul style="list-style-type: none"> <li>Award double CER for LDCs and SIDS to redress the current geographical inequity.</li> </ul>	<ul style="list-style-type: none"> <li>In view of investment risks in LDCs and SIDS, it is unclear if doubling CER would make those countries attractive CDM destinations.</li> </ul>
26. Expedient registration of small-scale projects and support for bundled projects (IETA 2005b)	<ul style="list-style-type: none"> <li>Ensuring expeditious registration and support for bundling may lead to a reduction in transaction costs.</li> </ul>	<ul style="list-style-type: none"> <li>May result in better geographical reach of CDM to LDCs and other poor developing countries.</li> </ul>
27. Unilateral CDM (Republic of Korea)/ South-south CDM (Matsuo 2004, FEALAC 2006)	<ul style="list-style-type: none"> <li>Promote unilateral CDM to ensure domestic flows of technology and finance in GHG mitigation activities.</li> </ul>	<ul style="list-style-type: none"> <li>Unilateral CDM has contributed a lot to expansion of carbon market,.</li> <li>South-south CDM is not allowed officially yet, but Republic of Korea has been implementing it in Indonesia.</li> </ul>
28. Allowing developing countries to sell CER from unilateral CDM (Sudo and Kimura 2005)	<ul style="list-style-type: none"> <li>Developing countries should be allowed to participate in the market by selling CER generated from the unilateral CDM projects.</li> </ul>	<ul style="list-style-type: none"> <li>May give incentive to developing countries to participate in emission reduction efforts, but some have difficulty in implementing CDM with their own domestic technology and finance, in some countries such as Indonesia.</li> </ul>
29. Greater use of flexibility with discount CER (Yamagata 2004) and Unilateral CDM linked with CER discounting scheme (Chung 2006)	<ul style="list-style-type: none"> <li>To produce more CERs cost effectively, developed countries can use only a part of emission reductions as CER. One unit of CER accrues from a project that reduces two units of emissions in developing countries (Yamagata 2004).</li> <li>The idea of unilateral CDM linked with CER discounting scheme aims to contribute to net global emission reductions through voluntary action by developing countries, maintain CER price through establishing a central bank to control total supply without imposing emission reduction target for DCs (hybrid type), and improve unequal geographical distribution and types of CDM projects, through differentiation of discounting ratio according to the level of economy (Chung 2006).</li> </ul>	<ul style="list-style-type: none"> <li>Greater use of flexibility with discount CER ensures further emission cuts in developing countries, but it's not globally cost-effective to constrain the use of CER (Sugiyama et al. 2005).</li> <li>It may be politically difficult to agree on the differentiated discounting ratio.</li> </ul>

*The decision of the Chinese government to create a sustainable development fund, based on proceeds from higher CER taxation for non-CO<sub>2</sub> CDM projects, to promote renewable energy sources and other environmental investments is a step in the right direction.*

#### 4.4 Perspectives of various countries

The participants in our consultations expressed a wide range of views on ways to strengthen CDM in the future climate regime. Several participants (e.g. Cambodia, China, India, Indonesia, Philippines, and Thailand) argued for simplification of the CDM approval process, especially for projects with high developmental benefits. However, a few participants (e.g. SIDS) voiced concern that excessive simplification might sacrifice the environmental integrity of the CDM (Bernow et al. 2000). Many participants (e.g. Bangladesh, India, and Viet Nam) stated that additional financial and institutional support at national and international levels is crucial for promotion of small-scale and renewable energy (e.g. Viet Nam, Bhutan) CDM projects (Yapp and Rijk 2000). A few participants (e.g. Indonesia) argued that sustainable development benefits are limited in non-CO<sub>2</sub> CDM projects. The decision of the Chinese government to create a sustainable development fund, based on proceeds from higher CER taxation for non-CO<sub>2</sub> CDM projects, to promote renewable energy sources and other environmental investments was seen as a step in the right direction. Many countries in the region did not initiate policies to introduce such differential taxation, however. Some participants (e.g. Sri Lanka) underlined the importance of integrating CDM in energy policies at national and regional levels, and the need for enhancing co-benefits from CDM projects (Hiraishi 2005). They argued that Annex I countries should consider the quality of CERs in their purchases in order to promote sustainable development in the region. Among the proposals to address barriers to sustainable development through CDM, many participants and respondents to our questionnaire (~70%) preferred SD-PAMs, which include pledges of GHG mitigation policies by developing countries.

Many participants (e.g. Cambodia, Mongolia, Indonesia, and Viet Nam) and respondents to the questionnaire (~70%) noted that the future climate regime should support institutional and human capacities to implement CDM projects in order to redress geographic inequity. Many participants (e.g. Japan, India, China, and the Philippines) argued for institutional reform of CDM-EB to hasten the CDM approval process. About 65% of respondents to the questionnaire supported the proposal of expeditious registration of small-scale CDM projects by CDM-EB. Sharing good practices in institutional and human capacity building, and CDM implementation through different platforms such as the DNA forum were considered crucial (UNFCCC 2006e). Many participants (e.g. India, Indonesia, and Republic of Korea) and most of the respondents to the questionnaire noted the need to relax additionality requirements and to develop new methodologies in sectors such as transportation and energy efficiency.

A few participants (e.g. Thailand) noted that CDM should not be seen as the main vehicle for technology transfer while others (e.g. China, India, and the Philippines) argued that the future climate regime should focus on both the transfer and deployment of climate-friendly technologies. Some participants (e.g. Japan), however, noted that developed countries are eager to transfer energy-saving technologies through expansion of related methodologies (Murphy et al. 2005) but voiced caution over the technology mismatch.

Several participants and nearly 50% of the respondents to the questionnaire noted the need for providing a clear signal on the continuity of CDM beyond 2012 and emphasised that the lack of such a signal is a barrier to raising underlying finance in many countries (e.g. Indonesia, Viet Nam). About 70% of respondents to the questionnaire supported the

proposal stating the need for establishing domestic DOEs in host countries with a view to reduce transaction costs. The views on the use of ODA for CDM were diverse. While some participants (e.g. China, India) and most of the respondents to the questionnaire (~77%) noted that diversion of ODA for CDM should not be allowed, others (e.g. Indonesia) argued for the creation of a special fund under ODA to support CDM efforts. Likewise, some participants (e.g. Mongolia) viewed the unilateral CDM as risky, while still others (e.g. India) suggested that ultimately it might be useful, especially from the point of view of technology deployment within the host country. A few participants (e.g. China) noted the need for regulating the CER price through formation of a cartel or a sellers' group.

Many participants (e.g. China, India, Indonesia, and Republic of Korea) and about 50% of respondents to the questionnaire suggested that the future climate regime should support actions to widen the scope of CDM not only in terms of geographic spread but also in terms of elevating the project-based CDM to the programme-based or sector-based CDM. However, some participants (e.g. China, India) raised concern over the need to resolve technical difficulties in baseline setting and monitoring for sector-based CDM.

Representatives from LDCs and SIDS and about 40% of respondents to the questionnaire supported the idea of doubling CERs for projects in LDCs and SIDS and for providing additional support for micro-scale CDM activities to improve geographical equity. However, other countries (e.g. China, India) were concerned about the possible market-distorting effects of such policies (Michaelowa 2003). The views of participants on expanding the scope of CDM to include, among others, LULUCF, deforestation avoidance, and nuclear energy were again diverse. Only 30 to 40% of respondents to the questionnaire supported expanding the scope of CDM in these sectors. Some participants (e.g. Thailand) cautioned that forestry-based CDM projects should consider ecological and social impacts more thoroughly than before.

## 4.5 Three priorities for strengthening the CDM

### 4.5.1 Provide an early signal to assure the continuity of CDM beyond 2012

Despite the fact that most of the CDM projects have crediting periods going beyond 2012 and can accrue CER for as many as 21 years, the current uncertainty about post-2012 climate regime generated negligible demand for post-2012 CER (UNFCCC 2006f). The need for an early signal on continuity of CDM is especially important in the Asia-Pacific region because CDM activities have just gained momentum, and many projects in the region have long gestation times with high capital costs. Giving an early signal is expected to increase the demand for CER and lead to procurement of a large number of CER at a minimal cost.

#### 4.5.1.1 Unilateral declaration by Annex I countries to purchase post-2012 CER

Several participants in our consultations strongly supported the proposal by Michaelowa (2005), who emphasised the need for unilateral declaration by Annex I countries to ensure the value of CER after 2012. So far, the EU in general and the Netherlands in particular have declared their support for post-2012 CER. In view of the big gap between demand and supply of CER, one approach could be for Annex I countries to declare their intention to extensively utilise post-2012 CER towards meeting their targets for the first

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*An institutional approach leading to greater clarity on the use of post-2012 CER is to extend the period of the next commitment to beyond 10 years.*

commitment period, perhaps through borrowing and banking. Another approach is to modify the linking directive of the EU-ETS to allow the continued use of CER beyond 2012. The extent to which CDM will play a role in EU-ETS in the immediate future remains to be seen however (Bhandari 2006). Other domestic and regional ETS (e.g. Japan, USA, and Australia) may also consider the use of post-2012 CER.

An institutional approach leading to greater clarity on the use of post-2012 CER is to extend the period of the next commitment to beyond 10 years instead of the five years of the first commitment period. Such reform is expected to enhance market stability for CERs and benefit several long-term projects (e.g. LULUCF, and energy-intensive social infrastructure projects). Many participants suggested that the discussion on post-2012 CDM should be linked with discussions on emission reduction targets of Annex I countries under Article 3.9 of the Kyoto Protocol. As there is widespread recognition that such new reduction targets must be decided by 2008 at the latest, an international agreement to decide on the use of post-2012 CERs must be made by then.

#### **4.5.1.2 Proactive support for post-2012 CERs by multilateral financial institutions**

International financial institutions such as the World Bank have been instrumental in creating and catalysing the carbon market even before the Kyoto Protocol entered into force on 16 February 2005 (World Bank 2006b). For example, the establishment of various carbon funds (e.g. PCF, CDCF, BCF) by the World Bank in 2000 mobilised a wide-range of funds from the private and public sectors. Likewise, an early signal for CDM was given by AIJ projects. The efforts to create mechanisms to ensure demand for post-2012 CERs will go a long way in sending a positive signal to project developers.

#### **4.5.2 Expand the scope of CDM through sector CDM and minimise geographic inequity**

##### **4.5.2.1 Promotion of sector-based CDM**

A “sectoral” approach to the CDM was suggested four years ago (Samaniego and Figueres 2002) and several variations have been proposed since then. Bosi and Ellis (2005), for example, listed three major options: policy-based, intensity-based and cap-based sectoral CDM. Sterk and Wittneben (2005) added sectoral project clusters. The COP/MOP1 took a step forward in this direction by agreeing to register “programme of activities” as a single CDM project if approved baseline and monitoring methodologies are used to define the appropriate boundary, avoid double-counting and account for leakage. However, local/ regional/national policy or standards are not yet accepted as the CDM (Decision 7/CMP.1).

Participants in our consultations in all sub-regions emphasised the need for widening the scope of CDM, although the understanding of stakeholders on sector-based CDM varied widely. Participants noted that such an approach can enhance CER supply considerably while effectively cutting down the transaction costs and offering the least cost mitigation opportunities for Annex I countries. Through sector-based CDM, synergies with the sector-based national development plans in Asian countries can be found. In addition, the adoption of a sector-based approach could support the broader enhancement of emissions monitoring and reporting systems in developing countries (Bosi and Ellis

2005). One senior negotiator from India noted that expanding the scope of CDM would enable Annex I Parties to adopt deeper emission reduction targets at the same cost, allow equitable burden-sharing among Annex I Parties, and enable greater participation by developing countries.

A sector-based approach could benefit the Asia-Pacific region, especially in LULUCF, transportation, and household sectors. Since GHG emissions from deforestation account for 20% of the total GHG worldwide and the rate of deforestation is high in the region, adoption of a sector-based CDM may offer a chance to reduce such emissions considerably. Indeed, carbon stocks in forest biomass dropped by 33% in South and Southeast Asia during 1990-2005, more seriously than any other region in the world (FAO 2005). Papua New Guinea and Costa Rica proposed to develop an emissions trading market based on deforestation avoidance (UNFCCC 2005b). A quick decision on the applicability of CDM for deforestation avoidance would go a long way towards supporting sector-based CDM. Transportation is another sector, where sector-based CDM is more effective than the project-based CDM to bring about fundamental changes in vehicle purchases (e.g. encouraging higher fuel efficiency), fuel use (e.g. lower carbon fuels) and, most importantly, travel behaviour (i.e. slower growth in demand for motorised trips) (IISD-CCAP-CC&D 2005).

The sector CDM approach, however, has problems such as baseline setting, monitoring, and potential leakage. To overcome such problems, some Asian countries have begun to take initiatives. India, for example, in collaboration with GTZ, developed baselines for the cement sector (Point Carbon 2006b). Similar approaches should be taken in other sectors and countries depending on national circumstances and sector priorities.

#### **4.5.2.2 Redressing geographical inequity**

If CDM really aims to promote sustainable development in developing countries, all developing countries will have to participate in CDM. However, since CDM is a voluntary market-based mechanism, private sector investment activities gravitate to countries and projects where transaction costs and investment risks are low (Silayan 2005, UNFCCC 2006d). Participants in our consultations, especially from LDCs and SIDS, discussed several options to address the issue of geographical inequity. Expedient registration of small-scale projects and support for bundled projects are crucial to improve the geographic reach of the CDM projects. Some participants (e.g. Cambodia) pointed out that the current definition of small-scale CDM does not truly reflect the circumstances in LDCs and SIDS, and has no positive impact on development of CDM projects as the current procedures do not give any premium to help realise micro-level projects in these countries. Therefore, creating another category for micro-scale CDM project activities (e.g. below 5 MW of electricity generation or equivalent) coupled with a fast-track system for registration and financial assistance can help reduce geographic inequity considerably. Relaxing additionality requirements for CDM projects, especially in renewable energy, in SIDS and LDCs for certain period of time is also recommended (UNFCCC 2006d).

The provision of international assistance through finance (e.g. low interest loans), transfer of technology, and capacity building of local financial institutions in LDCs and SIDS may go a long way. Insofar as funding is concerned, a part of the LDC Fund may be used to reduce the risk of CDM projects, and carbon funds targeting micro-scale CDM

*Expedient registration of small-scale projects and support for bundled projects are crucial to improve the geographic reach of the CDM projects.*

*The policies of Annex I countries and international financial institutions may be adjusted to give preferential treatment to LDCs and SIDS.*

project activities in LDCs and SIDS may be established. The policies of Annex I countries for CER acquisition, and of international financial institutions may be adjusted to give preferential treatment to LDCs and SIDS. For instance, Annex I countries may commit to allocate a share of CER purchases from LDCs and SIDS. Since some LDCs and SIDS carry high investment risks, agencies such as the Multilateral Investment Guarantee Agency (MIGA) of the World Bank group, and Nippon Export and Investment Insurance (NEXI) may consider providing insurance to cover such risks. Past experiences of carbon funds managed by the World Bank suggest that only a few countries (e.g. India, China, and the Philippines) received financial assistance (World Bank 2006a). The level of emission reduction seems to be one of the key determinants in the selection of countries and such criteria are working against the interests of LDCs, where emission reductions per project are low. In addition, capacity building programmes by international organisations, which include support to cover transaction costs in LDCs and SIDS, may help in redressing geographic inequity. Some participants (e.g. Bangladesh) suggested that a separate fund for CDM capacity building be established at the UNFCCC.

A doubling of CERs for projects in LDCs and SIDS was proposed in our earlier consultations (IGES 2005a). Some participants (e.g. India) expressed concerns indicating that it would lead to market distortions. However, other experts opined that distortion of market through government intervention is necessary in this case and that Annex I countries may consider paying a higher price or setting a higher quota for CERs from LDCs and SIDS.

Non-renewable biomass issues are critical to many LDCs and SIDS, since energy consumption in those countries is led by fuel wood, charcoal and such non-fossil fuel based sources. However, the recent decision by CDM-EB not to permit the use of non-renewable biomass as a baseline technology is considered a serious setback. In seeking the way forward, it is suggested that organisations such as IETA should submit alternative baselines that would safeguard the feasibility of CDM projects based on non-renewable biomass, and that UNFCCC should recognise non-renewable biomass as a long term objective and should take the necessary steps to overcome the various barriers.

#### **4.5.2.3 Sustainable development assessment in project implementation**

In view of the high imbalance between projects with huge GHG emission reductions but few development benefits, and projects with many development benefits but fewer CERs, several participants in our consultations agreed that assessment of the contribution of CDM to sustainable development should be strengthened further. Current screening methodologies based solely on the host country's checklist do not seem to favour projects with high development benefits. Indeed, some host countries (e.g. Cambodia) modified quantitative assessment of SD into qualitative assessment to hasten the approval process. As current rules do not compel project developers to seek out projects with the most development benefits, the CDM-EB should consider shaping a more expansive accounting and incentive-based framework that would accommodate development benefits within the existing CDM. For instance, the requirement by CDM-EB that assessment of development benefits must be validated by a third party in addition to meeting the host country's criteria may compel project developers to be more receptive to the idea of promoting the co-benefits. However, efforts are necessary to avoid a long bureaucratic process. The provision of incentives to consider developmental

co-benefits is also important. In this connection, Hiraishi (2005) suggested that co-benefits from CDM projects ought to be quantified and financially supported separately for example by, ODA, CSR funding or benevolent funds, so that the total value of the projects with high development benefits could compete well with those with high CERs.

Projects with a large number of CERs should be re-designed carefully to seek development benefits through finding ways to define SD or to evaluate secondary impacts of CDM in operational terms (Kolshus et al. 2001). Self-assessment by project developers using tools, such as an additionality tool for SD, or an economic internal rate of return through qualitative indicators reflecting on a number of non-monetary quantitative indicators (Motta et al. 2002) may be helpful. In addition, UNFCCC may create a registry system for SD-PAMs to be integrated into the CDM-EB approval process to strengthen SD assessment.

#### **4.5.3 Use ODA and multi-source funding approaches to cover underlying finance**

##### **4.5.3.1 Private-private partnerships in financial sector**

Participants in our consultations repeatedly noted that the lack of underlying finance was a major barrier to effective implementation of CDM projects. To overcome this barrier, synergies among the private sectors of Annex I and non-Annex I countries should be strengthened through bilateral business agreements. For example, Japan Carbon Finance Ltd. (JCF) concluded business agreements with RHB Bank in Malaysia, TMB Bank Public Co., Ltd. in Thailand, and ICICI Bank Limited in India in 2006. Such business agreements enhance the prospects of obtaining upfront payments for project development and underlying finance. Besides business agreements, adequate steps should be taken to strengthen capacity and increase the CDM awareness of both public and private financial institutions in developing countries so that the underlying finance may be raised domestically (Masuda 2005).

##### **4.5.3.2 Use of ODA for underlying finance**

Our consultations revealed diverse views on the use of ODA for CDM (Table 4.3). While some participants (e.g. Philippines) supported the use of ODA, others (e.g. China) were against such a proposal. If ODA were to be used for underlying finance, streamlining of additionality testing (Michaelowa 2003) and relaxation of financial additionality (Dutschke and Michaelowa 2003) are crucial. Measures to prevent undue diversion of ODA (e.g. purchase of CERs, reducing allocation to other developmental activities such as education) are, however, necessary. The need for providing ODA, especially during the initial stages of CDM implementation has been highlighted (UNFCCC 2006d). This is especially true in LDCs and SIDS, which are not financially attractive to investors from the perspective of project financing. In countries with high risks, and in unilateral CDM projects, ODA coupled with export credit insurance may be used to mitigate risks.

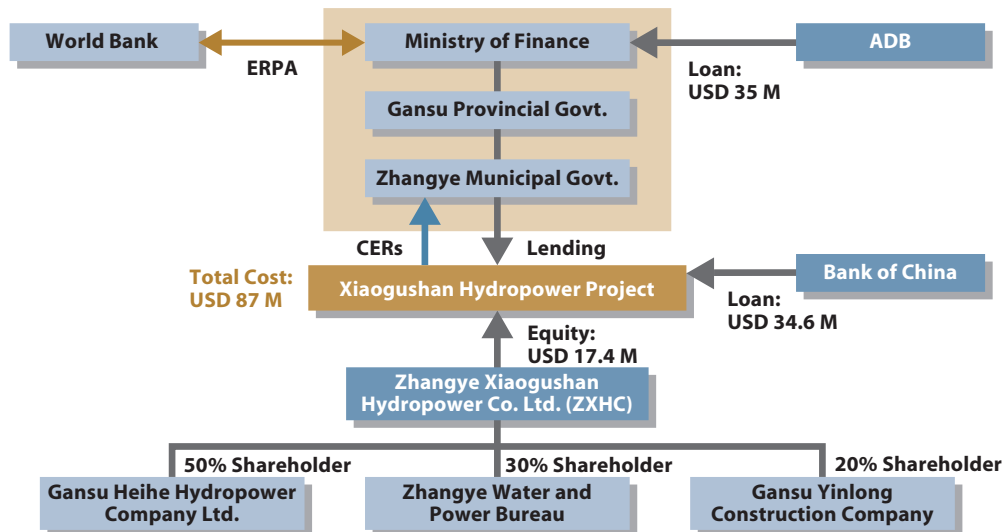
*Developmental co-benefits from CDM projects ought to be quantified and financially supported separately, so that the total value of the CDM projects with high development benefits and low CERs could compete well with those with high CERs.*

*Climate regime discussions should place a strong emphasis on a multi-source, multi-channel funding approach through existing and/or new financial mechanisms.*

#### 4.5.3.3 Effective use of multi-source funding

A mismatch between the needs for up-front investment and the annual payments for emission reduction is seen in all CDM projects (Kossoy 2004). Multi-source funding can, therefore, promote CDM projects by sharing risks among several financial institutions so that it helps project owners to receive up-front payments relatively easily (Gouvello and Coto 2003). Good coordination among funding institutions and project developers is, therefore, critical. Multilateral financial institutions and development agencies can act as catalysts to generate multi-source funding for CDM projects. For example, the Plantar project in Brazil was successful in overcoming financial barriers with the help of World Bank Prototype Carbon Fund (PCF). The Emission Reduction Purchase Agreement (ERPA) by PCF facilitated the payments for emission reduction to be placed in escrow and permitted project sponsors to get up-front finance from Rabobank Brazil and to use the ERPA proceeds to service debt. With the ERPA arrangement, Rabobank Brazil could even extend its loan tenure from two years without carbon finance to five years with carbon finance (Bishop 2004). Likewise, Xiaogushan Hydropower Plant Project in China received loans from Bank of China (39.8% of the total cost) and ADB (40.2% of the total cost) for implementation, because of the ERPA signed with the World Bank (World Bank 2004b). The equity contributions of the project owner covered the remaining 20%. Explicit guarantees from Gansu Provincial Government and Zhangye Municipal Government also facilitated the conclusion of the loan agreement (Figure 4.3).

**Figure 4.3 Multi-source Funding Structure of Xiaogushan Hydropower Project in China**



Climate regime discussions should place a strong emphasis on a multi-source, multi-channel funding approach through existing and/or new financial mechanisms. The synergistic benefits of such an approach will be seen in fast and effective implementation of CDM and intensive sharing of knowledge and experience.

## 4.6 Concluding Remarks

The ultimate measure of success for CDM will be its contribution to reducing the growth of GHG emissions and promoting sustainable development in developing countries. IGES consultations revealed a strong need to streamline and improve the current CDM to achieve these goals. Insofar as the first objective of reducing emissions is concerned, several technical, technological, and financial barriers need to be overcome. To achieve the second objective, a reorientation of thinking, both in host countries and by Annex B Parties, in terms of integrating development and climate actions is crucial. Our consultations revealed that the first priority to strengthen CDM is to ensure its continuity beyond 2012 and to expand its scope beyond the current project-based approach. Simultaneously, options for improving geographic distribution of CDM projects, and enhancing technology transfer and local SD benefits must be fully exploited. The future regime should also have adequate safeguards to reject projects that undermine social and environmental integrity. With such efforts, CDM's role as a tool for attracting clean energy investments and promoting SD in the Asia-Pacific region can be strengthened.

# Technology Development and Transfer

Kentaro Tamura

with contributions from J. Ichihara

## 5.1 Introduction

Energy demand in the Asia-Pacific region is accelerating rapidly because of expanding populations and swift economic and social transformations characterised by urbanisation and industrialisation. Consequently, GHG emissions from the region are expected to rise quickly (IEA 2005). Tackling climate change will require radical changes in socio-economic systems, which in turn necessitate further technology development, transfer and deployment.<sup>1</sup> Recent estimates by the IEA suggest that developing country emissions in 2050 could be reduced by 47-54% below the reference level if cost-effective technologies were to be adopted (IEA 2006). Discussions on the future climate regime, therefore, will have to include enhanced focus on technology issues. This chapter considers technology-related concerns and interests in the region, reviews major proposals to strengthen technology development, transfer and deployment under a future climate regime, and identifies a few options to move forward based on a full consideration of perspectives of various countries and stakeholders in the region.

## 5.2 Technology challenges and opportunities in Asia

This section presents technology challenges facing the Asia-Pacific region from three angles: the technology-development nexus, the technology-climate stabilisation nexus, and adaptation technologies.

The overriding priority for Asia is development, and technology is seen as a key element that helps to utilise limited resources to enable the development ladder to be climbed. While many Asian countries have been experiencing rapid economic growth recently, there still remain considerable gaps in economic prosperity and social well-being between countries in the region and other developed countries (Table 5.1). Such economic disparities spur eagerness for further economic growth and improvement of the quality of life in Asia, which lead to an increase in energy demand. In addition, many Asian countries are anticipated to become more dependent on oil imports from distant, often politically unstable parts of the world, thereby raising concerns on energy security. Technological upgrades and diffusion of such upgraded technologies can alleviate concerns about implications of mounting energy needs in the region, while allowing them to pursue economic development.

**Table 5.1 Economic development and infrastructure stocks in Asia**

	Gross national income per capita (PPP in US\$) 2004	Installed capacity per 1,000 persons (kW) 2001	Electricity consumption per capita (kWh) 2001	Average telephone mainlines per 1,000 persons 2001	Road density (km/sq, km of land) 2000	Access to improved water source (% of population) 2000
Developing countries	3,575	272	1,054	95	0.15	78
East Asia	4,589	223	921	59	0.15	71
South Asia	2,397	99	426	31	0.94	76
Developed countries	24,218	2,044	8,876	501	0.58	99

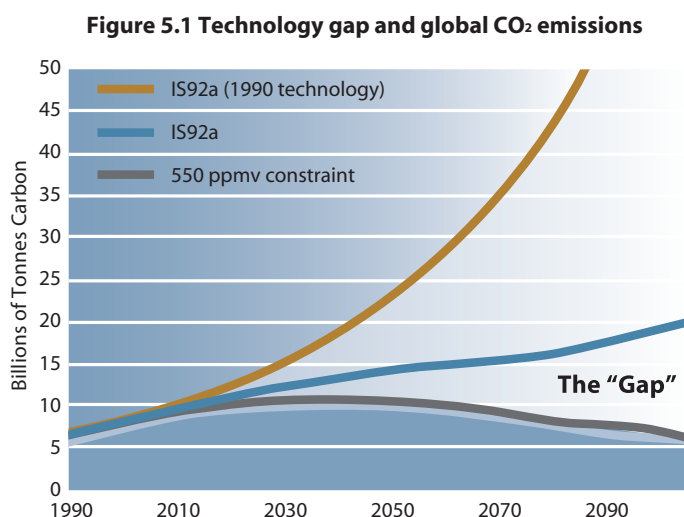
Source: World Bank 2004a

1. Technology development refers to the process of developing new technologies, while technology transfer refers to the diffusion of technologies across the border, and technology deployment describes the spread of a specific technology within a country.

*The overriding priority for Asia is development, and technology is seen as a key element that helps to utilise limited resources to enable the development ladder to be climbed.*

For the world to attain the ultimate objective of the UNFCCC, all countries need to “leapfrog” over one or more generations of technology. The gaps in currently used technologies and technologies necessary to stabilise GHG concentrations are illustrated in Figure 5.1. The middle curve, denoted *IS92a*, shows the global CO<sub>2</sub> emissions associated with IPCC’s middle-of-the-range scenario, which assumes a doubled world population and moderate economic growth by the end of the 21st century. The top curve assumes the same population and economic growth as *IS92a*, but it holds energy technologies constant at the 1990 level. The difference between the top and middle curves thus illustrates the technological improvement needed merely to achieve the *IS92a* emissions path. The lower curve describes an emissions path that would be necessary to attain a 550 ppmv GHG concentration target, which is twice the pre-industrial level. Achieving this stabilisation emissions path would require even greater use of advanced technologies than is assumed in *IS92a*. The key challenge here is how to enable countries in the Asia-Pacific region to employ such technologies through facilitating indigenous development or enabling transfer and deployment of climate-friendly technologies from developed countries.

*For the world to attain the ultimate objective of the UNFCCC, all countries need to “leapfrog” over one or more generations of technology.*



Source: Battelle (2001: 30)

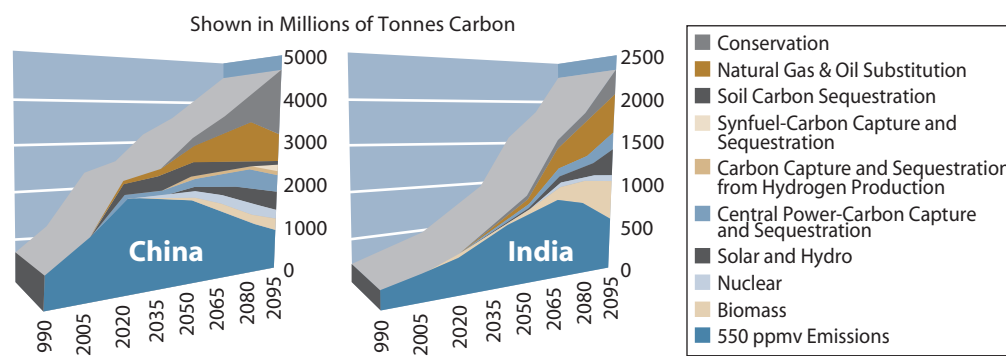
Another key point to recognise is that a broad portfolio of technologies would be required to meet the challenge, as no single technology alone can fill the gap between the future emissions based on the *IS92a* technologies and the 550-ppmv stabilisation path. Figure 5.2 shows a range of technologies that could allow China and India to move from the IPCC’s *IS92a* scenario to a 550-ppmv stabilisation path. Note that technology needs vary. For example, energy conservation technologies can play a greater role in China while in India biomass technologies offer significant potential. Not to be overlooked though is that both countries need to maximise use of other low carbon technologies.

*A broad portfolio of technologies would be required to meet the challenge.*

*Agriculture, water resources, coastal zone protection, and forest management, in particular, are very vulnerable sectors in Asia and the Pacific which particularly require development, transfer and deployment of adaptation technologies.*

*The extent to which international initiatives will mobilise existing technologies and help in development of breakthrough technologies will ultimately determine if we can achieve the goal of stable climate.*

**Figure 5.2 Technology portfolios for China and India**



Source: Battelle (2001)

The high degree of vulnerability to impacts of climate change in Asia is well-known (IPCC 2001b). In particular, agriculture, water resources, coastal zone protection, and forest management are very vulnerable sectors in Asia and the Pacific countries, which particularly require development, transfer and deployment of adaptation technologies. The nature of the technology required in each sector and the primary driving force behind the technology transfer also differ (Klein et al. 2006). In the agricultural sector, for example, both community-based endogenous technologies, such as floating agriculture and diversification of cropping patterns as well as modern biotechnologies to develop new varieties to cope with future changes in climate, are important in limiting negative effects of climate change. Given the uncertainty in local impacts of climate change, however, understanding the potential of both indigenous and introduced technologies and maintaining a broad range of technological options are critical.

### 5.3 Current status of technology cooperation

This section presents an overview of the various initiatives in technology research and development (R&D), transfer and dissemination at the multilateral and plurilateral levels with special reference to Asia.

#### 5.3.1 UNFCCC initiatives

Several articles of the UNFCCC and its Kyoto Protocol refer to promoting international cooperation in development, transfer and deployment of technologies. For example, Article 4.1(c) of the Convention states that all Parties shall “promote and cooperate in the development, application and diffusion, including transfer of technologies, practices and processes that control, reduce or prevent anthropogenic emissions” of GHG. Likewise, Article 4.5 stipulates that the developed country Parties included in Annex II shall “take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally-sound technologies and know-how to other Parties, particularly developing country Parties”. Article 4.7 acknowledges that the extent to which developing country Parties will effectively meet their commitments will depend on the effective implementation by developed country Parties of their own commitments on finance and technology transfer.<sup>2</sup>

2. Other relevant UNFCCC Articles include Articles 4.1, 4.3, and 4.4. The Kyoto Protocol Articles 3.14, 10(b), (i) and (c), and 11.2 are also pertinent.

The Conferences of Parties (COPs) to the UNFCCC made several decisions on technology development and transfer (Decision nos. 13/CP1, 7/CP2, 9/CP3, 4/CP4, 5/CP4, 9/CP5, 4/CP7, 5/CP7, 10/CP8, 1/CP10 and 6/CP10). In particular, the decision 5/CP7 adopted at COP7 in 2001 is particularly significant as it provided a “framework for meaningful and effective actions” to enhance the implementation of Article 4.5, covering five themes: technology needs assessments, technology information, enabling environments, capacity building, and mechanisms for technology transfer. The Expert Group on Technology Transfer (EGTT) was established in 2001 to analyse and identify ways to facilitate and advance technology transfer activities. In parallel, a technology information system, TT: CLEAR, was developed. The COP7, through the adoption of various decisions called the Marrakesh accords, also established the Special Climate Change Fund (SCCF) to address technology transfer as one of the four priorities, and the LDC Fund to support adaptation activities (including adaptation technologies). Decision 1/CP10, which includes the Buenos Aires Programme of work on adaptation and response measures, also refers to the promotion of the transfer of technologies for adaptation on an urgent basis in priority sectors, including agriculture and water resources.

The Global Environment Facility (GEF) is the operating entity of the UNFCCC Financial Mechanism. Between 1995 and 2005, GEF in its climate change focal area provided around US\$ 1.75 billion in grants, of which 20% was allocated to Asian countries to support many projects, including 23 in China, 13 in India and 10 in the Philippines (GEF 2005). As of April 2006, 11 developed countries had contributed or pledged a total of US\$ 45.4 million to SCCF, but only US\$ 2.7 million was made available for allocation to projects related to technology transfer and its associated capacity building activities (GEF 2006). Likewise, in the LDC Fund, very little of the 11.8 million allocated by GEF has actually ended up in adaptation technologies. Compared to the magnitude of the technology transfer challenge that climate change poses, the efforts by the UNFCCC and the GEF are of modest significance at best.

Through its flexibility mechanisms, such as the CDM, the Kyoto Protocol was assumed as a means to facilitate transfer of technologies from developed to developing countries. Indeed, the pricing of GHG emissions was regarded as an efficient measure to facilitate the development and diffusion of low carbon technologies. As of November 2006, as many as 421 projects were registered by the CDM Executive Board (CDM-EB) with an estimated issuance of 680 million tCO<sub>2</sub>e by 2012. If implemented well, these projects should promote extensive transfer of technologies. However, the administrative complexity of project-based mechanisms seems to restrict the ability to bring about major changes, in particular technology shift, in developing countries (Bell and Drexhage 2005). It was also noted by Sandén and Azar (2005) that the Kyoto Mechanisms are basically designed merely to provide Annex-I Parties with cost-efficient tools to meet their near-term emissions reduction targets, thereby resulting in only weak incentives to develop more advanced technology on a long-term basis. In the Asian context, the predominance of unilateral CDM projects (especially in India), and HFC destruction projects that produce a large amount of CERs (especially in China and the Republic of Korea) also indicate very limited prospects for effective technology transfer from developed countries.

Since many UNFCCC initiatives have so far focused on technology needs assessments, identification of barriers, and capacity building, rather than technology development and

***Compared to the magnitude of the technology transfer challenge that climate change poses, the efforts by the UNFCCC are so far of modest significance at best.***

***The Kyoto Mechanisms seem to provide only weak incentives to develop advanced technologies on a long-term basis.***

transfer per se, there was a broad agreement among stakeholders in the Asian-Pacific region that much remains to be done (IGES 2005a). One senior Malaysian participant to our consultations pointed out that convention-driven technology R&D and transfer has a dismal record in Asian countries. Indeed, at COP9, the Indian delegation expressed concern that the only concrete outcome of calls for technology transfer was TT:CLEAR (ENB 2003). The need for finding innovative ways to facilitate technology development and transfer in a post-2012 climate regime is, therefore, significant.

### **5.3.2 Non-UNFCCC initiatives**

Outside the UNFCCC, there are several plurilateral and bilateral initiatives focusing on low carbon technology development and transfer. Asian countries, in particular China, India, Indonesia, Japan and Republic of Korea, are members in many of these initiatives (Table 5.2). For example, implementing agreements (IAs) of the International Energy Agency (IEA) included more than 40 international collaborative energy R&D and demonstration projects, such as the Clean Coal Centre, the Greenhouse Gas R&D Programme, and the Climate Technology Initiative (CTI). Leading nuclear technology nations, including Japan and Republic of Korea, also established the Generation IV International Forum to develop next generation nuclear energy systems. In 2002, the World Bank launched the Global Gas Flaring Reduction (GGFR) Partnership in which Indonesia is a member.

Despite the rejection of the Kyoto Protocol in 2001, the USA launched a series of international initiatives for energy technology R&D and transfer, including three multilateral agreements: the Carbon Sequestration Leadership Forum (CSLF), the International Partnership for the Hydrogen Economy (IPHE), and the Methane to Markets Partnership (M2M).<sup>3</sup> All the major GHG emitting countries in Asia (China, Japan, India, and Republic of Korea) are members of these new initiatives, and some positive results are evident. Through the M2M Partnership, for instance, a USA company secured a US\$ 58 million contract to supply all the power generation equipment for a 120 MW coal bed and coal mine methane power plant in China.<sup>4</sup> Private sector participation in M2M is promoted through a mechanism called the Project Network, which is considered essential to build capacity, transfer technology and promote private direct investment.

In July 2005, a new international voluntary programme for developing and deploying cleaner and more efficient technologies, the Asia-Pacific Partnership on Clean Development and Climate (APP), was established.<sup>5</sup> Its member countries, including China, India, Japan and Republic of Korea from the region, besides the USA and Australia combine to produce nearly half of the world's GDP while producing and consuming more than 65 percent of the world's coal. The APP established eight public-private sector task forces, covering: (1) cleaner fossil energy; (2) renewable energy and distributed generation; (3) power generation and transmission; (4) steel; (5) aluminium; (6) cement; (7) coal mining, and (8) buildings and appliances. Various initiatives under these task forces can potentially provide the Asian participants with many opportunities to shift their economies towards low carbon ones.

3. For more details on each programme, see <http://www.cslforum.org/> for CSLF; <http://www.iphe.net/> for IPHE; and <http://www.methanetomarkets.org/> for M2M.

4. Press release is available at <http://yosemite.epa.gov/opa/admpress.nsf/4d84d5d9a719de8c85257018005467c2/8ec89e33e48a863f852571720063e8d7!OpenDocument>

5. For more details, see <http://www.asiapacificpartnership.org/>.

**Table 5.2 Non-UNFCCC initiatives focusing on development and transfer of technologies**

	Gleneagles Dialogue	G8 Gleneagles Plan of Action	Asia-Pacific Partnership for Clean Development and Climate (APP)	Methane to Markets Partnership (M2M)	Carbon Sequestration Leadership Forum (CSLF)	International Partnership for the Hydrogen Economy (IPHE)	World Bank Global Gas Flaring Reduction Partnership (GGFR)	Generation IV International Forum (GIF)	Implementing Agreements (IAs) under the International Energy Agency (IEA)			GHG Emissions in 2000* (MtCO <sub>2</sub> )
									Climate Technology Initiative (CTI)	Greenhouse Gas R&D Programme	Clean Coal Centre	
	2005	2005	2005	2004	2003	2003	2002	2001	1995	1991	1975	
Selected Annex I countries	USA	○	○	○	○	○	○	○	○	○	○	6,928.10
	EU	○	○	○	○	○	○	○	○	○	○	4,724.90
	Russia	○	○	○	○	○	○**	○	○	○	○	1,915.20
	Japan	○	○	○	○	○	○	○	○	○	○	1,316.70
	Germany	○	○	○	○	○	○	○	○	○	○	1,009.40
	Canada	○	○	○	○	○	○	○	○	○	○	680.2
	UK	○	○	○	○	○	○	○	○	○	○	653.7
	Italy	○	○	○	○	○	○	○	○	○	○	531.1
	France	○	○	○	○	○	○	○	○	○	○	513.4
	Australia	○	○	○	○	○	○	○	○	○	○	490.9
	Ukraine	○	○	○	○	○	○	○	○	○	○	481.9
	Spain	○	○	○	○	○	○	○	○	○	○	381.1
	Netherlands	○	○	○	○	○	○	○	○	○	○	215.1
	Greece	○	○	○	○	○	○	○	○	○	○	120
	Austria	○	○	○	○	○	○	○	○	○	○	80.4
	New Zealand	○	○	○	○	○	○	○	○	○	○	72.9
Finland	○	○	○	○	○	○	○	○	○	○	68.5	
Denmark	○	○	○	○	○	○	○	○	○	○	66.5	
Sweden	○	○	○	○	○	○	○	○	○	○	61.9	
Norway	○	○	○	○	○	○	○	○	○	○	53.8	
Switzerland	○	○	○	○	○	○	○	○	○	○	51.5	
Iceland	○	○	○	○	○	○	○	○	○	○	2.8	
China	○	○	○	○	○	○	○	○	○	○	△	4,937.70
India	○	○	○	○	○	○	○	○	○	○	△	1,884.10
Republic of Korea	○	○	○	○	○	○	○	○	○	○	○	520.9
Indonesia	○	○	○	○	○	○	○	○	○	○	○	502.6
Other non-Annex I countries	6	0	0	6	5	1	8	3	0	1	0	-
Total	20	9	6	18	22	17	15	11	9	18	9	-

Note: \* Excluding LULUCF and international bunker fuel, WRI 2006.

\*\* Participation of Khanty-Mansiysk province.

△ means industrial sponsors.

*Though the non-UNFCCC initiatives have significant potential for facilitating technology development and transfer, it is another thing for countries to actually implement them.*

Climate change has recently become an agenda item for the Group of Eight (G8) summit. The summit of 2005 adopted the Gleneagles Plan of Action on Climate Change, Clean Energy, and Sustainable Development in order to promote the deployment of cleaner technologies and to work with developing countries to enhance private investment and transfer of technologies. The summit also decided to review the progress in its summit in 2008. Informal sources indicate that the G8 summit planned for 2007 in Germany would again include climate change as an agenda item. With such recognition at the international level of G8, climate change seems to have finally left the sidelines of political agendas.

Though the above non-UNFCCC initiatives have significant potential for facilitating technology development, transfer and deployment, it is one thing to reach an agreement but another for countries to actually implement it. For example, while the APP stands at the forefront of the USA efforts to address climate change through involving major Asian developing countries, it remains to be seen if the USA congress will fully approve its financial commitment to the APP (US\$ 52 million as seed capital). Technology-oriented cooperation, which is usually seen as the most feasible option for USA international leadership, is not immune to the credibility problem of its international commitments (Tamura 2006b). Similarly, there are many examples of the G8 summit launching new initiatives only to abandon them later.

In summary, both UNFCCC and non-UNFCCC initiatives may enable Asian countries to access climate-friendly technologies. However, it is first important to demonstrate the value of such initiatives by effective implementation. The launching of the Gleneagles Dialogue, bringing together 20 major emitting countries to informally discuss new measures to tackle climate change and to monitor the implementation of the Gleneagles Plan of Action can be a departure point. The extent to which these initiatives will mobilise existing technologies and help in development of breakthrough technologies to achieve much steeper reductions in GHG in future will ultimately determine if we can achieve the goal of stable climate.

## **5.4 Asian aspirations and concerns over climate-friendly technologies**

Several Asian countries expressed strong aspirations for technology R&D and transfer in both rounds of our consultations. For those countries that are experiencing accelerating economies, and therefore increased energy demands, and where modern energy services such as electricity are still not available to large poor populations, technology development and transfer remain a key policy focus.

Recently, the IEA estimated the potential of various technologies for reducing global CO<sub>2</sub> emissions from the energy sector and concluded that the greatest GHG reductions in the year 2050 are projected to come from improvements in end-use efficiency, power generation and carbon capture and storage (CCS) (IEA 2006). In view of the high reliance of several Asian countries on traditional fossil fuels, as well as the high potential for renewable sources of energy, participants showed a keen interest in a wide range of both conventional (e.g. energy efficiency, renewable energy, technologies for adaptation) and advanced (e.g. clean coal technologies, Integrated Gasification Combined Cycle [IGCC], CCS, nuclear energy) technologies.

National preferences for low carbon technologies, however, vary, reflecting economic size, developmental stage, and geographical location. For example, China, India and Viet Nam have coal-based energy structures, and are expected to continue to rely on coal in their energy mix over the following decades (IEA 2004). Countries such as Indonesia, which have recently become net oil importers, have begun to consider depending on coal again. Hence, clean coal technologies are very important for these countries to reduce GHG emissions without compromising their development goals. Put another way, merely to maintain the current level of emissions would require installing IGCC and CCS technology in over three-quarters of all new coal-fired power stations for the next 30 years (IEA 2004). In addition, in many Asian countries, technologies for energy efficiency improvement and energy conservation are important in terms of achieving energy security and minimising local air pollution.

Notwithstanding the national aspirations of technology development and expectations for international technology cooperation, participants expressed serious concerns on the ability of the current international regime in facilitating technology development and transfer. Many participants were concerned about severe restrictions in place even on technologies already transferred to the countries. For example, Table 5.3 shows the degree to which restrictive conditions are imposed upon various technologies introduced into Thailand.

**Table 5.3 Restrictions on technology transfer (e.g. Thailand)**

Item	USA	Japan	Germany	UK	France	Others	Total
Technologies introduced	209	168	37	28	20	61	523
Technologies introduced accompanied by patent rights	122	82	28	18	4	31	280
% of technologies with restrictions	58.4	48.8	62.2	64.3	20.0	50.8	53.5

Source: Chantanakome, 2003

Many participants noted that under Annex I National Communications, only “soft” technology transfer including information networks and capacity building was often listed as transfer of technologies. Some participants argued that the poor record of technology transfer so far implied that the use of market mechanisms such as CDM was a failure. The transfer of technologies for adaptation faces additional barriers when compared to mitigation technologies; the uptake of such technologies is dependent on the buy-in and involvement of an expanded stakeholder community, and there is unwillingness at present to provide the funding required to transfer these technologies (Klein et al. 2006).

The rigidity of intellectual property rights (IPR), including the long duration of protection, was considered as another barrier to collaborative technology development projects and technology transfer. Some participants claimed that the 20-year protection period for patented technologies under the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement of the World Trade Organisation (WTO) makes climate-friendly

*Notwithstanding the national aspirations of technology development and expectations for international technology cooperation, there are many concerns over the current international regime.*

technologies obsolete by the time they are transferred to developing countries.

Although the potential of renewable energy sources is widely known in many Asian countries (especially in China, India, Indonesia, the Philippines and Viet Nam), renewable energy as a means of GHG mitigation has limitations in terms of both technology and economics. The technologies are not commercially competitive yet, and are burdened with high costs and high capital intensity, which stunts wider dissemination. A few participants (e.g. LDCs and SIDS) expressed that technologies for adaptation did not receive much attention in the current regime and sought for fair sharing of knowledge, technology and tools in future. They also expressed that effective transfer of technology should not be confined only between north and south but also between south and south. Some participants (e.g. India) noted that technology transfer in practice has become more of a financial transaction rather than a knowledge transaction.

***Climate-related funding under the current regime is both inadequate and unpredictable.***

Some participants noted that climate-related funding under the current regime is both inadequate and unpredictable. They noted, for example, that only US\$ 2.7 million was allocated for technology transfer out of nearly US\$ 45 million available for allocation under SCCF (GEF 2006). A further obstacle is the lack of domestic funds for technology development and deployment: China, for instance, has its own environmentally-sound technologies, but not the financing to localise and commercialise them (Peng et al. 2005). Many participants argued, therefore, for more proactive involvement of the private sector in technology initiatives in Asia and the Pacific, considering the fact that the private sector makes enormous investments in the energy sector. Striking the balance between publicly-funded R&D and private sector investments in terms of their appropriate roles in developing new technologies is a major challenge to be addressed in the future regime.

***Developing countries would only be able to be effective partners in technology transfer if they were able to choose, absorb, use and improve the technologies acquired.***

Participants (e.g. Nepal) noted that the lack of capacity in domestic institutions for dissemination of low carbon technologies was another barrier. Inadequacy in enabling environments in general, and lack of incentive mechanisms to reward the adoption of clean technologies in particular, were often considered as missing components of such domestic institutions. Participants observed that developing countries would only be able to be effective partners in technology transfer if they were able to choose, absorb, use and improve the technologies acquired.

In summary, Asian stakeholders expressed many concerns over the current international regime:

- (1) limited collaborative R&D and slow pace of the transfer of "hard" technologies
- (2) lack of sufficient technology transfer under the current Kyoto Mechanisms
- (3) rigidity of the international IPR system
- (4) high costs and capital intensity of renewable energy technologies
- (5) limitation of domestic and international fund availability and,
- (6) lack of domestic incentive mechanisms and enabling environments.

To enable each developing country in Asia to have a sense of ownership and confidence in the evolving climate regime, these concerns should be addressed thoroughly.

## 5.5 Proposals for promoting technology development and transfer

Based on the recognition that technologies hold the central key to the success of future climate regime, several researchers and policy makers made proposals to strengthen technology development, transfer and deployment. The proposals are grouped into five areas:

- (a) Promoting collaborative technology research, development and transfer
- (b) Restructuring of the CDM
- (c) Securing financial resources for technology development and deployment
- (d) Improving the flexibility of IPR regime
- (e) Enhancing “market-pull” mechanisms through setting technology targets and standards

### 5.5.1 Collaborative R&D and technology transfer as part of commitments

The future climate regime can provide incentives for technology development and transfer, through enabling collaborative R&D and/or transfer as part of commitments by Annex I countries. Dasgupta (2004) suggested that developed countries could comply with their legally-binding commitments by either meeting their emission reduction targets and/or through providing financial and technology transfer to developing countries. While preserving the basic structure of the Kyoto Protocol, this proposal would give Annex I countries a greater flexibility to achieve their commitments, as each developed country could determine its own mix of emission reductions and financial/technology transfer commitments. In practice, however, optimisation of the two types of commitments remains a challenge.

Gupta (2003) proposed setting-up of numerical targets for technology transfer in relation to national income. This idea is part of a broad proposal with the aim of gradually involving developing countries in a commitments-based regime, with the countries being placed into 12 categories based on GNP per capita, CO<sub>2</sub> emissions per capita, and Human Development Index. High and upper-high income countries with medium to high GHG emission levels would be required to transfer technology at a rate equivalent to a minimum percentage of national income. However, several challenges, such as the categories and the agreement on specific numerical targets for technology transfer, would need to be overcome for implementation of this proposal.

The Ministry of Economy, Trade and Industry (METI) of Japan also proposed technology transfer as well as collaborative R&D with developing countries as part of commitments by developed countries, but on a non-binding, pledge and review basis (METI 2004). While arguing that an international climate regime should be based on the UNFCCC, the

*While preserving the basic structure of the Kyoto Protocol, this proposal would give Annex I countries a greater flexibility to achieve their commitments, as each developed country could determine its own mix of emission reductions and financial/technology transfer commitments.*

*The idea of enabling technology development and transfer as part of numerical commitments has spread at the conceptual level, but further studies on definition, quantification and modalities of implementation of such commitments are necessary.*

proposal explored the possibility of bringing new initiatives among a smaller group of countries, and suggested multiple forms of commitments, besides quantitative emission reduction targets. This proposal suggested that international collaborative R&D and technology should be included in such multiple forms of commitments. Considering the poor record of non-binding commitments (technology transfer is a “commitment” under the Convention Articles 4.5 and 4.7), however, it is not clear how another non-binding agreement can really work.

In our consultations, participants repeatedly emphasised that developed and developing countries should conduct mutually-beneficial technology development and demonstration projects as well as technology transfer and deployment projects. The idea of enabling technology development and transfer as part of either legally-binding or pledge-and-review-based commitments has spread to some extent at the conceptual level, but further studies on definition, quantification and modalities of implementation of such commitments are necessary.

### **5.5.2 Restructuring of the CDM**

Participants in our consultations repeatedly mentioned that the nature of project-based mechanisms in the current regime remains as an obstacle to enable effective technology transfer through the CDM. To overcome this limitation, several proposals were made to strengthen the CDM through widening the scope of activities that are eligible for the CDM. Such proposals include the following:

- (a) Policy-based CDM, which allows public policies aimed at reducing GHG emissions to be eligible for the CDM without pre-established limitations in terms of geographical coverage (e.g. entire cities or regions); and,
- (b) Sectoral CDM, where GHG emissions reduction activities along the lines of a sector or sub-sector are made eligible for the CDM project regardless of the type of enabling instruments (i.e. either private initiatives or public policies).<sup>6</sup>

A derivative of the policy-based CDM, Technology Transfer CDM, where a policy that promotes the adoption of a certain low-carbon technology within a single sector or across many sectors is eligible for CDM, was proposed at our consultations (IGES 2005a). However, the feasibility of implementing such proposal remains a grey area.

The METI of Japan proposed that a wider range of activities, including CCS and nuclear energy projects, be eligible for the CDM (METI 2004). While the eligibility of CCS projects for the CDM is now under consideration (UNFCCC 2006f), nuclear energy projects are still controversial in terms of both political, environmental and safety concerns.

Although all these approaches to expand the scope of the CDM are expected to contribute to sector-wide technological transformation in developing countries, it is still not clear how the expansion of the CDM scope alone can contribute to promoting technology transfer. Perhaps sector-CDM would facilitate technology deployment

6. The terms “sector-based”, “sectoral” and “policy-based” CDM are used differently in the literature (see Bosi and Ellis 2005, Michaelowa 2005, Samaniego and Figueres 2002, Sterk and Wittneben 2005).

within a developing country rather than technology transfer from developed countries. In addition, such approaches face many problems: e.g. the establishment of a credible baseline, the treatment of additionality, the maintenance of the environmental integrity, and the reliability of emission monitoring (Sterk and Wittneben 2005).

*It is still not clear how the expansion of the CDM scope alone can contribute to promoting technology transfer.*

### **5.5.3 Securing financial resources for technology R&D and transfer**

Currently, funds available under the UNFCCC are not large enough to finance the costs associated with the technological changes that need to occur in developing countries. Therefore, several new ideas were put forward for securing financial resources for technology R&D and transfer. Barrett (2003), for example, proposed the establishment of a protocol for a global R&D fund, as such protocol would aid the development of new technologies. In this scheme, developed countries contribute funds based upon the principle of ability and willingness, as in the UN scale of assessments, or historical responsibility for climate change. He also proposed a similar financing mechanism for technology transfer. Reliance on the principle of ability and willingness or historical responsibility, however, poses a challenge to political feasibility of implementing this proposal.

Shelling (2002) proposed the “Climate Marshall Plan”—an assistance programme for low carbon technology dissemination in developing countries in return for their commitment to mitigate GHG emissions. In this proposal, massive financial transfers to developing countries are expected to occur, and simultaneously satisfy some notion of equity. Developed countries would make financial contributions to an institution that would finance energy-efficient and decarbonised technologies in developing countries. The process of allocation of resources made available by the scheme is based on ad hoc agreements between donor and recipient countries on how to spend grants, as well as “multilateral reciprocal scrutiny” of emission-reduction actions of the latter. As the proposal aims to attain twin objectives of GHG reduction commitments from developing countries and technology transfer, it needs to be further explored. However, implementation of this approach has, at least, two problems. First, its environmental effectiveness is not certain. Second, as Shelling himself recognises, “the burden on the rich countries will undoubtedly be more political than economic” (Shelling 2002).

*As funds available under the UNFCCC are not large enough to finance the costs associated with the technological changes that need to occur in developing countries, several new ideas were put forward for securing financial resources for technology R&D and transfer.*

Benedick (2001) proposed that revenues from a harmonised carbon tax among like-minded countries (including both developed and developing countries) might be used to finance an R&D fund and promote technology transfer. Potential difficulties with this approach are many. First, taxation is at the core of sovereignty of nation-states, thereby sparking off political obstacles to the harmonisation process. Secondly, developing countries may not be willing to participate as they might consider it unfair to adopt the same amount of tax as developed countries, given the unequal historical responsibility for climate change; and, thirdly the governments may be tempted to neutralise the effect of a carbon tax, especially during a period of economic recession or stagnation.

Aldy et al. (2001) proposed a hybrid international emissions trading programme that combines an international emissions trading scheme, not unlike that founded in the Kyoto Protocol, with a safety-valve or price cap mechanism. Under the safety-valve mechanism, when a permit price hits a certain level, additional permits would be sold

*Further work is necessary to identify ways to overcome specific instances of IPR related barriers to acquisition of existing proprietary technologies.*

without any upper limit.<sup>7</sup> One variation of this approach involves the creation of an international body that would sell additional permits and use the proceeds from the sale of such for mitigation efforts in and technology transfer to developing countries. The merit of this proposal is that the mechanism can be built upon the Kyoto Protocol, thereby reducing the long negotiation process. However, setting the price of an international safety valve may very well result in another political battle. In addition, creating a new powerful international financing body might not be acceptable to some groups (e.g. the USA Congress) and some countries.

Sugiyama et al. (2004) examined the role of international treaties in securing domestic financial sources, rather than financial resources at the international level. They proposed the Zero-Emission Technology Treaty (ZETT) and the Climate-wise Development Treaty (CDT) as part of a “nested” international climate regime. Under ZETT, participating countries would make non-binding pledges of zero-emissions from energy-related CO<sub>2</sub>. Such symbolic goal of ZETT could send a strong signal to both domestic political arenas as well as markets. Countries participating in the CDT would agree to modify the flows of financial assistance so that it mainstreams such climate issues as transfer of low carbon technologies, mitigation and adaptation, into development policies.

#### **5.5.4 Improving the flexibility of intellectual property rights on low carbon technologies**

The rigidity of the current international IPR regime is considered a major barrier for promoting transfer of low carbon technologies, which require significant up-front investment and have patented production processes. Many participants in our consultations recommended further work to identify ways to overcome specific instances of IPR related barriers to acquisition of existing proprietary technologies.

Ogonowski et al. (2004) proposed policy options that address IPRs according to the stage of technology development. For technologies under development, they proposed creation of an international association that coordinates and develops new technologies and hold IPRs in a pattern similar to that of the Consultative Group on International Agricultural Research (CGIAR). An international organisation could then be founded for developing advanced low carbon technologies and all participating countries would have access to the technologies developed. However, the CGIAR, as an informal association, has no formal role in the ownership and control of the gene collections under its umbrella, and the legal status of such collections has always been problematic (Blakeney 2002). Furthermore, the increasing use of modern biotechnology has caused a series of IPR-related problems under the CGIAR system. The development of advanced climate-friendly technologies that usually contain a number of technology components and processes subject to IPR protection may lead to similar problems that the CGIAR is facing now.

For technologies beyond the primary development stage, Ogonowski et al. (2004) suggested that IPR options could be either based on compulsory licensing or bilateral negotiations. Following the case of compulsory licensing for AIDS medicine under the Doha Declaration of the TRIPs, governments could grant domestic manufacturers

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7. For more details on a safety-valve mechanism, see Pizer (1999).

licence of advanced technologies, who must then pay royalties to IPR holders over time, not up-front.<sup>8</sup> Alternatively, governments and IPR holders could bilaterally negotiate an agreement on potentially non-financial terms. For low carbon technologies a similar arrangement can be made for an exchange of, for instance, CERs.

Compulsory licensing, however, does not automatically solve the problems of access to technology in developing countries, and the aggressive use of compulsory licences as an instrument of technology transfer may rather eliminate prospects for effective technology transfer (Correa 2005). Compulsory licensing may even discourage aggregate investments of foreign companies in the developing countries. Furthermore, the transfer of hardware through compulsory licensing does not compel the transfer of know-how and expertise necessary for generating and managing technical change, which many observers see as an indispensable element of effective technology transfer (Bell 1990, Watson 2002). For hybrid drivetrains (which are subject to strict IPRs), for example, the firms owning the IPRs would have to train mechanics in the recipient country in fitting and maintaining the drivetrains, which raises a skilled manpower issue. To avoid such negative consequences, policy-makers seeking compulsory licensing should take into account the summation of social costs that may, in the end, outweigh short-term benefits of this action (Reichaman and Hasenzahl 2003), and find a way through which foreign and local interests could be mutually satisfied.

Another way to improve the flexibility in the IPR system for low carbon technologies is to shorten the duration of IPR protection. This idea was raised on many occasions throughout the first round of our consultations (IGES 2005a). Two basic ideas lie behind the proposal: one is that since climate-friendly technology retains the nature of public goods, IPR protection rules should be liberally applied to it; and, the other is that the 20-year duration of patent protection makes technologies obsolete when the protection is removed. From the viewpoint of patent holders, however, simply shortening the duration of patent protection may not be so favourable, since they need to recuperate the costs for R&D. Thus, a more balanced approach, such as the establishment of a funding mechanism for purchasing licenses by developed and developing countries so that low carbon technologies could be used in the developing countries, would be necessary.

#### **5.5.5 Enhancing “market-pull” mechanisms through international cooperation**

Internationally agreed technology targets and standards can provide a “pull” incentive to commercialise new, low carbon technologies, and help participating countries to establish or enhance such “market-pull” mechanisms at the national level. Although Barrett (2003) stresses the self-enforcing nature of technology standards (if enough countries adopt the standards, others will follow due to economies of scale in production), adoption and implementation of such standards would actually help to gear domestic institutions towards the dissemination of low carbon technologies. Benedick (2001) suggested two such policies and measures (vehicle fuel-economy standards among auto-producing countries, and technology targets for power generation and fuel refining), while Ninomiya (2003) proposed an international agreement on appliance efficiency in the residential and transportation sectors in major GHG emitting countries.

*Internationally agreed technology targets and standards can help participating countries to establish or enhance such “market-pull” mechanisms at the national level. However, this approach has the difficulty in achieving a political consensus.*

8. Ockwell et al. (2006) also points out the possibility of drawing on the experiences of the Doha Declaration in the climate context.

*Most of the proposals discussed focus more on technologies for mitigation than on adaptation technologies. A few proposals specifically refer to the need for supporting adaptation technologies.*

*From the view point of Asian developing countries, participation in international technology collaboration is seen as a good vehicle to access knowledge and build capacity.*

Edmonds and Wise (1998) proposed medium- and long-term technology targets for Annex I, as a “backstop” in the case of failure of the first-best option, i.e. efficient policies such as tax or tradable permits. Here, technology targets can, for example, require all new power plants to capture and store all the carbon from their waste streams after 2020, and require new fossil fuel refining capacity to capture and sequester carbon from fuels after 2050. The proposal is also equipped with a graduation provision in that non-Annex I countries would be subject to the targets when their per capita income, in Purchasing Power Parity terms, equalled the average for Annex I countries in 2020 or 2050. This provision addresses the equity issue to some extent.

A major drawback of the above approach would be the difficulty in achieving a political consensus. The failed attempt to make all countries to commit themselves to reach some degree of renewable energy sources in their primary energy supply, and the fact that negotiations over certain provisions of the Kyoto Protocol remain locked in a stalemate clearly demonstrates how difficult it is to harmonise such domestic policies. Reaching some form of consensus on standards and targets even within a limited range of technologies through a multilateral environmental agreement such as that of the UNFCCC requires considerable efforts by both developed and developing countries.

Given the long history of emphasis on mitigation efforts by the international community, most of the proposals discussed above focus more on technologies for mitigation than on adaptation technologies. One proposal by Torvanger et al. (2005), however, specifically refers to the need for supporting adaptation technologies through establishment of a separate adaptation protocol, as part of the broader framework for mitigation commitments.

## **5.6 Perspectives on technology R&D and transfer**

Diagnoses of the problems related to technology R&D and transfer vary depending on particular positions held by stakeholders and technologies concerned, and prescriptions accordingly differ. This section examines various perspectives on technology R&D, transfer, and deployment as revealed through our consultations.

### **5.6.1 Perspectives on R&D**

There are various motivations for governments to participate in technology cooperation: knowledge creation; cost sharing; access to facilities and resources; strengthening of domestic capabilities through the exchange of information and experience; pursuit of specific economic, technological, political objectives, and creation of goodwill through science (Justus and Philibert 2005). Indeed, many participants to our consultations saw participation in such collaboration as a good vehicle to access knowledge and build capacity. Perhaps this is the reason why countries with a coal-based energy structure, like China and India, have a keen interest in collaborative R&D in clean coal technologies and CCS technologies, for example, through taking part in the APP and the CSLF.

The slow development of technology R&D cooperation under the current climate regime has led to frustration among many Asian developing countries. One Chinese participant, for instance, noted that developing countries may become less and less interested in the APP if no substantial joint technological development is demonstrated soon. A few

participants (e.g. India) noted that international technology collaboration must not be a pretext for exploitation of human and other resources in developing countries. Another typical problem concerns the imbalance in information among collaborators, where they are exposed to a temptation to engage in strategic behaviour to take advantage of the situation. For instance, technology collaborators may make less than full disclosure of their ongoing research and progress until they know what their relative position is in relation to that of others.

Technology developers in developed countries express concerns about IPR protection in countries with a history of weak enforcement. They also express concerns about possible loss of existing competitive advantage against recipients. One case of a clean coal technology programme in China showed that the weak IPR protection in developing countries would depress the willingness of domestic companies to adopt new technology due to the fear that competitors in their own markets could freely copy such technologies (Watson 2002, Justus and Philibert 2005, Liu and Vallentin 2005). Strengthening the infrastructure of information gathering on technology development alliances, and effective capacity building and institutional strengthening for technology development and adaptation are, therefore, crucial.

Participants in Southeast Asian consultations (e.g. the Philippines) expressed the need for establishing national R&D funds for low carbon technologies using local resources, rather than solely depending on international mechanisms.

### **5.6.2 Perspectives on technology transfer**

There are sharp disagreements between developed and developing countries with regard to causes for ineffective technology transfer to the latter. Developed countries often attributed the slow progress in technology transfer to deficiencies in domestic institutions of developing countries. A presumption here is that private firms own climate-friendly technologies, and that the firms only transfer their technologies if it is in their commercial interest to do so. At COP3, for example, the Australian delegation noted that “the bulk of environmentally-sound technologies are privately developed and owned. Governments can create enabling conditions for technology development and recipient countries must have appropriate policies for successful transfers” (ENB 1997). The USA proposed at COP4 that “GEF supports programmes to assist developing countries in altering their policy and legal frameworks in support of technology transfer” (ENB 1998), for example.

Many developing country participants of our consultations, however, emphasised that developed countries have an obligation to transfer technologies under the current regime. Participants insisted that the governments of developed countries must enhance technology transfer by stimulating the supply of technologies via mechanisms such as government-to-government programmes or increasing financial and technical support. They noted that the lack of willingness and awareness in developed countries as the fundamental reason for the limited progress of technology transfer. Throughout international climate negotiations, developing countries repeatedly expressed their frustration over the failure of Annex I parties to fulfil their commitments, as well as their limited transfer of technologies. At COP3, the Chinese delegation expressed their view: “developed countries are only interested in transfer of technical information, while

*There are sharp disagreements between developed and developing countries with regard to causes for ineffective technology transfer to the latter.*

developing countries deem technology transfer on non-commercial and preferential terms most important" (ENB 1997).

Asian developing countries have proposed several ideas to realise technology transfer. Participants in South Asian consultations recommended linking technology transfer to commitments by developed countries, and suggested that nations with commitments should buy the necessary IPRs and freely transfer relevant technologies to developing countries. They also suggested that the future climate regime should consider allowing technology transfer to earn CERs on a case-by-case basis. Several such ideas were proposed in past negotiations of the UNFCCC. For example, at COP3, the Indian delegation proposed the operationalisation of FCCC provisions relating to state-of-the-art environmentally-sound technologies in a new legal instrument. At COP4, a G-77/China proposal set forth the establishment of a "technology transfer mechanism" to assist developing country parties to obtain environmentally sound technologies and know-how on non-commercial and preferential terms, which would thus contribute to the ultimate objective of the convention (ENB 1998). However, the USA opposed the G-77/China proposal since it would be difficult to agree on its terms of reference. It also opposed to the reference to "non-commercial, preferential terms," recalling that the reference was rejected when the convention was being negotiated (ENB 1998).

In climate negotiations, south-south technology transfer is frequently overlooked, but it has far-reaching implications for developing countries. Many developing countries have already established new forms of renewable energy supplies, and technologies in these countries are more suited to local technical and financial demands in developing countries than transfer from developed countries (TERI 1997). South-South technology transfers would be preferable because such mode of technology transfer can present a less malignant commercial threat to indigenous industries than transnational corporations (Forsyth 1999). Furthermore, among developing countries there is a greater prospect for south-south cooperation regarding the transfer of technologies and techniques for adaptation, rather than relying on developed countries. Such technologies and techniques are based locally, thereby being more suited to south-south cooperation. Participants suggested that the future climate regime should consider establishing a separate funding mechanism for south-south technology transfer together with a strategy to establish partnerships.

*Whilst developing countries have taken several domestic measures to enhance technology deployment, they are sceptical about linking such domestic measures to international commitments in numerical terms.*

### **5.6.3 Perspectives on technology deployment**

Most participants of our consultations agreed that effective deployment or diffusion of low carbon technologies in developing countries is crucial to achieve the goals of the UNFCCC. For example, METI (2004) estimated that if 20% of energy is conserved in developing countries as a whole, which is possible by using currently available technologies, the increase in CO<sub>2</sub> emissions from developing countries from 2000 to 2020 would decline to roughly half of what it would be without such measures. Therefore, the EGTT urged in 2004 that technology "diffusion" should be recognised as an important process alongside innovation and development (UNFCCC 2004a,b), although EGTT discussions tended to focus on the supply of technologies and the roles of governments and international organisations (Forsyth 2005). Participants noted that domestic policies and measures in developing countries define national institutional conditions, which largely influence the deployment of low carbon technologies.

Several participants (e.g. China, India, the Philippines, Viet Nam) noted that developing countries have taken several domestic measures to conserve energy. Participants from China, for example, reported that the 11<sup>th</sup> Five-year Plan (2006-2011) called for overall consumption of energy per unit of GDP to be cut by 20% in five years. Recently, the Chinese government published a national list of energy efficiencies by region, which in turn offers a baseline for energy efficiency (*China Daily*, 4 July 2006). The Renewable Energy Law, with a target of 10 percent electricity generation from renewable energy, was also taken into force in China. India also enacted the Energy Conservation Act of 2001 and Electricity Act of 2003 in order to issue conservation measures.<sup>9</sup> Chandler et al. (2002) estimated that efforts already undertaken (including those related to technology deployment) by six developing countries (China, India, Brazil, Mexico, South Africa and Turkey) reduced their combined emissions growth by 288 million tons of carbon a year. It is worth noting that many Asian countries have begun to set targets for renewable energy utilisation, which again involves considerable technology deployment within those countries.

The question is whether or not such domestic measures and targets should be linked to international climate regime and, if so how. As discussed in Section 5.5.5, international technology standards can help participating countries establish or enhance domestic measures. In addition, if such common standards are established in sectors of internationally tradable goods, they provide a level playing field, thereby easing concerns held by developed countries about industrial competitiveness. The World Business Council for Sustainable Development (WBCSD), for example, has long worked on setting non-binding international sectoral standards or benchmarks in the cement sector.<sup>10</sup>

Participants from Asian developing countries are, however, highly sceptical about setting international technology standards or targets. Their view partly reflects a fear that such commitments on the sectoral basis may lead up to national emissions control targets in the future. Another drawback is the difficulty of negotiations over the selection of sectors and the setting of targets or standards.

Unilateral CDM could be another mechanism to link domestic technology deployment and international climate regime, subject to the availability of finance to operationalise CDM activities. Subsequent to the decision on procedures on unilateral CDM by the CDM-EB in February 2005, the number of unilateral CDM activities in Asia, especially in India, increased dramatically. While unilateral CDM does not lead to technology inflow from developed countries, it helps the dissemination of existing technologies throughout developing countries faster than a business-as-usual case, while also generating CERs. Most of the ongoing CDM projects in India are small-scale, such as biomass, which are carried out on a unilateral basis. However, the proliferation of unilateral CDM projects may increase the risk of a “lock-in” to less efficient technologies. An objective assessment of unilateral CDM in facilitating technology deployment is, therefore, urgently warranted. In the case of bilateral CDM projects, developing countries can facilitate technology transfer by focusing on the kinds of technology they wish to promote through their approval of CDM projects and programmes, and policies (Ockwell et al. 2006).

***The proliferation of unilateral CDM may increase the risk of a “lock-in” to less efficient technologies.***

9. IEA (2006) provides a concise review of domestic energy policies and measures of major developing countries, such as China and India. IGES (2005a) provides a brief review of climate change-related policies and measures taken in selected Asian developing countries.

10. See <http://www.wbcsd.org> for more details.

## 5.7 Three priorities for strengthening technology development and transfer

This section examines three areas where future climate regime discussions can make a difference to achieve the goal of rapid uptake of climate-friendly technologies. These include building synergies between the UNFCCC and the non-UNFCCC initiatives, enhancing the flexibility of IPRs, and improving financial mechanisms.

### 5.7.1 Building synergies between UNFCCC and non-UNFCCC initiatives

Technology development and transfer is a cornerstone of several new non-UNFCCC initiatives (such as the APP) which have the potential to provide the necessary paradigm shift in technology to reduce GHG emissions in selected industries. Given the growing energy demand, such shift needs to be especially accelerated in China and India. Therefore, it is crucial to build synergies between the UNFCCC and non-UNFCCC initiatives in order to address Asian concerns on technology comprehensively.

One example of synergy can be found in a process through which the M2M Partnership facilitates better access for coal mine methane project developers to markets in China. The climate regime provides unique CDM opportunities in methane recovery, and additional income for project developers. Of late, many providers of coal mine and coal bed methane recovery technology, who are members of the M2M Partnership, recognised the potential for carbon revenue (Point Carbon 2006a). While it remains to be seen if M2M-sponsored projects contravene the CDM additionality rules, the example shows a positive leverage point for building synergies between UNFCCC and non-UNFCCC initiatives.

A similar approach is possible in the case of CCS technologies, which are subjects of interest in both UNFCCC and non-UNFCCC initiatives. CCS is a significant GHG mitigation option, although further studies on its health, safety and environment risks are necessary. As Figure 5.3 shows, many CCS components are mature enough for deployment (IPCC 2005). While considerable uncertainty remains, as Table 5.4 Shows it was estimated that Asian developing countries would have some potential for geological carbon storage (Hendriks et al. 2004). Assuming that capacity is sufficient and storage sites can be planned close to emission sources of CO<sub>2</sub>, CCS could reduce overall mitigation cost significantly in Asian developing countries.

*Durable mechanisms to create incentives for CCS are not yet established at the international and domestic levels.*

**Figure 5.3 Current maturity of CCS system components**  
(the highest level of maturity for each component)

CCS Components	CCS Technology			
Capture		Oxyfuel combustion	Post-combustion Pre-combustion	Industrial separation
Transportation			Shipping	Pipeline
Geological storage		ECBM <sup>f</sup>	Gas or oil fields Saline formations	Enhanced oil recovery <sup>e</sup>
Ocean storage	Direct injection			
Mineral storage	Natural silicate minerals	Waste materials		
Industrial uses of CO <sub>2</sub>				Industrial uses
	Research phase <sup>a</sup>	Demonstration phase <sup>b</sup>	Economically feasible under specific conditions <sup>c</sup>	Mature market <sup>d</sup>

- Notes: a Research phase means that the basic science is understood, but the technology is currently in the stage of conceptual design or testing at the laboratory or bench scale, and has not been demonstrated in a pilot plant.  
b Demonstration phase means that the technology has been built and operated at the scale of a pilot plant, but further development is required before the technology is ready for the design and construction of a full-scale system.  
c Economically feasible under specific conditions means that the technology is well understood and used in selected commercial applications, for instance if there is a favourable tax regime or a niche market.  
d Mature market means that the technology is now in operation with multiple replications of the technology worldwide.  
e CO<sub>2</sub> injection for EOR is a mature market technology, but when used for CO<sub>2</sub> storage, its is only economically feasible under specific conditions.  
f ECBM stands for enhanced coal bed methane recovery, and is the use of CO<sub>2</sub> to enhance the recovery of the methane present in unminable coal beds through the preferential absorption of CO<sub>2</sub> in coals.

Source: Adapted from IPCC 2005

**Table 5.4 Potential for geological carbon storage in Asia**

	ONSHORE (Gt CO <sub>2</sub> )					
	Oil fields*			Gas fields*		
	Low	Best	High	Low	Best	High
East Asia	1.2	4.5	25	4	11.7	31.3
South East Asia	0.7	1.9	7.2	2.9	9.8	24.9
South Asia	0.1	0.5	2.3	4.1	13.4	33.5
	OFFSHORE (Gt CO <sub>2</sub> )					
	Oil fields*			Gas fields*		
	Low	Best	High	Low	Best	High
East Asia	0.4	1.7	5.6	0.3	0.4	1.1
South East Asia	1.4	5.2	17.6	18.1	34.9	65.7
South Asia	0.5	1.9	5.3	1.9	5.2	14.1
	ECBM**			Aquifers		
	Low	Best	High	Low	Best	High
	East Asia	0	158	840.7	1.7	13.4
South East Asia	0	19	113.9	0.8	6.4	28.8
South Asia	0	2	11.9	2.7	21.2	95.5

Notes: \* Oil and gas fields include both remaining and depleted fields. All future oil is assumed to be produced with CO<sub>2</sub>-enhanced oil recovery.

\*\* ECBM stands for enhanced coal bed methane recovery.

Source: Adapted from Hendriks et al. 2004

**Linking UNFCCC and non-UNFCCC initiatives more closely through information sharing could offer a platform for synergies.**

**By pursuing collaborative R&D initiatives at an early stage of technology development, both developed and developing countries could potentially enter into joint ownership of IPRs.**

In spite of the high potential in terms of both technological and storage capacity, there remain significant gaps in knowledge in the non-technical aspects (e.g. legal, regulatory, economic and social acceptability issues) of CCS, which need to be addressed before it can be broadly deployed (Coninck *et al.* 2006). In response to the G-8 Gleneagles Plan of Action, the CSLF has been working on these issues and plans to provide policy recommendations by 2008 (McKee 2006). However, durable mechanisms to create incentives for CCS are not yet established at the international and domestic levels.

If CCS projects become eligible as CDM project activities, the UNFCCC process may establish an international framework for CCS to provide the necessary incentives. The UNFCCC and its Kyoto Protocol do not expressly include or exclude CCS as an emission reduction mechanism. Since publication of the IPCC Special Report on CCS (IPCC 2005), discussion on applicability of CCS in CDM has started in the UNFCCC.<sup>11</sup> The CDM-EB stated that the issues of project boundaries, leakage, permanence, *inter alia*, need to be considered (UNFCCC 2006f). While it is necessary to carefully examine whether market mechanisms are an appropriate form of incentive to address risks in CCS investment, CCS is worth considering.<sup>12</sup>

Establishing a mechanism that functions as an intermediary conduit for knowledge on successful technology-development and -acquisition programmes could be another approach. The UNFCCC has developed an information clearing house, TT:CLEAR, but its technology information network is still limited. The success of TT:CLEAR partly depends on how far national governments engage with it, for example, through the submission of relevant information. More information on the outcomes of various technology programmes undertaken by governments through both UNFCCC and non-UNFCCC initiatives is expected to promote synergies. Such information can serve as a foundation for concerted actions in the future climate regime.

In short, combining facilitative roles played by public-private partnerships of various non-UNFCCC initiatives with incentive mechanisms of the UNFCCC is useful to create further synergies. Linking these initiatives more closely through information sharing could offer a platform for synergies.

### **5.7.2 Enhancing flexibility of intellectual property rights for low carbon technologies**

Many participants of our consultations emphasised the need for treating critical low carbon technologies as global public goods and for enhancing the flexibility of the IPR regime. However, it is necessary to first identify the critical technologies needed by the various Asian countries, and examine how IPRs are acting as a barrier to transfer of technology. It is also critically important to understand whether and how IPRs as a barrier to technology transfer might differ in importance depending on the stage of technology development or the nature of the technology itself. A case study of an IGCC programme between India and the UK, for example, identified that the key barrier for IGCC use in India was not the IPRs per se but the lack of knowledge on whether IGCC could work

11. The IPCC Special Report on CCS was developed in response to an invitation of COP7 in 2001. In the Marrakech Accords, clear mention was made of CCS.

12. Other than the issues raised by the CDM-EB, the price of CERs might be simply too low to be an incentive for CCS. IPCC (2005) pointed out that for CCS to be deployed in the power sector, the price of CO<sub>2</sub> reductions would have to exceed 25-30 US\$/tCO<sub>2</sub>.

even with the low quality of Indian coal and the technology's lack of a track record (Ockwell et al. 2006).

Several routes are available to move forward in dealing with IPRs. One approach recommended by participants of IGES consultations is to pursue collaborative R&D initiatives at an early stage of technology development so that both developed and developing countries could potentially enter into joint ownership of IPRs. They noted that such collaborative activities help developing country participants improve their capacity to absorb new technologies. Another option is to create a Multilateral Technology Acquisition Fund, as recommended by the South African Ministerial Indaba on Climate Action in 2006 ([http://unfccc.int/files/application/pdf/20060626\\_indaba.pdf](http://unfccc.int/files/application/pdf/20060626_indaba.pdf)), which could be structured to buy-out IPRs and make privately-owned, climate-friendly technologies available for deployment in developing countries.

For achieving joint ownership of IPRs with developed country parties, Asian developing countries need to build the capacity to formulate their negotiating positions and become well-informed negotiating partners (Muller et al. 2003, Pengelly 2005). Such capacity is a minimum requirement for them to fully enjoy the fruits of international technology cooperation. Indeed, in most of the ongoing international initiatives on technology R&D in which Asian developing countries are taking part, the treatment of IPRs is left to their implementation agreements and is to be addressed on a case-by-case basis.<sup>13</sup> It also partly mitigates the concern expressed by the Indian participants of the possibility of collaborative initiatives being used by developed countries to exploit the human resources of developing countries. Thus, collaborative R&D initiatives need to feature IPR-related capacity building programmes.

Another approach to enhance the flexibility of the IPR regime for climate-friendly technologies is along the lines of approaches taken to combat HIV/AIDS (e.g. compulsory licensing) (Ockwell et al. 2006; Ogonowski et al. 2004). However, many participants felt that the global community has not yet recognised the problem of climate change as being as serious as that of AIDS. Furthermore, the aggressive use of compulsory licensing might result in negative consequences.<sup>14</sup> In this context, it would be worth considering the establishment of an international code of compulsory licensing procedures with special reference to technologies for climate change. Such an international code may offer benefits in terms of reducing costs, enhancing certainty, and saving time. In this process, it is important for the climate policy community to achieve consensus on the list of critical technologies to be subject to the international code of compulsory licensing procedures. Simultaneously, Asian countries should try to enforce a well-defined national IPR legal structure so that developed countries could more proactively encourage their firms to disseminate low carbon technologies.

***Collaborative R&D initiatives need to feature IPR-related capacity building programmes.***

***It would be worth considering the establishment of an international code of compulsory licensing procedures with special reference to technologies for climate change.***

13. See Charter for the APP, available at <http://www.asiapacificpartnership.org/Charter.pdf>, also Terms of References for the IPHE, available at <http://www.iphe.net/> and Charter for the CSLF at <http://www.cslforum.org/>.

14. There is some confusion about the grounds for granting compulsory licences. Under the TRIPS Agreement, which does not specifically list the reasons that might be used to justify compulsory licensing, governments can establish compulsory licences on grounds of protecting the environment, or for reasons of "public interests", depending on the provisions of national legislation (Correa 1999).

*International funding mechanisms, like those under the UNFCCC, could be utilised to buy down the IPRs of such technologies and improve their access.*

### **5.7.3 Improving financial mechanisms to accelerate technology deployment**

Ensuring additional finance through innovative public and private support mechanisms is critical to make the currently available technologies commercially competitive in the market. Energy efficiency and renewable technologies in particular need such support in Asian developing countries. If such technologies are covered by existing IPRs, international funding mechanisms, like those under the UNFCCC, could be utilised to buy down the IPRs of such technologies and improve their access – as has happened in the case of the Montreal Protocol dealing with ozone depletion. The Montreal Protocol initially provided no mechanism to support developing countries in meeting ODS (Ozone depleting Substances) reduction measures. In order to address developing country concerns, however, the London Amendment in 1990 revised the Protocol and established the Multilateral Fund for the implementation of the Montreal Protocol (MLF). The MLF is used to finance incremental costs (additional costs incurred when a company switches from an ODS technology to a non-ODS technology) and several clearing-house functions relating to technical co-operation, information exchange or training programmes. Incremental costs are defined in the Indicative List of Categories of Incremental Costs, developed by the MLF Executive Committee. Similar efforts are necessary in the case of clean energy technologies. Although the MLF should only cover incremental costs in principle, Zhao and Ortolano (1999) reported that grants from the MLF typically cover a significant proportion of funds needed by enterprises to shift to non-ODS technologies. Likewise, for projects producing net benefit through changing non-ODS technology, financing is provided through concessionary loans. Again, provision of such loans is not originally stipulated by the MLF; it was made possible after making necessary modifications to the rules (De Sombre and Kauffman 1996). Therefore, several lessons can be learnt from the implementation of the Montreal Protocol in facilitating deployment of clean energy technologies. It must be noted, however, that incremental costs for technologies utilised in implementing the Montreal Protocol and the UNFCCC vary quite widely. The World Bank estimates that the incremental cost of decarbonising the power sector alone in developing countries could reach US\$ 30 billion per annum between now and 2050 depending on the level of decarbonisation and the assumed baseline (World Bank 2006a).

In the case of emerging technologies, the future climate regime could play a facilitative role in documenting the success stories of various policy instruments that can offset higher overall costs of such technologies. For example, with the introduction of the feed-in-tariff law to promote renewable energy in Germany in 1990, the cost of wind energy declined rapidly between 1990 and 2003, as the technology improved and became more fully deployed (CCAP 2006). Discussions on new technologies at the UNFCCC can also facilitate decision making at the multilateral financing institutions such as the World Bank, which has recently proposed a new investment framework for clean energy and development to foster the development of innovative but less competitive technologies.

## **5.8 Concluding remarks**

Our consultations confirmed that optimal utilisation of low carbon technologies in Asian developing countries is central to tackling climate change, and that there is no single recipe for successful development, transfer and deployment of technologies. Further, it is worth bearing in mind that, due to both domestic and international barriers, the diffusion

of new technologies has historically been a slow process, and that Asian developing countries have strong concerns about the pace and quality of support from developed countries for development, transfer and deployment of climate-friendly technologies. On the other hand, participants in our consultations made several constructive suggestions, implementation of which is certain to aid in achieving the future goals of the UNFCCC. The consultations emphasized the need for encouraging synergies between UNFCCC and non-UNFCCC initiatives and for enhancing the flexibility of IPR regime by treating critical low carbon technologies as global public goods. The future regime should also facilitate innovative options for financing of technology development and transfer.

# Adaptation to Climate Change

Ancha Srinivasan

## 6.1 Introduction

This chapter examines the status of international discussions on adaptation to climate change and reviews various proposals to strengthen the focus on adaptation for a post-2012 climate regime. After examining the perspectives of stakeholders from both developed and developing countries, a few priorities to move forward are identified.

### 6.1.1 Meaning and nature of adaptation

The term “adaptation” is now widely used in international climate change agenda, but various stakeholders define and interpret it quite differently. The IPCC for example, refers to adaptation as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (IPCC 2001b). IPCC distinguishes various types of adaptation according to intention and time of action, and type of actors involved, such as autonomous versus planned adaptation, anticipatory versus reactive adaptation, and public versus private adaptation. Thus, the IPCC provides a broad definition of adaptation that focuses not only on technical measures but also on institutional responses to facilitate adaptation of both natural ecosystems and human beings. The UNFCCC, on the other hand, interprets adaptation as “practical steps to protect countries and communities from the likely disruption and damage that will result from effects of climate change” (UNFCCC 2006a). The convention emphasises the steps to address human-induced climate change, although in most cases it is difficult to discern whether a particular climate impact results from anthropogenic causes or natural variability. The UNDP defines it as “a process by which strategies to moderate, cope with and take advantage of the consequences of climatic events are enhanced, developed, and implemented” (UNDP 2006).

The differences in the above definitions of “adaptation” may seem small but different stakeholders interpret them to suit their own interests, leading to widespread confusion. For example, community-based adaptation practitioners use a more technical interpretation of the term that focuses on actions, while adaptation policymakers use a broader definition and emphasise the institutional and policy sides of adaptation including building knowledge in support of policies and programmes, technologies, financing, capacity building and other institutional arrangements. International negotiators face the dilemma of differentiating adaptation to long-term climate change from adaptation to short-term climate variability, as the convention intends to support primarily those activities falling under the first category. Since such varied interpretations obviously have serious financial implications, it is important to promote a common understanding among the various stakeholders.

Like mitigation, adaptation to climate change is a dynamic and multi-dimensional process (Figure 6.1) as it integrates components such as sound planning, research, technologies, funding, training, capacity building, public awareness, and education (Hay et al. 2004). In order to address adaptation comprehensively, climate risks at local, national or regional levels must be assessed first using different decision support tools (involving data, information, knowledge, understanding, skills, methods and tools).

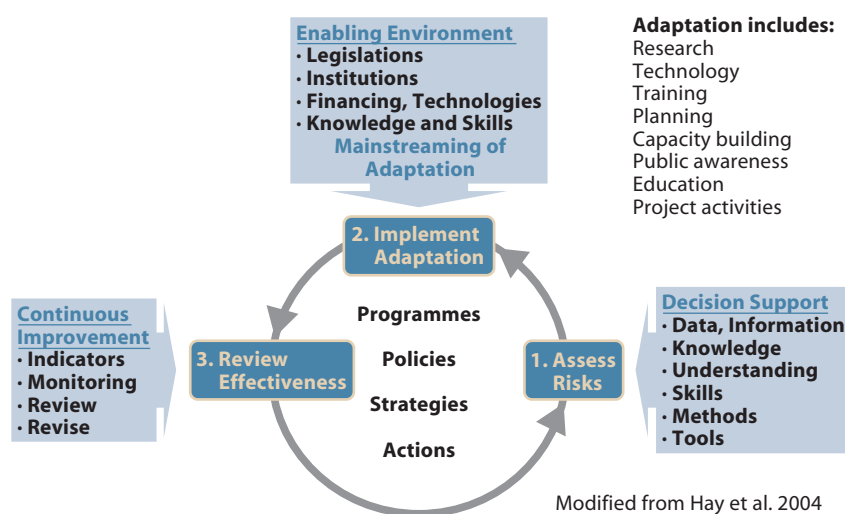
*The term “adaptation” is defined and interpreted in many ways, each with different financial implications.*

*Adaptation to climate change is a dynamic and multi-dimensional process.*

**Effective implementation of adaptation actions requires more than the mere output of climate data.**

For proper implementation of various programmes, policies, strategies and actions on adaptation, however, we need a good enabling environment, which includes legislations and institutions that can support mainstreaming of adaptation concerns in development planning. Effective implementation of adaptation actions, therefore, requires more than the mere output of climate data. Furthermore, we need to determine the effectiveness of the implemented adaptation activities through the development of reliable indicators and then revise the existing practices, if necessary. Successful adaptation to climate change, therefore, requires flexible institutional and policy processes, increased public awareness and dialogue, sharing of knowledge on adaptation measures, mobilisation of tools and technologies, capacity building, and appropriate monitoring and evaluation (Cosbey et al. 2005a).

**Figure 6.1 Multi-dimensions of adaptation process**



### 6.1.2 Emergence of adaptation as a policy priority at the international level

International climate discussions to date emphasised mitigation as a policy response to address climate change. However, with the publication of the Third Assessment Report of the IPCC in 2001, which emphasised that climate change impacts are already becoming evident in many economic sectors and ecosystems, the focus on adaptation as a policy priority has increased. The discussions gained further momentum in 2002 at COP8, which adopted the Delhi Declaration on Climate Change and Sustainable Development. Interestingly, the emergence of adaptation as a complementary strategy to mitigation coincided with the time when the USA decided to withdraw from the Kyoto Protocol. The Buenos Aires programme of work on adaptation and response measures adopted at COP10 in Argentina and the decision to develop a five-year programme of work for the SBSTA on the scientific, technical and socio-economic aspects of impacts, vulnerability and adaptation to climate change have again reiterated the importance of adaptation.

Simultaneously, the increasing numbers of scientific reports suggesting the rise in GHG concentrations and global mean temperature, and associated impacts of climate change (e.g. Arctic Climate Impact Assessment [ACIA 2004]) have also contributed to alert the policy community to strengthen strategies on adaptation. For instance, atmospheric concentrations of CO<sub>2</sub> reached a record high of 379 ppm at Mauna Loa in March 2004, and the 11 warmest years in the past 125 years have occurred since 1990, with 2005

*The lack of policy relevant scientific information and shortage of funds are major bottlenecks to facilitate adaptation in Asian countries.*

being the warmest year on record (GISS/NASA 2006). It is now accepted that even the most stringent mitigation efforts cannot avoid severe impacts of climate change in the next few decades. The design and implementation of adaptation measures to address the needs of vulnerable countries has thus become more and more pressing, and this represents a key challenge for the UNFCCC (Mace 2005).

### **6.1.3 Adaptation concerns and challenges in the Asia-Pacific region**

Our previous consultations held in 2005 indicated that the impacts of climate change in the form of increasing frequency of droughts and floods, and sea level rise are already evident in many parts of Asia, adversely affecting the productivity of ecosystems and livelihoods (IGES 2005a). Projections on future impacts of climate change in the region suggest serious impacts. For example, a 40-cm sea level rise by 2080 could displace as many as 55 million people in South Asia, and 21 million people in Southeast Asia as opposed to only 3 million in rest of the world, excluding Africa (IPCC 2001b). The severe adverse impacts of climate change on agriculture and water sectors make large populations across Asia particularly vulnerable. IGES consultations revealed that the lack of policy relevant scientific information and shortage of funding to address adaptation were major bottlenecks to facilitate adaptation in Asian countries.

Other concerns expressed by Asian policy makers include the failure to integrate adaptation concerns in development planning, inadequate capacity to assess local impacts, and the lack of appropriate adaptation technologies. Participants noted serious concerns on financing of adaptation, including (a) extremely limited funding, (b) inadequacy of 2% share of CDM proceeds to meet adaptation demands, (c) lack of clear guidelines, and complex procedures for utilising adaptation funds, (d) doubts on utility of market mechanisms for facilitating adaptation, and (e) immaturity of insurance markets in Asian developing countries. Some challenges for facilitating adaptation to climate change in the Asia-Pacific region at local, national and regional levels, as identified in our consultations, are listed below:

#### Regional and international:

- Developing international consensus on the scope of adaptation and means to enhance the availability of, and access to adaptation funds
- Identifying and building on inter-linkages (scientific, implementation and reporting linkages) of various communications
- Supporting Clearing House mechanisms specifically for the UNFCCC and the Kyoto Protocol at both regional and international levels
- Building synergies among subsidiary bodies of CBD, CCD and UNFCCC
- Awareness raising, education and public participation

#### National:

- Mainstreaming climate change in national and sector development planning, through changes in policies and institutions, including technology deployment
- Strengthening capacity of national institutions to seek complementarities among the environment and development frameworks through linkages with national communications and NAPAs, with PRSPs and MDGs
- Prioritising short-, medium-, and long-term adaptation actions which have a direct bearing on the livelihoods of vulnerable communities

*A survey of national communications of Asian countries to the UNFCCC revealed that most of the countries have paid scant attention to adaptation policies and measures.*

- Involving the private sector in adaptation activities through providing necessary incentives such as tax holidays
- Integrating alternative livelihood strategies for extreme climatic events through national disaster management plans, including dissemination of seasonal climate forecasts

Local:

- Identification of strategies for facilitating proactive micro-adaptation with the participation of the local communities and local governments
- Exchange of “best practice guidelines” and lessons learnt at the local level

The integrated assessments of adaptation-related challenges in Asia suggest that many countries lack the adaptive capacity to cope with future impacts (IGES 2005a). In most countries, even if vulnerable areas and communities are identified and suitable plans are established, financial resources for implementing such plans are extremely limited. Despite such challenges, a survey of national communications of Asian countries to the UNFCCC revealed that most of the countries have paid scant attention to adaptation policies and measures and that the discussion was largely confined to biophysical impacts (Table 6.1). Such lack of attention to adaptation strategies in national communications underscores the need for substantial progress in this area.

**Table 6.1 Coverage on adaptation policies and measures as reflected by number of pages in National Communications of selected Asian countries**

Country	Total number of pages	No. of pages describing impacts and vulnerability	No. of pages discussing adaptation policies
Bhutan	63	10	2
Cambodia	79	8	2
China (NC1)	112	13	4
India	292	48	8
Indonesia	116	10	3
Japan (NC4)	314	11	0.5
Lao PDR	97	2 lines	1 line
Malaysia	131	30	7
Maldives	134	30	10
Mongolia (NC1)	106	18	7
Nepal	181	41	10
Pakistan	92	14	9
Papua New Guinea	83	20	6
Republic of Korea (NC2)	132	8	2
Singapore	75	5	1 line
Sri Lanka	122	12	5
Thailand	100	15	2.5
The Philippines	107	20	12
Viet Nam	135	17	4

Source: UNFCCC, 2006g

Several participants in IGES consultations noted that the current climate regime failed to facilitate the transfer of adaptation technologies. Since the uptake of adaptation technologies is dependent on the buy-in and involvement of an expanded stakeholder community, and there is unwillingness at present to provide the funding required to

*Most of the substantive obligations for all parties on adaptation to climate change appear in Article 4 of the UNFCCC.*

transfer these technologies, technologies for adaptation face additional barriers when compared to mitigation technologies (Klein et al. 2006).

Many participants identified the lack of capacity of several Asian developing countries for developing constructive negotiation strategies on adaptation issues as a major barrier. Gupta (1997) reported that developing countries often tend to adopt defensive or “non-realist” strategies which focus more on the issues rather than interests, and mainly consist of pre-defined positions based on equity arguments and the north-south divide. The small size of delegations without any representatives to negotiate on adaptation issues, lack of negotiating experience, lack of back-up support by NGOs and academia, and low political priority at home also contribute to this problem (Richards 2001).

## 6.2 Adaptation in the current climate regime

### 6.2.1 Evolving focus on adaptation

As mentioned in section 6.1.2, the focus on adaptation in international discussions is gradually evolving. The climate change convention of 1992, for example, refers to the terms *adaptation*, *adverse impacts*, and *vulnerability* at least 20 times. Article 7 (COP), Article 9 (SBSTA) and Article 10 (SBI) also refer to adverse impacts of climate change implicitly. Article 3 (Principles), Article 4 (Commitments) and Article 11 (Financial mechanism) of the UNFCCC, and Article 10 (Reporting) and Article 12.8 (CDM proceeds to support adaptation) of the Kyoto Protocol refer to adaptation and adverse impacts of climate change. Article 2 refers to the goal of stabilising GHG concentrations at a level to be achieved within an adequate timeframe that allows ecosystems to adapt naturally to climate change. The goal may also be interpreted to mean that mitigation efforts have to be strong enough to keep climate change impacts within the realm of adaptive capacity, so as not to endanger food production and sustainable economic growth. Further, Article 3.1 of the UNFCCC asks developed countries to take the lead in combating the adverse impacts of climate change.

Most of the substantive obligations for all parties on adaptation to climate change appear in Article 4 of the UNFCCC (Verheyen 2002). Article 4.1 (b), (e) and (f), for example, stipulate commitments for all countries in terms of formulating, cooperating and considering the impacts of climate change in social, economic and environmental policies and actions. Parts g, h and j also require Parties to cooperate, exchange and communicate information related to implementation. Articles 4.3, 4.4, 4.5, 4.7, 4.8 and 4.9 address funding to assist developing countries in meeting various commitments of Article 4.1 (Mace 2005). Article 4.3 further refers to provision of “new and additional” funding to meet the full costs of national communications obligations of developing countries, and “incremental costs” of implementing adaptation measures. Article 4.4 refers to support for developing countries that are particularly vulnerable to climate change but does not refer to the incremental cost provision. Article 4.5 refers to support for technologies (including those for adaptation) while Article 4.7 acknowledges that the extent to which developing countries will effectively meet their commitments will depend on the effective implementation by developed country parties of their own commitments on finance and technology transfer. Article 4.8 refers to support for SIDS, countries with low-lying coastal areas, countries prone to natural disasters, drought and desertification, and so on, while Article 4.9 refers to supporting the LDCs. Article 12.3

requires developed parties to incorporate details of measures taken under Articles 4.3, 4.4 and 4.5 in their national communications. Article 21 of the UNFCCC and Decision 3/CP.4 confirmed that the GEF serves as the financial mechanism of the convention for both mitigation and adaptation. The creation of the Special Climate Change Fund (SCCF) and LDC Fund (LDCF) under the convention, and Adaptation Fund (AF) under the Kyoto Protocol through a series of related decisions at COP7 further increased the focus on adaptation. Decision 5/CP.7, for example, identified 18 areas of assistance on adaptation while Decision 28/CP.7 defined the process of development of National Adaptation Programmes of Action (NAPAs) in LDCs.

Adaptation gained further attention in 2004 at COP10, which adopted the Buenos Aires Programme of Work on Adaptation and Response Measures (Decision 1/CP.10). The programme included further scientific assessments of vulnerabilities and options for adaptation, support of the NAPAs of LDCs, new workshops and technical papers on climate change risk and adaptation, and support for mainstreaming adaptation into sustainable development planning. Later at COP11 in Montreal in 2005, a detailed five-year programme of work on impacts, vulnerability and adaptation to climate change that will assist Parties to make informed decisions on implementation of adaptation measures was adopted, through Decision 2/CP.11.

Simultaneously, international donor organisations have realised that their activities can both be affected by climate change impacts and influence capacities to cope with the impacts. The 2003 report of members of the Vulnerability and Adaptation Research Group (VARG) *Poverty and Climate Change* makes the case for integrating adaptation concerns into development programming (AfDB et al. 2003). The Asian Development Bank published a report on mainstreaming adaptation concerns in ADB Project operations (ADB 2003).

### **6.2.2 A comparison of the mitigation and adaptation regimes under the UNFCCC**

Adaptation is much less developed than mitigation as an international policy response in several ways. Based on a comparative assessment, Burton and May (2004) noted that mitigation was clearly defined in the convention with explicit objectives, standard measures and baseline (1990 emissions) while adaptation was not clearly defined, no specific objectives were stated and no standard measures or baselines were given. They also reported that global environmental benefits and incremental costs were easier to estimate in mitigation projects than in adaptation actions. For mitigation, financial arrangements are clearly defined along with a legally binding instrument “Kyoto Protocol”, while funding for adaptation is multiple, inconsistent and inadequate, without any legal instrument.

### **6.2.3 Adaptation financing – Status and challenges**

Based on recent World Bank estimates and the figures provided in NAPAs by the LDCs, Müller and Hepburn (2006) indicated that the cost of adaptation in the developing world will be in the tens of billions of Euros annually. Meeting such costs through international negotiations is a huge challenge. Moreover, the scope of adaptation to determine if it includes adaptation to natural disasters is not yet decided. The creation of a system to ensure that resources are contributed to various funds also remains a serious challenge (Bouwer et al. 2004).

*Adaptation is much less developed than mitigation as an international policy response in several ways.*

Currently, besides the Strategic Priority on Adaptation of the GEF Trust fund, two special funds under the convention (SCCF, LDCF) and one fund under the Kyoto Protocol (AF) are approved to support adaptation efforts (Table 6.2). Huq (2004) provided a detailed architecture for adaptation funding at the international level focusing on funding sources, actors involved and activities supported. The status of and challenges for the various funds are briefly discussed below.

**Table 6.2 Status of financing provisions for adaptation under the current climate regime**

Name of the Fund	Funding source	Total funds mobilised (US\$)	Legal basis for funding (COP and GEF decisions)	Operational criteria	Main activities of support	Remarks
<b>I. Funds established under the Convention (Articles 4.1, 4.3, 4.4, 4.5, 4.8, and 4.9)</b>						
(a) Global Environment Facility (GEF) Trust Fund	GEF		UNFCCC Article 4.3 1/CP.11, 5/CP.7 GEF/C.23/Inf.8	• Incremental cost to achieve global environmental benefits	• Vulnerability and adaptation assessments as part of national communications and enabling activities	
(b) Strategic Priority on Adaptation (SPA)	GEF	50 million	6/CP.7 GEF/C.23/Inf.8	• Incremental cost guidance with some flexibility, especially for Small Grants Programme	• Pilot and demonstration projects on adaptation • Small Grants Programme (\$5 M) to support community-based adaptation	
(c) Special Climate Change Fund (SCCF)	Voluntary contributions from 11 developed countries (Canada, Denmark, Finland, Germany, Ireland, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom)	<b>45.4 million</b> (Contributions: 36.7 M Pledged: 8.7 M)	5/CP.7, 7/CP.7, 5/CP.9 GEF/C.24/ 12; GEF/C.25/ 4/Rev.1	• Additional cost of adaptation measures • Sliding scale for co-financing	• Addresses adaptation as one of the four funding priorities	GEF allocation of 2.0 M was used for projects and administrative support.
(d) Least Developed Countries Fund (LDC Fund)	Voluntary contributions from 13 developed countries (Canada, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, New Zealand, Norway, Spain, Sweden, and Switzerland as of 30 April 2006)	<b>75.7 million</b> (Previous contributions: 29.9 M Pledged: 45.8 M GEF allocation to date: 11.8 M)	5/CP.7, 7/CP.7, 27/CP.7, 28/CP.7, 29/CP.7, 6/CP.9 3/CP.11, 4/CP.11 GEF C/24/Inf.7; GEF/C.24/Inf.8/ Rev.1; GEF/C.25/ 4/Rev.1	• Guiding principles: country-driven approach, equitable access by LDCs, expedited support and prioritisation of activities • Provision of full cost funding for adaptation increment as identified and prioritised in NAPAs • Sliding scale for co-financing	• Implementation of NAPAs (all projects for the preparation of NAPAs in 44 countries approved with a budget of US\$ 9.6 M)	GEF allocation of US\$ 11.8 M to LDCF was approved for projects, administrative budgets & special initiatives
<b>II. Fund established under the Kyoto Protocol (Article 4.10)</b>						
(a) Adaptation Fund	2% Share of proceeds from CDM	Not yet operational	5/CP.7, 10/CP.7, 17/CP.7 28/CMP1	• Guiding principles: country-driven and a "learning-by-doing" approach, sound financial management & transparency, separation from other funding sources	• Concrete adaptation projects & programmes identified in decision 5/CP.7	

Source: GEF/C.28/4/Rev.1, 19 May 2006

***GEF Trust Funds and Strategic Priority on Adaptation:*** Since the inception of GEF in 1991, cumulative resources made available for GEF Council allocation amounted to US\$ 6.62 billion as of 31 May, 2005. For example, GEF estimated that resources available for Council allocation on 30 June, 2006 were US\$ 547.4 million (GEF 2006). Of the six focal areas of GEF, climate change area receives about one-third of total funds to support four operational programmes, with the most emphasis on mitigation. For example, of the total financing of US\$ 527 million for entire climate change operations in GEF's third replenishment (GEF-3), only US\$ 50 million was allocated to support adaptation through its strategic priority on adaptation. Of this, about US\$ 5 million was allocated to support community-based adaptation in about 10 countries including three in the Asia-Pacific region – Bangladesh, Viet Nam and Samoa.

Participants of our consultations noted that many Asian countries failed to benefit from GEF funds for adaptation because of GEF's slow disbursement process (due to its relatively complex procedures), preference for larger projects and difficulties in determining incremental costs and global environmental benefits. As most adaptation projects are site-specific and have only local benefits, proving global environmental benefits is not an easy task. Further, as many adaptation activities are intimately connected to other aspects of development, such as water management, desertification prevention and disaster preparedness, calculation of incremental costs can be difficult (Cosbey et al. 2005a). Therefore, most GEF Trust Fund resources for adaptation were provided only in the context of the preparation of national communications. In view of such experiences, participants consistently sought for improving flexibility of GEF guidelines. However, Corfee-Morlot et al. (2002) noted that it is unrealistic to expect the GEF to cover the full cost of adaptation projects, as it would require billions of dollars and would quickly exhaust the resources of GEF.

***LDC Fund:*** The LDC fund, which is enabled through voluntary contributions by 13 developed countries (as of April 2006), supports NAPAs of LDCs. So far, US\$ 9.6 million has been approved for undertaking 44 national NAPAs and two global support projects. Among LDCs in the Asia-Pacific, Bangladesh, Bhutan and Samoa submitted NAPAs, while Cambodia submitted an advanced draft. The Myanmar NAPA is under discussion; and Nepal had yet to prepare a NAPA. The limited guidance available for LDCs to access the funds, especially in terms of defining the "additional costs" and "co-financing", and the limited amount available to support adaptation activities under this fund are the two main challenges. COP11 (Decision 3/CP11) gave initial guidance on the operation of the LDC fund through provision of full-cost funding for adaptation increment as identified and prioritised in the NAPAs.

***SCCF:*** This fund, which is also based on voluntary contributions from 11 donor countries, addresses adaptation as one of four priorities. As of 30 April, 2006, 7 projects have entered the pipeline, including one in India (*Climate-resilience Development and Adaptation*) and the Pacific region (*Pacific Islands Adaptation to Climate Change Project*). The tension among developing countries in prioritising activities supported by the SCCF, and the tension between developed and developing countries regarding the full-cost funding of adaptation activities remain major challenges for this fund. While AOSIS and LDCs push for utilising the SCCF for adaptation, OPEC countries would like to use these funds for economic diversification, and the other developing countries prefer to use them for technology transfer and mitigation efforts. This is an aspect where Asian

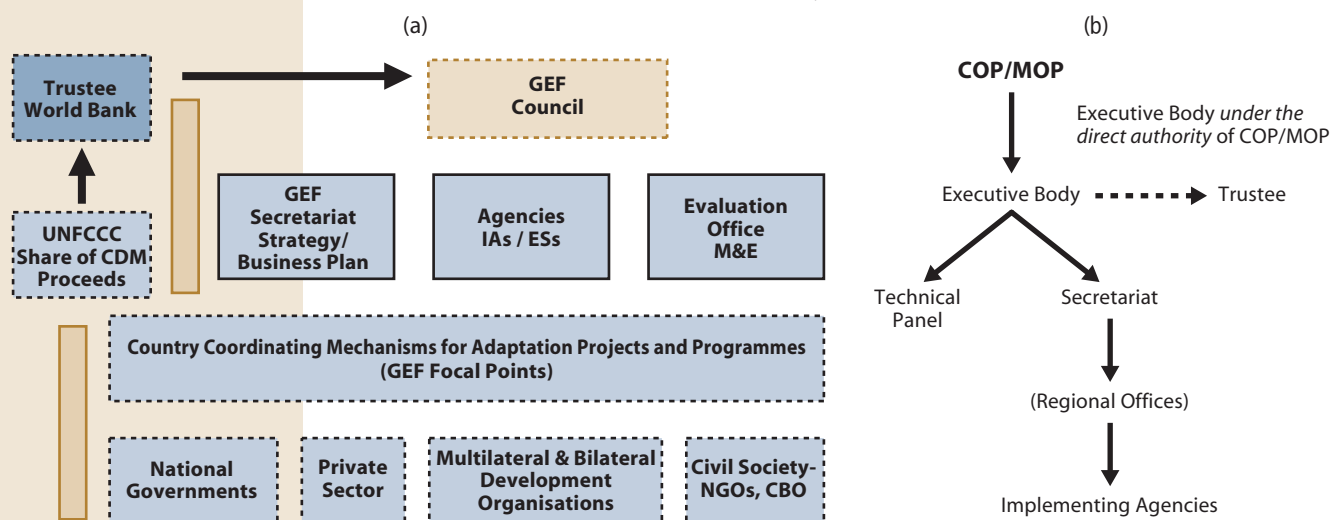
***Many Asian countries failed to benefit from GEF funds for adaptation because of GEF's slow disbursement process, preference for larger projects and difficulties in determining incremental costs and global environmental benefits.***

*The World Bank estimates that the AF is likely to remain small and uncertain, with funds anywhere between \$270 and \$600 million by 2012.*

developing countries must soon come to an agreement so that funding under SCCF can become smooth and effective.

**Adaptation Fund (AF):** This fund comes from the 2% levy on CDM proceeds and other contributions, if any. The World Bank estimates that the AF is likely to remain small and uncertain, with funds anywhere between US\$ 270 and 600 million by 2012. However, it is worth noting that the funds that will flow will do so at a steady rate, free of the uncertainties of donor replenishment rounds (Müller 2006). COP/MOP1, through its Decision 28/CMP1, provided initial guidance to operation of the AF but its governance structure has yet to be resolved. Recently, the World Bank proposed that it could support in management of the fund while reporting to the GEF Council (Figure 6.2a) and argued that GEF management of the AF with other funds (GEF TF/SCCF/ LCDF) avoids additional costs and time associated with standalone administration of the AF. On the other hand, the Fellows of the European capacity building initiative (ecbi) recently proposed that the Executive Body of the AF should be under the direct authority of the COP/MOP (Figure 6.2b). The fellows considered the AF to be unique because of its unprecedented private sector replenishment through the CDM levy (ECBI 2006).

**Figure 6.2 Proposed governance structure of the Adaptation Fund by (a) World Bank (2006) (b) Fellows of the European Capacity Building Initiative (2006)**



In addition to the above funds, the EU and other developed countries made a political declaration at COP7 in 2001, to provide US\$ 450 million a year up to 2005, mostly for adaptation. To date, however, only about US\$ 20 million has been provided (ICCTF 2005).

The World Bank estimated that the overall annual costs to adapt to projected climate change could be anywhere between US\$ 9 billion to 41 billion per year<sup>1</sup>. However, the total available annual funding for adaptation under the Convention or the Protocol up to 2012 ranges from US\$ 20 million to US\$ 300 million at best. From this viewpoint, it is unrealistic to expect that any new sources of funding available through climate regime negotiations will be able to cover all the costs related to adaptation. It is critical, therefore,

1. See World Bank Environmentally & Socially Sustainable Development and Infrastructure Vice Presidencies, 'Clean Energy And Development: Towards An Investment Framework' Development Committee (Joint Ministerial Committee of the Boards of Governors of the World Bank and the International Monetary Fund on the Transfer of Real Resources to Developing Countries), Washington D.C./USA: 5 April 2006

not to consider adaptation as a stand-alone issue, but in the context of challenges such as poverty alleviation and achievement of MDGs. Further, it is important to determine how various funds available for adaptation could be used in a complementary way in the future.

### 6.3 Approaches for facilitating adaptation in post-2012 climate regime

The international community has now recognised the need for addressing adaptation in a more balanced manner. However, defining a new approach to address it in the post-2012 regime is a challenge partly because of lack of clarity on the scope of adaptation and limited experience of the countries in implementing adaptation strategies. Burton et al. (2002) noted that the current knowledge of adaptation and adaptive capacity is insufficient for reliable prediction of adaptation, and is inadequate for rigorous evaluation of planned adaptation options, measures and policies. Moreover, it is not yet decided, whether funds available for adaptation could be applied to coping with natural disasters. Such limited experience may also be one of the reasons for the lack of concrete proposals on adaptation (Bodansky et al. 2004). Table 6.3 lists some approaches to strengthen adaptation at the international level, which largely fall into three categories:

- Seven proposals with adaptation as one of the components of a larger framework
- Five proposals with focus on vulnerability, impacts and/or adaptation
- Twelve proposals focusing solely on adaptation financing

Although the final group of proposals solely focus on adaptation financing, many proposals in the first group, which address adaptation as one of the components within a larger framework of climate regime, also touch upon funding issues. Torvanger et al. (2005) and Barrett (2003) recommended the creation of a separate adaptation protocol as complementary to the mitigation regime, but they did not provide information on either components of, or ways to realise the protocol. The global framework proposal by CAN (2003) included adaptation as one of three parallel tracks (together with Kyoto track and decarbonisation track) – and suggested that the most vulnerable countries (e.g. LDCs and SIDS) must be placed under the adaptation track and provided with adequate funds. This proposal, however, does not suggest any new approach to raise funds for adaptation, and appears to rely primarily on existing adaptation funds such as the LDCF and AF. Ott et al. (2004) proposed that the “polluter pays principle” must be the basis for ensuring adequate and predictable revenue streams for adaptation, and recommended modification of GEF rules and establishment of insurance schemes based on public-private partnerships. Gupta (2003) recommended broadening the financial base to support adaptation by levying a tax on all Kyoto mechanisms and indicated the eligibility criteria for countries to receive adaptation funds, while Peck and Teisberg (2003) suggested the use of revenues from permit auctions. However, these proposals lack details on the modalities for such collections. Winkler et al. (2002) proposed that providing support to policies and measures with climate and development benefits could be a way forward to involve developing countries in the future regime. Since adaptation policies enhance the coping capacity and have direct development benefits, they too can be the part of the portfolio. However, the proposal does not specify how adaptation policies and measures should be facilitated in the post-2012 regime.

*Defining a new approach to address adaptation in the post-2012 regime is a challenge partly because of lack of clarity on the scope of adaptation and limited experience of the countries in implementing adaptation strategies.*

**Most of the proposals on adaptation funding are based on ideas of historical responsibility, ability to pay, and “polluter pays principle”.**

The second group of five proposals focus on addressing vulnerabilities, impacts and/or adaptation. The Government of Tuvalu (2005) recommended the establishment of a clearinghouse for vulnerability assessment. The Government of India contemplated proposing a protocol to address adaptation at COP8 in 2002 but withdrew it due to objections from AOSIS<sup>2</sup>. However, both these proposals lacked specifics on who, how and on what basis these can be implemented. Downing in 2002 and Müller in 2002 also suggested that adaptation protocol or impacts and adaptation protocol would serve the interests of developing countries in the long run. These protocols are assumed to serve as a suitable counterbalance to the mitigation-centric Kyoto Protocol. Müller (2003) suggested the establishment of an “impacts protocol” by 2005. The proposal by several international agencies made at COP8 underscores the need for mainstreaming adaptation concerns in development planning. The major drawback of the second group of proposals was its emphasis only on the *what to dos* rather than the more practical *how to dos*.

As shown in Table 6.3, there are as many as 12 proposals addressing financing aspects of adaptation, indicating the keen interest of stakeholders on this important issue. Most of the proposals are based on ideas of historical responsibility, ability to pay, and “polluter pays principle”. Of the 12 proposals, four of them seek for creation of new and specialised funds (Government of Tuvalu 2005, TERI 2005, ICCTF 2005, Müller 2002). The proposal by Tuvalu identifies various means to diversify and enhance adaptation funds (solidarity fund and insurance fund to be supported from a levy on fossil fuel sales in Annex I countries, etc.) but it does not assess the feasibility of its implementation. TERI’s proposal, which incorporates convention’s guidance to provide new and additional financing besides compensatory financing, also suffers from the lack of practical means to implement the system. Five proposals suggest improving the flexibility of access to, (Parry et al. 2005) or enlarging the scope [(Bouwer and Aerts 2006, several developing countries (unpublished), Schellnhuber (unpublished), Brazilian proposal (unpublished))] of adaptation funds. In past negotiations, several developing countries proposed that a levy be imposed on transactions under all three mechanisms, while many others opposed an extension of the levy beyond CDM. Assuming that a given amount of revenue is to be raised, applying the same levy to all three Mechanisms, rather than the CDM alone, would result in a small improvement in economic efficiency (Haites and Aslam 2000). Three related groups of proposals focus on funding to reduce the climate change risks. Jaeger (2003) proposed to create a fund based on levy from emissions trading to buy insurance for adaptation costs and damage compensation. The idea of providing insurance was also central to the proposals by AOSIS (specifically to small island low-lying nations for the gradual expected sea-level rise, Germanwatch (against extreme weather events) and IIASA (two-tier insurance scheme). While AOSIS and Germanwatch proposals seek contributions solely from developed countries, the IIASA proposal seeks contributions from both developed and developing countries (Bals et al. 2005). Various other risk management schemes such as insurance pool, catastrophe insurance or micro-insurance (Parry et al. 2005) and risk transfer instruments such as catastrophe bonds (Hamilton

2. India for the first time introduced the idea of an adaptation protocol during G77 and China negotiations at COP8. The original proposal for the text of the Delhi Declaration that was negotiated within G-77 and China on 26 October 2002 contained the following language. ‘To initiate further action necessary for global, regional and sub-national assessment of adverse effects and steps to facilitate implementation of adaptation measures, such action should include the adoption of a Protocol on adaptation.’; The adoption of such an adaptation protocol was not put forward as a G77 and China position due to objections by AOSIS that negotiations for such a protocol would be used by Annex I Parties to distract from discussing the (in)adequacy of their mitigation Commitments.

2004), weather derivatives (Figueres 2005) and weather hedges (Linneroth-Bayer et al. 2003) were also proposed to finance adaptation efforts in developing countries. The major merit of these 12 proposals is that they promote a wide range of adaptation funds, but they also suffer a major drawback in the limited amount of information on feasibility of their implementation.

In view of the inadequacy of current multilateral donor funding for adaptation, Müller and Hepburn (2006) proposed in October 2006 a new proposal entitled “IATAL (International Air Travel Adaptation Levy)” that could attract as much as US\$ 4-10 billion per annum. The proposal aims to link adaptation challenge with a policy for regulating rapidly increasing aviation emissions, and is one of the unique proposals to involve the private sector proactively. However, it was announced after our second round of consultations; hence we could not assess its preference by Asian stakeholders.

Besides the 25 specific proposals mentioned above, there are five generic proposals that implicitly refer to the need for supporting adaptation. Cooper (1998, 2001), for instance, made a proposal on “agreed domestic carbon taxes” in which he noted the need for contingency planning about how best to adapt to more serious climate change. The proposal noted that some revenue from the carbon tax might go to the international community for refugee and peacekeeping operations and to developing countries for economic assistance. Reinstein (2004) proposed a bottom-up, country-driven approach to defining national commitments, which might include: a national emissions target, domestic policies and measures (PAMs), investments in emissions mitigation in other countries, technology transfer, financial contributions, adaptation measures, and so forth. The uniqueness of this proposal is to list adaptation measures as a form of commitment. The dual track (targets-based and PAMs-based) proposal by Kameyama (2003) retains the Kyoto Protocol’s adaptation fund as well as country contributions based on historical responsibility, determined by the Brazilian proposal. The “graduation and deepening” proposal by Michaelowa et al. (2003) suggests that LDCs would receive funds for adaptation to negative environmental, economic and social impacts of climate change. The “Orchestra of Treaties” proposal by Sugiyama et al. (2004) is a decentralised approach, involving four components: a group of emissions markets (GEM), to include countries with domestic emissions trading systems; a zero emissions technology treaty (ZETT), to foster long-term technological change; a climate-wise development treaty (CDT), to promote development, technology transfer, and adaptation; and the UNFCCC, as a focal point and forum to address issues on which all countries can cooperate. The CDT would address adaptation issues. The major drawback of the generic proposals is their vagueness in defining the scope and scale of necessary adaptation, and the modalities of ensuring support for adaptation.

***The major drawback of the generic proposals is their vagueness in defining the scope and scale of necessary adaptation, and the modalities of ensuring support for adaptation.***

**Table 6.3 Salient features of proposals to strengthen focus on adaptation in climate regime beyond 2012**

Proposal	Distinct Features	Remarks	Reference
<b>I. Proposals including "adaptation" as one of the components of a broader framework</b>			
1. Broadening the climate regime	A three-stage approach to mitigation commitments complemented by the establishment of a separate <u>adaptation protocol</u> <ul style="list-style-type: none"> <li>To secure the transfer of funds and technology to those countries most vulnerable to the impacts of climate change</li> <li>To earmark funding to support the implementation of policies and measures that move recipient countries on to a low-emission development path while increasing their adaptive capacity.</li> </ul>	<ul style="list-style-type: none"> <li>Modalities of implementation of the protocol are not specified.</li> <li>No indication on the scope and scale of adaptation</li> </ul>	Torvanger et al. (2005)
2. Technology centered approach	<ul style="list-style-type: none"> <li>Includes a <b>protocol for adaptation assistance</b> as one of the five components and visualises adaptation fund to be financed by contributions from industrialised countries; Other components are: <ul style="list-style-type: none"> <li>an R &amp; D protocol to "push" the development of new technologies</li> <li>protocols establishing technology standards to provide a "pull" incentive to commercialise new, low-emitting technologies</li> <li>a multilateral fund to help spread new technologies to developing countries</li> <li>a short-term system of "pledge and review"</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Modalities of implementation of the protocol are not specified.</li> <li>No indication on the scope and scale of adaptation funding</li> </ul>	Barrett (2003)
3. Global framework	<ul style="list-style-type: none"> <li>Division of countries into three parallel, interlinked commitment tracks – Kyoto track (Annex I countries), de-carbonisation track (major developing countries with high emissions) and adaptation track (for most vulnerable regions)</li> <li>Existing elements of the UNFCCC/Kyoto Protocol would form part of the adaptation track including SCCF, AF, LDC Fund and GEF funds.</li> </ul>	<ul style="list-style-type: none"> <li>No new initiatives to mobilise additional funds necessary to support countries in adaptation track</li> </ul>	CAN (2003)
4. Global climate agreement based on south-north dialogue on equity in the greenhouse	<ul style="list-style-type: none"> <li>Global and comprehensive approach involving differentiation of countries into six groups each with a different package of mitigation, adaptation and financial commitments.</li> <li>Proposal includes ensuring adequate and predictable revenue streams for adaptation, based on the "polluter pays principle"; modification of GEF rules to allow funding of adaptation projects with local benefits; and piloting of insurance schemes, possibly through public-private partnerships</li> <li>Support for capacity building in developing countries in a range of areas including sector-specific adaptation strategies, sensitisation of policy-makers, public awareness, and negotiating skills</li> </ul>	<ul style="list-style-type: none"> <li>Modalities of application of the polluter pays principle are not explained.</li> <li>No details on how to modify GEF rules are provided.</li> </ul>	Ott et al. (2004)
5. KISS (Keep It Simple, Stupid)	<ul style="list-style-type: none"> <li>Differentiation into 12 categories of countries based on three criteria: gross national product/capita, emissions/capita, human development index</li> <li>Countries with total emissions below three million metric tons are eligible for assistance for adaptation.</li> <li>Adaptation fund must be financed by tax on all flexibility mechanisms, not just the CDM.</li> </ul>	<ul style="list-style-type: none"> <li>Ignores the adaptation needs of vulnerable regions in countries with emissions above 3 million metric tons</li> <li>Modalities of allocation of adaptation fund are not explained.</li> </ul>	Gupta (2003)
6. Long term permit programme	<ul style="list-style-type: none"> <li>Long-term approach aimed at reaching an agreed concentration target by a specified date (for example, 2070), through national emission trading programmes in the major emitting countries</li> <li>Advocates negotiations among a larger group of countries on financial support for adaptation, possibly from revenue generated from permit auctions</li> </ul>	<ul style="list-style-type: none"> <li>Modalities of implementation are not specified.</li> </ul>	Peck and Teisberg (2003)
7. Sustainable Development Policies and Measures (SD PAMs)	<ul style="list-style-type: none"> <li>Developing country "commitments" initially take the form of pledges to implement national sustainable development policies, which would be listed in a registry. The basic function of a pledge-based approach is transparency. By making a pledge, a state opens itself up to international scrutiny of the pledge's adequacy and implementation.</li> </ul>	<ul style="list-style-type: none"> <li>Does not directly address adaptation measures although SD-PAMs might relate to adaptation</li> </ul>	Winkler et al. (2002)
<b>II. Proposals focusing solely on "vulnerability assessment""impacts" and/or "adaptation"</b>			
1. Vulnerability assessment clearinghouse	<ul style="list-style-type: none"> <li>Vulnerability assessment clearinghouse would operate as a toolbox for assisting countries with implementation of their vulnerability assessments</li> </ul>	<ul style="list-style-type: none"> <li>Modalities of implementation are not specified.</li> </ul>	Government of Tuvalu (2005)
2. Impacts and adaptation protocol	<ul style="list-style-type: none"> <li>Proposal to compensate developing countries for climatic disasters</li> </ul>	<ul style="list-style-type: none"> <li>Very few details on modalities of implementation</li> </ul>	Müller 2002-2005 (Various opinion pieces)
3. Impacts protocol	<ul style="list-style-type: none"> <li>Proposal focusing on reducing the adverse impacts of climate change</li> </ul>	<ul style="list-style-type: none"> <li>Very few details on modalities of implementation</li> </ul>	Downing 2002 (Unpublished)
4. Adaptation protocol	<ul style="list-style-type: none"> <li>Proposal focusing on international support to facilitate adaptation policies and measures in developing countries</li> </ul>	<ul style="list-style-type: none"> <li>Modalities of implementation are not specified.</li> </ul>	Govt. of India 2002 (unpublished)
5. Mainstreaming adaptation in development	<ul style="list-style-type: none"> <li>Encouraging a ministry with a broad mandate, such as planning or finance, to be fully involved in mainstreaming adaptation, especially in countries where major climate impacts are expected</li> </ul>	<ul style="list-style-type: none"> <li>More explanation on "what to do: rather than "how to do"</li> </ul>	AfDB et al. 2003

**Table 6.3 (continued)**

Proposal	Distinct Features	Remarks	Reference
<b>III. Proposals focusing on “financing for adaptation”</b>			
1. Specialised funds	<ul style="list-style-type: none"> <li>• Solidarity Fund with mandatory contributions to support preventative measures and relief from impacts, and Climate Change Insurance Fund to meet the restorative costs of the impacts of climate change</li> <li>• Financing for such a fund could come from a share of proceeds from a levy on fossil fuel sales in Annex I countries, contributions from governments, insurance funds and high GHG emitting industries</li> </ul>	<ul style="list-style-type: none"> <li>• Very few details on modalities of allocation of insurance fund to developing countries</li> </ul>	Government of Tuvalu (2005)
2. TERI’s alternative perspective on adaptation financing	<ul style="list-style-type: none"> <li>• New financing for adaptation measures which provide regional and global public goods</li> <li>• Additional financing to enhance adaptive capacity at national level – to top-up development aid</li> <li>• Special compensatory financing designed on fairness and “polluter pays” principle</li> </ul>	<ul style="list-style-type: none"> <li>• Differentiation of activities is challenging</li> <li>• Details on modalities of implementation are lacking</li> </ul>	TERI (2005), Friends of the Earth web site
3. ICCTF proposal on funding for adaptation	<ul style="list-style-type: none"> <li>• New and additional funding is provided to guarantee revenue for adaptation, with contributions linked, in part at least, to current and historical responsibility for emissions</li> <li>• Existing funding commitments on adaptation must be honoured. The EU and other developed countries made a “political declaration” at COP7 in 2001, to provide US\$450 million a year, mostly for adaptation. To date only about US\$20 million provided.</li> <li>• Pursue the establishment of an international compensation fund to support disaster mitigation and preparedness</li> </ul>	<ul style="list-style-type: none"> <li>• Very few details on modalities of implementation</li> </ul>	ICCTF (2005)
4. UNFCCC Impact Response Instrument	<ul style="list-style-type: none"> <li>• Establish UNFCCC Disaster Relief Fund to be financed by contributions from industrialised countries (based on historical responsibility for climate change and ability to pay);</li> <li>• Relief, rehabilitation and recovery efforts will be compensated through the use of this instrument.</li> </ul>	<ul style="list-style-type: none"> <li>• Very few details on modalities of implementation and on linkages with other initiatives in disaster risk management</li> </ul>	Müller (2002)
5. Improved flexibility for adaptation funding	<ul style="list-style-type: none"> <li>• Introduce more flexible approaches to funding adaptation activities, particularly with respect to the incremental costs and co-financing requirements in operationalising the LDCF and SCCF</li> </ul>	<ul style="list-style-type: none"> <li>• Modality of implementation to be worked out</li> </ul>	Parry et al. (2005)
6. Two-track approach for adaptation funding	<ul style="list-style-type: none"> <li>• Track 1 to secure climate change adaptation funding under the UNFCCC, by imposing a fixed percentage of gross domestic product (GDP) for Annex I countries</li> <li>• Track 2 to improve mainstreaming of climate risk management in development efforts</li> </ul>	<ul style="list-style-type: none"> <li>• Very few details on modalities of allocation of funds to developing countries</li> </ul>	Bouwer and Aerts (2006)
7. Enhancing the base of adaptation fund	<ul style="list-style-type: none"> <li>• Broadening adaptation levy from CDM to JI and IET</li> </ul>	<ul style="list-style-type: none"> <li>• Developed countries do not wish to expand the scope beyond CDM proceeds</li> <li>• Few details on implementation</li> </ul>	Several DCs (unpublished)
8. Adaptation credits and vouchers	<ul style="list-style-type: none"> <li>• Conceptually adaptation credits are equivalent to carbon credits</li> </ul>	<ul style="list-style-type: none"> <li>• Measures for quantification of adaptation credits are not available.</li> </ul>	Schellnhuber (unpublished)
9. Brazilian proposal on burden-sharing approach	<ul style="list-style-type: none"> <li>• Original pre-Kyoto proposal made by Luiz Gylvan Meira Filho and José Domingos Gonzalez Miguez with Luiz Pinguelli-Rosa provided that up to 10% of the Clean Development Fund could be used to finance adaptation projects in developing countries.</li> </ul>	<ul style="list-style-type: none"> <li>• No follow-up for a long time</li> </ul>	Filho, Miguez and Rosa (unpublished)
10. Insurance fund for adaptation and other insurance schemes	<ul style="list-style-type: none"> <li>• Jaeger’s proposal seeks to establish a mechanism for payments by emitting countries to countries that are adversely affected by climate change, in order to cover adaptation and damage costs. In this, revenues from a levy on emissions trading would be used to buy insurance for adaptation costs and damage compensation</li> <li>• AOSIS proposal seeks to establish a fund with mandatory contributions from industrialised countries to indemnify small-island and low-lying developing nations for losses resulting from sea-level rise.</li> <li>• Germanwatch proposal builds strongly on AOSIS ideas but proposes cover for sudden-onset risks, including floods, droughts and windstorms, for public infrastructure. To be eligible, LDCs would be required to take specified measures for preventing disaster loss.</li> </ul>	<ul style="list-style-type: none"> <li>• Both AOSIS and Germanwatch proposals rank high on many elements of fairness and efficiency, but payouts depend on a loss threshold, which means losses must be measured. The latter involves high transaction costs (Bals et al. 2005).</li> </ul>	Jaeger (2003), Germanwatch (2005), AOSIS 1991, cited by Bals et al. (2005)

**Table 6.3 (continued)**

Proposal	Distinct Features	Remarks	Reference
11. Risk management schemes	<ul style="list-style-type: none"> <li>• International Insurance Pool (a collective loss-sharing fund to compensate the victims of sea-level rise, to be administered by a Board under the UNFCCC and funded by mandatory contributions from industrialised countries in proportion to their GHG emissions and GNP (Hamilton 2004; Linnerooth-Bayer et al 2003; Muller 2002).</li> <li>• Public-Private Insurance Partnerships</li> <li>• Regional Catastrophe Insurance Schemes (Mandatory contributions from member governments will be used to pool regional cash reserves, which are then used for on-lending to members affected by a weather catastrophe (DFID 2004). These schemes or risk pools could be backed by a regional facility that provides a layer of reinsurance cover.)</li> <li>• Micro-insurance (Uses risk-pooling to provide compensation to low income individuals or groups adversely affected by a specified risk or event (Hoff et al. 2004). Schemes can be index-based (Skees et al. 1999) and should be developed jointly with governments, NGOs and private companies. Examples include local calamity funds, savings and credit schemes)</li> </ul>	<ul style="list-style-type: none"> <li>• Very few details on modalities of implementation and on linkages with other initiatives in disaster risk management</li> </ul>	Parry et al. (2005)
12. Risk Transfer Instruments	<ul style="list-style-type: none"> <li>• Catastrophe bonds (Provide private insurers with protection against extreme natural catastrophe events. Capital is provided by institutional investors, with money raised on the stock market by issuing bonds against a particular catastrophic event (DFID 2004; Hamilton 2004). The market for these bonds is targeted primarily to OECD countries and its potential in developing countries has not yet been fully explored.)</li> <li>• Weather derivatives (financial mechanisms developed to hedge financial risk associated with weather volatility. They are financial contracts whose value is tied to, or derived from, an underlying asset such as a temperature or precipitation index. While the weather derivative market continues to grow in the USA and Europe, developing countries have not yet been engaged)</li> <li>• Weather hedges (provide farmers with protection against extreme weather events. Insurance against a specific local weather phenomenon is sold by banks, farm cooperatives and micro-finance institutions to buyers at the same premium, who in turn receive the same indemnity payment per unit of insurance. Catastrophe bonds can be used to backstop this micro scheme to ensure that the insurance provider has sufficient capital to cover claims, Linnerooth-Bayer et al. 2003)</li> </ul>	<ul style="list-style-type: none"> <li>• Very few details on modalities of implementation and on linkages with other initiatives in disaster risk management</li> </ul>	UNEP-FI (2005) Cited by Parry et al. (2005)
13. International Air Travel Adaptation Levy (IATAL)	<ul style="list-style-type: none"> <li>• The proposal aims to link adaptation challenge with policies aimed at managing aviation emissions.</li> <li>• Aims to bring about an income of US\$ 4-10 billion annually.</li> </ul>	<ul style="list-style-type: none"> <li>• Modalities of allocation of levy are not established.</li> <li>• Active involvement of the private sector in adaptation</li> </ul>	Müller and Hepburn (2006)

## 6.4 Perspectives of different countries

Addressing adaptation comprehensively under future climate regime has been a subject of controversy between developed and developing countries for a long time in international negotiations. Of course, this does not mean developing countries have had a common position on adaptation. The starkly diverse political and economic interests of countries in groups such as the G77 and China made it difficult for these countries to develop a common position. This section discusses differences in the perspectives of developed and developing countries on general issues of adaptation, financing for adaptation and on proposals to strengthen adaptation in future regime.

### 6.4.1 General issues of adaptation

In our consultations, most of the participants recognised that adaptation to climate risks and climate change is a challenge for all countries. However, they noted that the international climate regime should first target the urgent needs of the most vulnerable countries, regions and communities. Participants from the Asian LDCs and SIDS emphasised that any future international regime should address their adaptation needs more comprehensively, as their nations contributed the least to the problem but remain the most vulnerable. A few participants (e.g. Republic of Korea, Japan) in our consultations noted that many developed countries had not yet developed a national adaptation policy, and that the future climate regime must focus on assisting all countries to develop such policies based on the exchange of positive experiences among countries. Some participants noted that the experiences of NAPA preparation by LDCs could be useful to developed countries. Participants from China, Mongolia and Thailand suggested that the future climate regime should support the development of national adaptation programmes of all developing countries. Currently such support is limited to LDCs through the LDC Fund.

Most participants agreed that adaptation did not receive as much priority as mitigation in the current regime due to several reasons. Some participants (e.g. Nepal) noted that it was perhaps due to wide differences in perceptions of developed and developing countries, as the former view nature as the main victim while the latter view human beings as the main victim of climate change. Burton et al. (2002) reported that the developed countries showed less interest in their own need for adaptation, and generally assumed that they have the financial and technical resources to adapt as and when necessary. A few participants (e.g. the Philippines) expressed strong dissatisfaction with the implementation of SCCF and SBSTA's five year work programme, and emphasised that the future climate regime must squarely deal with the adaptation challenge more proactively than before. They noted that the first two years of SBSTA's five year programme does not go beyond submitting views and holding workshops to exchange information. Some participants (e.g. Cambodia) recommended the establishment of an international registry of adaptation projects under the UNFCCC.

Many participants from Asian developing countries (e.g. Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Mongolia, Nepal, the Philippines) emphasised that developed countries are not seriously committed to supporting adaptation even though the international community has recognised their enormous contribution to the problem to date and that the focus on scientific uncertainties was only an excuse for their delayed

*Some participants expressed strong dissatisfaction with the implementation of SCCF and SBSTA's five year work programme, and emphasised that the future climate regime must squarely deal with the adaptation challenge more proactively than before.*

action. They repeatedly mentioned that the Kyoto Protocol is not adequate to advance the adaptation agenda. Some participants (e.g. Mongolia, Myanmar, Nepal) noted that the lack of a consistent position among developing countries on ways to address adaptation in the future climate regime was a major barrier to be overcome in the future. They noted that tensions among developing countries on prioritisation of SCCF activities (section 6.2.3), the lack of human and institutional capacity to undertake vulnerability and adaptation assessments, the lack of continuity in representation of developing country negotiators due to limited funding for their participation in UNFCCC meetings, and language difficulties prevented progress in advancing the adaptation policy agenda. A few participants (e.g. China) reported that many Asian developing countries lack the capacity to prioritise adaptation actions in different parts of the country due to limited experience. They maintained that the future climate regime should provide support in building such capacity in developing countries.

Participants (e.g. Bangladesh, Mongolia) noted that adaptation programmes targeting communities should be supported more proactively in the international climate regime and that they should be recognised for their provision of global benefits as they would contribute directly to the goal of poverty alleviation. However, current GEF guidelines suggest that global environmental benefits are distinct from the achievement of development or local benefits (Mace 2005). Many participants (e.g. Mongolia, Bangladesh, Nepal, Philippines, Cambodia, Indonesia) emphasised that the future climate regime must support initiatives for proactive micro-adaptation at the community level. They opined that the current allocation of US\$ 5 million as part of the GEF Strategic Priority on Adaptation is woefully inadequate to meet the needs of community-based adaptation. Some participants (e.g. Mongolia) noted the need for enhancing support of development, transfer and deployment of adaptation technologies, especially for sectors such as agriculture, coastal resource management and biodiversity.

In view of the limited exchange of international experiences on adaptation to date, and due to the fact that most of the adaptation is site-specific with local benefits, several respondents from developed countries (e.g. Australia, Belgium, Japan, USA) noted that adaptation should be considered largely a national responsibility and that the international climate regime should play only a facilitative role. However, some adaptation projects provide public goods with global benefits. For example, establishing an early warning system for extreme climate events will provide nearly universal benefits. The scientific uncertainties in differentiating impacts of climate variability and climate change were also cited as a reason for the limited progress on adaptation funding in the current regime. They suggested that support for adaptation initiatives under the future climate regime must be based on valid science.

#### **6.4.2 Adaptation funding**

Our consultations and personal interviews indicated some degree of conceptual conflict between developed and developing countries in determining whether adaptation funding is merely assistance for adaptation or compensation for impacts of all extreme weather events, and whether such assistance should cover climatic variability or only anthropogenic climate change. Notwithstanding such differences, there was consensus among participants that currently available funds for adaptation under the Convention and the Protocol are far from adequate to meet the adaptation needs in developing

*The current allocation of US\$5 million as part of the GEF Strategic Priority on Adaptation is woefully inadequate to meet the needs of community-based adaptation.*

countries, which could range from US\$ 9 to 41 billion per annum (World Bank 2006c). Judging from the fate of the 0.7% of GDP 'Monterrey commitment', Müller and Hepburn (2006) noted that it would be near impossible politically for industrialised countries to try and raise this sort of additional money to cover these costs through domestic taxation. Some participants from LDCs (e.g. Bangladesh, Bhutan, Mongolia) and SIDS (e.g. Maldives) emphasised that external funding would remain a key prerequisite for successful implementation of activities identified in NAPAs, and were concerned about a tendency in some circles to treat adaptation merely as a sub-set of CDM. They cautioned that CDM proceeds for adaptation are at most only adequate to identify adaptation needs of developing countries.

In order to enhance "new and additional" funds for adaptation, participants from Bangladesh suggested that an exclusive priority adaptation fund should be created through the imposition of a levy on the sale of fossil fuels in all Annex I countries. A representative from Tuvalu made a similar proposal to create an Adaptation Financial Facility through the imposition of levies on (a) fossil fuel sales in Annex I countries and (b) Kyoto mechanisms other than the CDM (Sopoaga 2006). Many participants (e.g. India) sought the need for incorporating an element of certainty in adaptation funding, besides voluntary contributions, to ensure a long-term, firm, regular and predictable flow of funds. Some participants suggested revisiting the funding pledges by developed countries (US\$ 450 million per year). Many participants urged that the complex bureaucratic procedures of GEF and SCCF must be streamlined in the future regime. They also requested that the co-financing requirement to access LDC Funds and SCCF must be removed especially for LDCs and SIDS. Participants from Sri Lanka proposed the implementation of higher tax regimes for technologies that are inappropriate for facilitating adaptation.

Developed countries, on the other hand, are concerned that adaptation could become a bottomless pit, absorbing a disproportionate amount of development assistance funds (Burton et al. 2002). Some participants (e.g. Japan) argued that assistance for adaptation through various initiatives such as ODA is relatively large and must not be ignored.

The consultations revealed the need to distinguish between, and prioritise adaptation actions that can be funded through international and national efforts of developing countries.

#### **6.4.3 Preferences for specific proposals to strengthen adaptation**

The preferences reported here are based on the presentations by lead discussants and panel members in various consultations in addition to the 47 responses to the questionnaire. Of the first group of seven proposals, which considered adaptation as one of the components of a larger framework, several participants and 56% respondents to the questionnaire strongly preferred the proposal by Ott et al. (2004). The proposal by the CAN (2003) also received much attention (34%). A few participants (e.g. Bangladesh, China, Philippines), however, preferred proposals by Torvanger et al. (2005), and Gupta (2003), and noted that financing for adaptation should be based on per capita GHG emissions and that the nations that contribute less should be rewarded especially when they have high adaptation needs.

*Many participants sought the need for incorporating an element of certainty in adaptation funding, besides voluntary contributions, to ensure a long-term, firm, regular and predictable flow of funds.*

*The concept of creating a separate protocol on adaptation, as a counter-balance to the mitigation-centric Kyoto Protocol, has been receiving some attention by researchers and policy makers since 2002.*

Among the second group of proposals, most of the participants and respondents to the questionnaire (76%) preferred the proposal on mainstreaming adaptation concerns in the development policy of national governments, regional and international aid agencies and development banks. However, participants noted the need for suitable entry points for such mainstreaming and the need to strengthen the capacity of policy makers to visualise the benefits of such mainstreaming. Huq (2004), however, pointed out that mainstreaming adaptation in development activities is a laudable and necessary goal in its own right but it is not necessarily the right issue to negotiate in the UNFCCC context. Likewise, Yamin (2005) questioned if mainstreaming adaptation is a distraction or part of the solution in future climate policy of the European Union.

Among the proposals on financing, several respondents (46%) preferred TERI's alternative perspective on adaptation financing, followed by the two-track approach (27%) proposed by Bouwer and Aerts (2006). The preference for the first proposal is perhaps because it gives clear guidance on what constitutes new and additional funding. The preference for the latter proposal is perhaps associated with its emphasis on mainstreaming of climate risk management in development efforts, which is highly similar to the one proposed by international agencies in the second category of proposals.

## **6.5 Three priorities for strengthening adaptation policy agenda**

Strengthening adaptation policy agenda in the future climate regime is a challenging task, especially when we consider the magnitude of the problem and the resources that we have at our disposal. Participants in our consultations discussed various options that can be put forward to climate change negotiators. Of these options, we identified three priority areas that deserve utmost attention. These include (a) establishing a separate protocol for adaptation, (b) optimising top-down and bottom-up approaches with a view to mainstreaming adaptation in development planning, and (c) financing for adaptation.

### **6.5.1 Adaptation protocol**

The concept of creating a separate protocol on adaptation, as a counter-balance to the mitigation-centric Kyoto Protocol, has been receiving some attention by researchers and policy makers since 2002. For instance, Müller (2003) noted that Indian's proposal for an "Adaptation Protocol" made at COP8 deserves further attention, but he felt that in the short term less ambitious measures, such as a reform of international natural disaster relief financing, may be more promising. Sharma (2003) also observed that the impacts of climate change can be addressed in the short term through a climate change relief fund along the lines of existing disaster relief funds, insurance and the GEF funds, and in the long term through a more detailed *adaptation protocol*. On the other hand, Drexhage (2003) noted that an adaptation protocol would effectively marginalise funding for this critical area. He argued that much more effective would be a response that would mainstream adaptation in development priorities of aid agencies, multilateral and regional banks and developing countries. Winnie et al. (2005) noted that any adaptation efforts in the future climate regime must be based on the UNFCCC (rather than the Kyoto Protocol) and non-UNFCCC instruments, such as the existing international disaster relief arrangements.

Several participants (e.g. Bangladesh, Bhutan, Cambodia, China, Nepal) in our consultations noted that the design of a separate protocol on adaptation is critical to enhance its profile and to coordinate adaptation actions and programmes internationally. Participants noted that such a protocol should be based on the “polluter pays principle”, “historical responsibility” and “equity” and comprise at least four components: a policy framework for mainstreaming adaptation in development with specific targets, capacity building of various actors involved, mechanisms for financing of adaptation efforts, and options for development, transfer and deployment of adaptation technologies. Participants agreed that the current regime had succeeded in initiating some efforts towards the first two aspects but much remains to be done to enhance financing and adaptation technologies. In the case of mitigation, market mechanisms were created to facilitate the transfer of technologies and finance but the practicality of implementing such mechanisms in adaptation remains to be seen. While some participants (e.g. Mongolia, China, Sri Lanka, Viet Nam) noted the need for creating market mechanisms for adaptation for facilitating financial flows, some participants (e.g. the Philippines) cautioned that market mechanisms should not be the primary means to support adaptation, and noted that any new institutional framework for adaptation should be set up in a timely fashion without allowing it to become a long negotiating instrument. Participants stressed that a global campaign to raise consciousness on the adaptation protocol is necessary.

Many participants (e.g. Japan, Indonesia, India), however, noted that the creation of a separate protocol for adaptation is not necessarily productive at this stage. Some feared that giving undue emphasis to adaptation might weaken the efforts on mitigation, while others (e.g. Indonesia) were concerned about the long negotiating process necessary to develop such a protocol. Some participants (e.g. Indonesia, the Philippines) were not sure of the components to be included in the protocol, while others (e.g. Japan) noted that the time for adaptation protocol may not be appropriate, as there was no consensus on who should bear the costs of adaptation. This is because some developed countries believe adaptation solely to be the responsibility of the country in question, while some developing countries argue that developed countries should bear such expenses. The overall sentiment of the participants was that there is a clear need for the future climate regime to prioritise the areas that require urgent action, as opposed to attempting to adapt to every single impact of climate change in one go.

In view of such diverse views, it is recommended that the future climate regime must first begin to explore the concept of adaptation protocol in a more formal way, and obtain views of different Parties perhaps through organising a special workshop or seminar in conjunction with meetings of the subsidiary bodies or COPs at the earliest. Based on the outcomes of discussions, an exploratory committee for the adaptation protocol may be established if necessary.

### **6.5.2 Mainstreaming adaptation concerns in development planning**

Adaptation, sustainable development and equity are mutually reinforcing (IPCC 2001b). It is widely accepted that impacts of climate change will undermine long-term economic development, increase poverty and damage human security. How to identify and design incremental interventions to integrate adaptation concerns in development, and then implement them across many sectors is a serious challenge for policy makers.

*Participants stressed that a global campaign to raise consciousness on the adaptation protocol is necessary.*

*The overall sentiment of the participants was that there is a clear need for the future climate regime to prioritise the areas that require urgent action, as opposed to attempting to adapt to every single impact of climate change in one go.*

*A combination of both “top-down” support and “bottom-up” engagement approaches is crucial to advance the adaptation agenda.*

Lack of awareness of climate change within the development community, limitations on resources for implementation, barriers within governments and donor agencies, insufficient relevance of available climate information to development-related decisions are the most frequently cited reasons for difficulties in mainstreaming adaptation in development (Warrick 2000, Agrawala 2004, OECD 2005, 2006). Mainstreaming can be done at both policy and operational levels. Developing water management policies based on projected impacts of climate change on precipitation in 20 or 50 years is an example of the policy-level mainstreaming. Operational level mainstreaming, on the other hand, refers to the process of critically analysing and addressing adaptation concerns in actual implementation of activities. It is often referred to as “climate proofing” of development. Likewise, both “top-down” institutional mainstreaming and “bottom-up” community-level mainstreaming are possible. Other mechanisms for mainstreaming include the incorporation of adaptation concerns into the National Strategies for Sustainable Development (NSSD) and Poverty Reduction Strategy Papers (PRSPs). Indeed many of the changes required in the transition to mainstreaming may not be costly but require changes in existing policies, institutions, and infrastructure design (IGES 2005b).

Most of the participants and respondents to the questionnaire surveys (92%) agreed that a combination of both “top-down” support and “bottom-up” engagement approaches is crucial to advance the adaptation agenda, as both approaches are important and complementary. Participants from Bangladesh and Bhutan noted that grassroots adaptation should begin with bottom-up needs assessment through a participatory approach by ensuring that the vulnerable communities define the contexts of vulnerability and devise plans for adaptation. A few participants (e.g. the Philippines) noted that some adaptation policies and measures need to emanate from the national level and filter down to the community level. A few other participants (e.g. Japan), noted that top-down approaches must come first, followed by bottom-up approaches involving self-help efforts by communities and local governments. The need for enhancing the capacity of local communities to understand climate information products including early warning systems was also considered important.

Participants emphasised the need for documenting the analytical tools and knowledge in both types of approaches. For example, the database on local coping strategies (UNFCCC 2006h) has potential to become a toolkit of good practices, which would enable policy makers and adaptation practitioners to pick and mix tools and practices that best suit their circumstances. Likewise, documentation of experiences of top-down operational level mainstreaming [e.g. climate proofing of road design in Kosrae island of the Federal States of Micronesia (Hay et al. 2004)] would encourage policy makers to undertake similar initiatives in other contexts.

### **6.5.3 Promoting financing for adaptation**

Adaptation funding has already become an intractable issue in current climate change negotiations, and greater demand for funding can be expected in the future as climate change proceeds. Participants in our consultations, therefore, agreed that innovative approaches to funding adaptation in the future climate regime must be pursued. Some participants (e.g. the Philippines) argued for re-defining financial mechanisms of the Convention and the Kyoto Protocol in the post-2012 climate regime, while others (e.g. Nepal) opined that different types of costs for adaptation will have to be dealt with via

different kinds of instruments. Some participants (e.g. Bangladesh) noted that principles of justice and equity are intrinsically linked in the adaptation funding negotiations, and these principles need to be acknowledged and addressed up front if the future climate regime is to retain any sense of fairness and global acceptance (Huq 2004).

The role of the private sector in facilitating adaptation in the current regime has been minimal. Many participants, therefore, highlighted the need for effectively engaging the private sector in adaptation efforts. Some participants (e.g. Indonesia), noted that the World Bank and regional development banks, such as ADB are preparing investment frameworks to secure greater investment in adaptation projects (Burton and Aalst 2004). It was suggested that the private sector could be actively involved in such efforts. Some participants (e.g. Mongolia) suggested that considerable scope exists in a post-2012 regime to establish market mechanisms for adaptation, for example through arranging special credits for initiatives that facilitate adaptation in developing countries. However, the concept of adaptation credits is still conceptual and further elaboration is necessary to convince the policy makers and markets. Participants from Republic of Korea noted that food companies, businesses involved in commodity trading, and the insurance industry would be interested in acquiring such credits. However, some participants (e.g. Japan) noted that adaptation credits might bring down the value of carbon credits. A few participants (e.g. Cambodia) suggested that the future regime should provide economic incentives for investment in adaptation by the private sector such as tax holidays and subsidies. They also suggested that CDM project developers and private investors should not have to be burdened by mandatory proceeds given to the adaptation fund, as CDM projects already contribute to sustainable development. Instead, they suggested that fossil-fuel based projects should contribute to the adaptation fund.

Participants felt that the role of insurance instruments needs further attention if we are to increase resources available for adaptation in the future climate regime. Although the UNFCCC Article 4.8 and the supporting Article 3.14 of the Kyoto Protocol call upon developed countries to consider actions, including insurance, to meet the specific needs and concerns of developing countries in adapting to climate change, there has been little understanding of, or agreement within the climate change community to date on the role that insurance-related mechanisms can play in assisting developing countries adapt to climate change (Bals et al. 2005). Promoting linkages between the climate community and the insurance industry could be a way forward. Indeed a number of the insurance and risk transfer instruments could be integrated into a post-2012 approach to adaptation.

A few participants (e.g. Japan) argued for developing a two-track approach to adaptation funding. Track 1, which could be outside the purview of the international climate regime, would be a soft regime to include mainstreaming adaptation concerns in development assistance and track 2, which could be within the framework of climate regime, would be a hard regime to include allocation of special funding to develop NAPAs or the creation of adaptation facilitation centres in the most vulnerable countries. The future climate regime should facilitate synergies between both approaches. Some participants from LDCs (e.g. Cambodia) and SIDS (e.g. Maldives) argued that a certain share of proceeds from ODA should be allocated for adaptation. However, there is concern that funding for adaptation would divert money from ODA that is meant to address challenges seen as being more urgent than climate change, including water and food supply, sanitation, education and health care (Michaelowa and Michaelowa 2005).

*A number of the insurance and risk transfer instruments could be integrated into a post-2012 approach to adaptation.*

Some participants (e.g. Bangladesh, Cambodia) highlighted the need for changes in implementation of adaptation funds in the future regime. They emphasised that the AF should not be subject to GEF criteria of identifying incremental costs and the requirement of co-financing. A recent proposal by ECBI Fellows suggests that AF should be managed by a special body to be created COP/MOP (ECBI 2006). Several countries (e.g. Nepal, Mongolia, Thailand, the Philippines, Indonesia, Maldives) in the region argued for simplification of the criteria for accessing funds under the LDC, SCCF and GEF to reflect each recipient country's circumstances.

Some participants (e.g. Bangladesh, India, Mongolia) noted that it is not desirable to link adaptation funds with mitigation efforts in developing countries. However, they preferred to see some additional allocation of adaptation funds if developing country parties voluntarily reduce emissions through domestic policies and measures. Participants also emphasised that the future regime should promote synergies between mitigation and adaptation actions. For example, prevention of deforestation can reduce GHG emissions while also contributing to enhanced adaptive capacity of local communities.

In summary, the adaptation financing agenda for the future climate regime will need further honing and clarity, especially in terms of (a) enlarging the funding base and developing flexible but clear guidance to access adaptation funds, (b) differentiating between actions that must be funded inside and outside the climate regime, and (c) creating market mechanisms and incentives for the private sector.

## 6.6 Concluding remarks

IGES consultations reaffirmed the need for redressing the balance of the current climate regime by giving due attention to the adaptation needs of Asian developing countries and undertaking new efforts that extend beyond the scope of the current climate framework. Such new efforts may evolve into the establishment of a separate protocol for adaptation in the long run. Since adaptation is a dynamic multi-faceted process (Willems 2005) involving decision making at all levels, it must be considered in an integrated manner locally, nationally and internationally by mainstreaming adaptation concerns in development planning and policy. Stakeholders at our consultations emphasised that the costs of implementing adaptation strategies would depend in part on the degree of success in integrating adaptation concerns in other policy initiatives. At national and local levels, the adaptation decision-making process should involve a "precautionary approach" with an initial preference for "no/low regrets" measures. However, due to the considerable uncertainty surrounding local impacts, decision makers must be ready to review and even reverse adaptation strategies in the light of new knowledge. As the challenge of adaptation cannot be addressed solely through the funds made available through international negotiations and donor funding, efforts to enhance adaptation funds through active involvement of the private sector are crucial.

In order to advance the adaptation agenda internationally, countries in the Asia-Pacific region should first proactively develop a regional forum on adaptation that can elaborate on necessary frameworks to address the adaptation needs of the region. Instead of floating general concepts and oft-repeated principles, the negotiators from the region must put forward and defend well-defined and workable proposals to facilitate adaptation at various levels. Second, the adaptation practitioners from the region must

*In order to advance the adaptation agenda internationally, countries in the Asia-Pacific region should first proactively develop a regional forum on adaptation that can elaborate on necessary frameworks to address the adaptation needs of the region.*

document information on high priority adaptation projects that go beyond planning and capacity building. Third, a suitable mechanism to monitor effectively the transfer of new and additional funding from developed to developing countries is also necessary. Options for establishing a mandatory global funding scheme, which is tied to both past and current GHG emissions by various countries, should be explored as a high priority so that all countries, both developing and developed, can contribute to and benefit from such scheme based on the principle of common but differentiated responsibility.

## Conclusions and the Way Forward

Ancha Srinivasan

*Despite a growing recognition worldwide that reducing the growth of GHG emissions in Asia would be a major determinant of the success of the future regime, efforts to reflect Asian concerns and aspirations in international climate negotiations are far from adequate.*

*The future climate regime should identify and facilitate the most pragmatic measures to mainstream climate concerns in national energy and development planning, and support implementation of integrated development and climate strategies at various levels.*

In the first round of consultations held in 2005, we ascertained the concerns and interests of various countries in the Asia-Pacific region on the post-2012 climate regime. Based on the outcomes of those consultations, we organised the second round in 2006 to discuss and prioritise options to strengthen the future climate regime under four specific themes of high priority to the region, namely, *energy security and developmental needs, clean development mechanism (CDM), technology development and transfer, and adaptation*. Participating stakeholders offered their views frankly on 20-30 proposals put forward under each theme and expressed preferences for a few proposals based on their interests. In addition, they contributed many valuable ideas to strengthen the climate regime from an Asian perspective. The salient findings of our consultations and analysis are given below.

1. ***Asia's role in the design of the future regime:*** Despite a growing recognition worldwide that reducing the growth of GHG emissions in Asia would be a major determinant of the success of the future regime, efforts to reflect Asian concerns and aspirations in international climate negotiations are far from adequate. This is partly due to the lack of effective involvement and negotiating capacity of Asian stakeholders in climate discussions. Indeed, most of the countries in the region have not yet declared a formal national position on the post-2012 climate regime due to barriers, such as uncertainty of the positions of various Annex I countries, low priority attached to climate change in national policy, limited awareness of developments in international climate negotiations, and lack of technical capacity. There was a consensus that the post-2012 climate regime would greatly benefit if Asian interests and priorities are considered more effectively than before. The ratification of the Kyoto Protocol served as one of the major drivers for policy formulation on climate and energy in many Asian countries, especially in the establishment of new institutions (e.g. DNAs for CDM implementation) and the promulgation of new regulations for energy conservation. Asian experiences gained from such efforts could be a sound basis for putting forward and defending well-defined and workable proposals at the international negotiations. The best available structure for the future regime in the near term may be the continuation of the Kyoto-style framework, complemented by pluri-lateral agreements engaging the USA in initiatives such as G8 agreements and the Asia Pacific Partnership (APP). However, efforts to create an inclusive (with all Annex I Parties) and mandatory regime should continue. The creation of a region-wide platform in Asia to build consensus on a fair, equitable and effective climate regime is also recommended.

2. ***Energy security and Development Needs:*** Even though the terms “energy” and “development” were referred to in several articles of the UNFCCC and the Kyoto Protocol, the efforts to reflect Asian concerns on energy security and development needs in international climate negotiations have been far from satisfactory. The future climate regime, therefore, should identify and facilitate the most pragmatic measures to mainstream climate concerns in national energy and development planning, and support implementation of integrated development and climate strategies at various levels. Indeed, the success of the future climate regime rests on the extent to which it can assist in transforming the region's social and economic structures toward low carbon societies, while addressing genuine concerns on energy security and development.

Improving energy security and access through maintaining affordable energy supplies are crucial for achieving economic development and realising climate benefits in

Asia. Strategic international cooperation through effective investments, policies and measures to improve energy efficiency and promote renewable sources plays a key role in achieving lower future GHG emissions in the region and in reducing the vulnerability of both regional and global energy security. Since energy security is an issue on which both developing and developed countries share common interests, the future climate regime should facilitate further development of climate-friendly energy policies through sharing good practices, setting standards and guidelines, building adequate human and institutional capacities, and initiating new partnerships for regional collaboration. The future regime discussions should explore new opportunities for clean energy investments. The CDM can be a supplemental source of financing clean energy, but the mobilisation of resources outside the Convention is crucial.

The future climate regime can never be effective and equitable unless it reflects the diversity in developmental needs and priorities of Asian countries. The discussions on a post-2012 regime, therefore, should focus more on social and economic aspects of co-benefits from mitigation and adaptation policies, with a view to help achieving the millennium development goals by the least developed countries and provide assistance to enhance the economic and environmental efficiency for newly industrialised countries in Asia. Operational support from the climate framework, for example, through maintaining a registry of SD-PAMs and identifying PAMs with synergies between SD benefits and GHG mitigation, is critical to address the mainstreaming of climate risks in the development agenda.

*The provision of an early, credible signal on continuity of CDM and ensuring the value of CERs after 2012 are vital because CDM activities have just gained momentum in the region, with many projects requiring long gestation times and high capital expenditure.*

**3. Clean Development Mechanism:** The provision of an early, credible signal on continuity of CDM and ensuring the value of CERs after 2012 are vital because CDM activities have just gained momentum in the region, with many projects requiring long gestation times and high capital expenditure. Indeed, the absence of financial benefits from post-2012 CER would reduce the viability of many CDM projects in the region. Options for an early signal include (a) unilateral declaration by Annex I countries to extensively utilise post-2012 CER including towards meeting their targets for the first commitment period, (b) extension of the period of the next commitment to beyond 10 years instead of the five years, and (c) proactive support for post-2012 CERs by multilateral financial institutions.

The future regime discussions should pursue opportunities for (a) widening the scope of CDM from the current project-based activity to sector-, programme- or policy-based CDM, (b) redressing geographic inequity within and outside the region, and (c) enhancing SD benefits from CDM. A sector-based approach can benefit the region in many sectors (e.g. transportation, LULUCF) and enables greater participation by Asian developing countries in climate efforts. However, problems such as baseline setting, monitoring, and potential leakage must be resolved. Expedient registration of small-scale projects and support for bundled projects, coupled with the creation of carbon funds targeting micro-scale CDM activities in LDCs and SIDS are crucial to improve the geographic distribution of projects within the region. Further, co-benefits from CDM must be quantified and financially supported separately, so that the total value of the projects with high development benefits but yielding low CERs could compete well with those yielding high CERs. In addition, the future regime may strengthen SD assessment by creating a registry system for SD-PAMs and integrating it into the approval process of the CDM-EB.

The need for employing innovative financing approaches to cover underlying finance of CDM projects in the region is widely recognised. Some options suggested include:

*Treating critical low carbon technologies as global public goods and enhancing the flexibility of the intellectual property rights regime for such technologies may be another strategy.*

strengthening synergies in the private sector between Annex I and non-Annex I countries through bilateral business agreements, utilising ODA for CDM implementation especially during the early stages and in countries that are not financially attractive to investors from the perspective of project financing, and utilising multi-source funding effectively to spread risk among several institutions.

4. **Technology development and transfer:** There are serious concerns on the ability of the current climate regime to facilitate the development and transfer of clean technologies in the region. One way to move forward is to exploit synergies with other initiatives outside the climate regime. Since technology is a cornerstone of several non-UNFCCC initiatives such as the Asia-Pacific Partnership on Climate and Development (APP), which have potential to provide the necessary paradigm shift to reduce GHG emissions in selected industries in the region, building synergies between the UNFCCC and non-UNFCCC initiatives is crucial. For instance, the climate regime can provide CDM opportunities in methane recovery and additional income for project developers while the methane to markets (M2M) initiative and/or the Asia-Pacific Partnership (APP) can provide access to necessary technologies. Likewise, transfer of technologies for carbon capture and storage (CCS) through APP can provide synergies with the future climate regime when the regime makes CCS projects eligible for CDM. The future regime should also facilitate synergies among the North-South and South-South technology cooperation and transfer initiatives, especially in adaptation.

Future regime discussions should facilitate efforts to identify “tipping points” where small interventions or infusion of resources can reap large gains in development and deployment of climate-friendly technologies. Treating critical low carbon technologies as global public goods and enhancing the flexibility of the intellectual property rights (IPR) regime for such technologies may be another strategy. Some of the options to be pursued in Asia include extensive collaboration in the early stages of technology development leading to joint ownership of IPRs with developed countries, and creation of a multilateral technology acquisition fund, which could be structured to buy-out IPRs and make privately owned, climate-friendly technologies available for deployment in developing countries.

Ensuring additional finance through innovative public and private support mechanisms is critical to make the currently available technologies commercially competitive. The future climate regime should play a facilitative role in determining incremental costs associated with acquisition of clean technologies relevant to Asia and in documenting various successful policy instruments that can offset the higher overall costs of emerging technologies.

5. **Adaptation to climate change:** The future climate regime should enhance the focus on adaptation to a similar level, if not more, as that of mitigation. Designing a separate protocol on adaptation will certainly enhance its profile in the future climate regime, although the process may require considerable resources and time in terms of negotiation. The future climate regime, therefore, should facilitate discussions on an adaptation protocol and its components in a more formal way to obtain views of different Parties and establish an exploratory committee for its adoption, if necessary.

Participants recognised that a combination of both “top-down” support and “bottom-up” engagement approaches is crucial to advance the adaptation agenda and urged that the future climate regime should facilitate identification of pragmatic options for mainstreaming adaptation concerns in development planning in Asia both at policy

and operational levels. The future regime should also support efforts to document such experiences as a way to strengthen the capacity of policy makers in visualising the benefits of mainstreaming.

Since the demand for adaptation funds will increase in the future as climate change proceeds in the region, the agenda for adaptation financing in the future climate regime will need further honing and clarity. It is important that the future climate regime should explore options for (a) enlarging the funding base and developing flexible but clear guidance to access adaptation funds, (b) differentiating between actions that can be funded inside and outside the climate regime, and (c) creating market mechanisms and incentives for the private sector to involve them in adaptation efforts. Options for establishing a mandatory global funding scheme, which is tied to both past and current GHG emissions by various countries, may need to be explored as a high priority.

*Since the demand for adaptation funds will increase in the future as climate change proceeds, the agenda for adaptation financing in the future climate regime will need further honing and clarity.*

**6. Other issues:** Our consultations also provided some insights into the other areas in which Asian stakeholders have expressed keen interest. Several participants emphasised that the role of private players including the corporate sector, financial institutions and NGOs will become increasingly important in the post-2012 climate regime. The future regime should proactively support initiatives by the private sector (e.g. carbon neutral approaches adopted by progressive companies as part of their Corporate Social Responsibility (CSR)) by giving them suitable opportunities in COP negotiations. Likewise, insurance, credit, investment practices and asset management services of financial firms will gradually become important in addressing both mitigation and adaptation in Asia. The number of Asian NGOs involved in climate regime discussions has been low so far. However, they can play a vital role in influencing climate policies of national governments and in building synergies with the international climate regime. The effective engagement of these stakeholders at national level and in international negotiations will surely help in building a more effective and flexible climate regime.

Forging new approaches that draw upon the above elements and closing gaps between what the stakeholders from the region want and what the multilateral climate regime can provide is surely a challenge. For this to happen, fostering effective linkages between the climate community and the development community and between the climate community and the financial community at both national and international levels is crucial. Above all, mustering strong political will from all nations, both developed and developing, is necessary to ensure strong and sustained action in both mitigation and adaptation.

*The revised framework should be flexible enough to accommodate diverse national circumstances and permit a wide range of commitments and actions that could vary in time, form and stringency.*

Since framing the current climate regime required substantial resources to date, the future focus should be more on removing its weaknesses rather than attempting to design a completely new framework. In doing so, respecting and reflecting aspirations and priority concerns of countries in the Asia-Pacific region is vital to involve them more effectively than in the current regime. The revised framework should be flexible enough to accommodate diverse national circumstances and permit a wide range of commitments and actions that could vary in time, form and stringency. Reaching an agreement on a post-2012 framework that is fair and equitable to all countries in the region may be a big goal, but not reaching an agreement in the near future will be more perilous for the entire world in general, and the Asia-Pacific region in particular.

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# Asia-Pacific Consultations on Climate Regime Beyond 2012 – East Asia

3-4 July 2006, Xindadu Hotel, Beijing

## Agenda

3 July 2006		4 July 2006	
09:00 – 09:30	<b>Registration</b>	09:30 – 10:00	<b>Summary of Day one discussions</b> Mr. Tomonori Sudo, IGES
09:30 – 11:30	<b>Session 1: Overview</b> <b>Chairperson: Prof. Akio Morishima, IGES, Japan</b>	10:00 – 12:30	<b>Session 4: Clean Development Mechanism</b> <b>Chairperson: Prof. Liu Desun, Tsinghua University, China</b>
09:30 – 09:50	Welcome remarks Prof. Akio Morishima, Chair of the Board of Directors, IGES Dr. Zhou Dadi, Energy Research Institute (ERI), China	10:00 – 10:20	Challenges and Strategies for Strengthening CDM Ms. Hitomi Kimura, IGES
09:50 – 10:10	Objectives and Scope of Consultations (including Salient Findings from Consultations in 2005) Dr. Ancha Srinivasan, IGES	10:20 – 10:35	Lead Discussant: Prof. Asuka Jusen, Tohoku University
10:10 – 10:50	National Perspectives on Climate Regime beyond 2012 China: Ms. Li Liyan, National Development and Reform Commission (NDRC) Japan: Mr. Osamu Mizuno, Ministry of the Environment Mongolia: Prof. Adyasuren Ts. Borjigdkhan, ECO ASIA Env. Edu. Republic of Korea: Dr. Jin-Gyu Oh, Korea Energy Economics Institute (KEEI)	10:35 – 10:50	<i>Tea/Coffee</i>
10:50 – 11:10	General Discussion	10:50 – 11:40	<b>Panel Discussion</b> China: Prof. Zhou Ji, Renmin University Japan: Mr. Makoto Kato, Overseas Environmental Cooperation Center Mr. Yuji Mizuno, Pacific Consultants Ltd. Mongolia: Prof. Adyasuren Ts. Borjigdkhan, ECO ASIA Env. Edu. Republic of Korea: Dr. Myung-Kyoon Lee, Keimyung University
11:10 – 11:30	<i>Tea/Coffee</i>	11:40 – 12:30	General Discussion
11:30 – 15:00	<b>Session 2: Energy Security and Developmental Needs</b> <b>Chairperson: Dr. Zhou Dadi, ERI, China</b>	12:30 – 14:00	<i>Lunch</i>
11:30 – 11:50	Energy Security and Development Needs in relation to Climate Regime beyond 2012 Ms. Rie Watanabe, IGES	14:00 – 16:30	<b>Session 5: Adaptation to Climate Change</b> <b>Chairperson: Dr. Lin Erda, Chinese Academy of Agricultural Science (CAAS), China</b>
11:50 – 12:05	Lead Discussant: Dr. Kejun Jiang, ERI	14:00 – 14:20	Challenges and Strategies for Facilitating Adaptation Dr. Ancha Srinivasan, IGES
12:05 – 12:45	<b>Panel Discussion</b> China: Prof. Zha Daojiong, Renmin University Japan: Dr. Hideaki Fujii, Mitsubishi Research Institute Mongolia: Prof. Adyasuren Ts. Borjigdkhan, ECO ASIA Env. Edu. Republic of Korea: Dr. Jin-Gyu Oh, KEEI	14:20 – 14:35	Lead Discussant: Dr. Lin Erda, CAAS, China
12:45 – 14:00	<i>Lunch</i>	14:35 – 15:15	<b>Panel Discussion</b> China: Prof. Xu Yinglong, CAAS Japan: Mr. Masahiro Nishimura, Ministry of Foreign Affairs Mongolia: Dr. D. Dagvadorj, Ministry of Nature and Environment Republic of Korea: Dr. Jin Hwan Hwang, Korea Environment Institute
14:00 – 15:00	General Discussion	15:15 – 16:15	General Discussion
15:00 – 17:30	<b>Session 3: Technology Development and Transfer</b> <b>Chairperson: Prof. Hironori Hamanaka, Keio University, Japan</b>	16:15 – 16:30	<i>Coffee/Tea</i>
15:00 – 15:20	Challenges and Strategies for Technology Development and Transfer Dr. Kentaro Tamura, IGES	16:30 – 17:15	<b>Session 6: Lessons learned and synthesis of consultations</b> <b>Chairperson: Professor Akio Morishima, IGES</b> Summaries from various sessions Feedback from the audience
15:20 – 15:35	Lead Discussant: Dr. Wang Yanjia, Tsinghua University	17:15 – 17:30	Closing Remarks by IGES and ERI
15:35 – 16:30	<b>Panel Discussion</b> China: Dr. Lu Xuedu, Ministry of Science and Technology Japan: Mr. Sadahiro Sugita, Cabinet Secretariat Mr. Shingo Takahashi, Ministry of Economy, Trade and Industry Mongolia: Dr. D. Dagvadorj, Ministry of Nature and Environment Republic of Korea: Dr. Dae-Gyun Oh, Korea Energy Management Corporation (KEMCO)	17:30	Adjourn
16:30 – 17:30	General Discussion		
18:00 – 20:30	<i>Reception and Dinner</i>		

# Asia-Pacific Consultations on Climate Regime Beyond 2012 – South East Asia

19-20 July 2006, UN Conference Centre, Bangkok

## Agenda

19 July 2006	
08:30 – 09:00	<b>Registration</b>
09:00 – 11:00	<b>Session 1: Overview</b> <b>Chairperson: Prof. Akio Morishima, IGES</b>
09:00 – 09:15	Welcome remarks Prof. Akio Morishima, Chair of the Board of Directors, IGES Mr. Rae Kwon Chung, Director, Environment and Sustainable Development Division, UNESCAP
09:15 – 09:35	Objectives and Scope of Consultations (including Salient Findings from Consultations in 2005) Dr. Ancha Srinivasan, IGES
09:35 – 11:00	National Perspectives on Climate Regime beyond 2012 Cambodia: Mr. Sum Thy, Ministry of the Environment Indonesia: Ms. Masnellyarti Hilman, Ministry of the Environment Lao PDR: Mr. Syamphone Sengchandala, Science, Technology and Environment Agency Malaysia: Mr. Chow Kok Kee, Malaysian Meteorological Service Myanmar: Mr. Thein Tun, Department of Meteorology and Hydrology Singapore: Mr. Daryl Sng, Ministry of the Environment and Water Resources Thailand: Dr. Monthip Tabucanon, Ministry of Natural Resources and Environment The Philippines: Ms. Gerarda Asuncion D. Merilo, Department of Environment and Natural Resources Viet Nam: Mr. Hoang Manh Hoa, Ministry of Natural Resources and Environment
11:00 – 11:15	<i>Tea/Coffee</i>
11:15 – 15:00	<b>Session 2: Energy Security and Developmental Needs</b> <b>Chairperson: Mr. Pranesh Saha, Energy Resources Section, UNESCAP</b>
11:15 – 11:35	Overview of Energy Security and Development in Asia and the Pacific Mr. Pranesh C. Saha, UNESCAP
11:35 – 11:55	Energy Security and Development Needs in relation to Climate Regime beyond 2012: Strategies and Challenges Mr. Kazuhisa Koakutsu, IGES
11:55 – 12:10	Lead Discussant: Prof. Thierry Lefevre, Centre for Energy, Environment Research and Development, Thailand
12:10 – 13:30	<i>Lunch</i>
13:30 – 14:15	<b>Panel Discussion</b> Indonesia: Mr. Komara Djaja, Ministry of Economic Affairs Malaysia: Ms. Loo Took Gee, Ministry of Energy, Water and Communications The Philippines: Mr. Mario C. Marasigan, Department of Energy
14:15 – 14:25	Completion of questionnaire on energy security
14:25 – 15:00	General Discussion
15:00 – 15:15	<i>Tea/Coffee</i>
15:15 – 17:45	<b>Session 3: Clean Development Mechanism</b> <b>Chairperson: Mr. Rae Kwon Chung, Director, UNESCAP</b>
15:15 – 15:35	Strengthening CDM in Climate Regime beyond 2012: Strategies and Challenges Ms. Hitomi Kimura, IGES
15:35 – 15:50	Lead Discussant: Mr. Rae Kwon Chung, UNESCAP
15:50 – 16:50	<b>Panel Discussion</b> Cambodia: Dr. Thanakvaro De Lopez, Ministry of Environment Indonesia: Ms. Masnellyarti Hilman, Ministry of Environment Thailand: Dr. Sangchan Limjirakan, National Climate Change Committee Viet Nam: Mr. Nguyen Mong Cuong, Research Centre for Climate Change and Sustainable Development Singapore: Mr. Yuvaraj Dinesh Babu, Asia Carbon International B.V. Japan: Mr. Yuji Mizuno, Pacific Consultants Ltd.

19 July 2006	
16:50 – 17:00	Completion of the questionnaire on CDM
17:00 – 17:45	General Discussion
18:00 – 20:30	<i>Reception and Dinner</i>

20 July 2006	
09:00 – 09:30	<b>Summary of Day one discussions</b> Mr. Tomonori Sudo, IGES
09:30 – 12:15	<b>Session 4: Technology Development and Transfer</b> <b>Chairperson: Prof. Hironori Hamanaka, IGES</b>
09:30 – 09:50	Facilitating Technology Development and Transfer in Climate Regime Beyond 2012: Strategies and Challenges Dr. Kentaro Tamura, IGES
09:50 – 10:05	Lead Discussant: Dr. Sitanon Jesdapipat, WWF Thailand
10:05 – 10:45	<b>Panel Discussion</b> Malaysia: Mr. Chow Kok Kee, Malaysian Meteorological Service Singapore: Mr. Daryl Sng, Ministry of the Environment and Water Resources The Philippines: Dr. Alice B. Herrera, Department of Science and Technology Viet Nam: Mr. Hoang Huy Bieu, Ministry of Natural Resources and Environment
10:45 – 11:00	<i>Tea/Coffee</i>
11:00 – 11:15	Completion of the questionnaire on technology issues
11:15 – 12:15	General Discussion
12:15 – 13:30	<i>Lunch</i>
13:30 – 16:00	<b>Session 5: Adaptation to Climate Change</b> <b>Chairperson: Mr. Masakazu Ichimura, Environment Section, UNESCAP</b>
13:30 – 13:50	Facilitating Adaptation in Climate Regime beyond 2012: Strategies and Challenges Dr. Ancha Srinivasan, IGES
13:50 – 14:05	Lead Discussant: Mrs. Lourdes V. Tibig, Philippine Atmospheric, Geophysical and Astronomical Services Administration, The Philippines
14:05 – 14:45	<b>Panel Discussion</b> Cambodia: Dr. Tin Ponlok, Ministry of Environment Indonesia: Mr. Dadang Hilman, Ministry of Environment Lao PDR: Mr. Syamphone Sengchandala, Science, Technology and Environment Agency Thailand: Dr. Vute Wangwacharakul, Kasetsart University
14:45 – 15:00	Completion of the questionnaire on adaptation
15:00 – 15:15	<i>Tea/Coffee</i>
15:15 – 16:00	General Discussion
16:00 – 16:45	<b>Session 6: Lessons learned and synthesis of consultations</b> <b>Chairperson: Prof. Akio Morishima, IGES</b> Summaries from various sessions Feedback from the audience
16:45 – 17:00	Closing Remarks from IGES and ESCAP
17:00	Adjourn

# Asia-Pacific Consultations on Climate Regime Beyond 2012 – South Asia

9-10 August 2006, Hotel Ashok, Delhi

## Agenda

9 August 2006		10 August 2006	
09:00 – 09:30	<b>Registration</b>	09:30 – 10:00	<b>Summary of Day one discussions</b> Mr. Tomonori Sudo, IGES
09:30 – 11:30	<b>Session 1: Overview</b> <b>Chairpersons: Prof. Akio Morishima, Chair of the Board of Directors, IGES</b> <b>Dr. R.K. Pachauri, Director General, The Energy and Resources Institute (TERI)</b>	10:00 – 12:30	<b>Session 4: Technology Development and Transfer</b> <b>Chairperson: Mr. Nitin Desai, former UN Under-Secretary General, TERI</b>
09:30 – 09:45	Welcome remarks Prof. Akio Morishima, IGES Dr. R.K. Pachauri, TERI	10:00 – 10:20	Facilitating Technology Development and Transfer in Climate Regime beyond 2012: Strategies and Challenges Dr. Kentaro Tamura, IGES
09:45 – 10:05	Objectives and Scope of the Consultations (including Salient Findings from Consultations in 2005) Dr. Ancha Srinivasan, IGES	10:20 – 10:35	Lead Discussant: Dr. Pradeep K. Dadhich, TERI
10:10 – 10:50	National Perspectives on Climate Regime beyond 2012 Bangladesh: Dr. Mohammed Nasir Uddin, Ministry of Environment and Forests Bhutan: Mr. Tashi Tshering, National Environment Commission India: Ambassador C. Dasgupta, TERI Maldives: Mr. Ahmed Jameel, Ministry of Environment, Energy and Water Nepal: Mr. Bhai Raja Manandhar, Ministry of Environment, Science and Technology Sri Lanka: Dr. W.R.M.S. Wickramasinghe, Ministry of Environment and Natural Resources Japan: Mr. Tokuya Wada, Ministry of the Environment	10:35 – 11:00	<b>Panel Discussion</b> India: Dr. Shambhu Singh, Department of Science and Technology
11:15 – 11:30	<i>Tea/Coffee</i>	11:00 – 11:20	<i>Coffee/Tea</i>
11:30 – 13:30	<b>Session 2: Energy Security and Developmental Needs</b> <b>Chairperson: Dr. Prodipto Ghosh, Ministry of Environment and Forests, India</b>	11:20 – 11:50	<b>Panel Discussion continued...</b> Nepal: Mr. Rajeev Munankami, Ministry of Environment, Science and Technology Sri Lanka: Dr. W.R.M.S. Wickramasinghe, Ministry of Environment and Natural Resources
11:30 – 11:50	Energy Security and Developmental Needs in relation to Climate Regime beyond 2012: Strategies and Challenges Mr. Kazuhisa Koakutsu, IGES	11:50 – 12:30	Completion of the questionnaire and General discussion on Technology Development and Transfer
11:50 – 12:05	Lead Discussant: Prof. Joyashree Roy, Jadavpur University, India	12:30 – 14:00	<i>Lunch</i>
12:05 – 12:45	<b>Panel Discussion</b> Bhutan: Mr. Ugen Sonam, Ministry of Trade and Industry India: Mr. Surya Sethi, Planning Commission Nepal: Mr. Ram Prasad Ghimire, Water and Energy Commission Secretariat Sri Lanka: Mr. P.G. Joseph, Ministry of Science and Technology	14:00 – 16:30	<b>Session 5: Adaptation to Climate Change</b> <b>Chairperson: Prof. Hironori Hamanaka, Keio University/IGES</b>
12:45 – 13:30	Completion of the questionnaire and General discussion on energy security and development needs	14:00 – 14:20	Facilitating Adaptation in Climate Regime beyond 2012: Strategies and Challenges Dr. Ancha Srinivasan, IGES
13:30 – 15:00	<i>Lunch</i>	14:20 – 14:35	Lead Discussant: Dr. Arun Bhakta Shrestha, International Centre for Integrated Mountain Development (ICIMOD), Nepal
15:00 – 17:30	<b>Session 3: Clean Development Mechanism</b> <b>Chairperson: Dr. Ajay Mathur, Senergy Global</b>	14:35 – 15:05	<b>Panel Discussion</b> Bangladesh: Dr. Ahsan Uddin Ahmed, Bangladesh Unnayan Parishad Bhutan: Mr. Lobzang Dorji, Ministry of Agriculture India: Ms. Rajasree Ray, Ministry of Environment and Forests
15:00 – 15:20	Strengthening CDM in Climate Regime beyond 2012: Strategies and Challenges Ms. Hitomi Kimura, IGES	15:05 – 15:20	<i>Coffee/Tea</i>
15:20 – 15:35	Lead Discussant: Dr. Ajay Mathur, Senergy Global, India	15:20 – 15:50	<b>Panel Discussion continued...</b> Maldives: Mr. Amjad Abdulla, Ministry of Environment, Energy and Water Sri Lanka: Mr. Bhujang Rao Dharmaji, IUCN Regional Biodiversity Programme
15:35 – 16:05	<b>Panel Discussion</b> Bangladesh: Dr. Mohammed Nasir Uddin, Ministry of Environment and Forests India: Mr. R.K. Sethi, Ministry of Environment and Forests Nepal: Mr. Jiwana Acharya, Winrock International Nepal	15:50 – 16:30	Completion of the questionnaire and General discussion on Adaptation
16:05 – 16:20	<i>Tea/Coffee</i>	16:30 – 17:15	<b>Session 6: Lessons learned and synthesis of consultations</b> <b>Chairpersons: Prof. Akio Morishima, IGES</b> <b>Ambassador C. Dasgupta, TERI</b>
16:20 – 16:40	<b>Panel Discussion continued...</b> Sri Lanka: Mr. M.M.S.S.B. Yalgama, Ministry of Environment and Natural Resources	17:15 – 17:30	Summaries from various sessions Feedback from the audience
16:40 – 17:30	Completion of the questionnaire and General discussion on Clean Development Mechanism	17:30	Closing Remarks by IGES and TERI
18:00 – 20:30	<i>Reception and Dinner</i>		<i>Adjourn</i>

# List of participating organisations

## East Asia Consultations

3-4 July, 2006 (Xindadu Hotel, Beijing)

<b>China</b>	Energy Research Institute (ERI)
	Beijing Energy Conservation Centre
	China Meteorological Administration
	Chinese Academy of Agriculture Sciences (CAAS)
	Chinese Academy of Environmental Sciences (CAES)
	Chinese Academy of Social Sciences (CASS)
	Ministry of Foreign Affairs (MOFA)
	Ministry of Science and Technology, China (MOST)
	National Climate Centre
	National Development Reform Commission (NDRC)
	Peking University
	Renmin University of China
	State Environment Protection Administration
	State Power
Tsinghua University	
<b>Korea</b>	Keimyung University
	Korea Energy Management Corporation
	Korea Energy and Economics Institute
	Korea Environment Institute
<b>Japan</b>	Cabinet Office
	Embassy of Japan, Beijing
	Japan Bank for International Cooperation (JBIC) Representative Office in Beijing
	Ministry of Economics, Trade and Industry
	Ministry of Foreign Affairs
	Ministry of the Environment
	Mitsubishi Research Institute
	Overseas Environmental Cooperation Centre
	Pacific Consultants Co., Ltd
Tohoku University	
<b>Mongolia</b>	Environmental Education and Research Institute ECO ASIA/Mongolian National Science Academy
	Ministry of Finance
	Ministry of Nature and Environment

## Southeast Asia Consultations

19-20 July 2006 (United Nations Conference Centre, Bangkok)

<b>Cambodia</b>	Ministry of Environment Center for Sustainable Development Research
<b>Japan</b>	Japan Bank for International Cooperation (JBIC), Representative Office in Bangkok Ministry of the Environment Pacific Consultants Co., Ltd
<b>Indonesia</b>	Ministry of Economic Affairs Ministry of the Environment
<b>Lao PDR</b>	Ministry of Energy and Mining Science Technology and Environment Agency
<b>Malaysia</b>	Economic Planning Unit, Prime Minister's Office Malaysian Meteorological Service Ministry of Energy, Water and Communications (MEWC) Pusat Tenaga Malaysia University Kebangsaan Malaysia (UKM)
<b>Myanmar</b>	Ministry of Meteorology and Hydrology
<b>Philippines</b>	Department of Energy Department of Environment and Natural Resources (DENR) Philippine Atmospheric Geophysical & Astronomical Services Administration (PAGASA) Industrial Technology Development Institute
<b>Singapore</b>	Asia Carbon PTE Ltd. Ministry of the Environment and Water Resources
<b>Thailand</b>	United Nations Economic and Social Commission for Asia and the Pacific Asian Institute of Technology Biomass Energy Development Centre Co., Ltd Centre for Energy Environment Resources Development Foundation for International Human Development (CEERD-FIHRD) Centre for Energy-Environment Research & Development (CEERD) Chulalongkorn University Danish Energy Management A/s Department of Alternative Energy Development and Efficiency (DEDE) Energy Policy and Planning Office Environmental Research Institute, Chulalongkorn University Kasetsart University Ministry of Industry Ministry of Natural Resources and Environment Ministry of Transport Office of Natural Resources and Environmental Policy and Planning Thailand Environment Institute (TEI) Mahidol University United Nations Development Programme United Nations Environment Programme WWF Greater Mekong WWF Thailand
<b>Viet Nam</b>	Ministry of Natural Resources and Environment Research Centre for Climate Change and Sustainable Development

**South Asia Consultations**  
9-10 August (Hotel Ashok, New Delhi)

<b>Bangladesh</b>	Bangladesh Unnayan Parishad (BUP)
	Ministry of Environment and Forests
<b>Bhutan</b>	Ministry of Agriculture
	Ministry of Trade and Industry
	National Environment Commission (NEC)
<b>Japan</b>	Embassy of Japan, India
	Ministry of the Environment, Japan
	Japan International Cooperation Agency (JICA), India Office
<b>India</b>	The Energy and Resources Institute (TERI)
	British High Commission, India
	Department of Science & Technology
	Development Alternatives
	Embassy of Switzerland, India
	Indian Agricultural Research Institute
	Indian Institute of Forest Management
	Jadavpur University
	Karnataka Urban Infrastructure Development and Finance Corporation
	M.S. Swaminathan Research Foundation
	Madhya Pradesh Forest Department
	Ministry of Chemicals and Fertilizers
	Ministry of Coal
	Ministry of Environment and Forests
	Ministry of Non-Conventional Energy Sources
	Ministry of Power
	National Thermal Power Corporation Limited
	National Physical Laboratory and Asia Pacific Network on Global Change (APN) Liaison Office for South Asia
	Planning Commission
	President's Secretariat
Pricewater House Coopers	
Senergy Global	
United Nations Development Programme, India	
Winrock International India	
WWF India	
<b>Maldives</b>	Ministry of Environment, Energy and Water
<b>Nepal</b>	Int'l Centre for Integrated Mountain Development (ICIMOD)
	Ministry of Environment, Science and Technology
	Water and Energy Commission Secretariat (WECS)
	Winrock International Nepal
<b>Sri Lanka</b>	IUCN-The World Conservation Union Regional Biodiversity Programme
	Ministry of Environment and Natural Resources
	Ministry of Science and Technology
	Munasinghe Institute for Development
<b>The Netherlands</b>	Institute for Environmental Studies

## About IGES

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The Institute for Global Environmental Strategies (IGES), established by an initiative of the Japanese Government in 1998, is a research institute that conducts pragmatic and innovative strategic policy research to support sustainable development in the Asia-Pacific region. The mission of IGES is to promote the transformation of 20th Century society, characterised by mass production and mass consumption, to a new societal framework founded on sustainability.

Currently IGES carries out research on themes such as climate policy, urban environmental management, forest conservation, business for sustainable society, freshwater resources management, and long-term perspective and policy integration. IGES also hosts the Technical Support Unit of the IPCC National Greenhouse Gas Inventories Programme (IPCC-NGGIP) and the Asia-Pacific Network for Global Change Research (APN).

## Environmentally Sound Architecture

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The innovative design of the IGES headquarters building uses the latest technology to make maximum use of natural assets including solar energy, light, wind, rainwater and greenery, and aims for symbiosis with the rich nature of the local environment in Hayama.





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